A programme for promoting positive attitudes towards the environment in primary school children

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A Programme for Promoting Positive Attitudes Towards the Environment in Primary School Children

by

Imad Tawfiq Najib Sa’di

A Doctoral Thesis
Submitted in partial fulfillment of the requirements for the award of Doctor of Philosophy of The Loughborough University

Supervisor: Professor Ivan Reid

May-1997

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DEDICATION

To the two women in my life:

My mother ... the origin of my existence and my wife ... the secret of it.
ACKNOWLEDGEMENTS

I wish to express my sincere appreciation and personal thanks to the following individuals who have contributed to the completion of this study.

For his unlimited humanitarian, faith and support, continued encouragement, academic expertise, guidance, skill, care, constructive comments, friendship and assistance. I shall always be especially indebted to Professor Ivan Reid, my Major Professor and Advisor. Professor Reid has also provided me with a very pleasant and intellectually stimulating environment in which to study and research. His knowledge and insight have been genuinely creative.

Special thanks are due to Mr. Patrick Bailey for his invaluable comments, fruitful suggestions, generous help, a highly-critical sharp eye and important advice throughout the whole period of my study.

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My particular gratitude goes to Dr. Ahmad Abbas the UNRWA area education officer-Irbid for his sincere feelings, substantial help and true support throughout the implementation stage of the programme.
Thanks are due to Dr. Nasser El-Ali the head of the advisory committee of the programme for his wise guidance, firm, strong and supportive force. Many thanks are also due to all members of the advisory committee for their detailed suggestions.

I wish to thank the head teachers, teachers and pupils for so kindly assisting in this study. The excellent response by schools throughout the programme implementation is greatly appreciated.

To the most friendly staff, helpful friends and tutors in the Department of Education at Loughborough University my respect and very best wishes. Sincere appreciation is extended to the head of the department Dr. Phil Wild and his wife Dr. Gay Wild for their lovely feelings and continued help.

To my true and sincere friends all my thanks and respect with special and particular gratitude to Adnan Abu Al-Hayja who has provided me with warm and frequent correspondence that gave the peace of mind which allowed concentration and made the study abroad a rich and rewarding experience. Faisal Azzeh, Mohammed Hassan Bzour, Mohammed Hatem Salman and Nabil Abdel-Aziz who offered me their faith and love while being in the UK. Special thanks here in the UK to my friends Atif Yousef, Tahseen Rafik, Ahmad Teraiqi, Tayseer Al-Sayed and Ramzi Haroun.

Special thanks are expressed to all my relatives particularly my brothers Mohammed Saleem Sa’di and Ahmad Mansour whose continuous love and feelings encouraged me to complete the study.
The researcher wishes to express his deepest appreciation and most sincere feelings to his family. My mother, the first and most effectual teacher of mine, her sacrifices, keen interest and moral support have provided me with the needed motivation and persistence in all my endeavors since childhood including the prosecution of this study. My brothers and sisters, for their love and support. To my brother Iyad, whose encouragement with books, papers and documents supplied throughout this endeavor I am indebted. I could not forget the most influential man in my life and family 'Abu Ghandi' whose sympathy, love and help are highly appreciated. The feeling that the successful completion of this thesis would bring joy to my mother, inspiration to my brothers and happiness to my sisters particularly Shereen made the hard work involved seem much easier.

Inevitably my wife has sacrificed in favor of my full attention to this research. She has provided the much-needed understanding, encouragement and comfort during the writing of the thesis. She deserves at least an honorary Ph.D. for her love, patience, continuous support and belief in my ability.

Last but not least, to my beloved sons Qais, Amr and Tamer whose love, faith and sacrifice made this pursuit possible, I am greatly thankful and happy.

The researcher
ABSTRACT

A Programme for Promoting Positive Attitudes Towards the Environment in Primary School Children

In a world where natural environments are under increasing threat, environmental education has become a global imperative. Research in the field has so far stressed its cognitive rather than its affective components. The development of positive attitudes towards the environment was identified as a goal in Jordanian schools, particularly in the primary school curricula. However, at present environmental education in Jordan remains oriented towards cognitive outcomes.

The study follows systematic procedures for: developing and delivering a Fourth Grade Environmental Education Programme (FGEEP); designing a scale to assess children’s attitudes towards the environment, and evaluating the impact of the programme on these attitudes.

A representative random sample of 360 fourth grade primary school children (180 boys, 180 girls) aged 9-10 years attending government or UNRWA schools in Irbid/Jordan in the academic year 1995/1996, was selected for the research. The sample was divided into two equal and equivalent groups: the experimental which received FGEEP alongside their normal curriculum and the control group which did not.
The programme involved the creation, development and evaluation of both teacher and pupil learning materials. Consisting of three books: a pupil’s textbook, a pupil’s workbook and a teacher’s manual.

A specially designed and trialled 30-items Environmental Attitudes Scale for Primary School Children (EASPSC) was found valid and reliable for use in Arabic and English. Also developed were an environmental knowledge scale and a scale for assessing parents’ environmental attitudes. The scales were given to both the experimental and the control groups, pre- and post-programme exposure. Participating pupils are shown to have developed strong, positive attitudes towards the environment and high level of environmental knowledge, as did their parents.

The results suggest that FGEEP was effective and appropriate for developing environmental understanding in primary school children in Jordan. Since content and methods of delivery of the programme differed from the normal curriculum, both contribute to the programme’s achievement. The researcher advocates the adoption of the programme in Jordan and, with suitable modifications, in a wide range of schools in other societies.
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Chapter I

The Problem and its Background
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Environmental Education

Earth Day 1990 provided a message which needs to be understood and accepted by every individual in the world; that the protection and improvement of the environment for the benefit of present and future generations of all living things has to become a major goal for governments all over the world. Individuals as well as governments must recognise and accept this goal and become active participants in working toward its achievement. This thesis describes an educational programme for Jordanian schools which helps to achieve this goal.

Such considerations were correctly addressed at the Earth Summit Inter-Governmental Conference on Environment and Development which was held in Rio de Janeiro in June 1992. This conference emphasised the need to integrate environmental concerns into all aspects of development programmes, in order to promote environmental community projects and to educate decision-makers and the people generally.

Environmental education received a big impetus in 1972, when the UN Conference on the Human Environment in Stockholm (Sweden)
recommended the establishment of an international environmental education programme. Subsequently, many workshops, conferences and programmes were conducted and sponsored by the UNESCO around the world. These efforts were followed by outlining the basic definition and goals of environmental education in Belgrade (former Yugoslavia) in 1975. A follow-up to Belgrade and a most important conference was held in 1977 in Tbilisi (former USSR) which was attended by more than 60 nations. In the Belgrade and Tbilisi International Conferences the delegates ratified the definition of environmental education as:

"a process aimed at developing a world population that is aware of, and concerned about, the total environment and its associated problems, and which has the knowledge, skills, motivation, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones" (Braus and Wood, 1993, p. 6).

As a result of international initiatives such as these, environmental education has been of interest for many years to governments and researchers alike, both in developed and developing countries. Research in this area increased especially over the past twenty years. Curricula have been developed, programmes have been conducted, national and international conferences have been held, textbooks have been produced and environmental societies, groups and associations have been formed. This high level of interest supports the fact that environmental education has become recognised as of global importance.
There is now a general agreement on the principles and objectives of environmental education world-wide, which were largely included in the stated aims of environmental education in the final report of Tbilisi Conference, 1977:

(a) to foster clear awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural areas;

(b) to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment; and

(c) to create new patterns of behaviour of individuals, groups and society as a whole towards the environment (UNESCO, 1977, p. 26).

In the light of the Tbilisi Conference and its final report the categories of environmental education objectives have been specified as follows:

- **Awareness**: to help students acquire an awareness of and sensitivity to the total environment and its allied problems; to develop the ability to perceive and discriminate among stimuli; to process, refine, and extend these perceptions; and use this new ability in a variety of contexts.

- **Knowledge**: to help students gain a variety of experience in, and acquire a basic understanding of environmental functions and its associate problems, how people interact with the environment, and how issues and problems dealing with the environment arise and how they can be resolved.
Chapter One

- **Attitudes**: to help students acquire a set of values and feelings of concern for the environment, and the motivation and commitment for actively participating in environmental improvement, maintenance and protection.

- **Skills**: to help students acquire the skills needed for identifying, investigating and solving environmental problems.

- **Participation**: to provide students at all levels with an opportunity to be actively involved in using their acquired knowledge and skills in taking thoughtful, positive actions and working toward the resolution of environmental issues and problems especially to their own localities (UNESCO, 1977, p. 27; Braus and Wood, 1993, p. 6).

One could realise that the development of environmental attitudes in students is one of the major and most important objectives of environmental education. Environmental education seeks the achievement of its objectives in practicable settings by emphasising the following three-phase inter-linked components:

- education **about** the environment (**knowledge**): which concerns in developing knowledge and understanding about values and attitudes;

- education **for** the environment (**attitudes**): which concerns in the development of attitudes, and encourages students to explore their personal attitudes to and relationship with the environment and environmental issues; and
education **in and through** the environment (skills): the environment here is used as a learning resource which enables skills to be developed, investigations and experiments to be conducted and knowledge and understanding to be developed, so bringing children closer to nature.

It is generally agreed that all these interrelated elements should be considered when planning for environmental curricula, programmes and learning tasks (NCC, 1990; Palmer, and Neal, 1994).

Hence, the principles of education for environmental understanding and concern can now be viewed as vital to humanity's future in the natural world in both post-industrial countries, and developing ones such as the Hashemite Kingdom of Jordan (Jordan). Through environmental education students learn about their own environment in systematic ways, become more aware of environmental problems and of alternative ways of solving these problems. In short, they acquire friendly, responsible behaviours and attitudes towards the environments they inhabit.

Despite the increased awareness of the role of environmental education and its objectives in understanding, preventing and solving environmental problems, and the national, regional and international efforts to solve them, one could argue that the achieved environmental activities altogether were neither sufficient nor effective to stop the continuous depletion of natural resources and the quality of nature.
Furthermore, it is very well recognised that the solution to the environmental problems lies in social, economic and cultural factors. It is agreed with the UNESCO-UNEP International Environmental Education Programme (IEEP) that people and their decisions and activities are responsible for most environmental damage. It is impossible to avoid the existence of environmental problems, or to solve them by technological means alone. Environmental behaviours, values and the attitudes of individuals and groups need to be changed, which requires that new means and methods of environmental education which support sustainable development are generally needed.

Accordingly, there is an increasingly important need to help citizens, particularly pupils, to gain the knowledge, skills and attitudes necessary to meet environmental problems and live in harmony with nature (Wilson, 1993).

While the cognitive component of schooling is obviously important, the affective component of environmental education may well be of greater long-term significance. How much knowledge pupils gain from the curriculum should not be the only or even the main interest of educators. Gudgion and Thomas (1991) assured us that:

"Environmental problems are largely the result of human activities, and thus of human attitudes towards the environment. It is only by changing human attitudes that the related environmental problems can be solved. For instance, physical technology such as increasing fuel efficiency in cars may help to reduce environmental problems but only change in human attitudes towards the use of transport means have
the potential to solve them (Gudgion and Thomas, 1991 P.102).

Consequently, a strong effort should be directed toward developing the attitudinal outcomes of instruction which are necessary if responsible action is to be taken by learners (Centre for Environmental Education, 1993; Jaus, 1984; Moyer, 1977). In this context Hofestein et al (1990) ascertain that:

"In recent years, we have become more concerned, not only with what students know about science, but also with how they feel towards science. Questions such as the following have become an important issue for science educators: what is the impact of science on students' attitudes? Schools seem to operate negatively in matters dealing with the affective domain" (p.13).

Triandis (1971); Borden and Schettino, (1979); Shepard and Speelman (1985), and Yount and Horton (1992) have analysed the attitudinal construct. They indicate that the construct of the attitude concept is considered to be an interaction of three components composed of:

(a) **the cognitive component**: involves the intellectual abilities, ideas, thoughts and knowledge that an individual has about the attitude object and accounts for the perceived relationships between the attitude object and other objects or concepts;

(b) **the affective component**: measures the degree of feeling or emotional attraction toward the attitude object; and
(c) the conative component: refers to the action or behavioural tendencies of an individual regarding the object.

However, some educators suggest that the term "attitude" should be reserved only for the affective dimension, indicating evaluation or favourability toward an object. They also define four entities that make up an attitude:

1. a target (the attitudinal object);
2. an action (what one would like to do with that object);
3. a temporal reference; and

Therefore, attitude is considered one of the most important influences on the behaviour. It is defined as:

- "an enduring positive or negative feeling about some persons, objects, or issues" (Newhouse, 1990, p. 26).
- Yount and Horton agreed with Newhouse and defined the environmental attitude as "an enduring positive or negative feeling toward a particular aspect of an environmental conflict" (p. 1059).
- It was also defined by Gordon Allport (1935) as "a mental and neural state of readiness, organised through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related" (Allport 1935, cited in Himmelfarb and Eagly, 1974).
Bain (1928) and Horowits (1944) have a more behaviouristic orientation in their definition to the attitude: “essentially... the attitude must be considered a response rather than a set to respond” (Cited in Kiesler, et al, 1969, p. 2).

Fishbein and Ajzen (1975, p. 6): “a learned predisposition to respond in a consistently favourable or unfavourable manner with respect to a given object”.

“a mental system of cognitive and affective components, combined with a behaviour tendency, directed toward a person, object, or idea” (Freedman, et al, 1981 cited in Shepard And Speelman, 1985 p. 21)

Whatever the definition of the attitude is, it does seem that Allport’s one is the best known, comprehensive and widely adopted, nonetheless it could be said, according to Oskamp (1977), that there are some common aspects in the majority of attitude definitions which include:

(a) a readiness to respond, that is an attitude which prepares the individual to act is not a behaviour by itself, but rather a predisposition to respond in a particular way to the attitude object;

(b) the motivating or driving force of attitudes, that is attitudes are not just a passive result of past experience; instead they impel the behaviour and guide its form and manner “exerting a directive or dynamic influence”, therefore it is defined in simple words as “likes and dislikes”;

(c) the physiological basis of attitudes;
(d) the evaluative aspect of attitudes, an attitude is now generally seen as a disposition to respond in a favourable or unfavourable manner to given objects;

(e) the permanence of attitudes;

(f) the relatively enduring nature of attitudes; and

(g) the learned nature and the evaluative character.

An attitude however is not observable by itself. Rather it is a theoretical construct which mediates or helps to explain the relationship between certain observable stimulus events (the environmental situation) and certain behavioural responses. The stimulus (the attitude object) of course might be things, people, places, ideas, or situations, either singular or plural (Oskamp, 1977, p.14).

Regardless of the agreement between researchers and scientists about the origin, definition, components, relation with other variables, the effect on behaviour and the interrelated characteristic of attitude, attitude studies are of great value. Oskamp point to the following reasons:

1. “Attitude” is a shorthand term.
2. An attitude can be considered as the cause of a person’s behaviour toward another person or an object.
3. The concept of attitude helps to explain the consistency of a person’s behaviour.
4. Attitudes are important in their own right, regardless of their relation to a person’s behaviour.
5. The concept of attitude includes the idea of unconscious determinants of behaviour and the dynamic interplay of conflicting motives, the importance of which has been stressed by Freud and later psychoanalysts.

6. The concept of attitude bridges the controversy between heredity and environment as factors influencing behaviour, for both instinct and learning can be involved in the attitude formation.

7. Within psychology, the concept of attitude provides a connote topic of interest for schools.

8. Within the field of sociology, some authors have viewed attitudes as the most central concept and the basis of all social behaviour, since they provide the mechanisms by which cultural patterns influence individual behaviour (Oskamp, 1977, p. 5).

Most of the environmental education programmes so far conducted have therefore adopted as their aim the creation of a citizen who can help resolve environmental issues, and who has the knowledge about and the attitudes towards the environment (Armstrong and Impara, 1991; Keen, 1991; Lisowiski and Disigner, 1991; Ryan, 1991; Al-Madhagi, 1987; Jaus, 1982; Euler, 1981; Stapp, 1979; Richmond, 1976).

The Jordanian Situation

The foundations of pre-adult attitudes, thinking, and performance towards the environment are laid during early childhood and will probably govern behaviour through adult life. These can serve as the
first steps in the development of an environmentally literate and concerned citizenry with great potential for changing the way the natural world is treated (Kirk and Karbon, 1986; Pomerantz, 1986; Wilson, 1993). This has also been recognised in Britain in the guidance provided for teachers, which points out, “promoting positive attitudes to the environment is essential if pupils are to value it and understand their role in safeguarding it for the future” (NCC, 1990).

To attain such a goal in Jordan, the development of positive attitudes towards the environment in primary school children is necessary. Helping pupils to acquire basic knowledge and skills which enable them to understand the environment, and the development of their capabilities to preserve the environment and its resources are two important sub-goals (Ministry of Education, 1991).

Attitudes, are often firmly established and fixed by the time pupils reach high school age. Early childhood attitudes towards the environment are therefore important, for both the development of children themselves and the preservation of the world. They can help children grow in self-confidence and develop an appreciation of beauty and diversity (Wilson, 1993). The challenging question which increasingly confronts all school systems throughout the reform plan in Jordan is whether it is possible to develop positive attitudes towards the environment in the primary school.

One would agree that there is a need for developing an environmentally literate society in Jordan. The land and rural places have been attacked
by buildings, motorways, and the continuous spread of cities and towns. People have been subjected to the discomfort and health hazards of air pollution, extreme noise, traffic development and the dumping of litter. In addition many people have left agriculture for unproductive urban jobs with the result that Jordan is now dependent upon other countries for its food supply as well as for many industrial materials.

Many people, perhaps the majority in Jordan, have little concern for environmental issues and their individual positive practices towards the environment are still limited as most of them still waste and abuse natural resources in various ways\(^1\) (Natour, 1990). Air, water and land are still seriously polluted, much unnecessary noise is produced, and animals and plants are not adequately cared for, or looked after. Unless Jordanians understand the natural environment and the impact of their activities on this environment, the chance of passing a liveable future to young people is un-promising.

According to the 1996 annual report of the Ministry of Education in Jordan, school pupils now form approximately one-third\(^2\) of the country's entire population (Ministry of Education, 1996). The present primary school education does little to modify the principles of their behaviour, which are characterised by consumption and wastefulness. Therefore, the ecological problems such pupils face today, may be symptomatic of a general lack of environmental knowledge, beliefs, values and attitudes in society as a whole.

\(^1\) The average of solid waste in Amman, the capital of Jordan, in 1984 was 0.5-1.4 Kg a day/individual.

\(^2\) The number of students during the academic school year 1995/1996 has reached 1,289,955 student. The entire population of Jordan in 1992 was 3,557,304.
In the late 1980's Jordan embarked on educational reform of its schools' curriculum involving consideration of environmental topics and issues. Environmental education objectives were adopted in the final recommendations of the National Conference for Educational Development in September 1987. This conference may be considered the cornerstone of the reform movement of Education in Jordan. Environmental issues were integrated into most of the instructional subjects. They were included particularly within the primary school curriculum for social studies, science, and Islamic education (Ministry of Education, 1988).

Because of the importance of environmental education at this early childhood level, primary school textbooks in Jordan have chapters devoted to environmental education. Unfortunately, the chapters are more likely to be oriented toward the cognitive domain rather than the affective. This cognitive tendency accords with the traditional role of Jordanian teachers, who still regard lecturing as their main method of teaching in schools.

There is no guarantee, however, that such cognitive teaching will produce positive affective outcomes such as attitudes and sensitivity to the beauty of nature and caring about what happens to our natural environment (Jaus, 1984). To possess positive attitudes towards the environment children must be given the opportunity to develop their investigative skills and understanding of environmental issues and problems within factual situations in the context of exploration and investigation. Both domains of environmental education, the cognitive
and the affective, in addition to the psycho-motor domain, need to be taught.

Though environmental education has already been integrated into some primary school subjects in Jordan, the conventional classroom environments and the traditional methods of instruction through which such education is delivered, decrease the importance of this subject and its outcomes. The teaching and learning of environmental education by such methods often leaves too much to chance and to the interest and competence of individual teachers. The subject is also sometimes diluted to fit the objectives of other subjects. As a result, the majority of pupils may not receive any effective environmental education whatsoever. It is suggested in this thesis that environmental education could be delivered as a single subject in which the priority is given to the subject and everything is pulled together with greater depth and comprehension (Braus and Wood, 1993).

A similar situation of environmental education also exists in the developed countries; Jordan is certainly not unique. For example, Lob describes the situation of environmental education in primary schools in Germany as follows:

"For about twenty years, in primary schools the problems of refuse disposal have been talked about, plants and animals have been observed, water, traffic and air pollution have been topics dealt with, school gardens have been designed, and the pupils have been taught to treat the things of nature practically. But, in primary schools environmental topics are mainly dealt with by the corresponding subjects. There is not very much to be found beyond this". It has to be asked why
religious education, the written and oral usage of language, sports, music and the fine arts, and even mathematics, cannot contribute to a comprehensive environmental experience and an environmental protection by making use of their specific potentials (Lob, 1992 P. 26, 27).

Thus, in Jordan environmental education topics and issues could be better understood if they were made concrete and exemplified through outdoor experiences. Taking students out into the environment on a regular basis is an important part of any comprehensive environmental education programme which allows children to meet their needs and strong interest in investigating and experiencing the natural environment.

Methods of teaching such topics might also be more effective if they concerned with opportunities for action-oriented approach and be directed towards the solution of problems in natural settings. Such an approach includes the following steps:

1. recognising the environmental problem;
2. identifying and defining the environmental issue or problem;
3. collecting data relating to the problem;
4. organising the collected data;
5. analysing the collected data;
6. determining the alternative solutions to the problem;
7. evaluating the solutions and selecting the best one for the situation;
8. developing a plan of action;
9. implementing the plan of action; and
10. evaluating the plan of action (Stapp, 1971; Braus and Wood, 1993).

By utilising this procedure, students might develop the ability to think critically and creatively: such students will be most effective as they are open-minded and can weigh options, look at an entire situation, try to find the reasons behind something, look for alternatives, keep the problem in focus throughout decision-making, gather information from a variety of sources, communicate, ask the right questions, analyse inputs and assess their credibility, define the problem clearly and make decisions. They ultimately, learn the essential knowledge and skills of solving environmental problems, gain positive attitudes towards the environment and can also generalise or transfer this learning and utilise the same skills and procedures to solve environmental problems that might confront them in future.

Environmental education has not yet been given a practical form in Jordanian primary schools sufficient to produce environmentally literate citizens. The pupils who could play a valuable role toward a sustainable development of their environment in the future, need carefully designed environmental education learning tasks and activities. These are not yet provided. This thesis suggests ways of doing so.

It is however the responsibility of educational decision-makers in Jordan to set priorities in environmental education by giving it a better focus and more practical visibility. If environmental issues are to become a central part of instruction designed to change attitudes to
create responsible active citizens, the instruction should not aim to develop only environmental awareness of problems and issues in children, but a sense of ownership and empowerment as well.

Environmental education takes many forms in schools nowadays both in Jordan or abroad. Some schools completely integrate environmental education into the existing school curriculum, which may add heavy duties to teachers and to the crowded school-timetable and could be boring for teachers. In other schools fragments of environmental education are delivered in different classes and grades, without a sequence and a general overview or specified objectives, which means that delivery is a random process.

In addition, few schools offer courses in different topics and aspects of the environment. Some schools link between the two approaches, they offer courses and integrate environmental issues in the school curriculum. Other schools find it sufficient to do their environmental education in clubs as a complementary subject to the school curricula. But, and this is the most amazing situation, many schools have no environmental education programmes whatsoever and depend on teachers to tackle environmental topics and issues according to their individual wishes and convenience. This situation exists in the primary schools of Jordan, which implies to a great extent a wholesale ignorance of such education (Braus and Wood, 1993).

What has yet to happen is the development of a cohesive strategy which produces the sort of environmental education recommended either at intergovernmental conferences on environment or at the first

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1 In Jordan, the primary school teacher teaches 24-26 lessons/week.
National Conference for Educational Development in Jordan. A well-planned environmental education programme can provide factual information and thinking skills which will lead to an understanding of the total environmental issues and problems, develop a concern for environmental quality, encourage pupils to acquire behaviours appropriate to responsible citizens, and gain strongly positive attitudes towards their environment.

Consequently, environmental programmes have now become a priority in the primary school in Jordan and the following guiding principles which were stated by Stapp should be considered when structuring them:

1. Subject areas that relate most closely to the environment should be linked, especially science and social studies, so that both the social and, scientific knowledge important in understanding and solving environmental problems are properly developed.

2. The programme should be correlated with the existing curriculum in a manner that will enhance the instructional goals of the school system.

3. The local environment should be focused on, without the neglecting of regional, national, and international environment issues.

4. Attitudes and problem-solving skills should be stressed.

5. The learner should play an active role in the learning process, because he/she develops attitudes through personal experiences and thinking and not through the presentation of pre-digested conclusions.
6. A comprehensive in-service teacher education programme should be provided which would operate throughout the school year and which would be directed at assisting teachers to increase their understandings, interest, awareness, and teaching skills in environmental affairs and involve them in curriculum development (Stapp, 1971, p. 274).

It is well known that the evaluation is essential and important for any educational task. It "provides a basis for decision making, assessing students' achievement, evaluate curricula, and improve educational materials and programmes" (Worthen and Sanders, 1987, p.5).

However, there are plenty of measurement instruments within the literature in the area of science in general and the attitudes in particular, Leeming et al (1995) note that:

"The evolution of environmental education over the past 2 decades has brought with it a host of questionnaires, surveys, and scales designed to measure people's knowledge of or attitudes and behaviours toward environmental issues. In their extensive review of techniques for assessing environmental attitudes and knowledge, Gray, and Weigel (1985) pointed out that the vast majority of these scales were project developed, with generally little attention to their psychometric properties. Because a majority of the studies have scales whose validity and reliability are often questionable, meaningful comparisons among investigations in the area are difficult" (P.22)
In spite of the increased research on attitudes towards science and their measurement instruments, a lack of consistent findings is often reported. Peterson and Carlson (1979) describe attitude research in science as chaotic. Blosser (1984) lays much of the blame on inadequate instrumentation. Aiken (1976) wrote that improvement in measurement is needed, if educational research is to have an impact on instruction. In his review of more than 200 attitude studies in science, Schibeci (1984) advised journal editors to be more critical of instrument reliability and validity in the acceptance of manuscripts (Abdel-Gaid, et al, 1986 p. 824).

Roth (1979) encouraged researchers in the field of environmental education to establish valid and reliable instruments in areas of student changes in attitudes in order to achieve sufficiently the aims of environmental education programmes, and the same matter has also been emphasised by Koballa (1984) who indicates that:

"Without techniques for measuring attitudes, research dealing with factors that cause attitude change would be impossible"

(p.110).

Leeming et al (1993) note that most of the measurement instruments used in the assessment of environmental attitudes need to be reviewed, bringing into consideration their quality and nature, with emphasis on their psychometric properties.

Accordingly it is very important to develop a valid and reliable scale for measuring children’s general attitudes toward the environment taking its psychometric properties into account. The scale will assist
educators, and environmentalists to evaluate environmental education curricula and programmes. In addition, it will provide the needed feedback to clarify the situation of environmental education and its implementation in childhood.

Parental behaviour and attitudes are an important influence on the formation of their children's attitudes towards the environment and the perceptions of the natural world (Schicker, 1988; Ryan 1991; Lob, 1992). It is important, therefore, to examine the impact of any programme on parents' attitudes towards the environment, particularly those whose children will be involved in the experimental group of this study. Parents should be encouraged to observe and enhance positive attitudes and practices of their offsprings toward the environment.

Wilson (1993) confirms the importance of parents in the success of environmental education programmes. He reports that:

"because parents are the child's first and most influential teachers, it is critical to the success of an early childhood environmental education programme to involve families in the process. Early childhood education has long recognised the importance of family involvement and had developed a variety of ways in which parents can be meaningfully involved, from having parents participate in school or field trip activities that they might do with their children at home" (p.21).

It is, of course, not essential or convenient to involve parents in school environmental education programmes all the time. They might be involved indirectly by encouraging their children to write their personal
plans regarding an environmental topic, such as: solid waste habits and how they are going to alter them; cleanliness campaigns and how they are going to carry them out; how bird feeders will be built in the garden; and water and energy conservation. Many, various topics can be discussed at home where parents and brothers and sisters may provide the plans with their own contributions and offer additional ideas (Arenstein, 1981, p. 6).

Braus and Wood (1993) assured that researchers in environmental education can make use of their environmental programmes by having an impact on students’ parents, they report that:

"In some cases parents may be educated by their students.
This "parent education" takes place when students bring home new information and skills, and it often provides the impetus to discuss and debate issues, ideas, and feelings.
You can also have an impact on parents , educators, and others together to achieve a common goal" (p. 12).

The Need for the Study

It has been noted that the majority of an individual’s basic attitudes, and behavioural tendencies are probably formulated between the ages of seven and twelve. Variables which affect environmental awareness such as beliefs, attitudes, behaviours, values and knowledge all influence the child at an early age, they then influence the individual cognitively and affectively for the rest of his/her life (Chin, 1985; Tourney and Tesconi, 1977 cited in Shepard And Speelman, 1985).
However, despite the importance of understanding how children’s early attitudes influence the later development of environmental attitudes and behaviours, our knowledge of primary school children’s awareness of, and attitudes towards, environmental issues is limited and relatively unexplored. Children’s learning in this field has been largely ignored (Cohen and Wingerd, 1993; Jaus, 1984).

Few studies have been conducted for the purpose of assessing the attainment of positive attitudes towards the environment by pupils at various levels. Most such studies deal mainly with learning at higher levels of education (Childres, 1978; Jaus, 1982). Subbarini states that the situation in Jordan is similar:

*Such a situation of concern and orientation of studies in environmental attitudes is similar to what is going on in the Arab states, including Jordan. Adult population, in both high school and college is used in the vast majority, if not all, of environmental education studies* (Subbarini, 1989, p.158).

Although there was a heightened level of international concern particularly after the Tbilisi Conference for Environmental Education to provide a sound basis for the development of environmental curricula and programmes, and the national concern in Jordan which has attempted to carry out further steps toward the development of environmental education, the present researcher has not found any environmental education programme implemented in Jordan either in primary or in middle and high schools. There is, then, a lack of studies that deliver environmental education programmes and/or investigate the
effects of such programmes on primary school children’s attitudes towards the environment.

This study explores the important, but neglected, field of primary school children’s attitudes towards the environment using a specifically designed environmental programme and scale for primary school children. Abdel-Gaid, et al (1986) emphasised the importance of the study of attitudes in general, they state that:

"Studies related to the science attitudes of students and teachers, should be central to the research of the science educator. In spite of the increased research on attitudes toward science, a lack of consistent findings is often reported" (p. 824).

In their broad review to 34 studies concerned with environmental education research published since 1974, Leeming et al (1993) indicated that none of the reviewed studies provided data on subjects below the fifth grade. In general, the size of the treatment effects in those studies were also small, and few showed clear positive results.

Therefore, it is of critical importance to investigate both the relation between a systematic environmental education programme delivered as a single subject and children’s attitudes and to bridge the gap between researchers who investigate high school children’s attitudes towards the environment and those who investigate primary school children’s attitudes. The programme can do much to help empower students to improve the quality of their lives and the lives of others which should ultimately lead them to affirm their attitudes and values and see that
their responsible behaviours can make a difference (Braus and Wood, 1993; Cohen and Wingerd, 1993; Chin, 1985).

By possessing positive attitudes towards the environment, children may become more responsible for and aware of environmental problems and their solution, and view the natural world as their wider home which needs their care and interest, hopefully the outcomes might affect decision-makers and ultimately the whole educational system which needs to be more environmentalised.

At present there are no environmental education textbooks for primary school children in Jordan. It was recommended by UNESCO (1977) that basic principles should be formulated for the preparation of model textbooks for use at all levels of the education system as the various approaches of teaching environmental education cannot be effectively implemented without the simultaneous development of instructional material. The present study will be unique in that it delivers special instructional materials (pupil’s textbook, pupil’s workbook, and teacher’s manual) within a well-designed programme; and assesses primary school children’s attitudes towards the environment.

This study advocates and proposes the systematic construction of a valid and reliable scale to measure environmental attitudes of 9 to 10 years old children in Jordan. Developing such a scale is a priority because Jordan in particular lacks such a scale which might also help the comparisons across various cultural settings. For that, Leeming et al (1995) identified the need for valid and reliable scales particularly
with primary school children who have not yet gained the ability to answer the traditional format of Likert-type scales:

"Because children have been shown to acquire knowledge and develop attitudes about environmental issues as early as kindergarten, and because early attitudes and knowledge shape the later thinking of adolescents and adults, there is a considerable need for instruments that will assess the developing environmental attitudes and knowledge during this important formative period" (p.23).

It is anticipated that assessing children's attitudes towards the environment will be beneficial in evaluating the attainment targets of the primary school curriculum in Jordan and the aims of the reform plan that has been started ten years ago. Looking beyond the scope of this study, the outcomes will be of value and serve as criteria for the evaluation of environmental education objectives and their achievement.

In developing attitudinal scales, one should not place undue dependence upon a panel of adult judges and test all items with children to assure their validity and variability. There can be a great difference between the interpretations of the adult members of a panel of judges of scale items and children's interpretations. The "panel of judges" technique for validating attitude scales, according to Bratt (1984), is suspect.

Nonetheless, most of attitude scales that have been constructed to assess children's attitudes have relied heavily on the panel of judges, as
it is the easiest and fastest way to be followed, bearing in mind the ignorance of their psychometric properties and readability for measuring the factual attitudes and changes that might appear in children. Abdel-Gaid et al (1986) indicate that:

"Attitude is an intervening variable, a construct that must be measured indirectly, by the self-report of respondents. Therefore, establishing a valid attitude scale is a complex process of statistical procedures and human judgement—both a quantitative and qualitative process" (p. 824).

Yet, despite the interest in environmental attitudes and their evaluation instruments, there is a shortage in the studies that deal with children in this particular area. Only one scale has been found that assesses attitudes towards the environment in Jordanian children aged (10 years +) with a traditional format of 5-point (strongly agree to strongly disagree) Likert-type scale (Subbarini, 1989 b).

Following the preceding discussion, there is clearly a need to develop a valid and reliable scale taking the psychometric properties into account. The scale will assist educators and environmentalists to evaluate environmental education curricula and programmes. In addition, it will provide the needed feedback to clarify the situation of environmental education and its implementation in childhood stages. The scale will also allow researchers to conduct studies that compare Jordanian children with those in other countries abroad, such as the UK (Reid and Sa’di, 1997).
Furthermore, this study may also be unique in that it connects the attitudes of children with their parents: updating research in the area of environmental education in Jordan and providing school planning and development divisions a valuable source of information. It will identify parents, interest in environmental programmes and the unwillingness to co-operate with schools in delivering these to their children.

However, Leeming et al (1993) indicate that none of the studies they reviewed in their meta-analysis to the research in this area addressed environmental education strategies for getting children to encourage their parents to change environmentally relevant behaviours and attitudes. In Jordan, Subbarini (1987) has also recommended further studies to investigate the impact of improvements in students’ attitudes on their parents’ attitudes which was also one of the recommendations of Tbilisi Intergovernmental Conference “to encourage action within the family for the environmental education of young children” (UNESCO, 1977, p. 28).

**Statement of the Problem**

Beyond the simple reason that there is:

(a) a lack of research concerning environmental attitudes in primary school children in Jordan, particularly the serious shortage of environmental education programmes which are conducted independently as single subjects for promoting positive attitudes towards the environment in children, programmes that take into consideration the developmental
characteristics of children's needs, interests, aptitudes and investigative skills;

(b) also a lack of an environmental attitude scale which does meet such characteristics, providing with factual and valid results that truly illustrate the effectiveness of environmental education and the extent to which its goals and objectives have been fulfilled and achieved by primary school children in such stages of development, and evaluate how environmental education programmes affect young children and influence their future environmental perceptions and awareness; and

(c) an ignorance of the role and influence of parents in forming children’s attitudes.

Beyond all of that it is very important to develop a comprehensive programme, not only to meet the said needs and children’s developmental requirements, but also to assure the importance of such a programme in the developing countries as well as the developed ones.

Specifically, the purpose of the present study is to follow a systematic procedure for:

(1) developing an environmental education programme which promotes positive attitudes towards the environment in Jordanian primary school children; and

(2) constructing a valid and reliable 4-point Likert-type scale for measuring primary school children’s attitudes towards the environment and evaluating the impact of the Fourth Grade
Environmental Education Programme (FGEEP) on such attitudes. Hence this study addresses seven questions:

1. What is the effect of FGEEP on the environmental attitudes of fourth grade children?

2. Are there significant differences in the environmental attitudes of fourth grade children due to the gender (male-female)?

3. Are there significant differences in the environmental attitudes of fourth grade children due to the school environment (city, camp, village)?

4. What is the effect of FGEEP on the parents' environmental attitudes of fourth grade children from the experimental group?

5. What is the effect of FGEEP on the environmental knowledge of fourth grade children?

6. What is the relationship between the knowledge and attitudes of fourth grade children?

7. What are the relationships between the academic achievement (social studies, science and general achievement) and attitudes; and knowledge of fourth grade children?
Hypotheses of the Study

Depending on the questions of the study it is hypothesised that:

1. FGEEP will produce no significant differences at the (α = .05) level in the environmental attitudes of fourth grade children.

2. There will be no significant differences at the (α = .05) level in the environmental attitudes of fourth grade children due to their gender (males-females).

3. There will be no significant differences at the (α = .05) level in the environmental attitudes of fourth grade children due to the school environment (city-camp-village).

4. FGEEP will produce no significant differences at the (α = .05) level in the environmental attitudes of fourth grade children's parents.

5. FGEEP will produce no significant differences at the (α = .05) level in the environmental knowledge of fourth grade children.

6. There will be no positive relationship at the (α = .05) level between the environmental knowledge and attitudes of fourth grade children.

7. (a) there will be no positive relationships at the (α = .05) level between the academic achievement (social studies, science and general average) and the environmental attitudes of fourth grade children.
(b) there will be no positive relationships at the \( \alpha = .05 \) level between the academic achievement (social studies, science and general average) and the environmental knowledge of fourth grade children.

Definitions of Terms

For the purposes of this study the related terms are defined as follows:

- **Irbid district**: is a governorate lies in the north of the Hashemite Kingdom of Jordan, contains about 15.5% (199,971 student) of the entire number of students in Jordan distributed in 521 school\(^1\). The centre of this governorate is Irbid city which is considered as the second important city in Jordan after the capital Amman and the second most populated part of the country. Irbid however includes both urban and rural environments.

- **Irbid directorate of teaching and education No 1**: is one of the 26 directorates that are responsible for education and its administration in different parts of Jordan. Irbid directorate No 1 however includes 77,295 students distributed in 152 school.

- **The Fourth Grade Environmental Education Programme (FGEEP)**: is the environmental activities that took place

\(^1\) The entire number of students in the academic year 1995/1996 was 1,289,955.
within the academic year 1995/1996 in the primary schools in Irbid district and its camps and villages. The programme was directed to the fourth graders containing the development of environmental attitude scales for children and parents, and the implementation of particular instructional material either in the classroom or out of doors with much emphasis on problem solving and investigation techniques.

**U.N.R.W.A.:** it is the United Nations Relief and Work Agency for the Palestinian Refugees in the Near East, established by the United Nations in December 1949 to give emergency assistance to assist the Palestinians in their living affairs particularly relief, health and education after the immigration from their lands to the Arab states such as Jordan, the west bank, Gaza Strip, Syria, and Lebanon wherein the UNRWA has its five operational fields. However, there are also five operational areas in Jordan, Irbid is one of those areas that has a special education division administered by an area education officer.

**Camps:** In Jordan and some of the Arab states, camps were built temporarily for the Palestinian refugees who immigrated in 1948. There are approximately one-third (34%) of the registered Palestinian refugees living in 61 refugee camps served by the United Nations Relief and Work Agency (U.N.R.W.A.), particularly in regard of relief, health and medical care, and education. However, 11 of these camps,
no longer of tents and make-shift huts, are in Jordan (UNRWA, 1992).

- **The pupils (children):** they were the fourth graders (9-10 years) who participated in the programme throughout the stages of the pilot study, the development of the environmental attitude scale and the implementation of the instructional material, throughout the academic year 1995/1996 in Jordan (see the study sample chapter four).

- **The instructional material:** this is a set of environmental well-designed activities laid out in three books: the pupil’s textbook, the pupil’s workbook and the teacher’s manual.

- **The scale:** The Environmental Attitudes Scale for Primary School Children (EASPSC). This is the developed scale to assess attitudes towards the environment in fourth grade children.

- **Parents’ questionnaire:** this is the questionnaire that has been developed to assess Jordanian parents’ environmental attitudes in order to be used for the purposes of this study.

- **The knowledge scale:** this is the Environmental Knowledge Scale for Primary School Children (EKSPSC) which was developed to assess pupils’ knowledge to the content of the instructional material.
Environmental attitudes: the following definition is adopted for the purposes of this study: "an enduring positive or negative feeling toward a particular aspect of the environment". However, attitudes in this study are represented by the subject total score for favourable or unfavourable response to the 30-items of the environmental attitudes scale which ranged between 30-120.

The conceptual framework: includes all environmental concepts upon which this study based. It is laid out in a well designed and carefully tied web connecting all the included environmental concepts. The framework clarifies relationships between the elements of environmental education in general and, in particular, its main aspects.

Assumptions of the Study

The following basic assumptions were proposed for this study:

- Students and their parents responded to the items in the administered environmental attitude scales objectively and honestly, and understood the instructions given; and that therefore the items provided a reliable measure of the attitudes of both relating environmental concerns discussed.

- All participating teachers implemented the instructional material according to the instructions and training given with enthusiasm for the programme.
- The data should best be obtained by the developed scales.

- The sample was randomly selected. It represented the population of 4th graders in the various types of primary school in Jordan. The experimental and the control groups were equivalent except for the treatment that has been used in the study.

- The methods of statistical analysis used were the most appropriate for handling the collected data and answering the questions raised by the study.

Limitations of the Study

This study is limited by the following circumstances:

1. The study was limited to 4th grade students aged 9-10 years attending the primary schools in Irbid city and its camps and villages in Jordan in the academic year 1995/1996.

2. The selection of the sample was limited to the data presented in the statistical reports of the UNRWA Training Division in Irbid Area, and of the Education Research, Planning and Development Division in the General Directorate of Teaching and Education in Irbid Governorate.

3. The environmental activities were necessarily limited to those included in the instructional material of the programme.
Chapter II

Literature Review
Literature Review

This study aimed at developing an environmental education programme which promotes positive attitudes towards the environment in children, and also designing a scale to evaluate the programme and assess children's attitudes. To broaden the background of the study and provide support for this research effort, a review of the available literature had been conducted. The following primary resources had been browsed:

- Eric database.
- Dissertation Abstract International.
- UNESCO publications.
- Various environmental education journals and books, or other related ones.
- National Curriculum (UK).
- Curricula of Social Studies, Islamic Religion and Science (Jordan).
- Nuffield Primary Science publications (UK).
- New Horizon (UK).

The reviewed research, which relating to the current study, was classified into two main categories:
1. Studies relating to attitude change.
2. Studies relating to scale development.

Studies Relating to Attitude Change

It is well-known that the formulation and development of positive attitudes towards any object is a long and gradual process. This is why complete educational programmes have been designed in different countries world-wide, with the official support from the international agencies such as the UNESCO and its international environmental education programme (IEEP), and from local governments, national societies and organisations as well. In spite of that, few programmes have been fully implemented.

To develop an appropriate environmental education programme (k-12) for a school system interested in developing and implementing such a programme, Stapp (1971) suggested the following strategy:

Phase 1: Establish an environmental education committee to develop and implement the programme. Some important duties of the environmental education committee are as follows:

(1) assist in the development of the philosophy and structure of the programme;
(2) become familiar with existing instructional material relevant to environmental education;
(3) identify community resources, both physical and human, to serve the programme;
(4) assist in the development and distribution of instructional material;
(5) train community citizens to serve the programme;
(6) assist in the development of school sites to serve the programme.

Phase II: Establish the goals of the programme.
Phase III: Establish the behavioural objectives of the programme.
Phase IV: Review the literature regarding theories of learning and instruction.
Phase V: Establish the curriculum organisation of the programme.

The following concepts might be developed:

- Closed system.
- Ecosystem.
- Human ecosystem.
- Land ethic.
- Population.
- Environmental contamination.
- Environmental quality.
- Environmental decisions.

Phase VI: Establish the curriculum of the programme.
Phase VII: Establish a comprehensive in-service teacher education.
Phase VIII: Develop instruments to evaluate the effectiveness of the programme.
Although Stapp did not implement his suggested programme to test its efficiency he indicates that:

"this environmental education programme should produce an individual who is:

(1) sensitive (total awareness) to his environment;
(2) able to recognise environmental problems;
(3) sophisticated in the utilisation of solution of emerging problem-solving skills essential to the environmental problems; and
(4) inclined to participate in coping with environmental problems" (Stapp, 1971, p. 279).

Stapp's study can of course be considered a theoretical rather than a practical one. It is believed that a practical and tested programme will be superior to one without field-testing, as the field might provide many challenges and feedback that could bring about improvement.

Some programmes have a list of educational goals, often more theoretical and less practicable. For example, Hungerford and Volk (1990) have six main goals:

- Teaching environmental concepts and relationships that exist within and between these concepts.
- Providing carefully designed and in-depth opportunities for learners to achieve some level of environmental sensitivity that will promote a desire to behave in appropriate ways.
- Providing a curriculum that will result in an in-depth knowledge of issues.
- Providing a curriculum that will teach learners the skills of issue analysis and investigation as well as providing the time needed for the application of these skills.

- Providing a curriculum that will teach learners the citizenship skills needed for the application of these skills.

- Providing instructional settings that increase learners' expectancy of reinforcement for acting in responsible ways, i.e., attempt to develop an internal locus of control in learners.

In an attempt for more practical settings Niedermeyer (1992) suggests the following behavioural objectives for primary school children:

- Use paper towels, napkins, and other paper products than are really needed.

- Make sure all trash ends up in the trash can.

- Use only as much water as is needed.

- Turn off unused lights, television sets, and other appliances when not being used.

- Turn off water faucets when finished and while brushing teeth.

- Close doors and windows when air-conditioning is on.

- Save newspapers, aluminium cans, glass, and plastic bottles for recycling.

- Keep reusable things or give them away rather than put them in rubbish bins.

- Use reusable rather than disposable plates, cups, towels and other items when possible.

- Walk or ride a bike when possible instead of riding in a car.
- Carpool or ride public transportation when possible.
- See that all trash, including hazardous waste, are disposed of properly.
- Conserve energy, water, paper, and other resources.

Some (e.g., Ramsey and Hungerford, 1989) designed a series of modules to attain instructional objectives. The modules are:

- **Environmental problem solving:**
  children explore the impact of beliefs and values on environmental issues and analyse and summarise these issues.

- **Basic issue investigation:**
  children identify environmental issues, write research questions, learn how to gather information from secondary sources, and compare and evaluate information sources.

- **Using surveys, opinionnaires, and questionnaires:**
  children learn how to gather information using primary methods of investigation and collect and record data using surveys, opinionnaires and questionnaires.

- **Interpreting data in environmental investigations:**
  children learn how to draw conclusions and inferences, formulate recommendation, and interpret graphs.

- **Investigating an environmental issue:**
  children themselves select and investigate an environmental issue.

- **Environmental action strategies:**
children learn the major methods of citizenship action, analyse the effectiveness of individual versus group action decisions, and develop plans to resolve issue.

The goals and objectives of environmental education imply a number of discrete programmatic characteristics. Engelson (1986) claims that environmental education programmes can be described as follows:

- **Action-oriented:** involving children in the resolution of real environmental problems and issues.

- **Continuous:** part of all subject areas at all subject levels but not precluding specific curricula and instruction focused solely at environmental education.

- **Experiential:** using a diverse array of learning approaches and environment.

- **Future-oriented:** concerned about future as well as present generations.

- **Globally-oriented:** considering the earth as a single eco-system.

- **Holistic:** dealing with the natural, manmade, technological, social, economic, political, cultural, moral, and aesthetic aspects of the environment. As a whole as well as separately.

- **Interdisciplinary:** drawing content from all disciplines.

- **Issue-oriented:**
dealing with issues having local, regional, national, and international dimensions.

- **Neutral:**
  approaching issues and problems without bias, the classroom being the forum where all points of view can be heard.

In a recent article entitled "environmental education as a comprehensive and integral commitment of primary school education" Lob (1992) asked a very important question related to the environmental education in Germany, however the situation seems to be the same in lots of countries:

"It has to be asked why religious education, the written and oral usage of language, sports, music and the fine arts, and even mathematics, cannot contribute to a comprehensive environmental experience and an environmental protection by making use of their specific potentials" (Lob, p.25).

Therefore, Lob tries to suggest the different dimensions of a comprehensive environmental education in primary schools as follows:

- **Ecological/technical dimension:** responsible usage of technology by considering the environmental harmlessness.

- **Historical dimension:** responsible usage of natural resources and technology by considering both the environmental stress already existing and the responsibility for the generations to come.

- **Social dimension:** responsible consuming behaviour:
- refuse tips, urban sprawl, water, traffic, etc.
  (structural stress of specific areas and their population).
- nutrition, agriculture and garden.

- Ethical dimension: responsible treatment of creation” Lob (1992), p. 27.

Lob did not develop a programme for the application of such dimensions to environmental education situations in primary schools. He only agreed with the modules developed by the University of Essen, which produced the following teaching experiences:

- Environmental attitudes and moral standards taught at primary school age can rapidly be changed in subsequent years.
- An educational “feasibility” of environmental topics is rather doubtful.
- The results of primary school environmental education are not influenced by one factor alone, as for example by one specific school subject, but are the integral of various influences; among them are:
  - the teachers’ ability to inspire.
  - the composition of the class.
  - parents’ behaviour.
  - everyday environmental observations made by the children themselves.
  - TV features.
- the teachers' exemplary attitudes (learning by models, observing examples).

- The aims of environmental education must therefore be striven for by many teachers and in all primary school subjects. Environmental education must become a general principle of education.

- The design of school-houses and school-yards must complement the aims of environmental education.

- The treatment of greens within and around the school areas as well as, for example, "refuse behaviour" are both important.

- As in secondary schools, days or weeks of environmental projects should also be established in primary schools.

- Environmental courses for parents must be promoted.

- Of particular importance to primary school pupils is a positive appreciation if their behaviour is adjusted to the environment.

- All environmental topics have to be concrete and illustrative. Primary school pupils have a strong interest in investigating and experiencing the natural environment. They are orientated to learning, acting and experiencing.

- Due to the fact that primary school pupils can hardly be expected to react according to moral standards, rules and standards of behaviour have to be given in this field of education.
The danger of letting threatening fears of the environmental crisis develop has to be counteracted and positive self-determined approaches must be rewarded.

Lob, of course, was impracticable as he did not implement his work and found it sufficient to conclude that "Environmental education has to become an educational approach that should be integrated into all primary school subjects" p. 29.

In environmental education programmes, affective outcomes are often considered just as important as cognitive ones. Hence, the development of attitudes in environmental education programmes has been a major research interest. It is hoped, but not proven, that better knowledge and understanding will promote desirable attitudes.

Most researchers who have devoted instructional materials, via lessons or programmes, to accomplish positive attitudes towards the environment in students have indicated success.

Jaus (1982) investigated the effectiveness of ten hours of environmental education instruction on fifth primary grade children's attitudes. He used a sample of 53 students from two intact semi-departmentalised 5th grade classes in different schools. The environmental instructional material was given to one group (experimental) consisting of 15 consequential lessons, of 40 minutes. Most of these lessons were provided by the major classroom teacher and some replaced students' science instruction. The control group did not receive any instruction other than the normal. A questionnaire of 20 Likert-type scale with five
response categories was administered to the experimental and the control groups after the completion of the environmental lessons. To avoid the reflection of the students' perception of how they should respond rather than their actual attitude, they were asked to respond to the items on the basis of whether they thought a 5th grader would be aware or know the idea included in the statement.

Jaus indicates that the group of children who received environmental instruction scored significantly more positive attitudes towards the environment than those who did not receive such instruction. Moreover, he points out the need for such environmental education to change children's attitudes from slightly positive, to strongly positive, so they can have an impact on society by providing solutions to major environmental problems caused by people's activities. Jaus however, did not note that some of the increase in the students' scores could have been due to repeated administrations of the scale within only fifteen days which might provide students with the opportunity to remember their responses.

To ascertain the effectiveness of the environmental instruction on the development and retention of environmental attitudes in children, Jaus (1984) also reported similar results in a study involving 49 third grade elementary school students. The children were exposed to two hours of environmental education instruction. A 10-item five-point (strongly agree through strongly disagree) Likert-type questionnaire was administered prior to the environmental instruction, in order to measure the attitudes towards the environment in children. The items altogether were positive, which of course, might lead to a biased questionnaire.
When the administration of the questionnaire was completed, a class of 25 third grade pupils (14 males, 11 females), designated as the experimental group, were delivered via discussion by the classroom teacher, instructional material consisting of five environmental 25 minute lessons on five consecutive days. The results of the statistical analysis revealed significant differences between the mean scores of the experimental group on the pre-test and on the post-test due to the treatment. Moreover, there were significant differences between the mean scores of the experimental group on the post-test and the control group (n=24) on the pre-test. These findings supported the assumption that the environmental education instruction was effective in changing students' attitudes towards the environment.

For the second component aim of the study, to determining whether or not positive attitudes towards the environment persist over time, Jaus administered the same questionnaire to the same sample after two years, when they were in 5th grade. The result of the statistical analysis which compared the mean scores of the same group revealed a slightly, but not significant, decrease of the students' retention mean scores in the experimental group.

Based on this result, it appears that elementary children do retain positive attitudes towards the environment over a two-years period. The control group retention mean scores in 5th grade was slightly higher than that when the group was in the third grade. In spite of this there was still a significant difference between the mean scores of the experimental and the control group. Yet, according to his findings, Jaus claims that highly positive attitudes towards the environment in
elementary school children can be produced and retained over time by introducing minimal environmental education instruction. Hence Jaus reinforced his previous findings. Jaus claimed his study succeeded in promoting positive attitudes towards the environment, without providing a clear explanation to the effect of the 2-hour presentations.

It could be said that Jaus's studies might reflect a type one errors. He did not explain the reasons beyond the extremely positive attitudes found in the students who received only 2 to 10 hours environmental instruction. In addition, Jaus did not specify how the affective domain could be trained in spite of his suggestion of such training. Moreover, he used only two intact classes in the two studies with a small number of pupils which is insufficient to generalise to the population from which they were drawn.

In a study to support educators who are trying to develop an environmental education curriculum that incorporates extensive classroom activities prior to a field experience, entitled "The Effects of Combined Advance Organisers and Field Experience on Environmental Orientations of Elementary School Children", Gross and Pizzini (1979) aimed at analysing the effects of an environmental education programme on the:

(1) environmental orientations of upper elementary students; and

(2) development of environmental orientations of elementary students concerning the value of wilderness and wilderness preservation.
A sample of fifth grade (n=295) and sixth grade (n=85) students from Iowa was selected and received a fifth-grade instructional unit as an advanced organiser, which involved students in various environmental activities specifically designed to develop conceptual perceptions and feelings about the natural world. The unit was presented to the students by their teachers prior to a field experience.

The Environmental Orientations Inventory developed by Voelker and Horvat was utilised to assess environmental orientations of the students. The sub-scales that were selected to be analysed for this study included: use-abuse of nature and wilderness which explore the relationship of man to nature. Internal consistency was .81. Test-retest correlation was .60 for urban fifth-graders and .68 for rural fifth-graders. Validity for these instruments was established by a team of environmental educators.

Another instrument, Student Perceptions of Woodlands, was also developed to assess student's perceptual orientations toward woodlands. The instrument required the student to give five reasons why he or she would or would not like to visit a woodland.

The results indicated that students' attitudes, sensory and affective awareness were developed in a more positive direction and that this development was stable one year later. For instance, the utilised approach in this study was effective. Therefore this approach was recommended to be examined by students who should be involved in classroom instructional activities designed to facilitate concept formation that would be emphasised in a field experience.
In a study to investigate the effect of including environmental dimension in teaching social studies on preparatory school students' environmental attitudes in Jordan, Almarashdah (1989) conducted a study consisting of (57) male students. The students were from two sections studying in government schools in a village, one section designated as an experimental group and the other as the control group. Two topics were delivered to the selected students (population and transport) for eight weeks from the original textbook of the students (first preparatory), the experimental group received the two topics in an environmental context whereas the control group was in a normal setting and teaching. A device for measuring attitudes towards the environment of 46-items 5-point Likert-type scale prepared by another researcher was used to assess the students' attitudes before and after the delivery of the two topics. Its validity and reliability was assured by a panel of experts and the test-re-test reliability even though the scale was initially designed for university rather than school students. Almarashdah noted that the environmental teaching appeared to produce statistically significant differences in students' attitudes towards the environment. He recommended that the environmental dimension should be included in all social studies curricula, and that further studies should be conducted taking into account variables such as levels of education, sex, socio-economic levels, and the level of pupil's achievement.

Also in Jordan, Subbarini (1989b) investigated the attitudes of Jordanian elementary school pupils towards the environment. A sample of 1,910 pupils from (36) male, female and mixed schools was selected representing low, middle and high socio-economic classes of
the urban and rural environments. The data were collected with the co-
operation of post graduate students without supervision by the
investigator. Obviously this may have affected the validity of the
results. A scale consisting of 28 Likert-type items with five responses,
which was developed and validated earlier by Subbarini using subjects
from the same population of this study, was utilised. Hence, the
children of this study were familiar to the administered scale and this
may have affected their responses. The minimum score a student could
obtain was (28), the maximum score was (140) and the ideal middle
score was (84). The results revealed:

"... favourable, but not very strong, positive attitudes towards
the environment 39% of the sample showed from a neutral to
an extremely negative attitude towards the environment.
Looking on the bright side, 61% showed a positive attitude. In
fact, nearly 56% scored above the (90) and 42% of the
sample scored above (95), however, the result exhibits a
need to produce strong, positive attitudes towards the
environment in elementary school children" (Subbarini,

Accordingly, Subbarini recommended that textbooks should be
enriched with environmental teaching materials covering various issues.

There is evidence too, according to Subbarini, that not only children
change their environmental attitudes due to the exposure to an
environmental instruction, but university students as well. Subbarini
(1987) reported that an environmental education university course had
such an impact on Yarmouk University students' attitudes.
Consequently, the researcher recommended further studies to investigate the impact of the changes in students’ attitudes on their parents’ attitudes and the need to integrate such environmental courses into all official programmes of teaching, including universities.

In an interesting and rather surprising study, no significant differences were found between the students who attended an environmental programme and those who did not. Ryan (1991) conducted the study to investigate the effect of a conservation programme on school children’s attitudes towards the environment. This used various out-of-doors activities relating to a conservation area and involved three main groups: students, teachers and parents who visited a conservation area twice. The first time was in Fall 1988 (6th and 5th graders, n = 954; teachers, n = 36 and parents, n = 40), while the second was in Winter 1989, (897, 34, 58 students, teachers and parents respectively). A pilot study was carried out to confirm the use of Likert-type scale and to overcome the problems which might confront the students throughout the implementation of the questionnaire. Some terms were found to be not recognised by the children, such as social sciences and English. Two questionnaires, one for the participants in the visit and the other for those who did not, were administered. When comparing two groups, a total sample 504 students was subjected to statistical analysis, which revealed:

"...some differences of attitudes were found, the children who participated in the programme were more likely to respond in a manner that showed environmental awareness. In two open-ended questions mentioned in the questionnaire checked the definition of the students to the term
"conservation", 78% of those who visited the conservation area cited reasons that could categorised as preservation of the environment in contrast to 67% who did not visit the area" (p.30, 32).

In some “leading questions” there were no significant differences between those who had participated in the programme and those who had not, both tending to define environmental issues in the context of nature and animals. Moreover, the results indicated that it was not easy for both groups of children to understand some abstract concepts such as “a food chain”, some (40%) did not attempt to answer the question regarding this concept, and half of those who did failed in their answers.

Although the results showed that parents played an important role in formulating their children’s attitudes, they seemed to indicate:

"... neither levels of participation in outdoor activities, nor enjoyment from those activities lead to significantly different attitudes towards the environment. Finally, it was noted that the more respondent enjoyed outside activities, the more likely they were to regard learning about conservation as being important" (p.34).

In his discussion of the results, Ryan affirmed that:

"...the programme was effective if one accepts that limited goals can be achieved in changing measurable attitudes of young children". (p.35).
It is believed that the above affirmation may confirm a serious tendency in the outcomes of this research area. That is, most of the implemented environmental programmes, or instructional materials have a positive impact on students' attitudes regardless of their findings. The question which needs to be asked therefore is whether this fact is a programme tendency or a researcher one? It seems that this question is clearly answered in Ryan's argument.

Moreover, it is agreed with Leeming et al who criticised Ryan's study and stated that:

"Ryan (1991) procedural information in the report is limited, and it is not clear when the instrument was administered, although the author implied that it was a full year after the visit. Selection bias is a possibility because there is no information as to why some children made the trip and others did not. The author compared differential responses to individual items but did not describe the complete instrument and may have ignored some items. However few of the items showed a difference in attitude between children who visited the conservation area and those who did not. Unfortunately there are no pr-test data and the groups were not randomly constituted, so and differences that were observed could draw have existed before the visit. Thus, we cannot draw any conclusions from this study" (Leeming et al, 1993, p.15).

In their study "The impact of an environmental education programme on knowledge and attitude, Armstrong and Impara (1991) attempted to evaluate the effectiveness of an environmental programme (Nature-Scope), which was developed to be used in K-7 grades. The focus was
on the students' knowledge and attitudes. Four groups were selected, two designated as experimental and two as control groups. Both groups were administered a pre and post measures of knowledge and attitudes.

Specifically, this study attempted to answer the following questions:

a. How students exposed to Nature-Scope compare to those not exposed on a measure of environmental knowledge?

b. How students exposed to Nature-Scope differ in environmental attitudes compared to those not exposed?

c. What the relationship is between students scores on the knowledge test and on the attitude measure?

d. How 5th and 7th grade students compare on the Nature-Scope knowledge and attitudes?

A pre-test/post-test control group design was used to assess knowledge aspects. In this design the investigators used the treatment group for another issue. The control and the experimental groups were 5th-7th grade intact classes. The control groups received both pre and post-test measures of knowledge, whereas the attitude measure was administered to the treatment groups as a post-test so as to avoid possible contamination of post-test results. Volunteer teachers taught the instructional programme in 4-8 weeks with the freedom to use any number of activities within their classes in order to assure naturalistic settings throughout the programme. The measures used in this study were tested by being administered to a pilot sample of students for the purpose of reliability. In the light of this application, measures were revised to improve their psychometric quality. The content validity of
the knowledge test was judged by a panel of specialists in environmental education and educational researchers. A 16-item, 4 point Likert-type scale was used to assess environmental attitudes, drawn from a pool of items from prior studies.

Only one of four issues in the programme had a significant positive impact on the participant’s knowledge. The results regarding grade level indicated that “in no case did means across grade levels differ significantly” (p. 39). In regard to the attitude scale, ANOVA was used which revealed no significant differences between the experimental and the control groups for any of the four issues. Furthermore, no significant differences in attitude across the two grades were found. The correlation coefficient between students’ post-test scores on knowledge and their scores on the attitude scale was calculated, the coefficient for the four issues ranged between (.51) to (.41). Armstrong and Impara ensured throughout the discussion of the results of this study that the theme of the environmental topic must be considered when evaluating the effects of an environmental topic on environmental attitudes.

Yet, the general conclusion which the researchers emphasised was that classes exhibited positive attitudes following the exposure to the delivered environmental programme, although the gain was not sufficient to make significant changes neither in students’ knowledge nor in their attitudes. These results however, were inconsistent with Jaus’s and Almarshdah’s, and support the idea of the tendency of the positive outcomes to the research in environmental attitudes which however, could be very dangerous.
To determine whether or not any measurable impact on environmental attitudes occurred as a result of the participation in an environmental camp in Ohio concerned in out of door programmes, Shepard and Speelman (1985-86) selected eight groups consisting of 613 children, aged 9-14 years, attending 3 to 5 days. Half of the subjects received a pre-test and all subjects received a post-test on a Likert-type survey instrument for assessing environmental attitudes developed and piloted by the authors. The experimental group consisted of 405 campers selecting outdoor education as one of their four camp programmes. The remaining 208 campers who did not select this activity formed the control group.

The participants were exposed to three common activities:

- an introduction to the concepts of conservation of natural resources and environmental protection;
- an exposure to a variety of animals kept on display in the outdoor education building; and
- a participation in a creek walk.

Survey responses were analysed using SPSS, the authors found lack of significance between the scores of the experimental and control groups. However, they suggest differences between first-time and repeat campers, and between rural and urban campers. They concluded that:

"conceptually a positive learning experience took place. The experimental treatment seemed to have little effect upon environmental attitudes. Several possible relationships are suggested by the data:"
(1) There is a relationship between programme length and conservation attitude development;

(2) An initial acclimatisation period for urban campers is desirable before implementing conceptual activities; and;

(3) There is greater opportunity to develop positive conservation attitudes in first time campers" (Shepard and Speelman, 1985, p. 20).

It could be concluded from this study that the experimental treatment had little effect upon environmental attitudes. This might be due to factors such as the shortness of the time of the programme, the reliability of the scale and that this study depended on the self-selection of the programme in forming the control and the experimental groups which might raise the potential for bias. However, Shepard and Speelman suggest differences between first-time and repeat campers, and between rural and urban campers.

The authors also reinforce the serious research tendency of concluding positive results for such studies. Although the differences between participants were not statistically significant they concluded that the students who completed the special energy unit seemed more conservation minded and aware of limited energy sources than those in the control group.
Overview

Table 2-1 summarises all the studies reviewed in this section. These studies were chosen from a wider range of studies on the basis of their relevance to the present study.
Table 2-1
Analysis of the studies relating to attitude change

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Grade</th>
<th>N</th>
<th>Gender</th>
<th>Independent variable</th>
<th>Dependent variable</th>
<th>Duration</th>
<th>Design</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stapp*</td>
<td>1971</td>
<td>k-12</td>
<td>NA</td>
<td>NA</td>
<td>instructional material</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Hngerford &amp; Volk*</td>
<td>1990</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Neidermeyer*</td>
<td>1992</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>a chick list</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Ramsey &amp; Hngerford</td>
<td>1989</td>
<td>7th</td>
<td>149</td>
<td>males &amp; females</td>
<td>issue investigation and action training</td>
<td>responsible behaviour</td>
<td>18 weeks</td>
<td>pre-test post-test group</td>
<td>positive</td>
</tr>
<tr>
<td>Engelson*</td>
<td>1986</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Lob*</td>
<td>1992</td>
<td>Primary School</td>
<td>NA</td>
<td>NA</td>
<td>environmental education dimensions</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Jaus</td>
<td>1982</td>
<td>5th</td>
<td>53</td>
<td>males &amp; females</td>
<td>15 lessons</td>
<td>attitudes</td>
<td>10 hours</td>
<td>pre-test post-test control group</td>
<td>positive</td>
</tr>
<tr>
<td>Jaus</td>
<td>1984</td>
<td>3rd</td>
<td>49</td>
<td>males &amp; females</td>
<td>5 lessons</td>
<td>attitudes &amp; retention</td>
<td>2 hours</td>
<td>pre-test post-test control group</td>
<td>positive</td>
</tr>
<tr>
<td>Gross &amp; Pizzini</td>
<td>1979</td>
<td>5th &amp; 6th</td>
<td>380</td>
<td>males &amp; females</td>
<td>instructional unit</td>
<td>environmental orientations</td>
<td>2 months</td>
<td>separate sample pre-test post-test</td>
<td>positive</td>
</tr>
<tr>
<td>Almarashdah</td>
<td>1989</td>
<td>1st preparatory</td>
<td>57</td>
<td>males</td>
<td>two topics (textbook)</td>
<td>attitudes</td>
<td>8 weeks</td>
<td>pre-test post-test control group</td>
<td>positive</td>
</tr>
<tr>
<td>Subbarini</td>
<td>1989</td>
<td>4th</td>
<td>1910</td>
<td>males &amp; females</td>
<td>survey</td>
<td>attitudes</td>
<td>2 weeks</td>
<td>NA</td>
<td>positive</td>
</tr>
<tr>
<td>Subbarini</td>
<td>1987</td>
<td>university</td>
<td>136</td>
<td>males &amp; females</td>
<td>university course</td>
<td>attitudes</td>
<td>academic term</td>
<td>pre-test post-test control group</td>
<td>positive</td>
</tr>
<tr>
<td>Ryan</td>
<td>1991</td>
<td>5th &amp; 6th</td>
<td>504</td>
<td>males &amp; females</td>
<td>out of door activities</td>
<td>attitudes</td>
<td>a visit</td>
<td>post-test control group</td>
<td>negative</td>
</tr>
<tr>
<td>Armstrong &amp; Impara</td>
<td>1991</td>
<td>5th &amp; 7th</td>
<td>88</td>
<td>males &amp; females</td>
<td>instructional material</td>
<td>attitudes &amp; knowledge</td>
<td>4-8 weeks</td>
<td>pre-test post-test control group</td>
<td>negative</td>
</tr>
<tr>
<td>Shepard &amp; Speelman</td>
<td>1985</td>
<td>9-14 years</td>
<td>613</td>
<td>males &amp; females</td>
<td>camp and out of door activities</td>
<td>attitudes</td>
<td>3-5 days</td>
<td>Solomon four group</td>
<td>negative</td>
</tr>
</tbody>
</table>

* Not environmental experiments.
Studies Relating to Scale Development

Gray, Burden, and Weigel (1985) pointed out that meaningful comparisons among investigations in the area of environmental knowledge and attitudes are difficult as the majority of studies used scales whose validity and reliability were often questionable, with generally little attention to their psychometric properties (Gray et al cited in Leeming et al, 1995 p.22).

In addition most instruments that measure pupils' attitudes have been designed in terms of Likert-type items. It has been agreed that such scales are appropriate to primary school children (Jaus, 1984; Subbarini, 1989; Ryan, 1991) although the traditional format of this type could have a range of responses from 1 through 5 (strongly agree to strongly disagree) which when administered to children, may affect the validity of the scale by their tendency to give what they believe to be socially acceptable responses.

In Jordan, Subbarini (1989) attempted to develop a scale to measure the attitudes of elementary school students towards the environment. For this purpose he defined the main aspects of environmental attitude in the light of the integration of natural and man-made environments.

Therefore, the following steps were carried out in developing the scale:

- The main aspects of environmental attitudes such as cleanliness, depletion of natural resources, pollution,
recycling, aesthetics of the environment, and conservation of natural resources were specified.

- The level of student’s language was guessed.
- (32) initial items were written which covered the whole aspects of environmental attitude altogether taking into consideration the sub-components of the attitude concept, i.e. ego-centred, social-centred, and action-centred were taken into account.
- The initial version was judged by a panel of experts.
- The initial version was also judged by the investigator’s undergraduate students.
- The scale was field-piloted with a sample of (56) students.
- Reliability, factorial validity and the power of discrimination were examined by administering the scale to a sample of (305) elementary school pupils aged 10 years or more.

This resulted in a 28-items five-point Likert-type scale: “The Scale to Measure Attitudes of Elementary School pupils Toward the Environment” and was recommended to be used to assess children’s attitudes towards the environment.

Chin (1985) conducted a pilot study to design an instrument for evaluating the effects of environmental education programmes on young children’s attitudes which could be administered quickly, easily, and without specialist personnel. This he did because he found attitudes very important for shaping young children perception of the
world, and because of a lack of scales for measuring children's attitudes and for evaluating knowledge scales for young children.

Chin attempted to develop a standardised instrument which might be used on large groups and variety of young children's environmental education programmes. Assumptions were made that 2nd and 3rd graders had environmental attitudes and that environmental education programmes had a potential to influence them. Moreover, two limitations were set: the possibility of using a longitudinal design for evaluating lasting effects; the necessity of an instrument which did not require reading.

Chin's instrument consists of pictures of an environmentally desirable event or object and an undesirable one -19 pairs were developed which covered a range of environmental attitudes, and were transposed into drawings. The children choose the picture in a given pair they like better. The drawings assess a wide range of environmental attitudes, so can be in many different kinds of nature-centred programmes.

The drawings are categorised into three categories: pastoralism Vs. urbanism; preservation of nature Vs. abuse of nature; and appreciation of natural objects Vs. appreciation of human-made objects. Face validity was checked, and readability and appropriateness in a trial run for the set of drawings tested. Some pairs were changed, some were combined and others were eliminated, producing an instrument consisting of (15) pairs of drawings. Twelve pairs were randomly
selected for the purpose of the pre-test and such pairs were reversed and used in the post-test in addition to the remaining three pairs.

The Hidden Villa Ranch Programme was chosen to serve as the intervention. The students visited Hidden Villa Ranch, an environmental education centre in Los Altos Hills, California for 2.30 hours, followed a week later by a full day visit to the Ranch. The history of the Ranch, its importance to the surrounding community, the value of the animals and plants, and the source of the food the students eat. In addition, the students were taught to appreciate the value of cooperation and group uniting and the value of being caretakers of the earth.

The experimental group was seven classes selected from seven schools, the control group was selected from schools in the same neighbourhood who did not visit Hidden Villa. 294 students completed the test, but 62 student who did not participate in both the pre- and post-test were eliminated.

Tests were carried out by class teachers, who were given specific instructions for the administration of these tests. Results showed that:

(1) the instrument can be administered to a large group of children quickly, easily and without trained personnel;

(2) the instrument has potential for evaluating changes in young children’s environmental attitudes;
Chapter Two

(3) the instrument can be standardised for use by many environmental education programmes or be customised to assess specific attitudes;

(4) age, sex, and prior environmental education instruction, either in a school or at a centre, apparently do not adversely bias students' test performance.

Chin concluded that the use of drawings has some potential for evaluating changes in young children's environmental attitudes. In spite of this conclusion it could be said that Chin's scale might not be valid to the extent that it provides valid and reliable results because it has only two choices. Hence a respondent could not be neutral. In addition, such questions might be subjected to random answering, resulting in misleading results.

Nonetheless, the scale was still a valuable attempt as it deals with children in lower grades and provides a new idea in using drawings. The visit to Hidden Villa Ranch Programme was a very short period to provide children with a rich and comprehensive overview about the delivered environmental education instruction.

To deal with the environmental problems such as a maladaptive behaviour which needs to be adequately assessed, Maloney, Ward and Braucht (1975), sought to refine and shorten the ecological attitude-knowledge scale developed by Maloney and Ward in 1973 in an attempt to provide a more practical and efficient instrument and, to make it publicly available.
The original scale had four subscales:

"verbal commitment (VC), which measures what a person states he is willing to do in reference to pollution-environment issues (31 items); actual commitment (AC), which measures what a person actually does in reference to pollution environment issues (36 items); affect (A), which measures the degree of emotionality related to such issues (37 items); and knowledge (K), which measures specific factual knowledge related to ecological issues (24 items)" (Maloney et al, 1975, p.787).

Three groups of adults were selected, one from conservation committee members, and the others were a college and a non-college adult groups in Los Angeles. The new version of the scale was validated by administering it to the three groups. The 10-items from each sub-scale which showed the best psychometric properties were chosen.

Cronbach’s alpha for the original and revised scales for the various groups, and for the A, VC and AC sub-scales were .84, .80 and .88 respectively. The results revealed significant differences between the three groups, the lowest mean score was gained by the non-college, adult sample. Although the scale’s reliability slightly decreased, the investigators found that:

"As a whole, the present results suggest that shortening the four ecology sub-scales has not only increased their practical efficiency (i.e., made them shorter) but has also generally improved them from a psychometric" (Maloney et al, p.788).
Leeming et al (1995) has detailed the construction and preliminary, validation of the Children's Environmental Attitude and Knowledge Scale (CHEAKS). Ten elementary schools in Tennessee were chosen and students in Grades 1-7 were selected (n = 1,040) divided into two groups: 1st-through 3rd-grade and 4th-through 7th-grade and administered CHEAKS twice. Of the 42 teachers in this study, half delivered environmental activities after the initial CHEAKS testing session and half taught their classes as usual.

The CHEAKS was based on the adult scale developed by Maloney et al (1975). The items of Maloney et al were reviewed by a panel of experts, in the light of their opinions many of the original items were modified or eliminated and others added. Then, CHEAKS was tested and revised according to the following procedures:

"(a) informal administration to children of friends and colleagues;
(b) administration to Sunday School classes at a large church;
(c) administration to intact classes at several grade levels in a local public school; and
(d) administration to more than 600 children in 22 classes in Grades K-5 in five schools. The pilot study led to modifications of the instrument until the final version was accomplished" (p. 23).

This final version of the instrument consists of two sub-scales, the attitude scale, which measures children’s attitudes towards environmental issues such as animals, energy, pollution, recycling, water, and general issues, 36-items 5-point Likert-type response format
(very true, mostly true, not sure, mostly false, very false), with a maximum score of 180, and the knowledge scale which contained 30-items with a maximum score of 180 (6 credits per correct item). The total score on CHEAKS for each individual student was obtained from the combination of the attitude and the knowledge scores, with a maximum score of 360.

Factor analysis for all items on the CHEAKS total Scale showed the presence of two factors and the separation of the attitude and knowledge questions. In both cases suggested the existence of a single factor.

Test re-test reliability coefficients ranged between .60 to .70 which was relatively low. Despite this low test re-test coefficient of stability, Leeming et al claimed that the results supported their goal of creating a global scale:

"The CHEAKS appears to satisfy the need for a scale to measure children's global attitudes and knowledge concerning environmental issues. As has been documented in this report, the CHEAKS shows excellent reliability and validity".

(Leeming et al, p.28).

While the approach followed by Leeming et al was systematic, the number of items that each child had to respond to was very large (66-items in the CHEAKS). This might affect the results particularly for items towards the end of the scale when children might loose their enthusiasm to think thoroughly and answer seriously.
In their study "A systematic procedure for constructing a valid microcomputer attitude scale" Abdel-Gaid et al (1986) aimed at designing:

"... a system for constructing Likert attitude scales as supported by the socio-psychological and measurement literature" (Abdel-Gaid et al, p. 823).

To achieve such a purpose they followed fifteen steps:

- Define and stratify the attitude object.
- Write negative and positive statements representative of all strata of the attitude object.
- Check trial statements against Edwards criteria.
- Submit trial statements to sample of target population.
- Submit data to Likert analysis.
- Select statements, with emotional intensity.
- Test select statements for homogeneity.
- Resubmit select, statements to Likert analysis.
- Submit data on select statements to factor analysis.
- Examine factor analytic data for clustering of items.
- Examine stability of factors across sub-samples of data.
- Examine data for unidimensionality.
- Test data for convergent and discriminate validity.
- Test data for known groups validity.
- Correlate items to theoretical variables predicted to have a logical relationship" (Abdel-Gaid et al, p.835).
A sample of 281 pre-service and in-service elementary teachers were selected for validating the scale. The subjects, all volunteers and predominantly females, responded to the statements of the initial version of the scale (70 trial statements) using Likert's five choices: strongly agree, agree, undecided, disagree, or strongly disagree.

Items in this stage were selected depending on two criteria:

1. Distribution of the data of all respondents on each statement should spread across Likert's continuum in both directions with a low percent responding at the midpoint. Mean scores on items ranging from 2.5 to 3.5 and standard deviations ranging from 1.0 to 1.5 are suggested as a rule of thumb.

2. For an item to be discriminative, the distribution of data generated by positive respondents should agree and negative respondents should disagree" (Abdel-Gaid et al, p. 826).

Therefore, 23-items were selected for further statistical and qualitative analysis, while 47-items failed to meet the above criteria. The second administration of the selected items (23) to the same sample (n = 281) generated the following data:

"(1) inter-item correlations ranged from 0.04 to 0.60; (2) adjusted item-total correlations ranged from 0.29 to 0.62; and (3) the coefficient alpha was 0.89" (Abdel-Gaid et al, p. 828).
Although the 23-items were homogeneous and reliable, factor analysis was used to assure the content validity and unidimensionality of the scale. The data revealed a unidimensional, valid scale.

Thereupon, Abdel-Gaid et al recommended the use of the scale for testing the attitudes of pre-service and in-service teachers towards the use of microcomputers in the classroom. Another important recommendation was that more attention should be given to the construct validity of the scale.

The main important aspect of this study was the 15-step flow chart for designing reliable and valid attitude scales. This study could be considered one of the most important in the field of attitudes scales, as a systematic procedure was followed to construct a reliable and a valid scale taking the psychometric properties of the scale into consideration.

Koballa (1984) designed a valid and reliable environmental scale consisting of 19 statements to measure teachers' attitudes towards energy conservation. He followed nine systematic steps which could be of a great value in developing such scales. Koballa argued that providing principals with attitude instruments may encourage them to evaluate the affective outcome of programmes concerned in environmental issues. His work however concentrated on developing a Likert-type instrument to measure attitudes about energy conservation. Koballa's nine steps were:

step 1: assemble an item pool. This should consist of moderately positive and moderately negative statements.
step 2: analyse statements via qualitative criteria to identify statements that should be dropped from the item pool or perhaps retained with modification.

step 3: piloting the item pool.

Step 4: analysis of data to determine discrimination index, bipolar data and neutral data.

step 5: selection of scale statements that met the criteria of acceptable statistics.

step 6: assessing attenuation of reliability.

step 7: analysis of attitude scale Likert data.

step 8: final statement selection by deleting the statements that cannot meet the criteria.

step 9: scale validation by establishing construct validity.

Although Koballa recommended the use of the nine steps to establish attitude scales, he ascertain that the scale should not be used as the only measure of attitudes toward energy conservation.

In order to develop an instrument to assess environmental attitudes utilising factor analytic techniques, Steiner and Barnhart (1972) attempted to: (1) identify the meaningful dimensions of environmental issues; and (2) develop scales for the assessment of attitudes reflected to these dimensions.

In developing the attitude scales they followed an inductive approach in which the procedures were:

1. Delimitation of the general domain of interest.
2. Development of standard attitude statements.
3. Administration of the chosen items.
4. Determination of the attitudinal dimensions of the respondents.
5. Interpretation of each resultant dimension and selection of representative items for attitude scale.

The result of this study was the development of the Inventory of Social Issues (ISI) which contained seven scales with a total of sixty Likert-type items.

Comparatively, few studies have been concerned with the design of non-traditional Likert-type scales for children, which might provide more valid results. However, one of Harter’s aims (1982) was to minimise the influence of social desirability response tendencies. She attempted to develop a new format for Likert-type scale items which would offset the tendency for children to give such socially desirable responses.

300 schools children (3rd-6th grade) were administered the initial version of the scale individually which contains 40-items. A “structure alternative format” was designed to offset the tendency to give socially desirable responses. The children were asked to decide which kind of children of two described groups they were most like. Once they decided, they were given additional instructions to decide whether the description of the group they chose was 'sort of true' or 'really true' for them.
Each item was scored from (1-4) points. Face validity, reliability and the meaningfulness to children were examined. Analyses revealed (28) scale items which were chosen as the final version of the Perceived Competence Scale for Children (PCSC).

Harter’s approach was adopted by Musser and Malkus (1994) in developing Children’s Attitudes Toward the Environment Scale (CATES). It was hoped that the scale would meet research needs under any circumstances, either to evaluate environmental education programmes or exploring the development of pro-environmental attitudes. The researchers reviewed the environmental education literature extensively. They identified three general topics: recycling, air pollution and wildlife, for inclusion in their instrument. This step followed by compiling a list of 89 words including one word -at least- from each group. All these words were read individually to 15 grade-school children so as to assure the appropriateness of these groups to the children depending on the correct definition by the children. The result was the selection of 40 words which were correctly identified by most of the children.

Musser and Malkus wrote (2 to 4) items for each of the forty words which were drawn from the three general topics. Items were varied depending on the three components of attitudes: beliefs, affect, and behavioural intentions.

Each item in the scale describes two different groups of children. Instructions were given prior to the administration of the scale to the children to choose one of the two groups of children described they are
most like by checking the appropriate box under each statement, either the larger box or the smaller one depending on the extent to which they believe that they like the described children.

For the final version of the scale, 90-items were selected and administered to 232 4th-5th grade students. Some items were selected for the final version, but others were eliminated in terms of statistical analyses of variability, validity and reliability. The final version of the Children’s Attitudes Towards The Environment Scale (CATES) was formed containing only (25) valid items in order to reduce the time for administrating. It is noted that these items gave good representation of the three components of the attitudes and various environmental issues.

The CATES was administered again to obtain internal consistency reliability to a new sample of (90) students for Cronbach’s alpha and (171) students (3rd-5th graders) for test-retest reliability. These revealed a coefficient of (.70) Cronbach’s alpha, and a coefficient of (.68) for test-re-test reliability.

In their discussion to the results of the scale implementation, the researchers indicated that they believe that this scale meets their criteria. Regardless of this discussion, nobody can claim that this scale is an international one particularly it has been developed only in the U.S.A., and as yet has not been administered to a large sample of students world-wide. Moreover respondents have to choose a large or a small square to specify their responses, which might lead to a biased responses as the children may tend to choose the bigger one,
particularly those in Piaget's pre-operational development stage. This issue has been overcome in the scale developed for this present study.

All evaluation needs valid tools and devices to be used in the measurement process. The situation is the same in environmental education:

"In order for environmental education programmes to provide maximum contribution to the achievement of educational goals, reliable and valid evaluation is needed. This will require researchers to strengths evaluation in areas of student changes in attitudes (Roth, 1979, p.17).

Although Roth recommended reliable, valid and effective evaluation programmes to obtain meaningful feedback for educators and interpreters, Leeming et al indicate that:

"few of measurement instruments that investigators used to assess attitudes appear to have constructed by means of rigorous psychometric techniques the quality and nature of their measurement instruments" (Leeming et al, 1993, p.18).

Furthermore, Leeming et al point out that:

"careful development of scales for measuring children's general attitudes toward and knowledge about the environment should be a high priority for future researchers" (Leeming et al, 1993, p. 18).

The new tendency in the validation of measurement instruments depends on the analysis of the scale items and avoids the use of the panel of judges. Munaby states that dangers of using the panel of
judges in validation of attitude scales as such a method does not guarantee an adequate and appropriate model of a science attitude. He writes:

"there can be no certainty that the panel have the same context for interpreting the meaning of test items that children do" (Munaby, 1982, p. 17).

Hence, little can be concluded from results revealed by a scale validated only by a panel of judges.

Bratt (1984) also asserted that the panel of judges technique for validating attitude scales is suspect, because of human factors that may affect judgements. Further, Munaby and Bratt supported Lucas (1975) who criticised the use of panels of judges as this procedure depends on the majority. Lucas argued that the majority is a political principle which has been extended to an epistemological one "the majority is right" and this should be rejected.

Despite such a criticism, the investigator of this study also agrees with Khalili (1989) that benefits are gained by using a panel of judges including: identifying the correctness and language structure of statements, the appropriateness of scale items to respondents and the extent to which scale items match the criteria of writing attitude statements (Khalili, 1989, p. 200).

Item-total correlation of scales is also a matter of discussion, Green et al (1977) argued that item-total correlation can be higher when a pool of items are heterogeneous. Lemke and Wiersma (1976) claimed that
content validity may be achieved whereas item-total correlation is relatively low. Scott (1960) also stated that the major test of homogeneity is positive inter-item correlation, but not necessarily (.30), or any other arbitrary r-value.

Koblla, (1984) argued that:

"the Summated Rating technique has no flaws. One obvious flaw in many Likert scales is the researcher's insensitivity to emotional intensity, a weakness that can be remedied. The mere selection of moderately positive or moderately negative statements, as suggested by Likert, does not guarantee evaluative quality. As practised in the attitude scale development central to this study, an examination of the distribution of responses across Likert's five point continuum is verified by checks of adjusted item-total correlations that can assure evaluation quality and thus greatly enhance the validity of the scale" (p. 711).

Furthermore, The ability of discrimination, is an important attribute for the readability of an attitude scale. Scale items should discriminate between children with negative environmental attitude, from those with positive one. The most discriminating items can be selected by computing the item-total correlation. Items with r-value of (.30) or more is desirable. A low correlation suggests that a statement may not be representing the attitude under study and contribute little to the measurement of individual differences (Shrigley and Trueblod, 1979, p. 74). However, the researcher agreed with the suggestion of Lemke and Wiersma (1976), Scott (1960) and Abed and Ibrahim (1990) that
positive item-total correlation is compulsory (Abed and Ibrahim, 1990, p. 150; Green et al; Lemke and Wiersma; and Scott cited in Abdel-Gaid et al, 1986, p.827; and Thorndike, 1982. p. 231).

Conclusion

Although positive effects were promoted in students’ attitudes towards the environment due to the implemented programmes, limitations for some studies also existed relating to experimental designs, evaluation instruments and data statistical analysis. Some generalisations therefore may be gleaned from the reviewed literature which could serve in the development of the current environmental education programme. However, such generalisations are not only concerned in the mentioned studies in this chapter but also to others.

- Some researchers claimed that a few hours of environmental education can promote long lasting positive attitudes towards the environment, and can also promote good environmental knowledge in pupils. This was not consistent to an extent with Shepard and Speelman (1985) who found that there was a relationship between programme length and environmental attitudes development, the longer the programme the more impact on subjects’ positive attitudes. Periods of implementation ranged from 2 hours to a full semester.

- Investigators used a wide age of subjects ranged from 8 years to college students and teachers, but most of them provided data on subjects above the fourth grade. In general,
researchers have ignored children in lower grades, although such grades are a fruitful area of research.

The results were inconsistent, a small size of treatment effects has been shown by most of the reviewed studies, some with clear positive results. Others reported mixed effects (positive and negative), whereas a few reported negative findings. In spite of that, investigators tend to discuss their results in a context of strongly positive effects, though evidence has not been indicated sometimes.

Several studies used notoriously weak designs such as the one-group pre-post test design within which subjects might be affected by variables other than the treatment. This design might lead to the acceptance of an untrue hypothesis or the rejection of a true one, both of which could be considered an error. Nonetheless, few studies adopted very strong designs such as the Solomon four group experimental design which could not be affected by most intervening variables.

A few studies have not included important details concerning the procedures followed and used weak or inappropriate statistical techniques. There was no explanation, for example, of the positive effects resulting from a few hours of environmental instruction and how these hours have been delivered to the pupils. The overall statistical results which were presented in some studies also lack the clarity which
could lead to a proper understanding of their findings. Moreover some studies did not report the statistical analysis of their data.

The majority of studies that used a pre-test/post-test control group design did not include both measures in a single analysis and found it sufficient to conclude that the differences between the experimental and the control group were significant without examining the pre-post differences in one group in order to assure the positive gain.

Few of the measurement instruments used have been constructed on the psychometric properties of such instruments and the analysis of items, which might affect the credibility and quality of such instruments, in addition to their outcomes. This matter was clearly pointed out by Gray, et al (1985) who ascertain the need for instruments with a good quality, as most of the instruments lack the validity and reliability. Most of the reviewed studies, however, ascertain the selection of items by knowledgeable 'experts' which is not sufficient as a unique procedure to obtain the validity of instruments. Other forms of scale validation are of critical importance.

Reservations therefore could be considered concerning the validity of some studies particularly those which might be affected by the experimenter expectancy. Although few studies tried to control children's socially desirable
responses, they administered assessment tools either by the same person who delivered the environmental instruction or immediately after the completion of such an instruction. In both cases pupils could be biased toward responding according to intentions of the experimenter.

Most of the reviewed instruments were not available for the comparisons between studies. The majority of investigators used their own instruments which were developed for a particular purpose. For this reason Gray et al (1985) tried to encourage investigators to use existing instruments if they wanted them to be more efficient, continuous, and capable of comparison.

This point of view was also emphasised by Leeming et al (1995) who reported that:

"no single scale is widely used to measure children's attitudes toward and knowledge of a broad range of environmental issues. It is essentially impossible to make meaningful comparisons across these various studies because the comparability of the instruments is unknown" (P. 22).

No single investigator developed a strategy to deliver an environmental education programme that lets children encourage others, such as their parents, peers and neighbours to change their environmentally attitudinal status.

According to the reviewed literature various variables could affect pupils environmental attitudes, perceptions, values and
knowledge such as cultural background, place of residence, gender, scholastic ability, ethnic background, involving in environmental activities, media, parents, companions and friends and different forms of publications (magazines, books, articles, leaflets...etc.).

Yet, despite the above mentioned criticisms, it could be argued that the reviewed studies are valuable and beneficial because altogether they can be viewed as contributions toward more efficient steps for promoting environmentally concerned citizens.
Chapter III

The Environmental Programme
The Environmental Education Programme

The major aim of this study was to develop a programme for promoting positive attitudes towards the environment in primary school children. To develop such a programme, the related literature has been comprehensively reviewed as described in Chapter Two. Such studies dealt with environmental programmes at different levels to the present one with much emphasis on adults.

It seemed appropriate to develop the programme in the light of other established ones particularly those which were validated and practically implemented or examined (Kent County Council, 1994; Braus and Wood, 1993; UNESCO, 1993; El Zubeir, 1992; Chin, 1985; Swan and Stapp, 1974; Bennett, and Willink, 1972; Stapp and Cox, 1972). The programme, therefore, has been developed into three main stages: stage of formulation, stage of implementation, and stage of evaluation.

I  Formulation Stage

This stage was undertaken through the following steps:

1. Establishing the Long-Term Objectives of FGEEP

The major aim of FGEEP was to help pupils acquire positive attitudes towards the environment. Other long-term objectives of FGEEP may
largely reflect those recommended ones of environmental education of the 1977 Tbilisi Intergovernmental Conference and the Belgrade Charter. Such objectives are to help pupils acquire:

a. an awareness and sensitivity of the total environment and its problems.

b. a basic knowledge and understanding of the total environment and how people interact with the environment and the existing environmental problems.

c. a set of values and feelings of concern for the environment and motivation to participate actively in environmental improvement and protection.

d. the skills needed to identify and investigate environmental problems and contribute to the resolution of the questions.

e. Experience in using knowledge and skills in participating and taking positive actions to solve environmental problems.


2. **Specifying the Conceptual Framework**

The reviewed literature was classified into categories and analysed. The analysis revealed hundreds of environmental concepts that could be included in FGEEP. It was realised that these concepts were clustered under major and more popular ones, such as: pollution, waste, animals and plants, conservation, and others. As mentioned above the attitude concept has three components and environmental education has also three inter-linked components (Chapter One, p. 5 and 8). Hence, the components altogether were connected with the main concepts of the programme (see figure 3-1 below).
The most important outcome in this study was to produce a systematically designed conceptual framework that included all these elements and to connect them with a web that identifies the relationships between these elements. The conceptual framework might serve educators around the world in developing environmental curricula suited to different ages of pupils taking their stages of development into account. Figure 3-1 illustrates the conceptual framework of the programme.
Fig. 3-1  The conceptual framework of the programme
3. **Establishing the General (Short-Term) Objectives of FGEEP**

From the conceptual framework (Fig. 3-1) the general objectives of the programme were established at the beginning of each unit of the instructional material. Such objectives included the three domains of objectives: cognitive, affective and psycho-motor (skills). They also included the three components of the attitude concept: cognitive, affective and behavioural. In addition, they were directed towards the three faces of environmental education: learning about the environment, learning for the environment and learning in/through the environment. Table 3-1 shows some examples of these objectives (for full details see Appendix 1-A).

**Table 3-1**

Examples of the general objectives of FGEEP

<table>
<thead>
<tr>
<th>Topic</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>pollution</td>
<td>- List the major causes of air pollution, water pollution and noise pollution at home, in school, and in the community.</td>
</tr>
<tr>
<td>Waste</td>
<td>- Suggest some conservation practices to reduce electricity, water and fuel waste at home, at school, and in the community.</td>
</tr>
<tr>
<td><strong>Animals and</strong></td>
<td><strong>Objective</strong></td>
</tr>
<tr>
<td><strong>plants</strong></td>
<td>- Produce graphs comparing the numbers of animals in different habitats studied.</td>
</tr>
</tbody>
</table>
4. Establishing the Instructional Material

A well-designed model for teaching and learning in environmental education is the one which links logically the components of attitudes with those of environmental education and the three domains of the objectives. This is particularly important in this study in order to sustain the logical consequence between the conceptual framework, the long-term and short-term objectives and the content of the instructional material. Hence, the components were integrated into one systematic and dynamic process of interacting elements. Figure 3-2 illustrates clearly this process. This scheme was taken into account since it meets the purposes of this study and was used to explain the project to the advisory panel and participating teachers. It is also hoped that it could be beneficial for further similar studies in future.

Fig. 3-2 Teaching learning model for attitudes within environmental education (attitudes, objectives, and environmental education)
Today, many Jordanian children are growing up in environments which are removed from direct experiences of the natural world. It is believed that an effective environmental education programme should include instructional material that involves children in direct experience with the world. Direct experiences are likely to establish more consistent and accurate attitudes than indirect experiences. Such experiences make more information available to the learner, cause him or her to focus on his/her behaviour, and involves a high level of repetition or mental rehearsal (Newhouse, 1990).

To provide developmentally appropriate environmental instructional material within this programme for Jordanian children, teachers in Jordan should begin to use simple, direct experiences to introduce young children to the world of nature and environmental problems. Children always want to hold and manipulate; they should be kept actively involved while respecting the integrity of the natural environment. However, the teaching-learning process in Jordan is still strongly teacher-centred. It is normally carried out inside classrooms where pupils stay for a long period of time responding to their teacher’s instructions; most of which deal with discipline. This situation, however, clearly reflects the serious gap between what was planned and recommended in the reform movement in Jordan and what is actually still practised.

Bearing this starting point in mind, the instructional material of this programme is based on out-of-door activities within the context of the suggested model in figure 3-2, which hopefully could help children feel free to start forming new impressions and strongly positive attitudes
toward the school, environmental education in general and the environment in particular. Naturally-related out-of-door activities related to the natural world tend to foster intuitive creative thinking and can help children appreciate and relate to nature in a very personal way. Nature may, in addition to its recreational and economical aspects, become a source of inspiration for aesthetic and artistic development.

In the light of this discussion, instructional materials have been developed to meet the needs of Jordanian school children towards a particular manipulation and creative interpretation for environmental issues. It is hoped that such instructional materials will help children to acquire higher levels of cognitive thinking skills as well as positive attitudes, particularly through activities which depend on investigation and problem-solving techniques. Moreover, it is one of the embedded aims of this study to help children gain critical and scientific thinking skills while dealing with environmental problems.

During this stage of the programme development emphasis was focused upon a well-designed environmental instructional material with plenty of environmental activities¹. This instructional material is based upon three main environmental topics:

a. **Pollution**: air pollution, water pollution, noise pollution and land pollution.

b. **Waste**: solid waste, house-hold waste, depletion of natural resources, conservation of natural resources (water, energy, and electricity),

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¹ The total number of activities is 77.
cleanliness, nature protection, recycling, re-use, reduction and population.

c. Animals and plants: animals and plants protection and conservation.

How to overcome environmental problems related to such topics was also dealt with. All these topics were included in three units with different types of activities. Three main books were developed for the programme: (1) Pupil's Textbook, (2) Pupil's Workbook and (3) Teacher's Manual. Table 3-2 shows examples of the format of the instructional activities (for full details see Appendix 1).

**Table 3-2**

Examples of the format of the instructional activities

<table>
<thead>
<tr>
<th><strong>STOP &amp; THINK!</strong></th>
<th>to motivate pupils and start learning.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACTIVITY</strong></td>
<td>to manipulate, understand, investigate and solve problems.</td>
</tr>
<tr>
<td><strong>FOLLOW-UP ACTIVITY</strong></td>
<td>to emphasise learning and findings.</td>
</tr>
<tr>
<td><strong>REMEMBER!</strong></td>
<td>to clarify environmental concepts and issues</td>
</tr>
</tbody>
</table>

These activities were established in a manner that would enable children to deal with each activity from a simple starting point. Some could be dealt with as self-study activities. Furthermore co-operative and collaborative learning were encouraged. The instructional material consists of three main books:
The Pupil’s Textbook:

This book contains all activities which cover the main three topics of the programme (see Appendix 1-A). Such activities were developed in light of similar environmental education programmes and the outlines of the National Curriculum for environmental education in the UK. Moreover, some British science books were thoroughly reviewed and consulted. (Dineen, 1993; Nuffield Primary Science “Key Stage 2”, 1993; Godfry, 1992; Elstgeest and Harlen, 1990; National Curriculum Council, 1990; Oxford Science Programme, 1990; Stapp and Cox, 1974).

The Pupil’s Workbook:

This book was designed to contain pupils’ written-work of environmental tasks or activities. Each activity in the Pupil’s Textbook, has its own related worksheets in this Workbook. The Pupil’s Workbook reflects children’s environmental attitudinal actions, beliefs and skills, and serves in the process of assessment through the whole period of implementation. The Workbook, however, was a valuable source of feedback for both teachers and pupils as well as the researcher and the advisory committee to the programme. Moreover, it facilitated the enrolment of parents in the programme by their co-operation with their children in the achievement of some environmental tasks (see Appendix 1-B).

The Teacher’s Manual:

This book is one of the most important books of the programme as it is the teacher who should guide pupils’ learning and direct pupils towards
the achievement of the environmental tasks and activities of the textbook. For example, the new role of teachers in this programme was as learning-facilitators, not importers of information. This, change required intensive in-service teacher training workshops, meetings, and seminars for teachers who participated in the programme. Hopefully, their perspective towards teaching in general, together with how they followed the instructional material was changed. Teacher lesson plans were drawn from the general objectives and the suggested procedures and resources which were included for each individual activity. Teachers, of course, were free to choose what they thought appropriate for their pupils, but they were requested to cover the all aspects of the three topics of the programme in terms of the conceptual framework of the instructional material (see Appendix 1-C).

5. Establishing the Instructional Model

A. **Philosophy of the programme:** FGEEP was being built upon the belief that the earth is a lifeboat with only limited seats, resources and load. Human beings need to develop, therefore, positive ways of thinking and feeling about, and attitudes towards the earth, if we are to live harmoniously with each other and our environment.

B. **Emphasis of the programme:** At age level 9-10 years (grade four), the stage of development of children in this age according to the Piagetian theory of development was taken into consideration in the three stages of the programme.
Most of the environmental topics were concrete and illustrative.

C. **Teaching-learning model**: The programme, hopefully, will help pupils to think globally and act locally. Hence, it is focused on local environmental issues using; investigations, problem-solving, inquiry and discovery as the main methods of dealing with such issues. Such methods are not widespread in Jordan, as lecturing is still the most popular method in schools. The programme, therefore, selected open-minded teachers who believed in the interaction between three compulsory elements of the teaching-learning process: the pupil, the teacher and the environment. Figure 3-3 illustrates the suggested model of interaction in the teaching-learning process for the programme.

![Interaction model within teaching-learning process](image_url)
Pupils in such an atmosphere should feel that they are gaining new ways of thinking, new attitudes, new style of learning about the environment, for the environment and in the environment. They should feel that they are full of motivation to confront environmental problems and achieve the stated tasks and activities. Teachers as discussed above (see 5.C) had a new role to create a learning environment, assist pupils in acquiring environmental information, provide pupils with the appropriate feedback and guide the process of learning and participate in it.

II Implementation Stage

While some parts of the formulation stage of the programme were achieved in the UK, the majority of this stage was carried out in Jordan where the fieldwork for the study was conducted.

1. Establishing an Advisory Committee

This committee was the compass of the programme throughout its three stages. The following responsibilities and duties were specified to the committee:

a. Identifying the changes needed to implement the programme and creating a reinforcing atmosphere by contacting the responsible authorities, parents and schools.

b. Creating effective ways of communication with the local community, particularly children's parents and requesting their assistance. This was done either through face to face meetings, or by mail depending, on the need or the targets of the educational tasks.
c. Developing a strategy to overcome challenges, particularly funding.

d. Revising the programme regularly before and throughout the implementation stage, and providing prompt suggestions to existing problems to improve progress in the work and feedback.

e. Developing a strategy to implement the programme. The committee agreed to the procedures that were followed by the researcher, with some minor modification (for more details see chapter 4).

f. Involving people and parents in the programme through effective advertising, seminars, lectures, leaflets, presentations, and displays.

g. Evaluating and modifying the programme regularly before, throughout, and after implementation.

h. Discussing findings and suggesting recommendations.

The advisory committee included experts from different sectors of the local community in Irbid Governorate as follows:

- University Professors of Education from Yarmouk University in Irbid.
- Education supervisors of social studies.
- Head teachers both from the government and UNRWA sectors.
- Teachers, they were also from the government and UNRWA sectors.
- Parents.
- Members from the private sector (see Appendix 3).

The committee reviewed all the materials which have been developed for children. In light of their suggestions and comments the programme was modified.

2. The Validation Process of the Programme

The programme was subjected to a long and a systematic period of validation. The following procedures assured that the programme is valid and suitable for the target population of this study:

a. Construct validity: It could be argued that the programme obtained such a validity and does achieve its objectives. In reference to its conceptual framework, establishment process, the drawn categories, major concepts and related concepts. In addition to the general objectives and how the content of the programme, particularly the instructional material, related to those objectives, it could be concluded that this logical process and consequence assured the construct validity of the programme.

b. Content validity: This type of validity was used to examine the degree to which the content of the instructional material and the intended activities represented the general objectives of the programme. The purpose of this step of the validation process was to improve the overall programme quality and appropriateness. A panel of Jordanian and English experts (see Appendix 5) judged the programme by examining the above mentioned aspects in addition to its clarity. The
experts strongly agreed that the content and the objectives were related. However, the application of their suggestions resulted in the elimination of some activities and objectives particularly some unnecessary repetition, both in environmental activities and general objectives.

c. Piloting the Programme: The most important process of validation was the pilot study which took place for a complete term (half of the academic year) in the academic year 1995/1996 in Irbid city. 30 boys and 30 girls 4th grade students were selected for this purpose who were exposed to the environmental programme (FGEEP) during their normal timetable without any changes or disruption to formal academic subjects. The researcher himself delivered the programme in order to keep in touch and close to the factual setting of learning and to confront the probable problems. In addition to assess that the programme and its activities were appropriate to the 4th grade children aged 9-10 years and their developmental stage (Participating schools are shown in Appendix 6).

Furthermore, the pilot study assured the relatedness between the objectives and content of the instructional material, and illustrated the requirements more precisely; such as the audio visual materials, other equipment and materials. It showed the extent to which parents co-operated with their children and encouraged them to be involved in the programme, and whether or not children had the essential enthusiasm to learn
the topics. The pilot study further helped in identifying the time needed to implement the environmental tasks and activities in general and the out-of-door activities in particular. Moreover, it gave an exact idea about the budget and the cost of achieving particular tasks. This process, resulted in major modifications to the activities and to the content of the instructional material which was subsequently coloured and illustrated with drawings.

d. Jordanian curriculum review: The 4th grade curriculum and textbooks were reviewed to ensure that the programme was suitable for the children aged 9-10 years -both in general and complimentary curriculum to the existing curricula and that it reinforced the textbook’s content with broad material and environmental activities.

e. The advisory committee round-table discussion: Such a discussion provided valuable improvements and suggestions throughout the stages of formulation, implementation and evaluation of the programme.

f. Teachers’ expertise: Further evidence of validity was obtained from the participating teachers (six teachers, 3 male, 3 female), all of whom were volunteers. One apologised that she could not continue implementing the programme. Therefore, the researcher changed her class to a control group and chose one of the control groups as an experimental one after ensuring the equivalence between them. The teachers were experienced in primary school
teaching with not less than 15 years, all were highly-qualified and specialists in science education (see Appendix 4).

These factors served to minimise the effect of a teacher as an intervening variable and to ensure the validity of the programme. At the same time they assisted in the adoption of requested instructions, particularly in the preparation of the educational tasks, the arrangement of the timetable and methods of teaching. However, most of the teachers' training for the programme took place individually in their own schools, except whenever a general issue need discussion. Individual meetings in the practice schools served to meet existing problems of its factual environment, with the opportunity to examine alternatives directly, in addition to the contribution of the researcher in the application of some tasks and receiving direct feedback relating to some issues by direct observation of children's and teachers' behaviours.

g. Scales' validity: As can be seen in Chapter Four (see Figure 4-5), the three scales used in the programme (EASPSC, EKSPSC, and parents' questionnaire) were subjected to a long process of validation in the light of the previous literature. This contributed positively and critically in the overall validity of the programme as these scales were central to it.

h. The researcher's experience: A last line of evidence to the programme's validity was the researcher's experience: as a primary teacher for 18 years, a teacher-trainer for 8 years and
in curricula development. Hence, the researcher was familiar with the educational settings in Jordanian primary schools and with teachers, had personal relationships with area education officers, head teachers and the participating teachers. These were extremely useful in the implementation stage in particular, in the formation and evaluation stages in general, and gave the programme stability. Friendly relationships with pupils were also established, which built confidence between the members of the participating team and eased the delivery of the programme as a single subject within the normal settings and timetable.

3. Establishing the Operational Objectives of the Programme

The following operational objectives have been specified:

a. Establishing the advisory committee.

b. Selecting the target population: 4th grade school children (9-10 years).

c. Selecting study samples: pilot, control and experimental in addition to the parents’ group.

d. Selecting the participating teachers.

e. Running in-service teacher training meetings, workshops, seminars, presentations, and discussion starting with what teachers know. This training was a continuous process so as to provide them with the appropriate feedback and to gather information regarding pupils outcomes. Most of this training was held individually with the participating teachers as it was not convenient to meet them whenever the programme...
required because of their different locations and timetables. Some of participating schools had two shifts, morning and afternoon.

f. Developing the instruments of the programme.

g. Piloting the environmental programme.

h. Providing the participating children with equal opportunities, except the experimental group which has been received the treatment. Therefore, teachers who taught the instructional material were sought who had, as far as possible, the same qualifications, experience and the same level of enthusiasm to be involved in the programme.

4. The Implementation of the Programme

The application took place in Jordan in the Irbid Governorate according to the following procedure:

a. A sample of 360 pupils took FGEEP during the academic year 1995/1996. Pupils were divided into two equivalent groups; the experimental which took the programme in addition to the normal academic subjects and the control group which continued with their academic subjects but not the programme.

b. Requesting permission to work in the selected schools (see Appendix 11).

c. The development and validation of the scales and the programme, including piloting testing.

d. The administration of the pre-tests, attitudes scale, knowledge scale and parents’ questionnaire.
e. Extensive meetings and workshops with the Advisory Committee and participating teachers, in addition to teacher training.

f. Producing the instructional material. This could be considered the critical part of the programme.

g. The distribution of the instructional material to the participating schools and commencing the programme in the second term of the academic year for a period of four months.

h. The continuous distribution of some printed materials, such as posters and leaflets throughout the implementation stage.

i. Providing the participating schools with audio-visual materials that facilitate learning.

j. Continuous arrangements with the Learning Resources Centre, the local environmental societies and authorities and Irbid UNRWA Health Centre. Some environmental films were shown particularly about pollution\(^1\), and lectures delivered by the schools’ doctor of health in UNRWA. A special symbol to the programme was also designed and distributed (see Appendix 7).

k. The administration of the post-test and gathering data in regard to the effect of the programme on children’s attitudes and knowledge and parents’ attitudes.

l. Analysing data by using the Statistical Packages for Social Sciences (SPSS) and appropriate statistics.

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\(^1\) Environment Pollution. Ministry of Education-Kuwait. Prepared and directed by, Taymour Sirry and Abdel-Muhsin Al-Khalfan.
m. Meetings with teachers to obtain their overall evaluation and suggestions. Meetings with the advisory committee to discuss the results and recommendations for future implementation. They recommended a follow-up of the attitude scale in order to examine the long-term effect of the programme. All these parties highly appreciated the face to face meetings after the implementation period.

5. The Challenges

The challenges of selecting the sample, piloting the programme, participating teachers, the co-operation of the head teachers and of parents were met. Some problems that confronted the programme are:

a. Funding: the main challenge was the budget for the programme. Co-operation with the programme from the concerned authorities was also insufficient to meet the needs of the programme. The only funding to the programme was from Yarmouk University, which supported it with 550 JD (about 500 Sterling Pounds). This was insufficient to cover the planned expenses. This challenge was overcome by minimising some of the environmental journeys and displays and by integrating the workbook in the textbook without loosing the content and the activities that were related to the stated objectives.

b. Environmental societies: two main environmental societies were contacted neither of which appeared to be interested in providing help. One put a condition, one would only think
about the programme if the researcher would agree to register as a member and pay the membership fees. The other society refused to adopt the programme and requested the instructional material without any guarantee to the investigator’s copyright (see Appendix 10).

c. **The UNESCO**: the researcher’s requests to meet the general officer of UNESCO in Amman or other principals in the office were not met. He did meet the librarian who provided the programme with some environmental books and leaflets but these were not suitable for children.

d. **The National Commission of UNESCO**: the librarian in the general office of UNESCO advised the investigator to suggest the project to the National Commission of UNESCO. The researcher was unable to meet the main principal or the director of the commission. He was informed by other employees that they had studied some environmental projects and they could not accept a new one.

e. **Participating teachers**: one of the participating teachers in Irbid camp apologised that she could not continue the implementation of the programme. Therefore, the investigator changed her group from an experimental group to a control group and visa versa for the control group in the same camp, after gaining the co-operation of the teacher to implement the programme with sufficient enthusiasm.
A teacher in the village was admitted to the hospital for a long period of time. Therefore, an alternative social studies teacher was chosen but he did not participate as well as the original one. The original teacher, whose health was getting better, came back to the school. He agreed to start the programme again. Some activities which seemed not very necessary to be explained or directed and guided by the teacher were given to the pupils as homework or self-study activities.

f. Audio-visual materials: some schools lacked such materials, particularly a videotape recorder and a TV. This was overcome by using of the investigator's personal ones.

III Evaluation Stage

Evaluation was a continuous process throughout the all stages of the programme. Figure 3-4 illustrates the evaluation model of the environmental programme.
Fig. 3-4  The evaluation model of the environmental programme
In the light of the evaluation model (figure 3-4), various evaluation instruments were utilised to gather information about the programme's progress, the achievement of goals and the general objectives (see Appendix 2) as follows:

1. **Developing the Assessment Instruments**

Three major devices were designed for assessing children's attitudes, children's knowledge and parents' environmental attitudes as follows:

- A major aim of this study was to develop the Environmental Attitudes Scale for Primary School Children (see Appendix 2-A). The scale was constructed through a long and systematic process which emphasised the analysis of its psychometric properties until high levels of reliability, validity and discrimination both in Arabic and in English were obtained in the 30 item final version (see Figure 4-5).

- The Environmental Knowledge Scale for Primary School Children (EKSPSC) was also constructed and examined. The 30 items of the scale also gave desirable reliability and validity (see Appendix 2-B).

- The Parents' Questionnaire was constructed having consideration of their living conditions, hence the final version was of 20-items in order not to limit the time involved in answering it (see Appendix 2-C). The questionnaire obtained favourable readability, reliability and validity. (for full details regarding the three scales, see Chapter Four).
2. **Developing Achievement Tests**

Formative and summative tests were constructed while teaching each unit of the instructional material. Such tests were developed by the teachers, with the co-operation of the researcher, for the purposes of feedback, but not for any type of formal assessment related to academic subjects. It was hoped that this would help in changing pupils' attitudes towards assessment as an aim in itself, from an atmosphere of failure and success, as adopted in most primary schools in Jordan, to an essential, normal and complementary process of progress and achievement.

3. **Informal Assessment Tools**

This informal assessment depended on the observation of pupils' work while they were carrying out their tasks and activities such as: follow up tasks, written work, reports, designs, posters, discussions, plans, campaigns, art products, interviews, findings, presentations, self-evaluation, debates, and a public display. Also, students were asked regularly to express their feelings, impressions, and attitudes toward the instructional environmental material and the environment which helped teachers to identify the extent to which their children were engaged in the programme and meeting the stated environmental objectives.

4. **Final Version of the Programme**

From the evaluation stages and the recommendations of the advisory committee of the programme the programme was modified and improved. Some recommendations, such as printing the instructional
material in colours, were not achieved in this stage. It is left to the decision-makers in Jordan who might adopt the programme and rewrite its materials in a new coloured form with full drawings to be more convenient to the children.

Funding was the main challenge that confronted the desirable delivery of the programme. Nonetheless, the united efforts of pupils, teachers, head teachers, the advisory committee, parents, the local community, Irbid education area (U.N.R.W.A.) and the researcher were reflected positively in pupils’ attitudes, knowledge and achievement and produced a successful, valid and practical environmental education programme.

In sum, the environmental education programme for promoting positive attitudes towards the environment in primary school children in Jordan was conducted throughout the academic year 95/1996. It seemed efficient to meet its stated objectives, the results of the participating pupils were evidence (for full details see Chapter 5).
Chapter IV

Methodology
Methodology

This study aimed to develop an environmental education programme which promotes positive attitudes towards the environment in primary school children, and design an environmental attitudes scale to evaluate the programme and assess children's attitudes towards the environment.

Design of the Study

Taking the above mentioned aims of this study into consideration and in the light of the study questions, the main variables of this study were:

Independent Variables

1. Fourth grade environmental education programme (FGEEP).
2. Place of residence (city, rural, camp).
3. Sex (male, female).
4. Academic achievement (social studies, science and general).

Dependent Variables

1. Fourth grade children's attitudes towards the environment.
2. Fourth grade parents' attitudes towards the environment.
3. Fourth grade children's knowledge towards the environment.
Accordingly, the Experimental Pre-test/Post-test Control Group Design was conducted because of its appropriateness (see Figure 4-1). To examine the efficiency of FGEEP in promoting positive attitudes towards the environment in children, and to answer the questions of the study, a main group of children was selected, whose differences in attitudes towards the environment were examined. The group was divided into two groups, a control and an experimental group, containing 12 subgroups of six each, (see the study sample, P. 126). Table 4-1 illustrates the study’s design.

Table 4-1

The Experimental Pre-test - Post-test Control Group Design

<table>
<thead>
<tr>
<th>Test</th>
<th>Group</th>
<th>Treatment</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>Experimental</td>
<td>FGEEP</td>
<td>Post</td>
</tr>
<tr>
<td>Pre</td>
<td>Control</td>
<td></td>
<td>Post</td>
</tr>
</tbody>
</table>

Both the control and experimental groups received the pre- and post-tests, only the later the FGEEP. Both groups received the same normal lessons throughout the period of the environmental programme, figure 4-1 clearly illustrates the design of the study.
Fig. 4-1 The experimental design of the study

Parents' attitudes towards the environment were explored together with the impact of the programme on such attitudes. Although there are some disadvantages to pre-test/post-test single group design in the absence of the control group, it was used for the parents. Given the concentration of this study on a large group of pupils (N = 360), it was thought sufficient to treat parents as a single group. Figure 4-2 shows the experimental design for the study of parents' attitudes.
Population

The target population of the study consisted all the primary school children aged 9-10 years attending the fourth grade either in the government sector in Irbid Directorate of Teaching and Education No 1 or in the United Nations Relief and Works Agency (UNRWA) schools in Irbid education area. The total number of fourth graders in Irbid directorate No 1 for the academic year 1995/1996 was 5835 (2879 boys and 2956 girls) whereas it was 3255 (1600 boys and 1655 girls) for the UNRWA fourth graders.

The majority of children in Jordan attend single-sex schools. The schools are located in urban and rural areas, and in camps, most being related to the government or to the United Nations Relief and Works Agency (UNRWA). All these school characteristics and learning circumstances were taken into account in the selection of the study.
sample. Table 4-2 shows the population distribution with respect to school, sector, section and sex.

Table 4-2

The population distribution with respect to school, section and sex

<table>
<thead>
<tr>
<th>Sector</th>
<th>School</th>
<th>Section</th>
<th>Pupils</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>Government</td>
<td>39</td>
<td>28</td>
<td>87</td>
</tr>
<tr>
<td>UNRWA</td>
<td>23</td>
<td>24</td>
<td>41</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>52</td>
<td>128</td>
</tr>
</tbody>
</table>

Sampling

Two major samples were selected:

I  Pupils’ Sample

Two main samples of pupils were selected:

1.  Pilot Samples

Four pilot samples were randomly chosen from fourth grades in Irbid city and its camp for the administration of the scale or the implementation of the programme:

(a) the sample of meaningfulness:

a sample consisting of 52 girls from Irbid city and of 50 boys from Irbid camp was selected to assure that the scale statements were interpreted in a single way.
(b) the sample of the initial administration:

a sample of 150 pupils distributed in 6 sections (classes) from 6 schools in Irbid city and Irbid camp (3 boys and 3 girls) was selected randomly, based on the section as a unit of selection, 75 boys and 75 girls. The number of each sub-sample was equal, hence 25 pupils were chosen randomly from each section.

(c) the sample of test-re-test:

a random sample of 50 (25 boys, 25 girls) 4th grade children from two elementary schools in Irbid city were chosen for the purpose of test-re-test and obtaining the reliability of the scale items.

(d) the programme piloting sample:

60 pupils were chosen (30 boys and 30 girls) for piloting the programme in general and the delivery of the instructional material in particular, in order to obtain ideas about its use and validity.

(e) the knowledge scale sample:

for the purpose of developing a knowledge scale the investigator selected three samples of 4th grade primary school children: one for assuring the meaningfulness of the items consisting of 32 boys and 41 girls from Irbid city; the second for the purpose of analysing the scale items and obtaining
their reliability, consisting of 30 boys and 30 girls from Irbid city and surrounding villages; and the third for the purpose of establishing the psychometric properties of the scale, consisting of 30 boys and 30 girls from Irbid city and Irbid camp.

(f) the English pilot sample (1st administration):

A pilot British sample of 54 (30 boys, 24 girls) for the purpose of obtaining the reliability and other statistical properties of the scale in order to fit children whose native language was English.

(g) the English pilot sample (2nd administration):

A British, opportunity sample year 4 pupils was selected from five classes consisting of 119 children (60 males and 59 females) was used to examine the readability and goodness of the scale and its suitability to the English students. Table 4-3 shows the description to the pilot samples of the study.
Table 4-3
The distribution of the pilot samples

<table>
<thead>
<tr>
<th>Sample</th>
<th>Size (N)</th>
<th>School</th>
<th>General Aim</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>Meaningful</td>
<td>50</td>
<td>52</td>
<td>1</td>
</tr>
<tr>
<td>Initial Adm.</td>
<td>75</td>
<td>75</td>
<td>3</td>
</tr>
<tr>
<td>Test-re-test</td>
<td>25</td>
<td>25</td>
<td>1</td>
</tr>
<tr>
<td>Prog. Piloting</td>
<td>30</td>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>Knowledge Scale</td>
<td>91</td>
<td>101</td>
<td>6</td>
</tr>
<tr>
<td>English (1st)</td>
<td>30</td>
<td>24</td>
<td>mixed</td>
</tr>
<tr>
<td>English (2nd)</td>
<td>60</td>
<td>59</td>
<td>mixed</td>
</tr>
<tr>
<td>Total</td>
<td>361</td>
<td>366</td>
<td>14</td>
</tr>
</tbody>
</table>

2. **Study Samples**

A representative random sample of 360 (180 boys, 180 girls) 4th grade primary school children attending either government or United Nations Relief and Work Agency schools in Irbid city and surrounding villages and camps was drawn from the target population and used to represent both the range of the socio-economic areas and a cross section of the school population of Irbid Governorate. This sample was divided into two equal and equivalent samples depending upon the results of the pre-test administration which revealed no significant differences (see table 5-5) and assured the equivalence of the experimental and the control group as follows:

---

1 As the educational system in Jordan presently has two stages of learning, primary (elementary) schools have been integrated into the compulsory stage of learning (Grade 1-Grade 10). Nevertheless, the term primary is used here to mean grades 1-6, which was identified as the elementary previously.
(a) the first was designated as an experimental group which received the treatment (FGEEP) in addition to the normal teaching; and

(b) the other as a control group which received normal lessons.

Table 4-4 shows the distribution of the study sample with respect to sex, school environment and the group.

**Table 4-4**

<table>
<thead>
<tr>
<th>Residence</th>
<th>Urban (City)</th>
<th>Rural (Village)</th>
<th>Camp</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Experimental</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Control</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
</tr>
</tbody>
</table>

II  Parents' Sample

To achieve the purposes of this study in developing an environmental scale to measure the attitudes of parents towards the environment and to explore the impact of the environmental education programme on such attitudes, the following samples were selected:

1. **Pilot Samples**

The following samples were chosen for the development of parents' questionnaire:
(a) **Pre-administration:**

A random sample of primary school children in Irbid city and surrounding villages consisting of 18 boys and 23 girls gave the questionnaire to their parents for their comments and feedback about its clarity, length and instructions;

(b) **The testing group:**

A sample of 150 parents of 4th grade pupils (of the 124 respondents 25 were males, 73 females, 13 couples and in 13 questionnaires the gender was not mentioned) from Irbid city, villages and camps was randomly selected in order to test the scale items and their psychometric properties.

2. *The Experimental Sample*

As previously mentioned, the study sample of the pupils which participated in the programme was divided into two groups, experimental and control (see table 4-4). The experimental sample of parents was therefore formed from all parents who had a participating child in the programme. Parents were allowed to answer their questionnaire either individually or sharing the response with each other, hence the respondents were 76 males, 57 females and 47 couples. Table 4-5 shows the distribution of parents with respect to sex and place of residence.
Table 4-5

Parents sample with respect to sex and place of residence

<table>
<thead>
<tr>
<th>Gender</th>
<th>Urban (City)</th>
<th>Rural (Village)</th>
<th>Camp</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>37</td>
<td>22</td>
<td>17</td>
<td>76</td>
</tr>
<tr>
<td>Female</td>
<td>12</td>
<td>18</td>
<td>27</td>
<td>57</td>
</tr>
<tr>
<td>Couple</td>
<td>11</td>
<td>20</td>
<td>16</td>
<td>47</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>180</td>
</tr>
</tbody>
</table>

The study sample and the sub-samples related to it altogether are well illustrated in figure 4-3.
Fig. 4-3 The samples of the programme
Instrumentation

It was a critically important aim in this study to develop a valid and reliable scale for assessing children’s attitudes towards the environment. However, the investigator extended this aim to develop a knowledge scale and a scale to measure parent’s attitudes. Thus, three main scales were developed as follows:

I  Children’s Scale (EASPSC)

The design procedure that was followed to develop the EASPSC included: logical and psychometric tests for reliability, power of discrimination, content and construct validity and unidimensionality.

1. Defining the attitude object

This can be defined as in Chapter Two as “an enduring positive or negative feeling toward a particular aspect of the environment”. An initial extensive review of literature was carried out by scanning various data bases, books and studies related to environmental education and to test constructions in general and with attitudes scales in particular (see Chapter Two, p.40).

The outcome of this review was analysed and categorised and resulted in the conceptual framework upon which the environmental programme was based, and from which the scale items were drawn. (see Figure 3-1). Consequently, three main aspects were chosen for environmental attitudes: Pollution issues, Waste and Animals and Plants. Within these domains lie a range of topics, for example, air, water, noise and land pollution; recycling, re-use; reduction, depletion of natural resources
and conservation of natural resources; population; and animals and plants protection.

2. Writing the Scale Items

a. The Scale’s Format

Although traditional, Likert scale questionnaires of 5 categories (strongly agree to strongly disagree) have been used in previous studies, (Jaus, 1984; and Subbarini, 1989b), there have been concerns over their suitability for children aged of 9 and 10 years, for example that they give socially desirable responses (Harter, 1982; Lowery et al, 1980; Moyer, 1977). In order to avoid these concerns and to follow the recommendation of Gray et al (1985) that "researchers should benefit from the prior measurement efforts of others" (p. 30). The EASPSC was developed in part on the structure from the Children’s Attitudes Towards the Environment Scale (CATES) (Musser and Malkus, 1994) and the Perceived Competence Scale for Children (PCSC) (Harter, 1982).

It was anticipated that the new format of the scale would be both more user-friendly and produce less socially constrained responses. As can be seen from the illustrated example below, each item in the scale contained a description of two different groups of pupils. Pupils were instructed, first chose which group they thought they were most like, and then to indicate whether they were only a little or a lot like the group, by marking the circle or the square respectively.
7. Some pupils throw plastic bags in the rubbish bin. but Other pupils re-use plastic bags when buying new things.

The positive scale items were scored (4, 3, 2, 1) the negative were reversed (1, 2, 3, 4), where 4 represents strongly positive attitudes towards the environment, and 1 represents strongly negative attitudes.

b. The Scale Statements

An initial pool of 107 items was designed to cover the complete range, consisting of 57 moderately positive, and 50 moderately negative statements. This design was used to minimise the possibility of a response set. Statements were written in line with the criteria suggested by Edwards (1957, cited in, Abu Hilu and Al-Omar, 1992, Khalili, 1989 and Hassan and Shrigley, 1984):

- Statements should not be written in the past tense.
- Likert’s original document (1932), advised researchers to avoid factual statements.
- Compound or complex statements should be written only when a shorter and similar statements lacks clarity.
- There are words to watch: ‘only’, ‘just’, and ‘merely’ should be used moderately, and words such as ‘all’, ‘always’, ‘more’ should be avoided.
- To avoid statements that have more than one interpretation, statements should be written in a clear, simple and direct manner.
- Double-barrelled statements, rather common on attitude scales, can be confusing to respondents.
• Double negatives should be avoided.
• Attitude statements should be no longer than 20 words.

Accordingly, the EASPSC statements did not exceed 20 words, each. Each part of the scale’s statements averaged (8.8) words in the English version, and (7.2) words in the Arabic version.

There has been some discussion over the use of panels of judges in the validation of attitude scales as mentioned in chapter two. Munaby (1982) and Bratt (1984) were against their use while Khalili (1989) stated few benefits for the panel of judges. On balance, however, the researcher agrees with Khalili (1989) that there are few benefits to the panel of judges. Consequently, the conventional method of the panel of judges was adopted, together with a more powerful objective method dependent on item analysis and pilot tests using (SPSS) modelling, in an attempt to combine the virtues and avoid the shortcomings of both approaches.

In Britain the 107 scale items were screened by three English experts in Geography, EE and Educational Studies (see Appendix 5). These experts identified 27 statements that should be dropped because either they were not suitable for children aged 9-10 years or did not represent directly the aspects of the environmental attitude. These items, such as the example below were deleted from the pool.
In Jordan, a meeting of university professors, education supervisors, head teachers, and teachers was held to discuss the scale’s development. The remaining 80 items were read, discussed and scrutinised using Edwards’ criteria. This led to the elimination of a further 12 items and the modification of some others. In addition, the highlighting of the most important word or phrase in each part of the item statement was adopted.

3. Piloting the Statements (The Item Pool)

In order to establish that the items were meaningful for children, a sample of 102 (50 boys and 52 girls), 4th grade children aged 9-10 years was selected from two elementary schools in the Irbid Governorate, Jordan. The 68 items were read one by one by the researcher, with each pupil having a copy of the scale on the pupil’s desk. The pupils were asked to raise their fingers if they felt that a statement lacked clarity or was ambiguous. As a result 20 items were found to be unclear or ambiguous by a majority of children and were consequently deleted from the scale. Some items were also revised and simplified.

The remaining 48 items were judged by a panel of 12 judges with higher degrees in Science Education, evaluation and measurement, geography, psychology, methods of teaching social studies, science, and child psychology, and the occupations of professors, supervisors, head teachers, teachers and education officers (see Appendix 5). The panel members received a copy of the scale items indicating the environmental concept that each item was designed to measure. For
each item panel members were asked to judge: each item’s relevance to a particular environmental concept on a two-point, agree-disagree continuum; the clarity of its language and its formation on a two point, fit-unfit continuum; whether it was suitable for children of 9 and 10 and to make additional comments or corrections. The panel unanimously agreed on 46 items, with an agreement coefficient of 0.96. Two items were subsequently dropped and minor changes have been carried out. Thus, it could be assumed that the scale items measure the aspects of the environmental attitude, and the scale content was valid and appropriate to the children aged 9-10 years.

The final scale was planned to consist of 25-30 statements and easy to be administered, long enough to represent the breadth of the environmental domains and related main concepts, but not fatiguing for children of this age. Therefore the scale administration would not exceed 30 minutes which allows the researcher himself to read each item to the children. However, the final selection of items was made according to the following criteria:

(a) Item-total correlation should be positive;

(b) High item correlation is desirable. "items that correlate .0 to .30 contribute little to measurement of individual differences in attitudes and hence reduce the reliability of the total scale" (Shrigley and Trueblood, 1979, Gogolin and Swarts, 1992);

(c) Cronbach’s alpha of the total score will decrease if the item was removed;

(d) Mean value near the midpoint (2.5); and
(e) Sufficient variability (SD at, or near, 1). Items with extreme means and/or low variability, indicating that everyone answered almost the same.

A pilot sample of 150 4th grade Jordanian children aged 9-10 years was selected randomly from 3 boys' and 3 girls' schools and given the 46 item scale in order to test the psychometric properties of reliability, discrimination and item-total correlation and to establish the final version of the scale.

Responses of 142 pupils were analysed only (70 boys and 72 girls), eight questionnaires were not used because they were incorrectly completed. The internal consistency reliability using Cronbach's alpha coefficient was estimated for the scale. The obtained alpha was (.60), which could be considered relatively low. Item means ranged from 1.23 to 3.86 with an overall mean of 2.81, whereas SDs ranged from 1.35 to .51 with an overall SD of 1.09. Five items gave negative item-total correlation, 8 items gave an item-total correlation of 0 and 7 items gave less than .1, item-total correlation ranged from .46 to -.24.

According to the criteria stated above, 16 items were eliminated and 30 were retained. Using SPSS to analyse the remained items for the same sample of pupils revealed an alpha coefficient of .72 with an overall mean of 3.01 and an overall SD of 1.08. Some items were modified and others were retained in the scale even though they did not meet all criteria, because they were important to the content validity or in order to maintain the balance between the positive and the negative items.
A random sample of 50 (25 boys, 25 girls) Jordanian 4th grade children from two elementary schools in Irbid city were given the resulting 30 item scale and re-tested after 3 weeks. Using SPSS analysis produced a test-re-test reliability coefficient of (.85).

The scale was also administered to a pilot British sample of 54 (30 boys, 24 girls). Reliability assessed by Cronbach’s alpha amounted to .82, with a mean of (3.09) and (.93) SD. Most of the 30 items gave an item-total correlation higher than .30, but some were lower. Item 6 gave a negative value, so some modification was carried out. Depending upon Lemke and Wiersma (1976) and Scott (1960) who assured that positive item-total correlation is preferable and a value of .30 is not important, it can be accepted therefore that the scale displayed satisfactory alpha and test-re-test reliability coefficients.

4. Final Statement Testing

a. Scoring the Scale

The final scale contained 15 positive and 15 negative items, randomly distributed and scored 4 to 1, or 1 to 4, providing both an overall score (120 to 30) and scores on three domains - Pollution issues 9-items, Waste 11-items and Animals and Plants 10-items (see Appendix 2-A). In each case the higher the score the more positive the attitudes towards the environment. Table 4-6 shows the direction of the items, their scores and domains1:

---

1 Some items could be classified in two domains, nonetheless they were classified as shown in the table.
Table 4-6
The direction of the items, their scores and domains

<table>
<thead>
<tr>
<th>Item</th>
<th>Direction</th>
<th>Scoring</th>
<th>Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>positive</td>
<td>4 3 2 1</td>
<td>animals &amp; plants</td>
</tr>
<tr>
<td>2</td>
<td>positive</td>
<td>4 3 2 1</td>
<td>waste</td>
</tr>
<tr>
<td>3</td>
<td>negative</td>
<td>1 2 3 4</td>
<td>Pollution</td>
</tr>
<tr>
<td>4</td>
<td>negative</td>
<td>1 2 3 4</td>
<td>Pollution</td>
</tr>
<tr>
<td>5</td>
<td>negative</td>
<td>1 2 3 4</td>
<td>animals &amp; plants</td>
</tr>
<tr>
<td>6</td>
<td>positive</td>
<td>4 3 2 1</td>
<td>animals &amp; plants</td>
</tr>
<tr>
<td>7</td>
<td>negative</td>
<td>1 2 3 4</td>
<td>waste</td>
</tr>
<tr>
<td>8</td>
<td>positive</td>
<td>4 3 2 1</td>
<td>Pollution</td>
</tr>
<tr>
<td>9</td>
<td>negative</td>
<td>1 2 3 4</td>
<td>animals &amp; plants</td>
</tr>
<tr>
<td>10</td>
<td>positive</td>
<td>4 3 2 1</td>
<td>Pollution</td>
</tr>
<tr>
<td>11</td>
<td>positive</td>
<td>4 3 2 1</td>
<td>Pollution</td>
</tr>
<tr>
<td>12</td>
<td>positive</td>
<td>4 3 2 1</td>
<td>waste</td>
</tr>
<tr>
<td>13</td>
<td>negative</td>
<td>1 2 3 4</td>
<td>waste</td>
</tr>
<tr>
<td>14</td>
<td>negative</td>
<td>1 2 3 4</td>
<td>Pollution</td>
</tr>
<tr>
<td>15</td>
<td>positive</td>
<td>4 3 2 1</td>
<td>waste</td>
</tr>
<tr>
<td>16</td>
<td>positive</td>
<td>4 3 2 1</td>
<td>waste</td>
</tr>
<tr>
<td>17</td>
<td>negative</td>
<td>1 2 3 4</td>
<td>waste</td>
</tr>
<tr>
<td>18</td>
<td>positive</td>
<td>4 3 2 1</td>
<td>waste</td>
</tr>
<tr>
<td>19</td>
<td>negative</td>
<td>1 2 3 4</td>
<td>animals &amp; plants</td>
</tr>
<tr>
<td>20</td>
<td>positive</td>
<td>4 3 2 1</td>
<td>animals &amp; plants</td>
</tr>
<tr>
<td>21</td>
<td>negative</td>
<td>1 2 3 4</td>
<td>animals &amp; plants</td>
</tr>
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<td>22</td>
<td>negative</td>
<td>1 2 3 4</td>
<td>animals &amp; plants</td>
</tr>
<tr>
<td>23</td>
<td>positive</td>
<td>4 3 2 1</td>
<td>animals &amp; plants</td>
</tr>
<tr>
<td>24</td>
<td>negative</td>
<td>1 2 3 4</td>
<td>Pollution</td>
</tr>
<tr>
<td>25</td>
<td>negative</td>
<td>1 2 3 4</td>
<td>waste</td>
</tr>
<tr>
<td>26</td>
<td>positive</td>
<td>4 3 2 1</td>
<td>waste</td>
</tr>
<tr>
<td>27</td>
<td>positive</td>
<td>4 3 2 1</td>
<td>Pollution</td>
</tr>
<tr>
<td>28</td>
<td>negative</td>
<td>1 2 3 4</td>
<td>waste</td>
</tr>
<tr>
<td>29</td>
<td>negative</td>
<td>1 2 3 4</td>
<td>Pollution</td>
</tr>
<tr>
<td>30</td>
<td>positive</td>
<td>4 3 2 1</td>
<td>animals &amp; plants</td>
</tr>
</tbody>
</table>
b. **Sampling of the Final Version**

The original purpose of developing the scale was to develop an Arabic version and an English one in order to assess attitudes towards the environment in children aged 9-10 years (4th grade) and to be used for comparative purposes in the future, two samples were used:

(1) **The English sample:**

A British, opportunity sample of 119 children (60 male and 59 female) from 4 year five classes was used - two from schools in the outskirts of Bradford, Yorkshire and two from schools in Loughborough, Leicestershire. They were administered the scale for the purpose of gathering data about the usability and goodness of the scale and its suitability to the English students. Analysis revealed a Cronbach’s alpha of .76, with 12 items having an item-total correlation less than .30, but 11 were positive. Item 6 had a negative correlation, and its removal would increase the alpha coefficient, therefore, it is recommended that this item should be dropped, and/or changed. The sample’s mean for responses was 3.13, with SD of 1.05. This suggests that the scale is suitable for British children of this age and is a reliable and valid instrument for comparison with Jordanian children.

(2) **The Jordanian Sample:**

A Jordanian random sample of 360 (180 boys, 180 girls) 4th grade children was used. The size of the sample facilitated factor analysis. Crano and Brewer 1973 (cited in Abdel-Gaid et al, 1986 and Abdel Moneim and Shrigley, 1984) recommends that the number of subjects
should be at least ten times the number of items planned for the final scale. In the present study, there were about 12 respondents per statement. The scale was administered to this sample after they were read the instructions, they were informed that the scale is related to a research project and the scores will not be written in their records of achievement, the items were read by the researcher individually in order to avoid reading ability as an intervening variable. An example was written on the blackboard and explained to them, the researcher did not start unless he was sure that each child knew how to respond.

c. Reliability

The gathered data was analysed on special sheets and saved in the computer, the statistical packages for social sciences (SPSS) were used in analysis and revealed the following:

a. Internal consistency:

Alpha coefficient of internal consistency reliability was .86 which can be claimed as a high value and indicating that the scale items have high internal consistency.

b. Split-half Coefficient:

To assure the scale reliability, Two parallel sets of items, one of the even, the other the odd items when tested produced a split-half reliability of .88, indicating high reliability.
d. Discrimination

Scale items need to discriminate between children with negative environmental attitudes and those with positive ones. Discriminating items can be selected by computing the item-total correlation - those with r-values of .30 or above being desirable. A low correlation suggests that a statement may not be representing the attitude under study and contribute little to the measurement of individual differences (Shrigley and Trueblod, 1979, p. 74). However, the researcher agreed with a few educators who suggest that positive item-total correlation is compulsory (Abed and Ibrahim 1990; Thorndike, 1982; Lemke and Wiersma, 1976, and Scott, 1960).

Item-total correlations on the scale (EASPSC) ranged from .52 to .20, with only four items lower than .30, suggesting that the scale is valid, and discriminates well. This is reinforced by the good variability obtained to the scale items - SDs ranged from .67 to 1.33 with an overall SD of 1.05 which indicates sufficient variability (see, table 4-7 below).

Item means ranged from 3.70 to 1.91 with an overall mean of 3.16, indicating that children's responses were not the same and the statements discriminate between them. Since the scale items had high internal consistency and correlated significantly with the total score, in addition to good variability and moderate difficulty, it can be concluded that attitude towards the environment is the common attribute measured by all the scale statements.
Table 4-7
Means, standard deviations and item-total correlations for the scale items

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>Std Deviation (SD)</th>
<th>Item-Total Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.99</td>
<td>1.25</td>
<td>.48</td>
</tr>
<tr>
<td>2</td>
<td>3.06</td>
<td>1.14</td>
<td>.37</td>
</tr>
<tr>
<td>3</td>
<td>3.63</td>
<td>.74</td>
<td>.20</td>
</tr>
<tr>
<td>4</td>
<td>3.36</td>
<td>1.01</td>
<td>.34</td>
</tr>
<tr>
<td>5</td>
<td>3.20</td>
<td>1.15</td>
<td>.41</td>
</tr>
<tr>
<td>6</td>
<td>3.70</td>
<td>.71</td>
<td>.25</td>
</tr>
<tr>
<td>7</td>
<td>2.56</td>
<td>1.31</td>
<td>.42</td>
</tr>
<tr>
<td>8</td>
<td>3.67</td>
<td>.67</td>
<td>.32</td>
</tr>
<tr>
<td>9</td>
<td>3.61</td>
<td>.80</td>
<td>.31</td>
</tr>
<tr>
<td>10</td>
<td>3.62</td>
<td>.76</td>
<td>.40</td>
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<tr>
<td>11</td>
<td>2.52</td>
<td>.84</td>
<td>.28</td>
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<tr>
<td>12</td>
<td>2.71</td>
<td>1.26</td>
<td>.49</td>
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<tr>
<td>13</td>
<td>1.97</td>
<td>1.20</td>
<td>.36</td>
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<td>14</td>
<td>2.91</td>
<td>1.15</td>
<td>.52</td>
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<td>15</td>
<td>2.40</td>
<td>1.33</td>
<td>.48</td>
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<td>16</td>
<td>3.17</td>
<td>1.10</td>
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<td>17</td>
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<td>.76</td>
<td>.31</td>
</tr>
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<td>19</td>
<td>3.4</td>
<td>.92</td>
<td>.31</td>
</tr>
<tr>
<td>20</td>
<td>3.55</td>
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<td>.37</td>
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<td>21</td>
<td>2.69</td>
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<td>22</td>
<td>2.98</td>
<td>1.13</td>
<td>.43</td>
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<tr>
<td>23</td>
<td>3.63</td>
<td>.74</td>
<td>.30</td>
</tr>
<tr>
<td>24</td>
<td>2.45</td>
<td>1.22</td>
<td>.29</td>
</tr>
<tr>
<td>25</td>
<td>1.91</td>
<td>1.21</td>
<td>.38</td>
</tr>
<tr>
<td>26</td>
<td>3.50</td>
<td>.98</td>
<td>.38</td>
</tr>
<tr>
<td>27</td>
<td>3.40</td>
<td>.89</td>
<td>.47</td>
</tr>
<tr>
<td>28</td>
<td>2.95</td>
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<td>.44</td>
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<tr>
<td>29</td>
<td>3.15</td>
<td>1.19</td>
<td>.47</td>
</tr>
<tr>
<td>30</td>
<td>3.11</td>
<td>1.21</td>
<td>.51</td>
</tr>
</tbody>
</table>
e.  **Factor Analysis of the Scale**

The generated data was subjected to a principal components factor analysis with a 5 factor solution summary of the results of factor analysis is shown in table 4-8. Factor 1 accounted for 30.8 per cent of the total variance -all statements in the scale falling along a single dimension. This clearly reinforces the scale’s homogeneity towards the environment as displayed by the high item-total correlations shown above.

The three domains of the scale were also subjected to component principle factor analysis. This revealed further proof of the unidimensionality of the scale, since the first factor accounted for 84.4 per cent of the variance, clearly showing that the scale measures a single trait-attitude towards the environment.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Eigen Value</th>
<th>Percent Of Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9.24</td>
<td>30.8</td>
</tr>
<tr>
<td>2</td>
<td>2.04</td>
<td>6.8</td>
</tr>
<tr>
<td>3</td>
<td>1.37</td>
<td>4.6</td>
</tr>
<tr>
<td>4</td>
<td>1.24</td>
<td>4.1</td>
</tr>
<tr>
<td>5</td>
<td>1.06</td>
<td>3.5</td>
</tr>
</tbody>
</table>

f.  **Content Validity**

To assign items to a factor, Comery rated orthogonal factor loading as follows (Comery cited in Khalili,1989. p. 207):
As can be seen in Figure 4-4, applying the scree test suggested by Cattel (1965, cited in Abdel-Gaid et al, 1986), three factors accounted for 42.2 per cent of the total variance were rotated using varimax rotation. All of the scale items loaded .32 or higher on the three factors except item 3 which loaded .27 on factor 2, nevertheless it was not eliminated for its favourable statistical data. The only criterion which has been used, is the high loading in a factor than on another based on Abdel-Aziz (1994).

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.71+</td>
<td>excellent</td>
</tr>
<tr>
<td>0.63+</td>
<td>very good</td>
</tr>
<tr>
<td>0.55+</td>
<td>good</td>
</tr>
<tr>
<td>0.45+</td>
<td>fair</td>
</tr>
<tr>
<td>0.32+</td>
<td>poor</td>
</tr>
</tbody>
</table>

Fig. 4-4 The Scree Test
Finally, Table 4-9 displays the factor construct of the scale items and provides the evidence of the scale's content validity. Ten items (1, 5, 6, 9, 20, 19, 21, 22, 23, and 30) loaded on factor 1. Each was written for original classification (Animals and Plants). Items (17, 26, 28, 29) loaded also on this factor, though, they were not originally classified with animals and plants items. Nevertheless, the researcher did not transfer these four items to this dimension and left them in their original one.

Seven items (3, 8, 10, 11, 14, 24, and 27), loaded on factor 2. Each was written for the original classification (Pollution), and eight items (2, 7, 12, 13, 15, 16, 18, and 25), loaded on factor three, each was written for the original classification (Waste). Item 4 loaded also on this factor though it was not originally classified in this dimension.

It should be realised however, that some items loaded on another factor for which they were not originally classified. This might be related to the content of the environmental attitude items, e.g. item 6 and item 4 can be classified with Pollution or Waste issues.

Hence, 25 items loaded on one of the 3 factors, matching the investigator's original classification of the scale into three domains: Pollution (9 items), Waste (11 items) and Animals and Plants (10 items). (see Table 4-6 above).
Table 4-9

The factor construct of the scale items

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>.61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>.57</td>
<td>.37</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>.53</td>
<td></td>
<td>.36</td>
</tr>
<tr>
<td>6</td>
<td>.53</td>
<td>.44</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>.52</td>
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<tr>
<td>20</td>
<td>.52</td>
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<td>.36</td>
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<tr>
<td>26</td>
<td>.50</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>.49</td>
<td>.44</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>.49</td>
<td>.44</td>
<td>.35</td>
</tr>
<tr>
<td>19</td>
<td>.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>.35</td>
<td>.35</td>
<td>.33</td>
</tr>
<tr>
<td>11</td>
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<td>.67</td>
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<tr>
<td>24</td>
<td></td>
<td>.64</td>
<td></td>
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<tr>
<td>10</td>
<td>.39</td>
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<td>.61</td>
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<td></td>
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<td>18</td>
<td></td>
<td>.56</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td>.54</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>.47</td>
<td>.49</td>
</tr>
<tr>
<td>2</td>
<td>.34</td>
<td>.43</td>
<td>.47</td>
</tr>
<tr>
<td>16</td>
<td>.43</td>
<td></td>
<td>.46</td>
</tr>
<tr>
<td>4</td>
<td>.32</td>
<td></td>
<td>.33</td>
</tr>
</tbody>
</table>
The data and analysis presented above suggest that the scale of environmental attitudes is valid and reliable for use with primary school children in Arabic and English speaking countries. Its comparatively novel format has been well received by Jordanian and British children, while findings suggest it is a useful instrument for the evaluation of environmental education programmes (see Reid and Sa’di, 1997).

II Parents’ Questionnaire

A device to measure parents' attitudes towards the environment was developed. In general, the appropriate procedures followed to develop the EASPSC were employed:

1. Defining the Attitude Object:

To avoid the repetition it could be said that this study adopted one definition of the attitude “an enduring positive or negative feeling toward a particular aspect of the environment”. However, the parents’ questionnaire was developed in the light of the conceptual framework of this study and therefore the three main environmental domains (Pollution, Waste and Animals and Plants) were represented (see table 4-10). This, of course, should be done because the same objectives of the environmental programme were planned to be delivered for all samples in this study.

2. Writing The Questionnaire Items

a. The Scale’s Format and Instructions

A device of three point Likert-type scale (always, occasionally, never) was constructed (see the example
below) which seemed appropriate for them. The final version was planned to contain 15-20 items. Responses of parents on the scale were given a numerical score (3, 2, 1 for the positive items and reversed 1, 2, 3 for the negative items) a high score reflecting positive, and a low one negative, attitudes.

Example:

"According to your actual (not ideal) behaviour, Please fill the (☐) appropriate to each statement, underneath one of the following: 1 if you always do the action, 2 if you occasionally do it, or 3 if you never do the action".

<table>
<thead>
<tr>
<th>No</th>
<th>statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>Leave water running when brushing my teeth.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>27</td>
<td>Worry about animals that become extinct.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

b. The Scale Statements

An initial version of the questionnaire containing (50) items was written in the light of Edward’s criteria (see p. 133) for writing attitude items, 25 items were positive and 25 negative, with emphasis on the real actions of respondents (the third component of the attitude concept). The average number of words in the fifty items (10.6) met Edward’s criterion.
Regardless of the criticism of Munaby (1982) and Bratt (1984) to the panel of judges, the questionnaire items were screened by three English experts in education and their modifications and suggestions were taken into account. None of the 50 items was deleted, but major alteration were carried out. The items were translated into Arabic for the target population of the environmental programme. In Jordan the items were read by an Arabic language specialist whose changes were considered.

41 Questionnaires were distributed in Irbid city and surrounding villages in order to obtain any useful comments and to assure the clarity of the questionnaire items. 7-items were eliminated either because they were impiguous or because of their unfamiliarity in the Jordanian society and some were modified. An example of a deleted item is:

17 Use saving electricity lamps.

3. Piloting the Statements

A copy of the 43 remaining items were attached to the EASPSC and judged by the 12 experts to ascertain the face validity of some items, that they were drawn from the stated objectives; related to the environmental aspects that they were initially written to measure and had clarity in language and formation. The panel of judges suggested the elimination of some items and the importance of the balance between the attitude components in the items, without being action-

1 Mr Ali Abu Ja'far, BA, MA Arabic Language.
oriented in general. Thus, many of the original items were further modified, 15 items were eliminated as they were viewed as unsuitable for parents and two new items were written.

The new version of the questionnaire containing 30 items was administered to a pilot sample of 150 parents chosen randomly from their 4th grade children not in the study sample in Irbid city, camp and villages. The pupils were instructed to tell their parents that the questionnaire can be filled in by their fathers, mothers or both of them. 125 questionnaires were returned and 124 were analysed using SPSS, which revealed alpha coefficient for internal consistency reliability of .57 which could be considered relatively a low coefficient. The item means ranged from 2.79 to 1.31, whereas SDs ranged from .80 to .48. Item-total correlations ranged from .38 to -.08, 3 items gave negative item-total correlations and 7 items gave 0. Those items that showed good variability and their elimination decreased alpha coefficient were retained while the rest were eliminated. 10 items were deleted 20 retained. The following is an example of a deleted item:

15 | Use the frying oil twice or more.

The remaining 20 items SPSS analysed and revealed .67 alpha coefficient which could be considered relatively good and suitable for use particularly because there were only 20 items. The item means ranged from 2.79 to 1.31, SDs ranged from .79 to .48, item-total correlations ranged from .48 to .12 and none of the items gave a negative value.
4. Final Statement Testing

a. Scoring the Scale

The final version of the questionnaire consisting of 20 items (9 positive and 11 negative), were distributed randomly and scored 3, 2, 1 for the positive items and reversed 1, 2, 3 for the negative ones. The overall score therefore ranged from 60 which reflects the highest positive attitudes towards the environment and 20 which reflects lowest negative attitudes, The neutral point between the positive and the negative attitudes is 40. Table 4-10 shows the direction of the items, their scores and domains (see the Appendix 2-C).
Table 4-10
The direction of the items, their scores and domains

<table>
<thead>
<tr>
<th>Item</th>
<th>Direction</th>
<th>Scoring</th>
<th>Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>negative</td>
<td>1 2 3</td>
<td>animals &amp; plants</td>
</tr>
<tr>
<td>2</td>
<td>negative</td>
<td>1 2 3</td>
<td>waste</td>
</tr>
<tr>
<td>3</td>
<td>positive</td>
<td>3 2 1</td>
<td>waste</td>
</tr>
<tr>
<td>4</td>
<td>positive</td>
<td>3 2 1</td>
<td>Pollution</td>
</tr>
<tr>
<td>5</td>
<td>negative</td>
<td>1 2 3</td>
<td>animals &amp; plants</td>
</tr>
<tr>
<td>6</td>
<td>negative</td>
<td>1 2 3</td>
<td>animals &amp; plants</td>
</tr>
<tr>
<td>7</td>
<td>negative</td>
<td>1 2 3</td>
<td>Pollution</td>
</tr>
<tr>
<td>8</td>
<td>negative</td>
<td>1 2 3</td>
<td>Pollution</td>
</tr>
<tr>
<td>9</td>
<td>negative</td>
<td>1 2 3</td>
<td>waste</td>
</tr>
<tr>
<td>10</td>
<td>positive</td>
<td>3 2 1</td>
<td>waste</td>
</tr>
<tr>
<td>11</td>
<td>negative</td>
<td>1 2 3</td>
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<td>12</td>
<td>positive</td>
<td>3 2 1</td>
<td>waste</td>
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<td>3 2 1</td>
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<td>16</td>
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<td>1 2 3</td>
<td>waste</td>
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<tr>
<td>17</td>
<td>positive</td>
<td>3 2 1</td>
<td>waste</td>
</tr>
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<td>waste</td>
</tr>
<tr>
<td>19</td>
<td>positive</td>
<td>3 2 1</td>
<td>waste</td>
</tr>
<tr>
<td>20</td>
<td>negative</td>
<td>1 2 3</td>
<td>animals &amp; plants</td>
</tr>
</tbody>
</table>

b. Final Administration

The parents of the children in the experimental group of the study (N = 180) were administered the scale pre-test and post-test. While the data were used to assess the impact of the environmental programme on their attitudes, the psychometric properties of the questionnaire were obtained to assure its readability.
c. *Psychometric Properties*

The statistical analysis was carried out in order to identify the reliability of the questionnaire and its validity, power of discrimination and unidimensionality. Cronbach's alpha for the internal consistency reliability in the pre-test amounted to .79 which could be considered as a good coefficient. Item means were ranged from 2.80 to 1.26 with an overall mean of 2.14, whereas SDs ranged from .81 to .51 with an overall SD of .68. Item-total correlations were between .65 and .03; most of the items have a good item-total correlation as all of them gave positive values and only one item have .03 value.

In the post-test the situation was better as the questionnaire gave better characteristics, the range of the item means was 2.82 to 1.7 with an overall mean of 2.43, SDs were between .86 and .53 with an overall SD of .67, and item-total correlations ranged between .54 to .26 with no zero or negative values. Alpha reliability coefficient equalled .83. Table 4-11 shows the properties of the scale items in the final administration.
### Table 4-11

The means, Standard deviations and item-total correlations

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>Std. Deviation (SD)</th>
<th>Item-Total Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.55</td>
<td>.54</td>
<td>.44</td>
</tr>
<tr>
<td>2</td>
<td>2.42</td>
<td>.67</td>
<td>.38</td>
</tr>
<tr>
<td>3</td>
<td>2.5</td>
<td>.61</td>
<td>.51</td>
</tr>
<tr>
<td>4</td>
<td>2.7</td>
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<td>.53</td>
</tr>
<tr>
<td>6</td>
<td>2.1</td>
<td>.79</td>
<td>.34</td>
</tr>
<tr>
<td>7</td>
<td>2.8</td>
<td>.52</td>
<td>.26</td>
</tr>
<tr>
<td>8</td>
<td>2.7</td>
<td>.53</td>
<td>.36</td>
</tr>
<tr>
<td>9</td>
<td>1.9</td>
<td>.78</td>
<td>.36</td>
</tr>
<tr>
<td>10</td>
<td>2.5</td>
<td>.71</td>
<td>.35</td>
</tr>
<tr>
<td>11</td>
<td>2.6</td>
<td>.73</td>
<td>.41</td>
</tr>
<tr>
<td>12</td>
<td>2.0</td>
<td>.84</td>
<td>.55</td>
</tr>
<tr>
<td>13</td>
<td>2.4</td>
<td>.62</td>
<td>.48</td>
</tr>
<tr>
<td>14</td>
<td>2.8</td>
<td>.44</td>
<td>.43</td>
</tr>
<tr>
<td>15</td>
<td>1.9</td>
<td>.86</td>
<td>.52</td>
</tr>
<tr>
<td>16</td>
<td>2.7</td>
<td>.55</td>
<td>.42</td>
</tr>
<tr>
<td>17</td>
<td>2.8</td>
<td>.54</td>
<td>.26</td>
</tr>
<tr>
<td>18</td>
<td>2.2</td>
<td>.80</td>
<td>.42</td>
</tr>
<tr>
<td>19</td>
<td>2.7</td>
<td>.59</td>
<td>.33</td>
</tr>
<tr>
<td>20</td>
<td>2.5</td>
<td>.67</td>
<td>.44</td>
</tr>
</tbody>
</table>

It can be concluded from the results of the reliability analysis that:

- The questionnaire is reliable and the internal consistency is good. This, supports the fact that the questionnaire items all measure the same attribute, that is, the attitude towards the environment, hence the questionnaire is unidimensional.

- The items scored good variability and positive inter-item correlations which assured the questionnaire items power of discrimination, that is, the questionnaire discriminates
between those who have positive attitudes and those who have negative ones.

- The parent’s questionnaire is valid and can be used to assess parent’s attitudes towards the environment.

## III Knowledge Scale (EASPSC)

The main aim of this study was to develop an attitude scale to assess attitudes towards the environment in children. However, the researcher found that textbooks, teacher training, teachers’ mentality, teaching methods and the evaluation instruments in Jordan were still knowledge-oriented in spite of the reform plan and objectives emphasising the affective domain of teaching-learning process. So it was valuable to assess the impact of the environmental programme on children’s attitudes and to identify the relationship between children’s knowledge and attitudes. In addition, the results might be of critical importance to decision-makers in Jordan in examining the extent to which desired changes have been achieved and the gap between knowledge and effective objectives truly bridged. An Environmental Knowledge Scale for Primary School Children (EKSPSC) was constructed which is unique in that was developed in Jordan. The EKSPSC went through subsequent revisions as a result of several forms of pilot testing that included:

1. **Specifying the Environmental Content**

The knowledge scale was developed as one of the main instruments in the environmental programme. The conceptual framework of the programme (see Chapter 3, figure 3-1) was the foundation on which the
knowledge scale depended, with its emphasis on the main three environmental aspects (Pollution, Waste and Animals and Plants, and concepts relating to them).

The instructional material was designed according to the major long-term objectives of the programme and to the conceptual framework. Then, the general objectives of the environmental content of the instructional material were specified and stated in the textbook of the programme which the knowledge scale was initially designed to assess their attainment (see Appendix 1-A).

2. The Scale Type

Multiple choice questions with three alternatives was the type chosen. The reasons for the choice were: the suitability of such types of questions to the evaluation of aims, objective results and to the familiarity of this type of question to children aged 9-10 years. In scoring the EKSPSC’s questions the respondent will score 0 or 1 which means the answer should be either correct or incorrect, there are no other choices.

3. Writing the scale items

50 multiple choice questions were initially written in order to select the best items for the knowledge scale. For the purpose of the meaningfulness of the items they were read by the researcher himself to a sample of 4th grade pupils (32 boys and 41 girls) from Irbid city. The pupils were instructed to raise their hands whenever they did not understand a word, or if any explanation was needed. The feedback
from this application led to modifications of the instrument (e.g., improved readability, simpler language, clarification of item stems), few changes were carried out and some items were rewritten.

a. The Face Validity of Items

The 50 items of the scale were subjected to the judgement of a panel of 7 experts in measurement and evaluation, educational psychology, environmental education and science education. They were asked about the items' clarity, formation and whether or not they were suitable to measure the content of the instructional material and its objectives. Judges were provided with copies of the textbook and the objectives of the programme.

The panel members indicated that the scale was suitable for 4th grade children and the items represented well the objectives of the instructional material. Nevertheless, they had some objections to some scale items and suggested some for elimination and others for modification. These suggestions led to 3 items being eliminated and 47 items being retained.

b. Piloting the scale Items

A sample of 30 boys and 30 girls 4th grade pupils from Irbid city and surrounding villages was selected and given the scale. The pupils were told that the questions would be read one by one by the researcher; they should look at the copy of the scale which they had; to choose the true alternative from the options after each stem, and to tick the appropriate cell alongside each question in the answer sheet. An
example were written on the blackboard to assist understanding and pupils were told not to choose two alternatives for a single question. A score of 1 was given to a correct answer. Using the formula of Kuder-Richardson 20 (KR-20)\(^1\) revealed a reliability coefficient of .63, the highest item-mean was 93% whereas the lowest one was 16.9%. SDs ranged from .50 to .25. Power of discrimination have also analysed and ranged between .60 to -39, 10 items gave negative values and 8 items did not discriminate between children and gave an item-total correlation of 0.

The items of a negative or 0 item-total correlation and/or the items which decrease the reliability were eliminated. 29 items of .20 to .80 difficulty coefficient and of .20 or more power of discrimination were retained, the alternatives effectiveness was also analysed and the alternatives which have been chosen by less than 5% of the pupils was modified or changed.

c. Final Item Testing

To test the remaining 29 items a sample of pupils consisting of 60 pupils (30 boys and 30 girls) was selected from Irbid city and Irbid camp and given the scale. 59 answer sheets were analysed. The statistical analysis revealed a reliability of .80 with an item-total correlation of .63 to .16, the item means ranged from .92 to .25 and the SDs ranged from .28 to .50. Table 4-12 shows the means and the standard deviations of the scale items.

\[ r = \frac{n}{n-1} \left( \frac{S_i^2 - \sum pq}{S_i^2} \right) \]
Table 4-12

The means, Standard deviations and item-total correlations of the knowledge scale

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>Std. Deviation (SD)</th>
<th>Item-Total Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.63</td>
<td>.49</td>
<td>.38</td>
</tr>
<tr>
<td>2</td>
<td>.83</td>
<td>.38</td>
<td>.22</td>
</tr>
<tr>
<td>3</td>
<td>.56</td>
<td>.50</td>
<td>.30</td>
</tr>
<tr>
<td>4</td>
<td>.83</td>
<td>.38</td>
<td>.37</td>
</tr>
<tr>
<td>5</td>
<td>.34</td>
<td>.48</td>
<td>.53</td>
</tr>
<tr>
<td>6</td>
<td>.25</td>
<td>.44</td>
<td>.16</td>
</tr>
<tr>
<td>7</td>
<td>.56</td>
<td>.50</td>
<td>.24</td>
</tr>
<tr>
<td>8</td>
<td>.73</td>
<td>.45</td>
<td>.31</td>
</tr>
<tr>
<td>9</td>
<td>.61</td>
<td>.49</td>
<td>.27</td>
</tr>
<tr>
<td>10</td>
<td>.92</td>
<td>.28</td>
<td>.49</td>
</tr>
<tr>
<td>11</td>
<td>.37</td>
<td>.49</td>
<td>.17</td>
</tr>
<tr>
<td>12</td>
<td>.90</td>
<td>.30</td>
<td>.19</td>
</tr>
<tr>
<td>13</td>
<td>.92</td>
<td>.28</td>
<td>.20</td>
</tr>
<tr>
<td>14</td>
<td>.19</td>
<td>.39</td>
<td>.23</td>
</tr>
<tr>
<td>15</td>
<td>.81</td>
<td>.39</td>
<td>.27</td>
</tr>
<tr>
<td>16</td>
<td>.59</td>
<td>.50</td>
<td>.33</td>
</tr>
<tr>
<td>17</td>
<td>.51</td>
<td>.50</td>
<td>.49</td>
</tr>
<tr>
<td>18</td>
<td>.93</td>
<td>.25</td>
<td>.24</td>
</tr>
<tr>
<td>19</td>
<td>.59</td>
<td>.50</td>
<td>.36</td>
</tr>
<tr>
<td>20</td>
<td>.20</td>
<td>.41</td>
<td>.26</td>
</tr>
<tr>
<td>21</td>
<td>.51</td>
<td>.50</td>
<td>.32</td>
</tr>
<tr>
<td>22</td>
<td>.59</td>
<td>.50</td>
<td>.33</td>
</tr>
<tr>
<td>23</td>
<td>.51</td>
<td>.50</td>
<td>.19</td>
</tr>
<tr>
<td>24</td>
<td>.73</td>
<td>.45</td>
<td>.30</td>
</tr>
<tr>
<td>25</td>
<td>.41</td>
<td>.50</td>
<td>.40</td>
</tr>
<tr>
<td>26</td>
<td>.75</td>
<td>.44</td>
<td>.30</td>
</tr>
<tr>
<td>27</td>
<td>.73</td>
<td>.45</td>
<td>.43</td>
</tr>
<tr>
<td>28</td>
<td>.71</td>
<td>.46</td>
<td>.20</td>
</tr>
<tr>
<td>29</td>
<td>.58</td>
<td>.50</td>
<td>.63</td>
</tr>
</tbody>
</table>

As there were 29 items, an item from the eliminated ones was modified and added to the scale items to facilitate computation. The final version of the scale has 30 items chosen from the most effective ones.
(see Appendix 2-B). It can be concluded that the scale is valid and reliable and suitable for the purposes of this study. The Steps in the development of the instruments are clearly illustrated in figure 4-5.

![Diagram showing the steps in the development of instruments]

**Fig. 4-5** Steps in the development of instruments
Analysis of Findings

I  Findings Relating to the Effect of FGEEP on Children’s Attitudes

The answers to the questions addressed in this thesis can be summarised in a series of tables, together with explanations. The first question in the study asked about the effects of FGEEP on fourth grade children’s attitudes towards the environment, and whether or not the programme met its stated objectives. To answer this question the following null hypothesis was tested:

“FGEEP will produce no significant differences at the (α = .05) level in the environmental attitudes of fourth grade children”.

To examine this hypothesis, the mean scores of the study sample and its sub-groups were computed. The results of the pre- and post-tests of the experimental and control groups (with 6 sub-groups each) are shown in table 5-1 and in table 5-2. Since it was the researcher’s main concern to evaluate the group (class) implementation of FGEEP rather than its impact on individual students, class means were used as the unit of analysis.
Table 5-1  
Pre-test/Post-test means and standard deviations of the experimental group

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>1</td>
<td>81.70</td>
<td>7.88</td>
</tr>
<tr>
<td>2</td>
<td>87.37</td>
<td>8.40</td>
</tr>
<tr>
<td>3</td>
<td>85.43</td>
<td>9.70</td>
</tr>
<tr>
<td>4</td>
<td>87.00</td>
<td>7.45</td>
</tr>
<tr>
<td>5</td>
<td>84.90</td>
<td>10.08</td>
</tr>
<tr>
<td>6</td>
<td>89.63</td>
<td>7.94</td>
</tr>
<tr>
<td>Total</td>
<td>85.99</td>
<td>8.85</td>
</tr>
</tbody>
</table>

Table 5-2  
Pre-test/Post-test means and SDs of the control group

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>7</td>
<td>82.90</td>
<td>6.57</td>
</tr>
<tr>
<td>8</td>
<td>83.40</td>
<td>9.51</td>
</tr>
<tr>
<td>9</td>
<td>82.10</td>
<td>8.24</td>
</tr>
<tr>
<td>10</td>
<td>88.97</td>
<td>8.52</td>
</tr>
<tr>
<td>11</td>
<td>88.77</td>
<td>11.99</td>
</tr>
<tr>
<td>12</td>
<td>81.23</td>
<td>8.07</td>
</tr>
<tr>
<td>Total</td>
<td>84.56</td>
<td>9.38</td>
</tr>
</tbody>
</table>

Figure 5-1 graphically displays the mean scores of the study sample. These show that the study sample scored higher post- than pre-test.
Figure 5.1 Means of the experimental and control groups on pre- and post-tests
The graph shows that the scores of the experimental group were higher in the post-test than the scores of the control group which scored only slightly higher in the post-test than the pre-test. The significance of the differences between the mean scores pre-test and post-test for the experimental and control groups were examined using the t-test for paired samples. The results of the analysis of the differences between the mean scores of the experimental group are shown in table 5-3.

Table 5-3

Results of the t-test of the experimental group on the pre and post tests

<table>
<thead>
<tr>
<th>Test</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>T-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>180</td>
<td>85.99</td>
<td>8.85</td>
<td>179</td>
<td>*-17.37</td>
</tr>
<tr>
<td>Post</td>
<td>103</td>
<td>103.12</td>
<td>11.69</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Statistically significant (α = .05).

The difference between the mean scores of the experimental group in the pre- and post-tests of the attitude scale (17.13) is significant at the (α = .05) level. Thus, the experimental group's scores improved through the period of the environmental programme. The control group's results are presented in table 5-4.
Table 5-4

Results of the t-test of the control group on the attitude scale

<table>
<thead>
<tr>
<th>Test</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>180</td>
<td>84.56</td>
<td>9.38</td>
<td>179</td>
<td>-1.76</td>
</tr>
<tr>
<td>Post</td>
<td></td>
<td>86.47</td>
<td>11.04</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The difference between the mean scores of the control group in the pre- and post-tests of the attitude scale was not significant at the ($\alpha = .05$) level. The difference between the mean scores in the two tests (-1.91) was due either to chance or familiarity with the test.

To make certain that the improvement of the experimental group in the post-test was not due to the effect of the pre-test or to other intervening variables, the differences between the mean scores of the experimental and control groups in the pre-test were examined to ensure the groups’ equivalence before the programme’s implementation, to isolate the effect of the programme. Table 5-5 shows the results of the t-test for independent groups in the pre-test of the attitude scale.

Table 5-5

Analysis of the pre-test, mean scores of the experimental and control groups

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>T-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>180</td>
<td>85.99</td>
<td>8.85</td>
<td>358</td>
<td>1.49</td>
</tr>
<tr>
<td>Control</td>
<td>180</td>
<td>84.56</td>
<td>9.38</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The difference between the mean scores in the pre-test of the attitude scale (1.43) was not significant at the (α = .05) level. The means of the two groups were equal, showing that the two groups were equivalent and randomly selected.

The difference between the mean scores of the two groups in the post-test was examined next. Table 5-6 summarises the results of the t-test for independent samples on the attitudes scale.

Table 5-6
Analysis of the post-test, mean scores of the experimental and control groups

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>T-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>180</td>
<td>103.12</td>
<td>11.689</td>
<td>358</td>
<td>*13.89</td>
</tr>
<tr>
<td>Control</td>
<td>180</td>
<td>86.47</td>
<td>11.04</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Statistically significant (α = .05).

The mean difference between the two groups (16.65) was significant at the (α = .05) level. Because the two groups were randomly selected and equivalent before the implementation of the programme, it can be concluded that the significant difference between the two groups in the post-test was due to exposure to the programme. It can also be claimed that the programme achieved its purposes in promoting positive attitudes towards the environment since the experimental group possessed more positive attitudes towards the environment than the control group at the conclusion of the experiment.
However, Campbell and Stanley (1963) indicate that “the most acceptable test in the case of the true pre-test post-test experimental design, as in this study, is to compute for each group pre-test/post-test gain scores and to compute a (t) between experimental and control groups on these gain scores” (p.23). Such computing revealed a t-value of (9.38) which was significant at the (α=.05 level and df 358). Table 5-7 contains the results of the analysis of the differences between the mean scores of the gain (pre-post-tests) between the experimental and control groups.

### Table 5-7

Results of the analysis of the gain scores for the experimental and control groups

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>T-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>180</td>
<td>17.65</td>
<td>14.832</td>
<td>358</td>
<td>∗9.38</td>
</tr>
<tr>
<td>Control</td>
<td>180</td>
<td>2.31</td>
<td>16.173</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Statistically significant (α = .05).

This result further supports the results above of the significant difference between the attitudes of the experimental and control groups and reinforces the positive effect of the environmental programme on children’s attitudes. The first null hypothesis was therefore rejected.

Armstrong and Impara (1991) indicate that the theme of each topic in attitude scales must be considered separately when evaluating the effect of such a topic on environmental attitudes. Some topics may have a greater impact on attitudes than others. The differences between the experimental and control groups were examined to
evaluate the impact of the programme on children’s environmental attitudes in the three domains of environmental attitude scale. Table 5-8 shows the results of the t-test for independent samples in the three domains.

Table 5-8
Analysis of the pre-test, mean scores of the experimental and control groups in the three domains of environmental attitudes

<table>
<thead>
<tr>
<th>Jordanian</th>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>T-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollution</td>
<td>Experimental</td>
<td>180</td>
<td>27.68</td>
<td>3.71</td>
<td>358</td>
<td>1.06</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>180</td>
<td>27.26</td>
<td>3.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste</td>
<td>Experimental</td>
<td>180</td>
<td>28.55</td>
<td>4.19</td>
<td>358</td>
<td>*3.05</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>180</td>
<td>27.21</td>
<td>4.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animals &amp; Plants</td>
<td>Experimental</td>
<td>180</td>
<td>29.76</td>
<td>4.46</td>
<td>358</td>
<td>-.86</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>180</td>
<td>30.09</td>
<td>4.82</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Statistically significant ($\alpha = .05$).

As can be seen there are no significant differences between the mean scores of the experimental and control groups in two domains in the pre-test, Pollution and Animals and Plants, whereas in the Waste domain differences are significant. Thus, the fact that the two groups were equivalent before the implementation of the programme in two domains a t-test for independent samples can be used to examine the differences between their mean scores in the post-test. In the Waste domain the two groups were not equivalent and Analysis of Covariance should be used to compare the differences between their means in the
post-test in order to avoid the effect of the pre-test. Table 5-9 presents the results of the analysis of the differences between the mean scores of the experimental and control groups in the Pollution and the Animals and Plants domains in the post-test.

Table 5-9
Analysis of the post-test, mean scores of the experimental and control groups in the two domains of environmental attitudes

<table>
<thead>
<tr>
<th>Domain</th>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>T-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollution</td>
<td>Experimental</td>
<td>180</td>
<td>31.69</td>
<td>3.66</td>
<td>358</td>
<td>*9.66</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>180</td>
<td>27.79</td>
<td>3.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animals &amp; Plants</td>
<td>Experimental</td>
<td>180</td>
<td>35.13</td>
<td>4.56</td>
<td>358</td>
<td>*9.08</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>180</td>
<td>30.58</td>
<td>4.94</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Statistically significant (α = .05).

The differences between the mean scores of the experimental and control groups were (3.9) in the Pollution domain and (4.55) in the Animals and Plants domain. Both differences were significant at the (α = .05) level. That is, children in the experimental group had more positive attitudes than the control group towards the environment in two of the domains of environmental attitude.

To examine the significance of the differences between the mean scores for the experimental and control groups in the Waste domain, Analysis of Covariance was used. Table 5-10 shows the result of the analysis of the means of the two groups.
Chapter Five

Table 5-10
Results of the ANCOVA for the mean scores of the experimental and control groups in the Waste domain in the post-test

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Covariates (Pre-test)</td>
<td>130.985</td>
<td>1</td>
<td>130.985</td>
<td>*4.81</td>
</tr>
<tr>
<td>Group (post-test)</td>
<td>5929.724</td>
<td>1</td>
<td>5929.724</td>
<td>*217.58</td>
</tr>
<tr>
<td>Residual</td>
<td>9729.488</td>
<td>357</td>
<td>27.253</td>
<td>*111.19</td>
</tr>
<tr>
<td>Total</td>
<td>15790.197</td>
<td>359</td>
<td>43.948</td>
<td></td>
</tr>
</tbody>
</table>

* Statistically significant (α = .05).

The table shows that the pre-test had an effect on both groups before the treatment, so the use of ANCOVA is important. It can be concluded that the mean difference (8.21) between the experimental and control groups was significant at the (α = .05) level. The experimental group scored higher than the control group because of the effect of the programme. Thus, it can be argued that there was a significant effect of the programme on the attitudes of children in each of the three domains of environmental attitude.

II Findings Relating to the Effect of Gender

To answer the second question of the study, the following null hypothesis was examined:

“There will be no significant differences at the (α = .05) level in the environmental attitudes of fourth grade children due to their gender (males, females)”. Before testing this hypothesis it is necessary to assure the equivalence of the two groups prior to the programme’s implementation and that
there were no significant differences between their mean scores in the pre-test. Table 5-11 shows the results of the analysis of the differences between the mean scores of males and females.

Table 5-11
Gender differences in mean scores of the pre-test

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>T-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>90</td>
<td>85.41</td>
<td>9.20</td>
<td>178</td>
<td>-.88</td>
</tr>
<tr>
<td>Female</td>
<td>90</td>
<td>86.57</td>
<td>8.51</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The mean difference of (-1.16), is not significant and the two samples can be regarded as equivalent. To examine the effect of children’s gender on attitudes towards the environment, the t-test was also used. Table 5-12 shows the results of the analysis of the differences between the mean scores of males and females in the post-test.

Table 5-12
Gender differences in mean scores of the post-test

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>T-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>90</td>
<td>100.41</td>
<td>11.69</td>
<td>178</td>
<td>*-3.19</td>
</tr>
<tr>
<td>Females</td>
<td>90</td>
<td>105.83</td>
<td>11.14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Statistically significant (α = .05).

The difference between the mean scores of males and females in the post-test (-5.42) was significant at the (α = .05) level; female pupils scored more highly than males and had more positive attitudes towards the environment. Thus the rejection of the second null hypothesis. The differences in the three domains of environmental attitude were also
examined. Table 5-13 presents the results of the analysis of the mean scores of the boys and the girls in the three domains in the pre-test.

**Table 5-13**

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>T-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollutin</td>
<td>Male</td>
<td>90</td>
<td>27.36</td>
<td>3.90</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>90</td>
<td>28.00</td>
<td>3.51</td>
</tr>
<tr>
<td>Waste</td>
<td>Male</td>
<td>90</td>
<td>29.46</td>
<td>3.95</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>90</td>
<td>27.64</td>
<td>4.24</td>
</tr>
<tr>
<td>Animals &amp; Plants</td>
<td>Male</td>
<td>90</td>
<td>28.60</td>
<td>4.48</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>90</td>
<td>30.92</td>
<td>4.15</td>
</tr>
</tbody>
</table>

* Statistically significant (α = .05).

The mean difference between males and females in Pollution issues was (-.64), in Waste issues (1.81) and in Animals and Plants issues (-2.32). Significant differences were found in attitude means in Waste issues and Animals and Plants issues at the (α = .05) level. In Pollution issues the mean difference was not significant. Thus, it can be seen that males and females were equivalent before the implementation of the programme in the Pollution domain, while they were not equivalent in the other two domains.

Hence, to examine the mean scores of males and females in the post-test in the three domains One-way (ANOVA) should be used in the case of Pollution and Analysis of Covariance in Waste and Animals.
and Plants domains, in order to overcome the effect of the pre-test in the post-test in these domains. Table 5-14 presents the analysis of the differences between the mean scores of males and females in Pollution issues in the post-test.

**Table 5-14**
Gender differences in the Pollution domain of the environmental attitude in the post-test

<table>
<thead>
<tr>
<th>Domain</th>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>T-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollution</td>
<td>Male</td>
<td>90</td>
<td>30.68</td>
<td>3.77</td>
<td>178</td>
<td>-3.85</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>90</td>
<td>32.70</td>
<td>3.26</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Statistically significant (α = .05).

The mean difference between males and females was (-2.02); the post-test mean score for females in Pollution was significantly higher than for males (t=-3.85, df = 178, α = .05). The practical impact of this finding is that gender did have an effect on the attitudes of pupils on Pollution issues.

In Waste issues the mean scores for males was 35.78 and for females 36.83. The mean difference between males and females (-1.05) was examined. Table 5-15 presents the result of Analysis of Covariance (ANCOVA) with two gender levels in the Waste domain. No significant attitudinal differences were found between the means for males and females (F = 1.442, α = .05).
Table 5-15
Results of the ANCOVA for the mean scores of children in the Waste domain in the post-test

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Covariates (Pre-test)</td>
<td>18.086</td>
<td>1</td>
<td>18.086</td>
<td>.655</td>
</tr>
<tr>
<td>Sex (post-test)</td>
<td>39.800</td>
<td>1</td>
<td>39.800</td>
<td>1.442</td>
</tr>
<tr>
<td>Residual</td>
<td>4884.308</td>
<td>177</td>
<td>27.595</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4942.194</td>
<td>179</td>
<td>27.610</td>
<td></td>
</tr>
</tbody>
</table>

In the Animals and Plants domain the mean for male students was (33.96) and for female was (36.30). Analysis of Covariance (ANCOVA) was used to examine the mean difference (-2.34) between males and females in the Animals and Plants domain. Table 5-16 shows the results of the Analysis of Covariance.

Table 5-16
Results of the ANCOVA for the mean scores of males and females in the Animals and Plants domain in the post-test

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Covariates (Pre-test)</td>
<td>404.071</td>
<td>1</td>
<td>404.071</td>
<td>*22.307</td>
</tr>
<tr>
<td>Sex (post-test)</td>
<td>117.847</td>
<td>1</td>
<td>117.847</td>
<td>*6.506</td>
</tr>
<tr>
<td>Residual</td>
<td>3206.143</td>
<td>177</td>
<td>18.114</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3728.061</td>
<td>179</td>
<td>20.827</td>
<td></td>
</tr>
</tbody>
</table>

* Statistically significant (α = .05).

The differences between the mean scores of males and females were significant (F = 6.506, α = .05). Females had more positive attitudes towards the environment than males in Animals and Plants issues.
The null hypothesis, that there are no significant differences between the mean scores of males and females in the Waste domain was therefore accepted. The null hypotheses regarding the Pollution and Animals and Plants domains was rejected.

III Findings Relating to the Effect of the School Environment

To answer the third question of the study the following null hypothesis was examined:

"There will be no significant differences at the (α = .05) level in the environmental attitudes of Fourth grade children due to the school environment (city-camp-village).

Table 5-17 presents the mean scores and standard deviations of the three groups in the pre-test. The differences between the mean scores of the three groups in the pre-test were tested using One-way Analysis of Variance (ANOVA). The result of the Analysis of Variance is shown in table 5-18.

Table 5-17
Pre-test, mean scores and SDs of children with respect to school environment

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>City</td>
<td>60</td>
<td>83.57</td>
<td>8.96</td>
</tr>
<tr>
<td>Village</td>
<td>60</td>
<td>86.27</td>
<td>7.98</td>
</tr>
<tr>
<td>Camp</td>
<td>60</td>
<td>86.08</td>
<td>9.27</td>
</tr>
</tbody>
</table>
Table 5-18  
Analysis of Variance of children’s scores with respect to school environment in the pre-test

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>2</td>
<td>273.1444</td>
<td>136.5722</td>
<td>1.78</td>
</tr>
<tr>
<td>Within groups</td>
<td>177</td>
<td>13571.0500</td>
<td>76.6726</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>179</td>
<td>13844.1944</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5-17 reveals only minor variations in mean scores. The results of a One-way Analysis of Variance (ANOVA) revealed no statistically significant differences between the mean scores in terms of school environment (Table 5-18). It can be said that the three groups of children were equivalent with respect to school environment before the implementation of the environmental programme.

A One-way Analysis of Variance of children’s responses in the three domains of environmental attitude with respect to school environment in the pre-test also revealed no significant differences (Table 5-19).

Table 5-19  
The Analysis of Variance in the three domains of environmental attitudes with respect to school environment in the pre-test

<table>
<thead>
<tr>
<th>Domain</th>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollution</td>
<td>between</td>
<td>2</td>
<td>44.41</td>
<td>22.21</td>
<td>1.677</td>
</tr>
<tr>
<td></td>
<td>within</td>
<td>177</td>
<td>2343.92</td>
<td>13.24</td>
<td></td>
</tr>
<tr>
<td></td>
<td>total</td>
<td>179</td>
<td>2388.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste</td>
<td>between</td>
<td>2</td>
<td>20.08</td>
<td>10.04</td>
<td>.586</td>
</tr>
<tr>
<td></td>
<td>within</td>
<td>177</td>
<td>3032.37</td>
<td>17.13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>total</td>
<td>179</td>
<td>3052.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animals &amp;</td>
<td>between</td>
<td>2</td>
<td>64.71</td>
<td>32.36</td>
<td>1.729</td>
</tr>
<tr>
<td>Plants</td>
<td>within</td>
<td>177</td>
<td>3311.87</td>
<td>18.71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>total</td>
<td>179</td>
<td>3376.58</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Based on these results and the equivalence of the groups of students (city, village and camp) in all three domains, the null hypothesis relating to the effect of the environment of the school on children's attitudes in the post-test in the three domains of environmental attitude was examined. Table 5-20 shows the mean scores of children with respect to school environment.

Table 5-20
Post-test, mean scores and SDs of children with respect to school environment

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>City</td>
<td>60</td>
<td>98.35</td>
<td>10.24</td>
</tr>
<tr>
<td>Village</td>
<td>60</td>
<td>104.95</td>
<td>9.96</td>
</tr>
<tr>
<td>Camp</td>
<td>60</td>
<td>106.07</td>
<td>13.23</td>
</tr>
</tbody>
</table>

The differences between the mean scores of the three groups were examined. The results of a One-way Analysis of Variance are shown in table 5-21.

Table 5-21
Results of the Analysis of Variance of children’s attitudes with respect to school environment in the post-test

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>2</td>
<td>2087.0778</td>
<td>1043.5389</td>
<td>*8.26</td>
</tr>
<tr>
<td>Within Groups</td>
<td>177</td>
<td>22372.2333</td>
<td>126.3968</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>179</td>
<td>24459.3111</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Statistically significant (α = .05).
The differences between the mean scores of the three school environments are significant at the ($\alpha = .05$) level. The third null hypothesis was therefore rejected. In order to relate the variations to their source, the pairwise differences between the means were tested using Newman-Keuls multiple comparisons. The results are presented in table 5-22.

**Table 5-22**  
Multiple comparisons between the mean scores of children with respect to school environment

<table>
<thead>
<tr>
<th>Group</th>
<th>City</th>
<th>Village</th>
<th>Camp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>98.35</td>
<td>104.95</td>
<td>106.07</td>
</tr>
<tr>
<td>City</td>
<td>98.35</td>
<td>-</td>
<td>*-6.6</td>
</tr>
<tr>
<td>Village</td>
<td>104.95</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Camp</td>
<td>106.07</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* Pairs of groups significantly different at the ($\alpha=.05$) level.

The difference between the mean scores of the children in villages and those in camps (-1.12) is not significant at the ($\alpha = .05$) level, while the difference between children in cities and in villages (-6.6) is significant at the ($\alpha=.05$) level. The difference between the mean scores of children in cities and camps (-7.72) is also significant at the ($\alpha = .05$) level. Thus, the mean scores of children in cities are responsible for the differences of the mean scores between the three settings of the school environment.

In all the domains of environmental attitude, children’s mean scores and standard deviations are shown in table 5-23.
Table 5-23
Means and standard deviations of children by environmental domain and school environment

<table>
<thead>
<tr>
<th>Domain</th>
<th>Environment</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollution</td>
<td>City</td>
<td>60</td>
<td>30.45</td>
<td>3.55</td>
</tr>
<tr>
<td></td>
<td>Village</td>
<td>60</td>
<td>32.38</td>
<td>2.93</td>
</tr>
<tr>
<td></td>
<td>Camp</td>
<td>60</td>
<td>32.23</td>
<td>4.13</td>
</tr>
<tr>
<td>Waste</td>
<td>City</td>
<td>60</td>
<td>33.35</td>
<td>4.72</td>
</tr>
<tr>
<td></td>
<td>Village</td>
<td>60</td>
<td>37.43</td>
<td>4.35</td>
</tr>
<tr>
<td></td>
<td>Camp</td>
<td>60</td>
<td>38.13</td>
<td>5.39</td>
</tr>
<tr>
<td>Animals &amp; Plants</td>
<td>City</td>
<td>60</td>
<td>34.55</td>
<td>4.11</td>
</tr>
<tr>
<td></td>
<td>Village</td>
<td>60</td>
<td>35.13</td>
<td>4.27</td>
</tr>
<tr>
<td></td>
<td>Camp</td>
<td>60</td>
<td>35.70</td>
<td>5.23</td>
</tr>
</tbody>
</table>

The differences between the mean scores of children in the three school environment settings in the three domains in the post-test were examined. Table 5-24 shows the results of the One-way Analysis of Variance for the comparisons between the three means.

Table 5-24
The Analysis of Variance in the three domains of environmental attitude with respect to school environment in the post-test

<table>
<thead>
<tr>
<th>Domain</th>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollution</td>
<td>between</td>
<td>2</td>
<td>138.8111</td>
<td>69.4056</td>
<td>*5.44</td>
</tr>
<tr>
<td></td>
<td>within</td>
<td>177</td>
<td>2257.7667</td>
<td>12.7557</td>
<td></td>
</tr>
<tr>
<td></td>
<td>total</td>
<td>179</td>
<td>2396.5778</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste</td>
<td>between</td>
<td>2</td>
<td>800.8778</td>
<td>23.39734</td>
<td>*17.11</td>
</tr>
<tr>
<td></td>
<td>within</td>
<td>177</td>
<td>4141.3167</td>
<td>0.04389</td>
<td></td>
</tr>
<tr>
<td></td>
<td>total</td>
<td>179</td>
<td>4942.1944</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animals &amp; Plants</td>
<td>between</td>
<td>2</td>
<td>39.6778</td>
<td>20.83831</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>within</td>
<td>177</td>
<td>3688.3833</td>
<td>9.8389</td>
<td></td>
</tr>
<tr>
<td></td>
<td>total</td>
<td>179</td>
<td>3728.0611</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Statistically significant (α = .05).
The differences between children on Pollution issues are statistically significant at the ($\alpha = .05$) level, as are those on Waste issues. No significant differences were found between the mean scores of children in the Animals and Plants domain. To test the pairwise differences between the means in the three domains of environmental attitude, Newman-Keuls multiple comparisons were employed. The results are summarised in table 5-25.

**Table 5-25**

Multiple comparisons between the mean scores of children in the Pollution domain in the post-test

<table>
<thead>
<tr>
<th>Group</th>
<th>City</th>
<th>Village</th>
<th>Camp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>30.45</td>
<td>32.38</td>
<td>32.23</td>
</tr>
<tr>
<td>City</td>
<td>30.45</td>
<td>-</td>
<td>*-1.93</td>
</tr>
<tr>
<td>Village</td>
<td>32.38</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Camp</td>
<td>32.23</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* Pairs of groups significantly different at the ($\alpha=.05$) level.

The difference between the mean scores of the children in villages and those in camps (.15) is not significant at the ($\alpha=.05$) level, while the difference between the mean scores of children in cities and in villages (-1.93) is significant at the ($\alpha = .05$) level. The difference between the mean scores of children in cities and camps (-1.78) is also significant at the ($\alpha = .05$) level. The mean scores of children in cities are responsible for the differences in the mean scores between the three school environment settings. This result is consistent with that of the differences in overall attitude means shown in table 5-22.
Table 5-26
Multiple comparisons between the mean scores of children in the Animals and Plants domain in the post-test

<table>
<thead>
<tr>
<th>Group</th>
<th>City</th>
<th>Village</th>
<th>Camp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>33.35</td>
<td>37.43</td>
<td>38.13</td>
</tr>
<tr>
<td>City</td>
<td>33.35</td>
<td>-</td>
<td>*-4.08</td>
</tr>
<tr>
<td>Village</td>
<td>37.43</td>
<td>-</td>
<td>-0.70</td>
</tr>
<tr>
<td>Camp</td>
<td>38.13</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* Pairs of groups significantly different at the (α=.05) level.

The same results are shown in table 5-26. The difference between the mean scores of the children in villages and those in camps (-0.70) is not significant at the (α = .05) level, while the difference between the mean scores of children in cities and in villages (-4.08) is significant at the (α = .05) level. The difference between the mean scores of children in cities and camps (-4.78) is significant at the (α = .05) level. As before the mean scores of children in cities are responsible for the differences of the mean scores between the three settings of the school environment. These results therefore are consistent with the differences in the overall attitude which are shown in table 5-22 and in table 5-25.

IV Findings Relating to the Effect of the Programme on Parents’ Attitudes

To answer the fourth question of this study, the following null hypothesis was examined:
"FGEEP will produce no significant differences at the (α = .05) level in the environmental attitudes of fourth grade children's parents".

Table 5-27 summarises the means and SDs of parents in the pre- and post-tests, and the results of a t-test for paired samples.

Table 5-27
Results of the t-test of the experimental group (parents) on the attitude scale

<table>
<thead>
<tr>
<th>Test</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>T-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>180</td>
<td>42.88</td>
<td>6.148</td>
<td>179</td>
<td>*-9.48</td>
</tr>
<tr>
<td>Post</td>
<td></td>
<td>48.60</td>
<td>6.568</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Statistically significant (α = .05).

The difference between the mean scores of parents in the pre-test and the post-test was (-5.72) and the t-value was (-9.48), which is significant at the (α = .05) level. The fourth null hypothesis was therefore rejected. The environmental programme produced positive attitudes towards the environment in parents.

However, the results of the t-test for independent samples and the Analysis of Variance revealed no significant differences between the mean scores of parents due either to their gender or to their place of residence (city, village, camp). Nonetheless, a t-test for paired samples revealed significant differences between the mean scores of males, females; city, village and camp residents from pre-test to post-test. No comment is offered on these results which lie outside the scope of this study.
V Findings Relating to the Effect of FGEEP on Children’s Knowledge

To answer the fifth question of the study, the following null hypothesis was examined:

"FGEEP will produce no significant differences at the (\(\alpha = .05\)) level in the environmental knowledge of fourth grade children".

Tables 5-28 and 5-29 show the mean scores of the study sample (experimental and control group) on the knowledge scale, pre and post-test.

Table 5-28
Pre-test/Post-test knowledge scale means and SDs of the experimental group

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>1</td>
<td>14.83</td>
<td>2.89</td>
</tr>
<tr>
<td>2</td>
<td>12.80</td>
<td>3.35</td>
</tr>
<tr>
<td>3</td>
<td>14.27</td>
<td>4.06</td>
</tr>
<tr>
<td>4</td>
<td>13.40</td>
<td>2.87</td>
</tr>
<tr>
<td>5</td>
<td>13.10</td>
<td>2.78</td>
</tr>
<tr>
<td>6</td>
<td>13.83</td>
<td>4.34</td>
</tr>
<tr>
<td>Total</td>
<td>13.71</td>
<td>3.46</td>
</tr>
</tbody>
</table>
Table 5-29
Pre-test/Post-test knowledge scale means and SDs of the control group

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>7</td>
<td>10.63</td>
<td>3.40</td>
</tr>
<tr>
<td>8</td>
<td>11.90</td>
<td>3.24</td>
</tr>
<tr>
<td>9</td>
<td>13.53</td>
<td>4.07</td>
</tr>
<tr>
<td>10</td>
<td>13.90</td>
<td>3.84</td>
</tr>
<tr>
<td>11</td>
<td>12.40</td>
<td>3.58</td>
</tr>
<tr>
<td>12</td>
<td>13.30</td>
<td>3.65</td>
</tr>
<tr>
<td>Total</td>
<td>12.61</td>
<td>3.76</td>
</tr>
</tbody>
</table>

Figure 5-2 graphically displays the differences between the mean scores of the experimental and control groups on the knowledge scale.
Figure 5-2 Means of the experimental and control groups in the pre-and post-tests of the knowledge test
The graph shows the mean scores of the experimental group in the post-test were higher than in the pre-test. The same result was also found between the mean scores of the control group. To examine the significance of such differences, the t-test for paired samples was used. Table 5-30 shows the results of the analysis of the mean scores of the experimental group from the pre-test to post-test.

### Table 5-30
Results of the t-test of the experimental group on the knowledge scale

<table>
<thead>
<tr>
<th>Test</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>T-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>180</td>
<td>13.71</td>
<td>3.46</td>
<td>179</td>
<td>*-29.33</td>
</tr>
<tr>
<td>Post</td>
<td></td>
<td>23.92</td>
<td>4.74</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Statistically significant (α = .05).

The difference between the mean scores of the experimental group in the pre and post-tests (-10.21) was significant at the (α=.05 and df 179) level.

The t-test for paired samples was also used to examine the differences between the mean scores of the control group on the knowledge scale from the pre-test to the post-test. The results of the t-test are shown in table 5-31.
Table 5-31
Results of the t-test of the control group on the knowledge scale.

<table>
<thead>
<tr>
<th>Test</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>T-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>180</td>
<td>12.61</td>
<td>3.76</td>
<td>179</td>
<td>-3.64</td>
</tr>
<tr>
<td>Post</td>
<td></td>
<td>13.57</td>
<td>3.92</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Statistically significant (α = .05).

The difference between the mean scores of the pre-test and the post-test (-.96) was significant at the (α = .05).

To establish whether or not the programme affected children’s environmental knowledge, a comparison was made between the mean scores of children in the experimental and control groups. A t-test was used to examine the equivalence of the two groups at the beginning of the study. Table 5-32 summarises the results of the knowledge scale of the t-test for independent samples in the pre-test.

Table 5-32
Analysis of the pre-test, mean scores of the environmental knowledge of the experimental and control groups

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>T-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>180</td>
<td>13.71</td>
<td>3.46</td>
<td>358</td>
<td>2.87</td>
</tr>
<tr>
<td>Control</td>
<td>180</td>
<td>12.61</td>
<td>3.76</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Statistically significant (α = .05).

The result show a significant difference between the mean scores of the experimental and control groups at the (α=.05 and df 358) level. The experimental group scored higher than the control group(+ 1.1). The
two groups were not equivalent on the knowledge scale and ANCOVA should be used to examine the difference between their mean scores.

The means and standard deviations of the experimental and control groups in the post-test are shown in table 5-33.

Table 5-33
Means and standard deviations of the experimental and control groups in the post-test of the knowledge scale

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>180</td>
<td>23.92</td>
<td>4.74</td>
</tr>
<tr>
<td>Control</td>
<td>180</td>
<td>13.57</td>
<td>3.92</td>
</tr>
</tbody>
</table>

The mean difference between the scores of the experimental and control groups in the post-test was (10.35). To examine the significance of this difference and to overcome the effect of the pre-test on children's knowledge, the Analysis of Covariance (ANCOVA) with two group levels was used. Table 5-34 shows the results of such an analysis.

Table 5-34
Results of the ANCOVA for the mean scores of children on the knowledge scale in the post-test

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Covariates (pre-test)</td>
<td>2840.189</td>
<td>1</td>
<td>2840.189</td>
<td>*192.637</td>
</tr>
<tr>
<td>Group (post-test)</td>
<td>8330.781</td>
<td>1</td>
<td>8330.781</td>
<td>*565.038</td>
</tr>
<tr>
<td>Residual</td>
<td>5263.519</td>
<td>357</td>
<td>14.744</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>16434.489</td>
<td>359</td>
<td>45.779</td>
<td></td>
</tr>
</tbody>
</table>

* Statistically significant (α = .05).
There are significant differences between the mean scores of the experimental and control groups at the \((\alpha = .05)\) level in the post-test. Therefore, the fifth null hypothesis was rejected - the experimental group scored significantly higher than the control group in the post-test of the knowledge scale due to the effect of the programme.

**VI Findings Relating to the Relationship between the Pupils’ Scores on the Attitudes and Knowledge Scales**

To answer the sixth question of the study the following null hypothesis was examined:

"There will be no positive relationship at the \((\alpha = .05)\) level between the environmental knowledge and attitudes of fourth grade children". Pearson’s correlation coefficient was calculated to estimate the correlation between children’s post-test scores on the knowledge and attitude scales. Individual student scores on these scales were used to determine such a correlation. The resulting correlation coefficient \((r = .44)\) is significant at the \((\alpha = .05)\) level. The sixth null hypothesis was therefore rejected. It appears that the more knowledge children obtain the more positive are their attitudes towards the environment.

**VII Findings Relating to the Relationship Between the Pupils’ Academic Achievement and Attitudes and Knowledge**

To answer the seventh question of the study, the following null hypotheses were examined:
(a) "there will be no positive relationships at the ($\alpha = .05$) level between the academic achievement (social studies, science and general average) and the environmental attitudes of fourth grade children.

(b) "there will be no positive relationships at the ($\alpha = .05$) level between the academic achievement (social studies, science and general average) and the environmental knowledge of fourth grade children".

Pearson’s correlation coefficients of the relationships between the academic achievement of children and their responses on the attitude and knowledge scales are shown in table 5-35.

Table 5-35
The correlation between the academic achievement, attitudes and knowledge.

<table>
<thead>
<tr>
<th>Scores</th>
<th>N</th>
<th>Social studies</th>
<th>Science</th>
<th>General average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>180</td>
<td>.27*</td>
<td>.27*</td>
<td>.37*</td>
</tr>
<tr>
<td>Knowledge</td>
<td>180</td>
<td>.58*</td>
<td>.54*</td>
<td>.62*</td>
</tr>
</tbody>
</table>

* Statistically significant ($\alpha = .05$).

The correlation coefficients between the academic achievement and children’s attitudes and knowledge are both significant. That is, the seventh null hypothesis was rejected. The higher the academic achievement of the child, the more positive the attitudes and knowledge he/she displayed.
It is clear that there is a relationship between both knowledge and academic achievement and attitudes. This would be expected from the fact that attitudes are seen to be composed of these three components (see Chapter One, p. 8). What cannot be determined from the study is a causal relationship between the components. It could be that more able children have, or develop, more favourable attitudes, or indeed already hold them. On the other hand it may be that such children benefited more than others from the programme.
Discussion of the results of the study

The study followed a systematic procedure for developing and evaluating an environmental education programme to promote positive attitudes towards the environment in children and to construct a scale for assessing the development of such attitudes. The programme used fourth grade primary school children aged 9-10 years as its target population as representative of pupils in lower primary classes in Jordan (grades 1-4).

The study began in 1995 in surveying environmental education literature concerning environmental attitudes, in order to design a conceptual framework for the study. This was the foundation of the programme and in itself an important outcome of the study (see Figure 3-1). Both the programme, in its three stages, and the measurement tools and instructional materials are based upon such a framework. The programme was carried out in the two academic years 1995 and 1996.

The main target population of the study was primary school children in Jordan, but the programme was extended and studied British children, in respect to the development of the environmental attitudes scale. As a result the EASPSC has two versions, the Arabic and English.
Validation of the scale took a long and very precise process until it reached the criteria set and met the desirable psychometric properties.

The programme developed instructional materials; a pupil’s textbook, a pupil’s workbook and a teacher’s manual (see Appendix 1). These three books altogether provide a valuable foundation for the development of an environmental education curriculum for Jordanian primary schools. The books include a new and critical perspective to the teaching-learning process in general and to environmental education in particular. The instructional material was not designed as a traditional textbook, which students generally use in the primary school in Jordan, but as a guide that might be more attractive for children to study.

Furthermore, the programme gave a particular concern to parents who have not hitherto played any significant role in Jordanian primary schools. The schools recognise only the authority of the head teacher and the instructions, rules, and regulations of the education directorate in the area. Hence, in the absence of the Minister of Education, the general education director is regarded as the absolute authority and the source of all rules and orders. The head teacher will express the wishes of all higher authorities. In any event, parents are ignored. For example, it was impossible to find a single meeting attended by parents with a general education director or even a head teacher. It seems almost as if these are forbidden procedures, or even a matter of shame. In the school, if a meeting is held throughout the academic year it would be a routine meeting with no effective decisions taken. Some head teachers even indicate that they filled records by imaginary
meetings with parents, just to meet the satisfaction of the general director.

In contrast, parents were enrolled in FGEEP, many leaflets were sent to them, they were invited to observe their children's work and investigations in the field. A questionnaire was administered to them (see Appendix 2-C). They were informed whenever a visitor, or a lecturer, was invited to the school to deliver an environmental lecture. They shared their ideas and suggestions with the investigator to develop the questionnaire and the EASPSC. They were found to be effective, co-operative and very helpful.

Many questions were to be answered in the study which are discussed in the following pages.

1. The Impact of the Programme on Children's Attitudes

The question of "What is the effect of FGEEP on the environmental attitudes of fourth grade children?" is interesting to note the impact of the programme on pupils' attitudes. The null hypothesis relating to this question, was examined using the t-test for independent samples to compare the mean scores of the experimental and control groups. The t-test for paired samples was also used to analyse the differences between the mean scores of the students in the pre and post-tests for each group.

The null hypotheses concerning the impact of the environmental education programme on children's attitudes which state that:
"FGEEP will produce no significant differences at the ($\alpha = .05$) level in the environmental attitudes of fourth grade children was rejected. The difference between the mean scores for the experimental sample from the pre to post-tests was (17.13) while it was (1.43) for the control sample. The improvement in the experimental sample’s mean scores was highly significant. This result was consistent with the result of the t-test for independent samples between the mean scores of the experimental and control groups (16.65), also highly significant.

These results could be taken as an indication of the straightforward success of the programme in promoting positive attitudes towards the environment. Such an outcome is obviously related to differences in both the content and methods of delivery of environmental education in the programme compared with that in the normal primary school curriculum. It is not possible from the present study to determine the relative contributions of content and delivery methods to the promotion of positive attitudes. It was noticeable that a few teachers in the programme found it easier to adopt the content in their lessons, than to change the teaching and learning methods in their classrooms. The researcher suspects that the programme was most successful in those classrooms where changes in both content and method were incorporated, but can not demonstrate that this was so.

Nonetheless, it was the researcher’s concern in this study to develop an effective programme to promote desirable attitudinal outcomes regardless of the various elements that might contribute positively or negatively to the aforementioned results. There was still a great
difference between teachers' abilities and enthusiasm for teaching and introducing environmental education to their students particularly in a non-conventional learning atmosphere. There were some differences also in the acceptance of parents and their co-operation with their children's enquiries and investigations. The school's administration was a third variable of major importance. Some head teachers\(^1\) participated more effectively in the programme than others. Some merely accepted the programme as extra material without any effort towards understanding its importance or its major objectives. Nevertheless, those mainly responsible for the programme's implementation were the class teachers.

The effect of the programme on children's attitudes was not only on the total score that each child might gain on the attitudes scale, but also on the three domains of environmental attitude. The results in Chapter Five indicate that the fourth grade children in the experimental group demonstrated more strongly positive attitudes in each three domains of environmental attitude. This result leaves no doubt that the programme had a positive impact on children's attitudes towards the environment.

These results are consistent with previous findings reporting that pupils exhibited positive attitudes following the exposure to an environmental education programme. Jaus (1982, 1984) indicated that the environmental education instruction was effective in changing students' attitudes towards the environment. Almarashdah (1989) noted that the

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\(^1\) Mr. Moh'd Al-Jamra, the head teacher of Irbid Camp Boys School No 4, shared voluntarily with the science teacher in introducing the instructional material to his pupils within his own vocational education periods. He also attended different environmental activities with the pupils and encouraged parents and the science teacher to adopt enthusiastically the programme.
environmental teaching appeared to produce statistically significant differences in students' attitudes towards the environment.

At the same time, the results were inconsistent with those of Ryan (1991), who found no significant differences, in few environmental issues, between the pupils who had participated in the programme and those who had not. The inconsistency might be related to the research methodology in Ryan's study and the short duration of his programme (see Chapter Two for more details).

Armstrong and Impara (1991) also found no significant differences between the pupils exposed and not exposed to an environmental programme even though the duration of their programme was longer. As Ryan (1991) and Armstrong and Impara (1991), Shepard and Speelman (1985) emphasise: "the experimental treatment seemed to have little effect upon environmental attitudes" (p.20). It could be argued that the duration of the programme might well be critical for bringing about sustainable and significant changes in pupils’ attitudes. This was noted by Shepard and Speelman (1985) who wrote "there is a relationship between programme's length and conservation attitude development" (p.20). This issue will be focused on in future research.

2. The Effect of Gender

Previous research, in several societies, with older pupils and with students, has shown irregular gender differences in environmental attitudes. For example, Gifford et al (1983) found females to hold more favourable attitudes than males, while both Blum (1984) and Roth and Perez (1989) found males more positive than females. In the
present study, significant differences were found among children. Female pupils scored significantly higher than males, with a mean of over 5 points higher. In other words, female pupils tended to have more positive attitudes towards the environment than males. This difference may be related to the values of the society to which the boys and girls belong.

The null hypothesis that states “there will be no significant differences at the ($\alpha = .05$) level in the environmental attitudes of fourth grade children due to their gender (males-females)” was therefore rejected.

In the three domains of environmental attitude, differences were more varied. As can be seen from the results in chapter five (tables 14-5, and 15-5), female overall positive attitudes towards the environment were found in two environmental domains. Their scores are significantly higher than males in Pollution issues (+2.02) and Animals and Plants issues (+2.34). Scores on the Waste domain are however almost identical, (35.78) for males and (36.83) females. Explaining these differences is far from straightforward. That girls scored higher than boys in the Pollution and the Animals and Plants domains might well be seen as related to sex role differences. It could be argued that such role differences did not account for the scores on the Waste domain, which could be related to similar consumption and environmental habits of both sexes. However, both males and females showed strongly positive attitudes towards the environment due to the exposure to the environmental programme. Both improved significantly from pre-test to post-test. The t-test for paired samples
revealed, in the case of males, \( t = -10.27, \text{df} = 89 \) and \( \alpha = .05 \), and for females \( t = -14.88, \text{df} = 89 \) and \( \alpha = .05 \).

3. The Effect of school environment

It might well be expected that children's environmental attitudes vary according to the setting of their home and school. The environmental differences of these settings in Jordan are obvious. Hence, the question "are there significant differences in the environmental attitudes of fourth grade children due to the school environment (city, camp, village)?" was asked. An analysis of pupils' scores from schools in the city of Irbid and its camp and surrounding rural areas (villages) was undertaken.

Table 5-22 above (p. 180) shows that, there was only minor variation in mean scores of children in villages and camps, their means being almost identical a difference of (-1.12). City school pupils had lower scores than those from village (-6.6) and camp (-7.72) schools. A One-way Analysis of Variance (ANOVA) revealed statistically significant differences between the three. Thus, city school children showed significantly lower positive attitudes towards the environment than those of villages and camps.

A possible explanation for this result is that city school pupils might have better living conditions than those in villages and camps which could affect their consumption habits and ways of using modern facilities such as cars instead of public means of transport. Their opportunity for observing or causing pollution and waste might be greater. In addition, children in Jordanian cities might still think that
some conservation actions such as recycling, reusing old items and reducing waste in energy use is a matter of shame rather than a positive and socially responsible form of behaviour. Whereas, children in villages and camps might collect items to sell them and gain some money to assist parents, who encourage them, in their living expenses.

Furthermore, it was impossible to ascertain whether or not city teachers were as enthusiastic in delivering the programme to the same extent as village or camp teachers. Teachers in camps were supported by their head teachers who attended many environmental activities and shared some of them with their students. Nonetheless, using the t-test for paired samples, city school pupils scored significantly higher from the pre-test to the post-test (t = -9.45, df = 59 and α = .05) which might be related, in general, to the impact of the programme on their attitudes.

This was also found to be true with respect to the children’s responses in the three domains of environmental attitude. The results in chapter five show that the children in the three school environments scored approximately the same and no significant differences were found in their responses in the Animals and Plants domain. In Pollution and Waste issues significant differences were found between the mean scores of children in the three school environments. City school pupils scored significantly lower (-1.93) than village school pupils. The same results (-1.78) were found between them and the camp school pupils. Multiple comparisons as shown in table 5-26 produced identical results in the Waste domain. No significant differences were found between the mean scores of village school pupils and camp school pupils. City
school pupils scored significantly lower than village pupils (-4.08) or camp pupils (-4.78).

As the explanation of the differences in the overall attitudes towards the environment, it could be argued that similar living conditions might have contributed to the identical environmental attitudes shown by village and camp pupils. Whereas in cities, modern life and more means of recreation, transportation, food habits, modern electronic and electrical equipments and life-style may lead to greater waste and pollution. In general, children in villages and camps have only limited modern facilities available. For example, there are fewer private cars available, less markets and stores to purchase from, little extra paper or food to be thrown away and loud electronic noises to be heard. Many people in villages and camps get some of their fruit and vegetables from their own gardens, own some animals, particularly chickens, and make use of their products. All these aspects of life might affect pupils' responses and contribute to the differences in their environmental attitudes. It has also to be said that teachers and head teachers might make some contributions to such variation unintentionally or otherwise.

Accordingly, the null hypothesis that states: "there will be no significant differences at the (α = .05) level in the environmental attitudes of fourth grade children due to the school environment (city, camp, village)" was rejected.
4. The Impact of the Programme on Parents’ Attitudes

The question of "what is the effect of FGEEP on the parents’ environmental attitudes of fourth grade children from the experimental group?" is interesting in that parents have been largely ignored in previous research. Parents’ attitudes towards the environment are very important for their children. Positive attitudes in particular can help to enhance children’s attitudes and facilitate their environmental learning. Children can easily recognise the consistency between what they learn at the school and what their parents do.

The null hypothesis relating to parents’ attitudes was examined using the t-test for paired samples. This led to the rejection of such a hypothesis that states: “FGEEP will produce no significant differences at the (α = .05) level in the environmental attitudes of fourth grade children’s parents”.

Parents were involved in the environmental education programme (FGEEP) either by responding to the environmental attitudes scale and/or by their co-operation with their children in helping to explain some environmental issues. They were interviewed by their children, asked many questions which needed to be understood, shared their children’s investigations and enquiries. Hence, all the instructional materials used by pupils throughout the programme were available to their parents. Parents could be considered as an important element in the programme, whose attitudes have particular potential.
The t-test for paired samples was used to determine the impact of the environmental programme on parents’ attitudes. The results seen in chapter five showed significant differences between the mean scores of parents from the pre-test to the post-test, \( t = -9.48 \), \( df = 179 \) and \( \alpha = .05 \). The mean difference between the pre-test and the post-test was (-5.72), which means that parents had more positive attitudes on the post-test than the pre-test.

It is well known that the Pre-/Post-test Single Group Design used in this study to examine the effect of FGEEP on parents’ attitudes has some limitations and that various intervening variables might contribute to the differences between mean scores pre-test and post-test. Despite these, the design is widely used in research. Accepting the assumption that different conditions might affect parents’ attitudes towards the environment were stable, it could be said that the programme had a positive effect on their attitudes and appeared to be successful in promoting such attitudes.

The results are inconsistent with Ryan’s findings (1991) who reported that: “neither levels of participation in outdoor activities, nor enjoyment from those activities lead to significantly different attitudes towards the environment in parents who participated in the programme” Regardless of his findings, Ryan confirmed that parents played an important role in formulating their children’s attitudes. As discussed above (p. 200) Ryan’s programme might be affected negatively either by its short duration or by the nature of the introduced activities. Parents in his programme were not activated to the extent that could affect their attitudes.
5. The Impact of the Programme on Children's Knowledge

Although the main purpose of the study was changing the attitudes of children, it was anticipated that FGEEP would have a particular impact also on their knowledge. The question "what is the effect of FGEEP on the environmental knowledge of fourth grade children?" was therefore asked.

The mean scores of the study sample were examined and the null hypothesis that indicates: "FGEEP will produce no significant differences at the ($\alpha = .05$) level in the environmental knowledge of fourth grade children" was rejected.

The decision of rejection was based on the results of the experimental and the control groups, both of which scored significantly higher on the post-test than the pre-test (tables, 30-5 and 31-5; p. 188, 189). The experimental group showed an increase of (10.21) points from the pre-test to the post-test, while the control group showed a minor increase of (.96) but such an increase was statistically significant ($t= -3.76$, $df = 179$, $\alpha = .05$). However, the results of the Analysis of Covariance revealed significant differences between the mean scores of the experimental and control groups ($F = 565.038$, $df = 1$, $\alpha = .05$).

It is to be noted here that the mean difference between the experimental and control groups on the post-test of the knowledge scale was (10.35) points and both lower than the ideal middle score (15) in the pre-test. In the post-test, the mean score of the control group was still lower, whereas the experimental group scored (+ 8.92) higher than the point
of (15). Accepting that 50% is the normal level of success in the educational system in Jordan, the mean score of the control group (45.23%) did not meet that level, but the experimental group's score (79.73%) can be considered as a high level of success. However, Armstrong and Impara (1991) did not support this finding. They reported that most of the explored topics concerning the impact of the environmental programme on pupils' knowledge did not significantly increase due to the exposure to such a programme.

It could be concluded that the environmental instructional material of the FGEEP produced positive effects on children's environmental knowledge. The control group illustrates the tendency and emphasis of teaching in the primary school in Jordan on the knowledge domain, in that it was not as effective in producing high scores in the affective domain. Such an outcome therefore should be carefully considered in the evaluation process of the recommendations of the National Conference for Educational Development in 1987 and the reform plan in Jordan.

Ignoring the affective and perhaps the psychomotor domains in teaching primary school children did not lead to the attainment of desirable targets of education in Jordan in creating the knowledgeable pupil who can manipulate, investigate, create, discover and produce solutions to the confronted problems either in the environmental aspects, in particular, or in life in general.

The results might also be explained in terms of teachers' thinking. Teachers need intensive sessions not only to receive new methods of
planning and teaching which are always emphasised in the educational workshops in Jordan, but they need to experience also new methods of thinking with open-minds which might lead to better outcomes. It is believed that teachers should be given a high level of concern and may be more than children particularly in an educational system which depends on teachers as the core of the teaching and learning process. Boring meetings in their holidays should be stopped, dealing with them as mere receivers of instructions from their supervisors should be changed. Teachers have to be respected and treated as important agents in the educational process. Supervisors have to abandon their inspectorial manner and attack educational problems at the root level by specifying the real causes behind them and not primarily focus on the symptoms of such problems.

The ways used to evaluate the instructional materials in FGEEP could also be an influence, since it depends on both pupils’ practical work through a systematic observation and his/her product rather than retention of the textbook - the most familiar method of assessment in Jordan. The programme therefore seemed to produce not only a systematic way for promoting environmental attitudes in children but a new perspective to the educational process in general by giving all their independence in planning, teaching, learning, solving, producing and so on.

In FGEEP, the teacher was given the opportunity to design his/her work and plan lesson plans within general objectives using self-study materials for his/her pupils and with a large margin of freedom. The pupils were very active in choosing the environmental activities and the
ways or the time of achieving them. In addition the head teachers and/or some of them were working as co-ordinators and facilitators for teaching and learning, fully sharing in the planning, implementation and evaluation processes. In addition, parents were given a specific role in explaining, investigating, developing and teaching their offsprings. This high level of activity could to an extent be responsible for the strongly positive attitudes shown by pupils in one hand, and their knowledge on the other. It was noticeable that the pupils and their teachers were very happy to be enrolled in the programme. The teachers requested their own copies of the instructional material and they still keep in touch with the programme’s advisory committee to make use of any additional material related to FGEEP.

6. The Relationship Between Knowledge and Attitudes

“What is the relationship between the knowledge and attitudes of fourth grade children?” was the sixth question in the study. The hypothesis that states: “there will be no positive relationship at the (α = 0.5) between the environmental knowledge and attitudes of fourth grade children” was rejected. The relationship between the children’s environmental knowledge in the experimental group and their attitudes was found to be positive. A correlation of (r = .44) revealed by Pearson coefficient was statistically significant at the (α = .05) level. While the relationship between the knowledge of the control group children and their attitudes (r = .14) was not significant. This might be related to the programme’s positive effect on children’s attitudes as well as their knowledge. The environmental activities produced
knowledge and attitude change at the same time. The normal teaching which depends on the textbook containing environmental topics was not sufficient to produce neither positive attitudes towards the environment nor high level of environmental knowledge. Therefore, no significant relationship was found between the environmental knowledge of children in the control group and their attitudes. The result is consistent with that of Armstrong and Impara, (1991).

In the light of the results of both the impact of the programme on the environmental knowledge of fourth grade children and the relationship between their knowledge and attitudes, it could be argued that knowledge teaching needs to be of a particular level and quality in order to produce positive attitudes and significant changes in the knowledge domain. The situation in Jordan seems to be, to an extent, very serious; needing a practical and field-based reform plan rather than a theoretical one. Decision-makers' concern should not be directed only towards planning by transferring other nations experiences and attempts which might not fit Jordanian schools. They instead have to go to the field itself, working with teachers and pupils and to evaluate the imported theories and ideas, in order to filter them and adopt those suitable to the Jordanian community and educational settings.

Many decision-makers, particularly those dealing with environmental education, refuse to co-operate with new thoughts and ideas. For example, the National Commission of UNESCO in Jordan refused to study the current programme although such a commission believes that schools should be environmentalised. While personal relationships with
its principals usually lead to the approval and adoption of similar programmes or projects. In other words, Jordan suffers from a serious gap between the education decision-makers' thinking and public statements and their actual actions in practicable settings in the field. Therefore, one could say that education is passing through schizophrenic phase. These conditions might be the causes of the inconvenient outcomes of the control group in particular, and the failure of the reform plan in general. The situation in Jordan is well illustrated in His Majesty The King's letter which described education as "disruptive and has not been connected to the needs of the society yet!".

7. The Relationship Between the Academic Achievement and Attitudes and Knowledge

High concern is given to academic achievement in Jordanian primary schools. Both teachers and parents assess the child on his/her scores in the study subjects at school. The clever child is the one who scores higher than others, those who do not, are considered stupid and un-intelligent. This general rule is still adopted by teachers and parents alike. Such a limited rule should be changed as it has no scientific or practical basis. The question of "what are the relationships between the academic achievement (social studies, science and general achievement) attitudes and knowledge of fourth grade children?" was asked. If positive relationships between the academic achievement and attitudes and knowledge are found, parents in particular and teachers in

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1 The letter of His Majesty King Hussein to the new Prime Minister in Jordan on 19th March 1997.
general would be encouraged to give much more attention to future environmental programmes.

"There will be no positive relationships between the academic achievement (social studies, science and general average) and the environmental attitudes of fourth grade children"; and "There will be no positive relationships between the academic achievement (social studies, science and general average) and the environmental knowledge of fourth grade children". These hypotheses were shown to be untrue, table 5-35 (p. 192) indicates that there are significant positive relationships between pupils' achievement in social studies and their attitudes \((r = .27 \text{ and } \alpha = .05)\) as well as knowledge \((r = .58 \text{ and } \alpha = .05)\). There is also a significant positive relationship between pupils' achievement in science and their attitudes \((r = .27 \text{ and } \alpha = .05)\) and knowledge \((r = .54 \text{ and } \alpha = .05)\). The relation between the pupils' general average (overall achievement) and their attitudes was significantly positive \((r = .37 \text{ and } \alpha = .05)\), and was also significant between their general achievement and knowledge \((r = .62 \text{ and } \alpha = .05)\).

The results above show positive relationships between academic achievement and both attitudes and knowledge. The relationship between academic achievement and knowledge is stronger than that between academic achievement and environmental attitudes. This result might support what has been discussed before that teaching in the primary school in Jordan is more directed towards the knowledge than the affective domain.
These positive relationships assured the importance of the environmental programme (FGEEP) as its aims and outcomes were of great benefits not only to the promotion of children’s attitudes or knowledge, but also to academic achievement, considered more important in Jordan than other outcomes by both parents and teachers. FGEEP, instead of having a negative impact on children’s study to the normal subjects as some parents and/or head teachers suspected, showed a positive impact and an improvement in relationships. The time which was spent by pupils in achieving their environmental tasks was very valuable for them; they gained both positive attitudes and knowledge in addition to the significant relationships with their academic achievement. It is realised that the correlation coefficient between the general average (achievement)\(^1\) of the pupils and their attitudes and knowledge was higher than the correlation between the attitudes and knowledge and the achievement in social studies or science. However, such subjects include environmental topics more than other subjects and therefore might be expected to have greater influence on environmental attitudes and knowledge than other subjects; but it seems that the general average may serve as a predictor to knowledge and/or attitudes better than each individual academic subject.

**Conclusions**

The study developed a programme for promoting positive attitudes towards the environment in primary school children in Jordan, and designed an environmental attitudes scale for primary school children.

\(^1\) The general average = \(\Sigma\) means of all subjects + total number of subjects \times 100\%.\)
The results of the study show these two main aims have been achieved. They substantiate the need to use the proposed environmental education programme which emphasises educating primary school pupils, males and females from different sectors and various school environments to possess positive attitudes towards the environment; to make them more knowledgeable, environmentally responsible citizens; and to develop their skills in the use of problem-solving techniques when manipulating or interpreting and solving an environmental issue or problem.

The programme contains well-designed instructional materials based on out-of-door activities with particular emphasis on investigation and problem-solving, that pupils generally lack in Jordan. The instructional material was organised so that it could be self-studied with no need for detailed explanation or much time for its achievement. The material, as observed in the field, was very interesting for children, who liked it and requested more activities to be undertaken (a sample of children’s work is shown in Appendix 9). In addition the material was valid and appropriate for the age of the pupils and their stage of development, as well as to the teachers who were provided with the teacher’s manual so that little teacher training was necessary. Nonetheless the materials need to be up-dated and re-edited, illustrated with drawings and produced in colour in order to be more attractive to children.

It could be concluded also that it was of critical importance that the environmental attitudes scale was designed and developed in a special format that was also attractive for children, and therefore more objective and reliable. It would produce as less socially desirable
responses as possible. The long and systematic construction procedures and the non-traditional format produced a suitable scale for children aged 9-10 years and might well be appropriate for all six grades in the primary school. The scale is a device that has good psychometric properties.

The Environmental Attitudes Scale for Primary School Children is not the only device that researchers can use, but the knowledge scale and the parents’ questionnaire as well. Both these are valid and reliable and have a good level of confidence.

The pupils’ responses were the most important evidence for the success of the environmental programme. The pupils of the experimental group scored significantly higher in the post-test than on the pre-test and better than the pupils of the control group both in their attitudes and knowledge. This evidence reinforced the critical need for such environmental education programmes in the primary school with the included techniques and methods of teaching.

The programme did not only affect pupils’ attitudes and knowledge but it correlated significantly with their academic achievement too, the higher the academic achievement the pupils produced the more level of knowledge or positive attitudes they displayed.

Children seemed to vary in their environmental attitudes in terms of their gender and/or the school environment. Females in general showed more positive attitudes towards the environment than males. Pupils from poor areas and bad living conditions also showed more positive attitudes towards the environment than those who lived in
better conditions. For instance, the pupils of the Palestinian Refugees in camps seemed to gain more positive attitudes than other pupils either in the city or in the village. This might be related, as stated above (p. 204), to the condition of their lives, with limited opportunities for waste and pollution in addition to good opportunities to experience the agriculture life and the benefit of keeping animals. In camps, there was also a high level of co-operation teachers and head teachers introduced for children in particular, and the programme in general which might contribute significantly in the results.

Finally, it could be said that the most effective participants in the programme were the parents. A special scale was designed for them, they were the actual teachers of their children, a lot of activities were achieved under their supervision and by their generous assistance. Parents, as they comment on their children’s workbooks were very happy to participate and were notably effective in teaching their children and clarifying their ideas. One of them writes “it is the first time for me to share learning with my child and to co-operate with his school. I have not been given such an opportunity before”.

Although there are councils for parents in the majority of the Jordanian schools, such councils are ineffective. Parents are not allowed to suggest ideas or to share in the school’s plans. Thus, an effective and a real plan should be undertaken to provide parents with an identifiable role. In contrast, governors in the UK are very effective and share in their school’s decisions and plans. Such a system should be adopted in Jordan so that parents will become a critical part of the school instead of being a mere audience.
Chapter Six

An important issue could also be discussed, that is the position of teachers who participated as the core of the programme in all its stages. They felt that they were responsible for its adoption and success. Hence, the programme was delivered to children with a high level of enthusiasm, desire and willingness. Teachers are not treated appropriately in the Jordanian community; they do not have good positions or high social status in society. Those who fail to be accepted in the university to study a subject such as engineering or medicine can study any subjects to get a degree which qualifies them to be teachers with no intensive training and professional practice in schools. Then, they will be responsible for implementing the instructions of their supervisors and head teachers without being provided with the opportunity to express their own thoughts and ideas.

If teachers are offered good opportunities to be decision-makers they will become active elements in the teaching and learning process more than now and many educational problems will be solved. Teaching has to be looked at as a main and very important profession in society. Teachers should not remain as only receivers and order-implementers as they are now, they should participate in the educational process from the initial stages of developing the curriculum to the last one of evaluating the whole process and obtaining feedback to improve outcomes and modify their work.

A participant teacher writes: "I am sad that the programme was completed, the children began to love my subject, their school and teachers more than any other time". Another teacher reports: "I am so happy to feel that I can do whatever I would like without traditional
orders. I am happy because my students like the environmental tasks and asked me for more activities, they like to discuss their achievement with me and with their friends”. A third teacher indicates: “I am looking forward to teaching very interesting textbooks like the environmental instructional materials in this programme instead of these heavy textbooks and boring ones for me and for my pupils”. A teacher in the village says “I would be very grateful if I could deliver such instructional material again”.

The above comments from parents and teachers could be considered the actual conclusion of FGEEP, the programme was accepted by the pupils, teachers and parents. The results can be summarised as follows:

1. The programme is effective and had an impact on pupils’ attitudes and knowledge and positive relationships with academic achievement.

2. The EASPSC can be used for measuring primary school children’s attitudes and does not need staff or much time to be implemented.

3. The knowledge scale (KASPSC) can be used for assessing primary school children’s environmental knowledge.

4. The effective instructional material of the programme needs to be modified and produced in colour.

5. Parents are a resource for assistance in the achievement of school’s aims, and they can be very good participants in schools’ activities.

6. Both male and female pupils showed positive attitudes due to the exposure to the programme, but females had higher
scores. The school environment like the pupil’s gender had an influence on pupils’ attitudes, but the programme was very effective in the three studied school environments. Pupils in the three school environments gained strongly positive attitudes towards the environment.

Recommendations

The results suggest that FGEEP was effective for primary school children in Jordan and that consideration might therefore be given to its adoption by the Ministry of Education. It would be necessary to train teachers not only to use new instructional materials but also to adopt more informal and pupil-based methods of teaching and learning. The programme has potential, following necessary modification, for use in a wide range of other societies. Hence, several recommendations can be made for future research based on the findings of the present study:

I  Recommendations to the Ministry of Education in Jordan

1. The FGEEP could be widely used in primary schools in Jordan in order to help children confront environmental problems and to possess positive attitudes and friendly, responsible behaviours towards the environment. Curriculum developers should bear in mind that the findings presented in this study pinpoint the vital area of environmental attitudes (as opposed to knowledge) that require emphasis in the Jordanian primary school curriculum.

2. The EASPSC could be used to assess children’s attitudes in Jordan since it has a high level of validity, reliability and
obtained good psychometric properties. The scale might also be used by individual schools to establish their local affective baseline (entry behaviours), prior to implementing or developing environmental programmes or materials. In addition, in using the EASPSC it would be possible to identify schools with pupils having strongly positive or negative environmental attitudes. By examining these schools it might be possible to identify programmes, teaching practices, types of educational administration, levels of socio-economic status, audio-visual material and facilities and any other factors that contributed to these outcomes.

3. Teaching methods and textbooks should be revised regularly and effective methods of teaching involving on investigation, discovery and problem-solving should be adopted.

4. The participating teachers in the programme could be used in teacher-training workshops to explain the methods they followed in implementing FGEEP so as to persuade others to use such methods. Reviewing the environment first hand by investigation to reinforce classroom materials would be most effective for teachers to help students to acquire knowledge and attitudes, rather than traditional methods of providing them with environmental knowledge to be given to their students through lectures.

5. The instructional material, modified, coloured, and including illustrations could be used for classroom teaching or by pupils as an additional reading and extra-curricula activities.
6. Since this study has shown that certain domains are
significantly associated with pupils’ attitudes, programmes
and/or textbooks designers either in the Ministry of
Education in Jordan or other researchers outside, need to
know what levels of attitudes pupils would show before they
establish programmes to enhance positive attitudes and/or
knowledge. However, this strategy was followed in this
study and contributed significantly in the success of the
FGEEP.

7. Behaviour modification programmes could be developed for
use after the completion of environmental programmes, either
to change the pupils’ behaviours with low environmental
attitudes and unfriendly behaviours, or to reinforce those with
strongly positive attitudes and environmentally responsible
behaviours.

8. Interventions can be developed to enhance pupils’ positive
attitudes and to meet their needs. Teachers and textbook
designers could plan extra curricular activities enabling
pupils to be actively involved in environmental clubs and
associations. Such experiences should teach pupils skills that
would enhance their environmental attitudes and behaviours.

9. The significant sex and school environment differences
should be taken into account in the planning of environmental
education programmes, textbooks and instructional materials.

10. Analysis of pupils’ attitudes who watched a film concerning
pollution suggests that media should be utilised in promoting
positive attitudes towards the environment.
II Recommendations for Further Research

1. A follow-up study should be undertaken, after a period of time, in order to ascertain both the effectiveness of FGEEP on maintaining long-term retention of children’s positive attitudes and the stability of the EASPSC over time.

2. As children pass through different stages of development, during which their concerns, behaviours, mental ability and level of attitudes will change, it would be important to investigate the effect of FGEEP on producing positive attitudes in different age groups. This would determine the extent to which the changes in pupils’ attitudes can be correlated with their grade level and age.

3. In order to standardise the EASPSC, norms would be specified by administering it to different ages of children in the primary school.

4. The pool of environmental items was used in the development stage of the EASPSC in addition to the pool items of the knowledge scale could be simultaneously tested on the entire population of the primary school pupils in Jordan in order to establish a special scale to assess both knowledge and attitudes.

5. The programme should be conducted with different groups and in different environments. For example the Jordanian desert (Badiyah) to examine the effectiveness of the programme on Bedouin children. And to conduct further comparative studies between them and the children in other school environments.
6. Replication of the FGEEP with different types of populations and Arab societies, is also strongly recommended. This would provide data on how pupils differing geographically and demographically vary in environmental attitudes and allow for comparisons. It is hoped that this study will be useful as a model for such studies. Such information would provide some insight into the exportability of environmental curricula between countries. Possibly, environmental education could become international with successful experiences in the field repeated saving time, effort, money and contributing positively and practically in conservation.

7. Teachers’ attitudes towards the environment need to be examined before and after implementation of the programme in order to examine its impact on them.

8. There is a need to study the different settings of parents, for example working women and housewives, parents with different levels of education, income, and social backgrounds, and their relationship with environmental attitudes.

9. Much more detail is required about the influence of specific domains of environmental attitudes. Separate measurement instruments for different topics depending on the conceptual framework of the study (e.g. conservation, recycling, cleanliness, ways of collecting refuse, using the public means of transports etc.) should be developed.

10. Further research would be conducted to explore the effect of the academic achievement on children’s positive attitudes in
order to ensure whether or not the more able children have, or develop more favourable attitudes. Such children can be divided with respect to their academic achievement into three groups (high, middle and low), therefore the effect of the academic achievement could be investigated.

11. The relationship between children’s attitudes and behaviours, and to examine the effect of FGEEP on these, need to be explored.

12. It is clear that the involvement in investigating environmental problems, using problem-solving and interviewing parents had a beneficial impact on their environmental attitudes and knowledge. Future research needs to compare such methods and identify the most effective ones.

13. Further research and development should be directed towards isolating the effects of content and methods of delivery with a view to optimising the programme’s effect on pupils attitudes towards the environment.

14. As there is no consistency in research findings concerning the impact of environmental programmes on pupils’ attitudes related to programme duration, it is recommended that future research should focus on this issue in order to clarify the best and the most convenient length necessary.

Finally, the study should serve as a support for educators, the Ministry of Education in Jordan and environmental societies, who plan to provide environmental experiences for pupils. They can look to FGEEP as evidence that can positively affect the attitudes of children. All these authorities should be encouraged to examine the programme.
The situation of environmental education in Jordan is not very different from that in other countries abroad, particularly in the Arab world. In some respects it is better and could be further improved relatively easily. It is clear that on environmental education Jordan needs a well-designed and practical programme and instructional materials so as to attain positive environmental attitudes and desirable behaviours not only in primary school children but in pupils in different stages and in the population at large. What is now required on the part of all people concerned with the administration of education is an honest open-minded recognition of problems which remain unsolved; and a determination to solve these by efforts which are based on the facts, not on what the facts are pretended to be.
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KEY TO REFERENCES

The full references to the following can be found in the bibliography above:


1 Key to references stated in the instructional material.
34. Stapp, W., and Cox, D. op cit.
44. West Sussex, ibid. (1991c).
47. Centre for Environment Education. (1989).
56. UNESCO. (1976).
Appendices

1. Instructional Material
2. Evaluation Instruments
3. The Advisory Committee
4. Participants
5. The panel of Judges
6. Participating Schools
7. The Programme’s Symbol
8. The Certificate of Participation
9. Children’s Product
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11. Letters of Correspondence
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Appendix 1

LOUGHBOROUGH UNIVERSITY
DEPARTMENT OF EDUCATION

FOURTH GRADE ENVIRONMENTAL EDUCATION
PROGRAMME (FGEEP) IRBID AREA - JORDAN

INSTRUCTIONAL MATERIAL

(ENGLISH VERSION)

1 The references in the three books of the instructional material are denoted by numbers, a key to which is to be found on page 258. The second number in each reference is the page.

2 The Arabic version is to be requested from the researcher. P. O. Box 617, Irbid, Jordan.
UNIT 1

POLLUTION
GENERAL OBJECTIVES

After working through this unit the pupil should be able to:

- Define the term pollution and the related terms; air pollution, water pollution and noise pollution.
- List the major causes of air pollution, water pollution and noise pollution at home, in school, and in the community.
- Describe in writing some problems of air pollution, water pollution, and noise pollution in the community.
- Discuss ways in which pollution (air, water, noise) can damage both living things and non-living things. Note particularly its effects on people.
- Observe some pollutants of air, water, and noise.
- Investigate some of the pollution problems in the community, perhaps by comparing some polluted situations with non-polluted ones.
- Use problem-solving steps to solve some of the pollution problems at school and/or in community.
- Take a positive action towards the environmental problems.
- Develop and implement action plans to overcome pollution problems.
- Plan and carry out a campaign to make people aware of air pollution caused by cars, trucks, and buses.
- Design, assemble and distribute a booklet on a pollution issue.
- Draw three ways on how he/she use unpolluted air, water, and less noise at home, while playing, and on holiday.
- Make a drawing to show three ways in which he/she and the family avoid the dangers of polluted air, water and loud noise.

- Understand that human beings should protect the earth, in order to be able to continue support future generations of living things.

- Feel responsible for pollution problems.
A local newspaper has the following headlines:

- Our air is highly polluted.
- No Diesel cars in Jordan.
- The dust hurts our eyes.
- People without Ears.
- The Ozone layer is wearing thin.
- Restrictions on cars' horns.

If you read these headlines thoroughly, you might know the extent to which people have damaged their environment. They have been using the available resources for many years with the ignorance of the effects this has. One of the major effects that damage the earth is pollution.

STOP & THINK! 1

What is pollution? …………………………………………………………………………………

Pollution is a term used to describe ……………………………………………………………
…………………………………………………………………………………………………….
…………………………………………………………………………………………………….
…………………………………………………………………………………………………….

To help you in rewriting your definition, try to answer the following questions: Have you ever...
1. seen a burning garbage container? [yes-no]
2. heard a sound when was too loud? [yes-no]
3. tasted salty water? [yes-no]
4. smelled dusty air? [yes-no]
5. found litter around a bin? [yes-no]
6. seen a black wall or building? [yes-no]

These questions may lead you to better statements describing the term pollution. Now try to improve your statements.

REMINDER!

"Pollution is a very broad term used to describe anything which is likely to have a detrimental effects on the environment". [35-114]
Or it is "the addition of unwanted substances or effects (pollutants) which adversely alters the natural or man-made environment". [38-84]

ACTIVITY 1

Look at the pictures which are shown by your teacher. Then, Identify two serious environmental problems you've seen yourself. [31-78]

After you have completed Activity 1, you might be able to realise that pollution takes place in different types. Some of which are:
- air pollution.
- water pollution.
- noise pollution.

In order to recognise such terms well, read the statements of Activity 2 and organise them into three categories, air, water and noise.
ACTIVITY 2

What type of pollution is it? [31-81]

Categorise the following statements into three groups according to the type of pollution they are related to (air, water and noise pollution):

a. Some pupils burn leaves in Winter to warm their houses.
b. Some industries dump sewage in waterways.
c. Many people smoke cigarettes.
d. The record player was very loud.
e. Oil tankers wash out tanks at sea.
f. Some pupils enjoy burning tyres in Winter.
g. The horn of the gas seller was loud.
h. Some pupils enjoy throwing stones into ponds.
i. Some pupils like to use spray deodorants.
j. Black smoke was released by chimneys into the air.

AIR POLLUTION

The first type of pollution we are going to learn is air pollution. Think about the following questions:
- Can you smell, see, feel the air?
- How do you know it is around us?
- Can you see evidence of its presence outside? What is it? [34-110]

People around the world and all living things need air for survival. Human beings breathe air that is a mixture of various gases as well as some solids and liquids. These gases are essential to all life. [37-31]
STOP & THINK! 2

What is air pollution? ........................................................
Air pollution is ..................................................................
........................................................................................

To help you in defining air pollution, discuss with your friend the following questions:

1. Have you had something stuck in your eyes? How did it get there?
2. Where did the dust come from?
3. Have you ever seen dust on leaves? Where did it come from?
4. Can you see or smell dirty air?
5. Does air contain many impurities? How do you know? [34-110]

FOLLOW-UP ACTIVITY 1

At your home play a game with someone else to identify some pleasant and unpleasant smells.

The steps of this game are:
- Let the one who wants to play with you be blindfolded.
- Let him/her identify some pleasant and unpleasant smells.
- Record the responses.
- Change places and repeat the steps again.
- The winner is the one who identifies most smells.

Air, as you might realise, is not always clean as it should be. Some harmful substances might be mixed with it and cause unpleasant smells.
These substances, such as dust, smoke, and sulphur dioxide, are called pollutants. The pollutants are the causes of air pollution.

**STOP & THINK! 3**

Study this category!

<table>
<thead>
<tr>
<th>people-made pollution</th>
<th>car engines, burning fuels, factory smoke, car and truck exhausts, fumes coming from cars, open burning, smoke coming from chimneys, burning leaves and garbage, and heating homes using fireplaces.</th>
</tr>
</thead>
<tbody>
<tr>
<td>natural pollution</td>
<td>dust storms, forest fires, volcanic eruptions, and rotting plants or animals bodies.</td>
</tr>
</tbody>
</table>

**REMEMBER!**

The air is polluted when some pollutants are mixed with it. In other words, air pollution means dirty air which might cause health problems, and affects living things and non-living things.

**ACTIVITY 3**

Investigate air pollution in our school surroundings, by collecting leaves from different areas. Look thoroughly at the leaves, and make notes.

**ACTIVITY 4**

Be ready to visit the school parking lot. You are going to investigate a new type of pollutant.
FOLLOW-UP ACTIVITY 2

Stand at the corner of your house for approximately 15 minutes. Investigate the number of vehicles passing along the street (cars, trucks, buses) and whether or not smoke is released from them. If it is released, what colour is it?

STOP & THINK ! 4

How does air pollution affects living things and non-living things? Remember how leaves were affected (Activity 3).

Polluted air is affecting the health and well being of plants, animals, and living things, as well as non-living things.

ACTIVITY 5

Interview your parents in order to investigate the effect of air pollution on living things and non-living things. [37-31]

You could ask some of the following questions:
- Does air pollution affect plants and/or animals?
- How do your parents think air pollution hurts us and/or other living things?
- Does air pollution affect non-living things? How?
- What diseases might it cause?
- Does air pollution take part in: lungs damage, cough, headaches, eyes watering, vomiting, nausea and fatigue?
- Does air pollution colour buildings? What colour is it?
- Does it dissolve marble and pit metal?
- Does it corrode steel?
- Does it discolour paint?
- Are your parents smokers?
- Does smoking affect their life? How?

**STOP & THINK! 5**

Do you think that air is polluted in your school? What proof do you have?

You should realise that air pollution affects our health. Therefore, we should try to have clean air and support people who are stopping air pollution.

**ACTIVITY 6**

A doctor will visit you to talk about the effects of air pollution on your health.

**ACTIVITY 7**

Investigate whether or not air is polluted in your school. [34-108, 35-98]

**Try to do** the following experiment:

Have some white cards. Smear Vaseline thinly over them and hang them in various places outside. After thirty minutes examine the cards and answer the following questions:

1. What colour are the cards now?
2. What can you see on the cards?
3. What do you think it is? smoke, soot, dust, fume, pits...etc.
4. Is the air polluted or not?
5. Is the pollution man-made or natural?
6. Do you think that there are other sources of air pollution in our school? What are they?

7. How can we reduce air pollution in our school?

FOLLOW-UP ACTIVITY 3

As you learn about air pollution in school and in the community try to achieve the following tasks:

- Draw four sources of air pollution you've observed at school.
- Investigate whether or not the light of a candle, a match, and a lighter cause air pollution.
- Develop a plan of action to carry out a car anti-pollution campaign.
- Design and assemble a booklet from the information gathered on air pollution.
- Distribute the booklet to inform parents about the problems and possible solutions of air pollution.

WATER POLLUTION

The second type of pollution we are going to learn about is water pollution. As you have realised, air is essential for living things. Water is also next in importance to it. Every living thing needs water to stay alive. Moreover water is used in different aspects of life, such as construction, washing, cooking, transportation, sports, and in other ways. [37-25]
We as human beings use clean water to support life and for enjoyment. Therefore, we use it at home, at play, and during vacation.

**ACTIVITY 8**

1. Investigate all the ways in which your family use water during one day.

2. Does the quantity of water increase or decrease in your house, in the community, and in the world after using plenty amount of water?

3. Collect pictures from magazines, newspapers and old texts. Make a special book to show some benefits of water. Write one sentence under each picture telling why it matters that water is clean.

4. Categorise the ways you and your family use clean water into three groups, and draw a picture underneath each of these.

5. Discuss with others what would happen if it does not rain all the Winter.

6. Ask your parents whether they can live for a longer time without food or without water? [31-59]

It could be realised that water is widely used by your family. Other families should be nearly the same as your family.

**STOP & THINK ! 6**

<table>
<thead>
<tr>
<th>What is meant by water pollution?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water pollution is</td>
</tr>
</tbody>
</table>
Try to remember what is meant by air pollution, what are the substances which pollute air, what are pollutants. Think of a comparison between the two terms (air and water pollution). Have you found the meaning of water pollution?

The following questions may help you explain what you mean:
- What would happen if clean water is added to more clean water?
- What would happen if stones are thrown into drinking water resources?
- What would happen if oils, heavy metals, chemicals, sewage are thrown or dumped into drinking water resources?
- What is the effect of lead pipes on water that is distributed to houses?

Have you formed some statements to define water pollution? If so, please write them on your workbook.

**REMEMBER!**

Water pollution is the entry of strange substances into water, such as oil, dust, chemicals, cans, paper, litter, glass, fertilisers, pesticides, or any other things. Water due to these pollutants becomes dirty and not usable.[34-35/36] *Compare your definition with this one.*

Now, discuss the following questions with your group:
1. Where do we get our water from?
2. What do we use water for?
3. What happens to water after we use it?
4. What does a sewage treatment plant do?
5. If we dump sewage into a lake what would be happen to the fish?

FOLLOW-UP ACTIVITY 4

a. Have two aquariums.
b. Fill both of them with clean water from the source your family use to drink.
c. Put sand into one aquarium until the water becomes cloudy.
   - What is the pollutant in your experiment?
   - Who is the polluter? [34-35]

ACTIVITY 9

Now observe your teacher doing an experiment to show you water pollution and start thinking about the causes of water pollution. [34-135]

You might realise that water pollution is caused by different pollutants and ways:
1. Chemicals.
2. Sewage which dumped into water.
3. Oils.
4. silt.
5. Industrial chemicals and heavy metals.
6. Chemicals from the air dissolved in rain water.
7. Pesticides and Fertilisers leached from the land.
10. Human and industrial waste. [38-85/86]
Moreover, you have to know that most resources of water in Jordan are springs, ponds, and lakes. These resources are more easily polluted than rivers and streams because pollutants tend to accumulate in the springs, ponds, and lakes. Some of the pollutants are visible (sand, leaves, pebble, milk etc.), while others are invisible pollutants (salt, sugar, chlorine etc.).

**FOLLOW-UP ACTIVITY 5**

1. Investigate people action in your area and how they pollute water.
2. Check your water container on the roof of your house, and the ones of your neighbours. Have a decision of the extent to which they are polluted, and if so, what kind of pollutants you've observed.
3. Discuss with your parents the following issues:
   - It is important for each of us not to be water polluter.
   - What would happen if all the water in our area slowly becomes unusable due to pollution factors. Write a short story about that.

**ACTIVITY 10**

Prepare yourself to visit:
- A local spring or pond. Investigate the extent to which it is polluted.
- A sewage treatment plant. Have an idea about its operations.

**STOP & THINK ! 7**

Does water pollution affect living things?
Water pollution as well as air pollution affects living things. It affects human survival, spoil human fun, and spoil non-human life. The effects of water pollution are:

1. it causes many diseases,
2. it prevents sunlight getting, in seas or rivers, to plants. Therefore, it kills plants and animals as well,
3. it creates dead lakes,
4. when filtering water it needs an extra cost for families and the local community, and
5. it pollutes land by its pollutants.

FOLLOW-UP ACTIVITY 6

Visit a doctor. Ask him/her about the diseases polluted water might cause.

🌿STOP & THINK! 8

- How do you help to keep water cleaner at home, at school, and in your community?
- You have to understand that the earth will be able to continue support a diversity of living things and future generations if only human beings protect the earth.

1. As you investigate some of water pollution resources describe to your group three ways you would do to keep water cleaner. One is personal, the other is a family project, and the third one is national or related to your community. The following points are mentioned to help you:
   - Water containers should be cleaned at least once a month.
- Prevent sources of pollution from reaching water at home.
- Do not throw objects into water.
- Remove paper and cans.
- Filter water to be sure of its cleanliness.

2. Discuss with your friends whether or not they believe that the earth will be able to continue to support a diversity of living things if only human beings protect it. Why?

FOLLOW-UP ACTIVITY 7

- Draw three pictures showing how water is polluted to be displayed at school.
- Write three ways of how you avoid the dangerous of polluted water, at home, while playing, and in a vacation. Draw a picture underneath each way.
- Develop and implement a plan of action to keep water cleaner, and to overcome water pollution problem at home, at school, and in the community. [31-60]

NOISE POLLUTION

The third type of pollution which we are going to learn about is noise pollution.

There are various amount of sounds in nature. They might be as follows:
- Sounds made by different materials: animals, car engines, doors closing and opening, water running from a tap, roads, and so on.
- The weather: Sounds made by rain, hail, wind, and thunder.
- Sounds generated in different materials by: striking, plucking, shaking and blowing, and sounds that are made by different musical instruments. [39-30]

**ACTIVITY 11**

Talk to your group about the following different sounds:
- Sounds that you can hear.
- Sounds which frighten you or make you feel safe.
- Warning sounds: the school bell, bikes' horns, cars' horns, telephone bells, and fire alarms.
- Toys that make distinctive sounds.

You have been at a noisy area. Haven't you? You should know that noise is a type of pollution as it is not appropriate for ears.

**STOP & THINK ! 9**

**What is meant by noise pollution?**

Noise pollution is ..........................
.................................
.................................
.................................
.................................

The following questions may help you in defining noise pollution:
- Is the discussion inside the classroom a type of noise pollution? [yes-no]
- Is your oral reading a type of noise pollution?
  [yes-no]
- Is the sound of a loudspeaker a source of noise pollution?
  [yes-no]
- Is the sound of cars' horns a source of noise pollution?
  [yes-no]

Now, write the definition of noise pollution on your workbook.

**REMEMBER!**

**Noise pollution** is the increase of the average level of sounds. It is an irregular pattern of sound vibration. Whereas pleasing sounds are produced by regular or harmonic vibrations such as those which produce music. [37-23]

**ACTIVITY 12**

Listen to, think, and identify the sounds.

Now, do the following:

- You'll hear some sounds on a tape try to identify these sounds by writing the name of the sound on your workbook.
- Categorise these sounds into two groups: noisy sounds or not.
- Try to listen to sounds released in two places in your area for ten minutes. Which one is noisy, the first one or the second? Where would you like to live in the first area or in the second one? Why?
FOLLOW-UP ACTIVITY 8

- Stand outside your house for ten minutes, try to identify whether your area is noisy or not.
- Repeat the same process inside your house. Is it noisy or not?

As you know something about noise pollution let's ask this question: **What** are the sources (or causes) of noise pollution in our community?

There are many sources of noise pollution, some of which are:

- Subway vehicles.
- Motorcycles.
- Jack hammers.
- Trucks with faulty exhausts.
- Wedding parties.
- Fire-truck alarms.
- Continuous noise from streets, factories, aeroplanes, and loudspeakers.
- Vehicles such as, school buses, ice-cream cars, and gas trucks.
- Industrial noise such as, machines of factories and electricity generation motors.
- Using streets as play grounds by children.

ACTIVITY 13

Listen to different sounds inside and outside your house. Record their names and check whether they are noisy or not. (pleasant or annoying sounds).
FOLLOW-UP ACTIVITY 9

- Collect a variety of sound makers both natural and manufactured. If some are heavy, draw them in your workbook.
- Try to do different sounds and check whether they are noisy or not.

Now, listen to this story:
Many years ago, there was a skilful musician. His name was Ziryab. The people at that period of time used to meet each other at night in the Caliph palace.

Once a day Ziryab was one of the attendants; he was requested to play a piece of music. Once he started playing all the audience felt sad. He played another piece but the audience began crying. The Caliph ordered him to stop playing such pieces. Therefore he started a new one and the audience altogether were laughing.

- What do you learn from this story?
- Is there an effect to music as a sound on human feelings?

STOP & THINK ! 10

What is the effect of noise on humans and non-humans?

People around the world may suffer some hearing impairments. Noise from certain sounds might lead to death, particularly among young people, who might die prematurely.
Super sonic sounds has been known to shatter windows, weaken foundations of buildings, and influence the health of humans and productivity of farm animals.

Depending upon such facts noise pollution can cause physiological damage to the human ear as well as considerable mental strain. Continuous noise from streets, factories and loudspeakers can cause permanent hearing loss. Noise pollution might cause stress to the mind, including high blood pressure, ulcers, and a variety of psychological disorders.

**ACTIVITY 14**

Visit a public clinic and investigate the number of patients who are suffering from hearing problems. Ask the doctor, if possible, about the causes of these problems. Record your investigations.

**FOLLOW-UP ACTIVITY 10**

Tape undesirable sounds and listen to the tape with your parents. Discuss each sound and its effects on humans or non-humans.

**STOP & THINK ! 11**

As you have realised, noise pollution is harmful for hearing. Therefore, it's the responsibility of each one to think about what he/she would take to lessen noise pollution and what are the ways by which noise level can be controlled?
There are many ways to lessen noise pollution, some of which are:
1. Finding legislation that serve preventing some of noise pollution sources such as cars' horns inside the city (camp-village).
2. Encouraging workers who are working in a noisy situation to wear ear protection devices.
3. Planting some trees which serve absorbing some noise and reduce noise pollution.
4. Encouraging people to avoid noisy behaviours.

FOLLOW-UP ACTIVITY 11
- Make a leaflet to encourage people to avoid noisy behaviours.
- Ask your parents to suggest actions to reduce noise pollution at home, and in your local area.
- Make models to fire trucks, jet planes, and industrial machines.
- Collect items which help minimise noise, and displayed them at the school.

Additional Investigation

As you learn about pollution, you should know that there is another serious pollution problem hurts the environment. Garbage, Chemicals, fertilisers, broken vehicles, are altogether land pollutants.

In Jordan, homes, factories and shops throw hundred of tons of waste every year. Most of this waste is thrown on the land or buried in it.
Therefore, a new type of pollution exists. This type of pollution is land pollution. [30-49]

Think about the problem of land pollution. Try to follow these steps:

1. Discuss the problem with your friends, brothers or sisters, teachers, and parents.
2. Recognise an environmental problem related to land pollution.
3. Define the problem of land pollution, particularly in your area.
4. Collect information, use the school library, ask people, and co-operate with your friend.
5. Organise the collected information.
6. Analyse the information.
7. Generate alternative solutions.
8. Develop a plan of action.

**REMEMBER! REMEMBER!**

To help, you should do more and more. You should realise that the earth is harmfully used. It is the responsibility of each one of us to protect the earth, in order to be able to continue support a diversity of living things and future generations:

- Harmful gases must not be released.
- Industrial waste and sewage must not be dumped.
- Horns, loudspeakers and machines must not be heard.
- Waste, chemicals, and fertilisers must not be thrown on land.
UNIT 2

WASTE
GENERAL OBJECTIVES:

After working through this unit the pupil should be able to:

- Define waste material and some related concepts such as conservation, recycling, re-use, and reduction.
- Identify, collect, sort, and categorise various types of waste material.
- Identify other types of waste (fuel, electricity, and water) at home, at school and in the community.
- Undertake a litter survey in the classroom, school grounds, local streets and shopping centres.
- Plan, publicise, and assist in carrying out an anti-litter campaign. [31-140]
- Design and distribute posters, write leaflets and/or messages, which oppose litter and the thrown-away society.
- Investigate some problems related to waste material dumping.
- Investigate bin designs at home, at school, and in the community, and solve some design problems.
- Discuss ways of waste disposal.
- Talk about the effects of waste material disposal on land, in the air, and in water.
- Compare compacted objects with non-compacted ones.
- Identify conservation, recycling, re-use, and reduction as effective ways of saving natural resources and stopping waste.
- Carry out surveys and interviews about waste material and their recycling, re-use and reduction.
- Suggest new ways of cutting down the amount of waste material produced at home, at school, and in the community.
- Design a package for a certain item which will produce less waste when the item is used.
- Identify some benefits of conserving, recycling, re-using, and reduction of waste material.
- Collect data related to conservation, recycling, re-use, and reduction. Analyse the data and draw conclusion from it.
- Compile data in charts.
- Express ideas statistically.
- Investigate and categorise electrical items at home and at school.
- Read, record, and analyse the electricity and water meters and/or bills.
- Collect, categorise, and analyse data that related to electricity, water, and fuel waste.
- Discuss whether or not there are electricity and water shortages in Jordan.
- Suggest some conservation practices to reduce electricity, water and fuel waste at home, at school, and in the community.
- Record water and electricity sources that are left running when not in use.
- Investigate and write alternative solutions to a water waste problem by using problem-solving techniques.
- Appreciate the role of refuse collectors, assist them to keep the environment beautiful, and identify some of the problems they face.
- Specify the relations between human activities and producing local changes in the environment.

- Mention that human activities produce a wide range of waste products.

- Look for problems caused by the careless disposal of waste items at dumping areas.

- Specify the relations between the way people live their lives, and the amount and type of conserving or wasting natural resources.

- Discuss the statement that "human activities and life styles must be changed if waste problems are to be solved".

- Specify the relation between the increased numbers of world population and global energy waste.

- Discuss the idea that humans can be "caretakers" of the earth, rather than "careless" about the earth.

- Show a personal feeling of responsibility about environmental matters.
Undoubtedly you've realised that your family throw away a bag of garbage at least once a week. This bag may include lots of things, such as glass, bottles, cans, paper, food, metals, plastic, textiles and miscellaneous household waste material.

STOP & THINK ! 1

What is meant by waste material? .................................................
It is ................................................................................
................................................................................

To help you in rewriting your definition have a permission from your parents and open garbage bags, over a period of one week:
- What does your house bin consist of?
- Make a record of all waste products produced in your home over a period of one week and work out their percentages. Include all things that you consider to be waste.
- Why do you think these things are waste? Is there anything else that you think is waste in your house?
- Where did the waste items originally come from?
- What was each item used for before it was thrown away? [35- 67,78].
- What kind of things that have been used most and thrown away by your family?
- Why did your family produce more waste of one kind than another?
- How could your family produce less of these wastes?
- Ask your parents whether or not they want to make changes in what and in what form they buy it, and what they do with waste.

REMEmber!

Waste material may define as "material that has no use in its present form and location". [37-21]

ACTIVITY 1

Collect thrown-away waste material from your class, school grounds, streets, and shopping centres, with your parents' and teachers' permission.

WHAT EXACTLY IS THE PROBLEM

FOLLOW-UP ACTIVITY 1

You will be looking around your house and your school, and checking on the following things:

litter: around your house, on streets, at school.

garbage: uncovered containers, construction debris, cans, others (specify).

defacement: to road signs, to walls, to desks, broken windows.[31-65]
ACTIVITY 2

Have a walk around the school. Check to see if there is any illegal waste material dumping. Investigate the problem. [31-139,140]

ACTIVITY 3

A local refuse collector will visit your school to talk about his problems with people while collecting their garbage. Do prepare yourself to ask him some thoughtful questions about his work. [43-3]

ACTIVITY 4

Investigate some of bin problems such as the design, siting, and the material they are made of. Try to ask some questions like "how", "why", and "what will happen if". [43-16,17,18]

🌟STOP & THINK! 2

What happens to waste material when it is taken from your house or school? Think about methods of waste material disposal, and the effects of these methods on the environment. [30-66; 35-64,68, 79, 112; 37-21; 42-13, 14, 15 ; 43-12 ]

I. It is realised that the only method of collecting waste material in Irbid/Jordan is putting it in bins, then it is thrown in area containers. A refuse truck takes it after being compacted in a special machine. To help you in thinking broadly discuss the following questions with your parents:

Have your family ever:
Appendices

1. Instructional Material
2. Evaluation Instruments
3. The Advisory Committee
4. Participants
5. The panel of Judges
6. Participating Schools
7. The Programme’s Symbol
8. The Certificate of Participation
9. Children’s Product
10. Organisations Contacted
11. Letters of Correspondence
12. Publications
1. Put glass bottles in a special bag? [yes-no]
2. Saved food waste for compost heaps? [yes-no]
3. Compacted big boxes before throwing them away? [yes-no]
4. Thought of something you shouldn't have thrown away after putting it in a bin? [yes-no]
5. Save aluminium cans or plates to be sold to an aluminium collector? [yes-no]

Now, think about waste material disposal methods. In general, waste material is disposed in two main methods:
- Burying: in this method it is buried in large holes which are filled gradually with layers of refuse and soil and left as a tip.
- Burning: in this method it is burnt outside cities, villages, or camps.

II. Both of these methods affect the environment.[30-66; 35-64,79; 42-14,15]. Hold a discussion with your group about such effects. The following points may help you:
- The need to dig holes.
- The remaining material in the soil.
- Chemicals that are leached into the ground and get into drinking water.
- Safety, if a landfill site is built on, or used for agricultural purposes.
- Gases that are released when waste rots (Carbon dioxide and Methane).
- Air pollution.
- Dumping in water or beside it.
- The conditions which cause some materials to decay or rust.
- Effects on human health and animals.

**FOLLOW-UP ACTIVITY 2**

Compare compacted objects with non-compacted ones. [42-13]

**Try** to follow the steps below:

- Fill a container with non-compacted objects.
- Fill the same objects, but compacted, in the same container.
- Compare the volume taken up by the two.
- Why is waste material compacted?
- Do you think children can help in this process? How? [42-13]
- Record your findings.

**STOPPING LITTER**

**ACTIVITY 5**

Plan, publicise, and assist in carrying out an anti-litter campaign. [31-140; 37-21; 42-4.5]

**さまざ ーストップ & THINK ! 3**

How can people stop producing a great amount of waste material?
Waste originates from the activities of people. People produce a great amount of waste material which causes many problems to the environment as well as to people themselves. All governments around the world meet problems of waste material disposal and seek to solve them.

But in fact, solving waste material disposal problems is the responsibility of each individual in the community. Each individual should share in conserving natural resources if living harmoniously with the environment is to be a major aim of our lives. Conservation requires people's responsibility to maintain the environment and their involvement in this process.

The most effective way of conserving natural resources and reducing waste is to recycle some of waste materials whenever possible.

**REMEMBER !

There is an effective way people can do to stop producing waste material in particular, or waste of other resources such as energy (electricity, petrol) and water, in general. This way is conservation which may include the following actions:

- recycling.
- re-use.
- reduction.

Those three magic Rs can keep the earth capable of providing an acceptable quality of life to all people and to future generations.
RECYCLING

"SAVE IT AND USE IT AGAIN"

Many waste materials such as plastic, glass, aluminium, steel, and paper need not to thrown away as most can be recycled. Recycling is the way that provides us the opportunity of reducing the amount of waste and making the most of what we have.

The table below shows the following waste items as percentages which were found in one of our neighbour's bin:

<table>
<thead>
<tr>
<th>plastic</th>
<th>metal</th>
<th>clothing</th>
<th>glass</th>
<th>dust</th>
<th>paper</th>
<th>kitchen waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 %</td>
<td>6 %</td>
<td>8 %</td>
<td>13 %</td>
<td>6 %</td>
<td>25 %</td>
<td>34 %</td>
</tr>
</tbody>
</table>

About half these items can be recycled. Things that can not be recycled are made of non-renewable resources such as oil and gas. This means that they can be used once only.

As Jordanian homes produce thousands of tonnes of waste material every year, the major step in reducing such waste is recycling. The starting point should be saving items that appropriate for recycling instead of throwing them away. [40-3]

STOP & THINK ! 4

What is meant by recycling ? ..................................................
Recycling is .................................................................
.................................................................
To help you in rewriting your definition try to think about the following points, after collecting a selection of waste material:

- Should we sort waste material and classifying it?
- Can we recycle all items of household waste?
- Is it possible to re-use recycled items?
- What does recycling save?
- Why do we need recycling?
- Are there any things that you think could be recycled, but are not?
- What would you like to recycle if it was possible? Why?

**REMEMBER!**

**Recycling means** "making new products from waste material". [30-66]

**FOLLOW-UP ACTIVITY 3**

- Carry out a survey at home and at school of things that have been recycled or re-used for any purpose.
- Interview your parents about the need to recycle and to re-use material such as glass, metal cans, paper, and plastic. Ask them about the advantages and disadvantages of recycling. How can waste material be re-used? Why is recycling important? [35-81]

To help you in carrying out your survey consider using:

- Yoghurt pots for planting and paint pots.
- Bottles as vases or refilled with water for uses in refrigerator.
- Newspapers for wrapping take-aways, covering shelves, protecting surfaces.
- Old clothes and toys for younger children
- Old wood and metal for making toys.
- Wool for re-knitting, making toys, and decorations.

**STOP & THINK ! 5**

What we can save if we recycle some items of waste material.

**If we recycle** waste material it helps us to: [30-66; 35,112; 40-25]
- Conserve the environment and natural resources.
- Reduce the amount of waste that has to be dealt with.
- Reclaim useful raw materials.
- Save money.
- Save energy because we don't have to produce new materials or transport these materials to different markets.
- Reduce air, water, noise, and land pollution and save the cost of its control.
- Produce goods more cheaply.
- Reduce the demand to landfill space.
- Recycling paper helps save trees and energy. [29-7]
- By recycling glass we can save land from being dug up and also save energy. [29-7]
- By recycling plastic materials we save oil which plastic is made of it.
RE-USE

STOP & THINK! 6

Read the following advertisement closely:

WANTED
Scrap Metal of All Kinds

Cookers, Boilers, Washers, Bikes, refrigerators, Lawn Mowers, Copper, Brass, Aluminium, Lead, Cast Iron Guttering, Car parts, Radiators, Engines, Can springs etc.

WE WILL CALL TOMORROW - THANK YOU

Discuss this advertisement with your group:
- Why do people need such items?
- Do they recycle them?
- Do they re-use them?
- Do they throw them away?
- What shall you do if you collect all these items?

As you may realise, recycling material leads to re-using material instead of throwing it away. But sometimes waste material can be re-used without recycling. Can you think of examples?

ACTIVITY 6

Collect items of waste material at school and at home that can be re-used. [41-26]
**REDUCTION**

Recycle, re-use, and reduction are steps toward a better and cleaner environment. The three procedures together are parts of one process, conservation. Conservation reduces waste material and conserves natural resources. Therefore, the earth will be protected and continue to support a diversity of living things.

**ACTIVITY 7**

- Interview your parents and at least one of your neighbours. Ask them whether or not they have started reducing waste material.
- Write a leaflet to encourage them to reduce waste material, and give it to them.
- Ask them for their suggestions.

The following points may help you in working out your questions:

- Save cans and bottles.
- Pass down clothes from elder boys/girls to younger ones.
- Use washing service nappies and towels instead of disposable ones.
- Buy drinks in refillable bottles.
- Send broken bits of cars to scrap yard.
- Send unwanted clothes to charities or to sale shops.
- Send yoghurt pots and cereal packets to play groups and kindergarten.
- Re-use plastic containers for freezing food or growing seedlings.
- Refill empty cosmetics containers.
- Re-use carrier bags as often as possible at shops and supermarkets.
- Use rechargeable batteries.
- Keep paper for re-use and/or recycling.
- Re-use envelops.
- Use recycled paper.
- Use glass plates and metal spoons instead of plastic ones when they have a party.
- Repair the old furniture.
- Pick up litter. [40-7,8,14]
- Keep bottles, cans, newspapers, and plastic for recycling.

FOLLOW-UP ACTIVITY 4

- With the co-operation of your parents examine the type and quantity of packaging of some items that your parents used to buy during their weekly shopping trip.
- Design a package for a certain item which will produce less waste when the item is used.

FOLLOW-UP ACTIVITY 5

Suggested three ways of cutting down the amount of waste at your house. [35-82]
Consumption levels of energy and natural resources in the world have been raised to an alarming amount due to the increase of population. Waste is not only confined by household material but there is a great amount of waste in energy (fuel and electricity) and water. Therefore, we should start thinking about how such waste can be reduced. The earth does not have unlimited amounts of water and energy.

STOP & THINK !

Read this notice:

**ALWAYS SWITCH OFF WHEN YOU LEAVE**

Switching off:


Our Energy Bill in School is 2376.78 JD / year.

Help Us Reduce it.

This notice was stuck over electricity keys in each classroom at some schools which have already taken valuable steps toward conserving and reducing waste in energy and water. Now answer the following questions:
- Explain the notice.
- Do you think that this school has taken part in the conservation process?
- What should we do at our school?
- Can our families share in this process at home?
- How do you advise them to start?
- How can you encourage them to start?

**ACTIVITY 8**

Investigate how electricity is used in your house. [31-42,44]

**FOLLOW-UP ACTIVITY 6**

Investigate lights or any electricity sources which are left switched on when not in use at your house. [31-66]

**Try** the following:

- **For two days**, record the number of lights or electricity sources left switched on when not in use.
- Discuss, with your parents, whether or not there is an electricity shortage in Jordan.
- Discuss with your family members some practices to conserve electricity and to reduce electricity waste. Emphasise the message you've sent to your parents to encourage them to reduce waste material (activity 7).
- **For another two days**, see if waste has been reduced, and keep another record.
ACTIVITY 9

Investigate whether or not water is running from taps, that are supplied directly from the main line of water.

The general steps that you should follow are:

- Remind your family about water pollution and the uses of water that you've studied within this programme. Hold a new discussion about the relation between water pollution and water waste. Ask your parents whether or not there is a serious water shortage in Jordan.

- Check the main source of water in your house, find out whether water is supplied everyday or not. What does the total number of days which water is supplied, mean to you? Do you think that there is a serious water shortage in Jordan or not?

- Record your family's uses of water for a day and rank order such uses of water from most important to least important: hand washing, flushing toilet, drinking, washing clothes, cleaning rooms, washing car, brushing teeth, and taking a bath or shower. Were you surprised at how much water your family actually used?

- Stop the main source of water to your home for an hour. How do your family feel when they run out of water? Do you feel that water is used wisely?

- Calculate your family water bills for the former 12 months. Do you think it is a big number? What shall your family do to reduce water bills?

- Record water sources at home that are left running when not in use on Friday.
- Suggest five conservation practices to reduce water waste at home, at school and in the community.

**FOLLOW-UP ACTIVITY 7**

Visit a car washing station. Investigate water waste there and try to work out an alternative solution to this problem.

**How to do this:**
- Visit a car washing station with your father/mother.
- Investigate the extent to which water is wasted.
- Suggest alternative solutions to such problems.
- Hold a discussion about this problem with the car washing station owner then with your father/mother.
- Write a report on your findings.

**ACTIVITY 10**

With the co-operation of your group, stand on a corner of a street in order to make a survey to the number of cars and the number of persons in them. [34-130, 131]

**FOLLOW-UP ACTIVITY 8**

Hold a discussion with your parents about the relation between the increased numbers of world population and global energy waste.

**REMEMBER ! REMEMBER !**

Waste should be stopped and natural resources should be conserved.
GENERAL OBJECTIVES:

After working through this unit the pupil should be able to:

- Sort living things (animals and plants) according to their observable features.
- Compare the characteristics and aspects of several different animals and plants.
- Discuss the special conditions necessary for the survival of different creatures and establish their common needs for air, food and water.
- Collect data regarding animals and plants' life, habitat, changes, kinds, and conditions of living. Analyse such data and draw conclusions.
- Look after animals and plants with care and understand basic needs.
- Draw pictures of the basic needs and the seasonal changes of animals and plants.
- Describe the basic life processes of animals: feeding, breathing, scratching, fighting, washing, catching, jumping, burrowing and exploring.
- Compare animals' and humans' activities.
- Make a chart of the observed animals' activities.
- Be aware of the role animals and plants play in humans' life.
- Design a mask showing an animal or a plant.
- Draw some natural and/or raw materials which are made of animal and plant products.
- Describe the different ways in which the animals and plants grow up.
- List the names of living things observed on and around a tree, using all the senses.
- Be aware of how trees are important to a variety of creatures as an environment by themselves, and as a part of a larger environment.
- Discover the interrelationships among living things which reveal their interdependence.
- Use all the senses of perception together in rather than relying heavily on sight alone.
- Be aware of the world of trees.
- Define a habitat for animals and/or plants.
- List different types of habitats within walking distance of school.
- Draw a picture of all the living things that live in one habitat.
- Produce graphs to compare numbers of animals in different habitats.
- Describe the adaptation processes of different kinds of animals and plants to certain habitats.
- Draw a food chain which includes man.
- Observe animals and plants, carefully, and record their number.
- Describe ways in which people can change a habitat.
- Observe and understand birds' needs for natural materials.
- Draw a bird's nest.
- Observe a spider's web carefully, and draw it.
Show a positive attitude towards spiders, and an appreciation to their good work.

Discuss the causes of the extinction of animals and plants including human-actions and their impact on the extinct or survival of animals and plants.

Suggest some practices to conserve animals and plants.

Describe a food chain in a pond.

Identify and draw three levels of food chains in a pond such as producers, consumers and decomposers.

Write about two ways in which human beings affect the pond's ecosystem.

Identify different sounds under a tree.

Explain the meanings of some sounds of animals such as danger signal, call to potential mates, and to identify persons or other animals.

Be aware of number and variety of sounds under a tree particularly animals.
ANIMALS & PLANTS

First look around. Animals and plants are everywhere. They play an important role in our daily lives. They live with us and share their lives with us. We see tree views, find signs of animals, and hear their sounds in the fields, gardens, and roads.

Some of our diet comes from animals and plants, as do some of the clothes we wear and the things we use. We read, write poems, draw pictures, and sing songs about animals and plants. [47-70]

ACTIVITY 1

Look at the pictures of animals and plants which are shown to you by your teacher. [48-4]

When you have seen the pictures, answer the following questions in your workbook:
- List all living things that you can see.
- Classify them into two groups: animals and plants.
- Classify animals into two groups: flying animals and non-flying.

ACTIVITY 2

Sort animals and plants according to their observable features. [7-44; 10-46]
- Go outside your classroom and observe animals and plants in their natural habitats in the school surroundings.
- List as many animals and plants as you can.
- Examine the ways in which these animals or plants are similar. Emphasise the parts of the body or the number of legs for animals and the shape of the leaves for plants.
- The following questions will help sorting such living things:
  - Can it move itself from a place to another?
  - What does it need to live?
  - Does it have six legs? Is it an insect?
  - Does it have eight legs? Is it a spider?
  - Does it have more than eight legs? Is it a centipede?
  - Does it have segments? Is it a worm?
  - Does it have a shell? Is it a snail?
  - If it hasn't a shell, is it a slug?
  - What is this animal?

FOLLOW-UP ACTIVITY 1

Make a baby birth announcement. [47-33]

STOP & THINK ! 1

What do animals and plants need to live? [35-28, 29, 32; 44-17; 45-10, 11; 46-8]
Now, you have observed some animals and plants in your school surroundings. Next,
- Hold a discussion with your group about the conditions which animals and plants need to live.
- Draw the main or the general conditions and requirements which animals and plants need to live. Animals, for example, need food, air, and water, whilst plants need water, air, soil and sun light.

FOLLOW-UP ACTIVITY 2

Draw the seasonal changes of animals and /or plants. [35-32]

Try to watch animals and plants in different seasons. You should see some changes in them because of weather or other conditions. Such changes are:
1. The fall of plant leaves in Autumn.
2. Animals change their hair or migrate.

Now: Use the school library to draw more seasonal changes of plants and animals.

ACTIVITY 3

Now, prepare yourself to visit a farm to observe animals. Pay close attention to their activities and life process. [41-69; 45-4,6,7]
STOP & THINK ! 2

Do animals and plants play an important role in our lives? [44-16; 47-67,70]

Animals and plants play an important role in human life. To identify their role, think about the following points:

- What human beings eat.
- Clothing and shelter.
- Tools which are made of bones.
- Inspiration for art.
- Animals are also used for work, hunting, and transport, and for medical and scientific research.
- Animals are used to plough fields, draw water, guard homes, and for companionship.
- Items which are made of animals' skins and of plants.
- Making medicine, natural beautiful views and shadow or good weather.

STOP & THINK ! 3

Is it an animal or a plant? What is its name? [47-36]

ACTIVITY 4

Get ready to visit a big tree near your school. [5-4, 12,17,18]
When you get there, this is what you have to do:

- Observe living things on and around the tree, such as plants, insects or small animals, birds, and large animals.
- Record your observations according to the following points:
  - location of living things.
  - size.
  - outstanding characteristics of living thing.
  - what activities are they doing (for animals).
  - your comments and a small sketches of living things.

**FOLLOW-UP ACTIVITY 3**

Now prepare yourself to play a game with one of your friends. [5-8, 9; 41-62]

- Choose a tree to play a game under.
- Collect different bits of bark, leaves, flowers, fruits, and twigs of the tree.
- Let your friend be blind-folded.
- Let him/her feel one of the collected items.
- Put the items on or around the tree.
- Remove the blindfold.
- Ask your friend to point out the same item.
- Change places with him and repeat.
- The winner is the one who finds most items.
STOP & THINK! 4

What is a habitat? .................................................................
A habitat is ...........................................................................
..........................................................................................
[29-24; 31-133; 34-25,26; 35-44,45; 47-50,51; 49-6]

As you have observed some animals and plants in their habitats, try to define a habitat. To help you, answer the following questions:
- Where do you live?
- Is it your habitat?
- Where do animals live?
- Where do plants live?

REMEMBER!

A habitat is "the place where an animal or a plant lives". [47-50; 49-6]

ACTIVITY 5

Investigate a pond community. [34-133,134]

FOLLOW-UP ACTIVITY 4

Investigate a nest. [41-59]
This follow-up activity depends on the availability of a nest. You should never touch a nest with birds in it, and should not disturb it while a nest is still in use. Now, try to:

- Describe its shape to your group. How big do you think the bird must have been.
- Take the nest apart carefully.
- See all parts of the nest such as feathers, hair, twigs, moss or scraps of man-made materials.
- collect pictures of different type of bird nests.

FOLLOW-UP ACTIVITY 5

Prepare yourself to watch a spider in its web around the school. [41-61]

PROTECTING ANIMALS AND PLANTS

People, as we know often destroy animals' habitats. Some animals adapt to a new environment, but others die out and become extinct.

Many kinds of plants may become extinct during the next few years. Therefore several types of animals will die out particularly if people continue damaging rain forests. Building towns and roads also causes the extinction of animals and plants.
You should worry about the danger to wildlife, and should think about ways of conserving it.

STOP & THINK! 5

Are animals and plants really in danger?! [46-24; 47-67,68,69; 49-59,60,61]

Yes, animals and plants are in danger for many reasons:
- Natural happenings such as storms, earthquakes, floods, forest fires, and changing temperatures.
- Actions of people such as hunting, building houses, using forest wood for furniture, using insecticides and deforestation.

Now, is there a solution, and what is the role of school children in such a solution?

ACTIVITY 6

Investigate different sounds under a tree. [47-58,59; 5-10]

You will visit a tree to identify different sounds which are being under it, such as sounds of trees, small animals, birds and mammals.

Please remember that some animals are shy and easily frightened. Therefore, be quiet and never pull up wild flowers, cut branches or disturb bird nests and spider webs, and never damage any aspect of nature. You are a good friend for nature and wildlife.
REMEMBER! REMEMBER!

Animals and plants should be conserved and protected.
UNIT 1

POLLUTION
STOP & THINK ! 1

- Air pollution is a term used to describe: .............................................................
- Have you ever:
  1. [yes-no]. 2.[yes-no]. 3.[yes-no].
  4. [yes-no]. 5.[yes-no]. 6.[yes-no].

ACTIVITY 1

I've seen the following serious environmental problems:

1. ......................................................................................................................
2. ......................................................................................................................

Now, share with your friends the discussion administered by your teacher.

ACTIVITY 2

<table>
<thead>
<tr>
<th>Air pollution</th>
<th>Water pollution</th>
<th>Noise pollution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

The correct answers are:

Air pollution(a, e, f, i, j). Water pollution (b, e, h). Noise pollution (d, g).
AIR POLLUTION

STOP & THINK ! 2

Air pollution is:

STOP & THINK ! 3

I can add the following pollutants:
- People-made:
- Natural:

ACTIVITY 3

<table>
<thead>
<tr>
<th>The Plant</th>
<th>Dust Seen</th>
<th>Tree's Place</th>
<th>Leaf's Place</th>
<th>Leaf's Picture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>
ACTIVITY 4

Answer the following questions:

- What can you see on the cloth?
  I can see .........................................................

- What type of pollutant is this?
  It is ............................................................

- Are there gases that can't be seen? How do you know?
  .................................................................

- Does the car add unnecessary pollutants when it is allowed to run while standing?
  .................................................................

- What can we do to remind others of good habits?
  We can ...........................................................

FOLLOW-UP ACTIVITY 2

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Cars</th>
<th>Buses</th>
<th>Trucks</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No smoke</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

STOP & THINK ! 4

I understand that air pollution affects ............ things and ............... in different ways.
ACTIVITY 5

When you have completed your interview, analyse your data by filling in this sheet:

<table>
<thead>
<tr>
<th>Living Things</th>
<th>Non-Living Things</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease</td>
<td>Yes</td>
</tr>
<tr>
<td>Lungs</td>
<td></td>
</tr>
<tr>
<td>Cough</td>
<td></td>
</tr>
<tr>
<td>Eyes</td>
<td></td>
</tr>
<tr>
<td>Headaches</td>
<td></td>
</tr>
<tr>
<td>Vomiting</td>
<td></td>
</tr>
<tr>
<td>Breathing</td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td></td>
</tr>
<tr>
<td>Nausea</td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td></td>
</tr>
</tbody>
</table>

STOP & THINK! 5

- I think air is [polluted-not polluted] at our school.
- My proofs are: .................................................................................................
  ....................................................................................................................

ACTIVITY 6

With the co-operation of your parents, prepare some questions about some issues or health problems you or your parents are worried about, in order to ask the doctor about them when he/she visits our school on / / 1996.
ACTIVITY 7
Depending upon your observation, fill this sheet:

1. The colour of the white cards has been changed to......................
2. I can see..............................................on the cards.
3. I think it is.................................................................
4. There ............. air pollution at my school.
5. Is it man-made, or natural pollution? It is.................................
6. The other sources of air pollution at our school are......................
    ...............................................................................
7. We can reduce air pollution at our school by:
    a. ......................................................................
    b. ......................................................................
    c. ......................................................................

Now, compare your investigation with your friends'.

FOLLOW-UP ACTIVITY 3

1. Draw pictures of four sources of air pollution you've observed at school using the boxes below: (write the names alongside the numbers)
2. Have a candle, a match, and a lighter. Blow them and hold a plate of glass over them individually. Investigate if they cause air pollution or not? How do you prove that?

3. Discuss, with your parents, how to carry out car anti-pollution campaign. The following points might help you:
   - The efficiency of the engine in burning its fuel.
   - Repeat the experiment that you observed (Activity 4) to your parents.
   - Ask your parents, after the experiment, what makes the black colour, and whether there are other released gases or not?
   - Discuss the electric or steam car with your parents.
   - Persuade people to use bicycles and/or public transportation.
   - Cars should be kept in good condition.
   - The production of cars that have a pollution-control device.
   - Good habits which should be adopted by people.
   - Drivers should avoid rapid acceleration and braking (which causes attrition pollution).
   - The possibility of arranging shared rides.

Try to do the following:
- Advise your parents to stop car's engine while it is standing.
- Make a poster presentation of vehicles, air pollution problems. Distribute and display it at school and in your community.
- Prepare and distribute leaflets about air pollution caused by cars.
4. Using what you have learned about air pollution, design a booklet that illustrates:

a. The major sources of air pollution in your community.

b. How pollution hurts man and other living things as well as non-living things.

c. How we can help reduce pollution in the air and overcome its bad effects.

- If possible, make the booklet of recycled or reusable paper.
- Pictures of problems could be placed in it with a story about each picture.
- Share your ideas with friends, teachers, and parents, in particular the best solutions of air pollution.
- Distribute the booklet when finished, particularly amongst the member of your family in order to inform them of the problems and possible solutions of air pollution.
ACTIVITY 8

1. My family used water last (Friday) for:

<table>
<thead>
<tr>
<th>User</th>
<th>Ways of Using</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother</td>
<td></td>
</tr>
<tr>
<td>Father</td>
<td></td>
</tr>
<tr>
<td>Brother</td>
<td></td>
</tr>
<tr>
<td>Sister</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td></td>
</tr>
</tbody>
</table>

2. The quantity of water has been increased / decreased.

3. Use separate sheets to make a special book from the collected pictures.

4. I can categorise (and draw) water uses of my family into three groups:

<table>
<thead>
<tr>
<th>Support Life</th>
<th>For Enjoyment</th>
<th>Non-Human Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>
5. If it does not rain all the winter:
   a. .................................................................
   b. .................................................................
   c. .................................................................

6. We can live for a longer time without ............., but not without .............. .

🌿 STOP & THINK! 6

<table>
<thead>
<tr>
<th>Water pollution is...</th>
<th>.................................................................</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>...........................................................................................................................................</td>
</tr>
<tr>
<td></td>
<td>...........................................................................................................................................</td>
</tr>
<tr>
<td></td>
<td>...........................................................................................................................................</td>
</tr>
</tbody>
</table>

FOLLOW-UP ACTIVITY 4

- The pollutant is ................. .
- The polluter is ..................... .

FOLLOW-UP ACTIVITY 5

1.  

<table>
<thead>
<tr>
<th>Container</th>
<th>Clean</th>
<th>Dirty</th>
<th>Pollutants</th>
<th>Suggestions</th>
</tr>
</thead>
<tbody>
<tr>
<td>My Family</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neighbour 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neighbour 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neighbour 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. If water in Irbid area is polluted slowly.........................
   ......................................................................................
   ......................................................................................
   ......................................................................................
ACTIVITY 10

Prepare, to visit a spring with your teacher. The spring is polluted. You have to collect as much data as you can before going there.

Fill in the blank spaces:

- The problem of this spring is..........................................................

- Some information about it..............................................................

- Analyse and organise your data under main headings.......................(use extra sheets if needed)

- Generate alternative solutions:....................................................(use extra sheets if needed)

- Develop a plan of action:............................................................(use extra sheets if needed)
Can you implement your plan or some parts of it. If yes, keep your record and let's begin.

🌸STOP & THINK! 7

Categorise the list of water pollution effects mentioned on the blackboard into three main groups:

<table>
<thead>
<tr>
<th>Human Survival</th>
<th>Spoil Human Fun</th>
<th>Spoil Non-Human Life</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

FOLLOW-UP ACTIVITY 6

Write a report about diseases which are caused by polluted water. Discuss it with your friends and hang it in the classroom:

........................................................................................................................................................................
........................................................................................................................................................................
........................................................................................................................................................................
........................................................................................................................................................................
........................................................................................................................................................................
........................................................................................................................................................................
......................................................................................................................(use extra sheets if needed)

🌸STOP & THINK! 8

1. I will describe to my group the following ways that would keep water cleaner:
   - I will ................................................................................................................
   - My family can .................................................................................................
   - People in my community can .........................................................................
2. I believe / don't believe that the earth needs our protection.  
Because .............................................................................
.........................................................................................

FOLLOW-UP ACTIVITY 7

1. Draw three pictures showing ways water is polluted:

2. Write and draw three ways of avoiding dangerous from polluted water:

<table>
<thead>
<tr>
<th>1. ......................</th>
<th>2. ......................</th>
<th>3. ......................</th>
</tr>
</thead>
</table>

3. Discuss with your parents how to carry out a plan of action to reduce water pollution at home, at school, and in the community. The following sheet may help you:
# A Plan of Action

At home, I could reduce water pollution by:

1. 
2. 
3. 

At school:

1. 
2. 
3. 

In the community:

1. 
2. 
3. 

To help reduce water pollution I'll start doing the following:

1. 
2. 
3.
NOISE POLLUTION

ACTIVITY 11
The sounds which I am going to talk about to my group are:

- Sounds that I can hear: ............................................................
- Sounds which frightened me: ..................................................
- Sounds which make me feel safe: ...........................................
- Warning sounds: ..................................................................
- Toys that make distinctive sounds: .......................................  

STOP & THINK ! 9
1. [yes-no] 2. [yes-no] 3. [yes-no] 4. [yes-no]

ACTIVITY 12
I have heard the following sounds:

<table>
<thead>
<tr>
<th>Sounds</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noisy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Noisy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- The [first-second] one is noisy.
- I would like to live in the [first-second] area.
  Because it is .................................................................

FOLLOW-UP ACTIVITY 8
- I heard the following sounds outside my house: ......................
  My area is [noisy-not noisy].
- I heard the following sounds inside my house: ........................................

  My house is [noisy-not noisy].

**ACTIVITY 13**

<table>
<thead>
<tr>
<th>Sound</th>
<th>Noisy</th>
<th>Not Noisy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A piece of music.</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**FOLLOW-UP ACTIVITY 9**

The sound makers I have collected are:

<table>
<thead>
<tr>
<th>Maker</th>
<th>1. .................</th>
<th>2. .................</th>
<th>3. .................</th>
<th>4. .................</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picture</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**STOP & THINK ! 10**

What are the effects of noise pollution:

- On humans: ............................................................................

- On non-humans: ........................................................................
### ACTIVITY 14

<table>
<thead>
<tr>
<th>Patient</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hearing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cause</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### FOLLOW-UP ACTIVITY 10

<table>
<thead>
<tr>
<th>Sound</th>
<th>Effects on Humans</th>
<th>Effects on Non-Humans</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**STOP & THINK ! 11**

- I feel I am responsible / not responsible for reducing noise pollution.

- Noise pollution should be lessened in the following ways:
  1. At home: .................................................................
  2. At school: ...............................................................  
  3. In the community: ...................................................

- I will do the following actions to reduce noise pollution:
  1. ........................................  2. .......................... 
  3. ........................................  4. ..........................
The following drawings illustrate three ways to avoiding danger from noise pollution:

FOLLOW-UP ACTIVITY 11
1. Your leaflet should include:
   - Sources of noise pollution.
   - Effects of noise pollution on humans and non-humans.
   - What people should do to reduce the level of noise in the community.

2. The suggestions of my parents are:
   - at home: .................................................................
   - at local area: .............................................................

3. The models I will design: ...........................................

4. The items I have collected: ........................................
ADDITIONAL INVESTIGATION

- Land pollution is: ........................................................................................................
  ........................................................................................................
  ........................................................................................................

- Identify five land pollutants:
  1. .................................................................................................
  2. .................................................................................................
  3. .................................................................................................
  4. .................................................................................................
  5. .................................................................................................

- Specify three effects of land pollution on humans and/or non-humans:
  1. .................................................................................................
  2. .................................................................................................
  3. .................................................................................................

- Write three ways of preventing land pollution:
  1. .................................................................................................
  2. .................................................................................................
  3. .................................................................................................

- Investigate one cause of land pollution problems in your area. Try to use the steps of problem-solving in dealing with it. Write a report about it.
UNIT 2

WASTE
My house: waste products over one week

<table>
<thead>
<tr>
<th>item</th>
<th>Sun</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ACTIVITY 1**

Useful or not useful waste material

<table>
<thead>
<tr>
<th>Items</th>
<th>Number</th>
<th>Useful</th>
<th>Not Useful</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Classification of the useful items

<table>
<thead>
<tr>
<th>Item</th>
<th>Tally Chart</th>
<th>Total Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Paper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Glass</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Cans</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Plastic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Sticks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Wood</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Other</td>
<td>( )</td>
<td></td>
</tr>
</tbody>
</table>
FOLLOW-UP ACTIVITY 1

Items I have found

<table>
<thead>
<tr>
<th>Material</th>
<th>Tally Chart</th>
<th>Total Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Litter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- on street</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- at school</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garbage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- uncovered container</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- construction debris</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- cans</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- others</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Defacement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- to road signs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- to walls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- to desks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- broken windows</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ACTIVITY 2

<table>
<thead>
<tr>
<th>Time of visit:</th>
<th>Date:</th>
<th>Place of dumping:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The problem of this illegal dumping area is: ........................................

Dear President of the local council:

I visited ................................................................................................
..............................................................................................................

Could you please give this problem your prompt attention.

NB: Some pictures of this place are attached.

Yours Sincerely,
ACTIVITY 3

- The visitor should be asked the following questions:
  1. ..............................................................................................................
  2. ..............................................................................................................
  3. ..............................................................................................................

- The problems refuse collectors face are:
  1. ..............................................................................................................
  2. ..............................................................................................................
  3. ..............................................................................................................

- I think the role of refuse collectors (is / is not) important, Because
  ..............................................................................................................

- To keep the environment beautiful, I can assist refuse collectors
  by taking the following actions:
  1. ..............................................................................................................
  2. ..............................................................................................................
  3. ..............................................................................................................
ACTIVITY 4

I. I have checked the following bins:

<table>
<thead>
<tr>
<th>Type of Bin</th>
<th>Material</th>
<th>Place / Site</th>
<th>Litter Found</th>
<th>Efficiency / Problems</th>
<th>Picture / Photo</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

II.

I would like to test the following hypothesis: ........................................
........................................................................................................
........................................................................................................
I suggest this solution: ...........................................................................
........................................................................................................
........................................................................................................
I will test my solution using the following steps:
........................................................................................................
........................................................................................................
My conclusion is: .............................................................................
........................................................................................................
........................................................................................................
### Appendix 1-B

#### III. Interview

<table>
<thead>
<tr>
<th>Date: / / 199</th>
<th>Place:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviewer:</td>
<td>Person interviewed:</td>
</tr>
</tbody>
</table>

1. How many? 
   
   Answer:

2. How do you find the quality which they are made of? 
   
   Answer:

3. Why? 
   
   Answer:

4. What will be happen if? 
   
   Answer:

#### IV.

If there were no bins and the litter was left on the ground it will be:

1. 
2. 
3. 

STOP & THINK! 2

#### I. My family have ever:

## II. Effects of burying or burning waste on the environment

<table>
<thead>
<tr>
<th>Environment</th>
<th>Effect</th>
<th>Picture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Land</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Air</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Water</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## III. What Happens to waste material which is thrown away

<table>
<thead>
<tr>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
</tr>
</thead>
</table>

### FOLLOW-UP ACTIVITY 2

I have found the following:
ACTIVITY 5

Plan for an anti-litter campaign

- The aim of this campaign is to .................................................................

- To carry out this campaign, the following materials are needed:
  1. .................................................................
  2. .................................................................
  3. .................................................................

- We will divide ourselves into ............... groups as follows:
  Group 1 to (do) .................................
  Group 2 to .............................................
  Group 3 to .............................................
  Group 4 to .............................................

- Anti-litter posters will be distributed to .............................................

- To keep the school tidy I suggest rubbish containers should be placed near the .........................

A message to support anti-litter policy at school

Dear ...................
STOP & THINK ! 3

The best way of solving waste problems is ........................................ .

Three good conservation main actions of solving these waste problems are:

1. Re ........................................ .
2. Re ........................................ .
3. Re ........................................ .

STOP & THINK ! 4

Recycling could be defined as ..............................................................

..............................................................

..............................................................

..............................................................

FOLLOW-UP ACTIVITY 3

I. Things that have been recycled or re-used at school or at home

<table>
<thead>
<tr>
<th>Recycled/Re-used items</th>
<th>It's used for</th>
<th>Sketch</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
II. Interview

<table>
<thead>
<tr>
<th>Date: / / 199</th>
<th>Place:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviewer:</td>
<td>person interviewed:</td>
</tr>
</tbody>
</table>

- Do you think we need recycling?
- Why?
- What are the advantages and the disadvantages of recycling?
- How can waste material be re-used?
- Why is recycling important?
- What is the role of people's attitudes in recycling?

STOP & THINK! 5

If we recycle some items of waste material we can save the following:

1. ..................................................
2. ..................................................
3. ..................................................
4. ..................................................
5. ..................................................
STOP & THINK ! 6

- They need such items for ...........................................
- [yes they do/ no they do not] recycle them.
- [yes they do/ no they do not] re-use them.
- [yes they do/ no they do not] throw them away.
- If I collect all these items I will .............................................

ACTIVITY 6

<table>
<thead>
<tr>
<th>Items</th>
<th>Reusable</th>
<th>Non-Reusable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ACTIVITY 7

Interview worksheet

Name of interviewer: Date: / / 199
Name of person interviewed: Place:

Questions:
1. ............................................. Answer: .............................................
2. ............................................. Answer: .............................................
3. ............................................. Answer: .............................................
4. ............................................. Answer: .............................................
5. ............................................. Answer: .............................................
6. ............................................. Answer: .............................................
7. ............................................. Answer: .............................................
8. ............................................. Answer: .............................................
9. ............................................. Answer: .............................................
10. ........................................ Answer: ........................................

Comments: .......................................................................................................
..........................................................................................................................
..........................................................................................................................
..........................................................................................................................

Conclusion: .......................................................................................................
FOLLOW-UP ACTIVITY 4

I. I have examined the following items:

<table>
<thead>
<tr>
<th>Items</th>
<th>How it is Packaged</th>
<th>Picture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

II. Suggested ways of packaging certain items to reduce waste

<table>
<thead>
<tr>
<th>Item</th>
<th>New Ways of Packaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
</tbody>
</table>
FOLLOW-UP ACTIVITY 5

I. I suggest the following three ways of cutting down the amount of waste at my house:

1. ....................................................... .
2. ....................................................... .
3. ....................................................... .

II. Waste products I have observed in my house (week 1)

<table>
<thead>
<tr>
<th>item</th>
<th>Sun</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

III. Waste products I have observed in my house (week 2)

<table>
<thead>
<tr>
<th>item</th>
<th>Sun</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

IV. In comparison, the amount of waste at my house in week 1 is (less / more) than the amount of waste in week 2.
STOP & THINK! 7

I. The new types of waste that I have read about were:
   1. ...................................................................................................
   2. ...................................................................................................
   3. ...................................................................................................

II. I have understood that those schools ............................................
   ...................................................................................................

III. My school should start the following actions toward conserving
     energy and water:
   1. ...................................................................................................
   2. ...................................................................................................
   3. ...................................................................................................

IV. Our families (can / cannot) share in the conservation process at
    home.

V. I advise them to start the following actions to conserve natural
   resources:
   1. ...................................................................................................
   2. ...................................................................................................
   3. ...................................................................................................

VI. The following actions will be done to encourage them to start
    conserving fuel, electricity, and water:
   1. ...................................................................................................
   2. ...................................................................................................
   3. ...................................................................................................
ELECTRICITY

ACTIVITY 8

I. My house electrical items data sheet*

<table>
<thead>
<tr>
<th>Item</th>
<th>Type</th>
<th>Item</th>
<th>Type</th>
<th>Item</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>clocks</td>
<td>electrical</td>
<td>fans</td>
<td>electrical</td>
<td>lamps</td>
<td>electrical</td>
</tr>
<tr>
<td>shower</td>
<td></td>
<td>clock</td>
<td>shower</td>
<td>fans</td>
<td></td>
</tr>
<tr>
<td>knife</td>
<td></td>
<td>electrical shaver</td>
<td></td>
<td>electrical shaver</td>
<td></td>
</tr>
<tr>
<td>toaster</td>
<td>grill</td>
<td>electrical waffle iron</td>
<td>fry fan</td>
<td>recorders</td>
<td>hair</td>
</tr>
<tr>
<td>machine</td>
<td>food</td>
<td>bun</td>
<td>hot water</td>
<td>tank</td>
<td>air-condition</td>
</tr>
<tr>
<td>blender</td>
<td>mixer</td>
<td>telephones</td>
<td>video tape</td>
<td>camcorder</td>
<td>recorder</td>
</tr>
<tr>
<td>others...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* The circled items are available in my house.

II. Sketch of electrical items in my house room by room

III. Electrical items' consumption

<table>
<thead>
<tr>
<th>Items that need a lot of electricity</th>
<th>Items that don't need much electricity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1.</td>
</tr>
<tr>
<td>2.</td>
<td>2.</td>
</tr>
<tr>
<td>3.</td>
<td>3.</td>
</tr>
<tr>
<td>4.</td>
<td>4.</td>
</tr>
<tr>
<td>5.</td>
<td>5.</td>
</tr>
<tr>
<td>6.</td>
<td>6.</td>
</tr>
<tr>
<td>7.</td>
<td>7.</td>
</tr>
<tr>
<td>8.</td>
<td>8.</td>
</tr>
</tbody>
</table>
IV. My home electricity meter reading is as follows:

V. If we add up all the meter readings of the whole class the result is (big / small).

VI. We (can / cannot) live without electricity.

VII. Without electricity our lives would be ..........................................
     .................................................................

VIII. Electricity bills contain the following items:

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

IX. My parents (pay / do not pay) much money for electricity.

X. Some of the ways that my family could follow to reduce electricity bills are:
   1. ............................................................
   2. ............................................................
   3. ............................................................

XI. A message to my parents

Name of sender: Date: / / 199

To my beloved mother and father

My dear parents,

To reduce electricity waste and to conserve it please

........................................................................................................................................

Yours affectionate son/daughter,
FOLLOW-UP ACTIVITY 6

Electrical items which are left switched on when not being used (1)

Date: / /199 & / /199

<table>
<thead>
<tr>
<th>Electrical item/mean</th>
<th>Unused/Minutes</th>
<th>Meter Reading-kw/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>................ minutes</td>
<td>..................... kw/day</td>
</tr>
</tbody>
</table>

Electrical items which are left switched on when not being used (2)

Date: / /199 & / /199

<table>
<thead>
<tr>
<th>Electrical item/mean</th>
<th>Unused/Minutes</th>
<th>Meter Reading-kw/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>................ minutes</td>
<td>..................... kw/day</td>
</tr>
</tbody>
</table>

- I think there (is / is not) an electricity shortage in Jordan.

- I suggest the following practical conservation practices to reduce electricity waste in my house:
  1. ................................................ .
  2. ................................................ .
  3. ................................................ .
WATER

ACTIVITY 9

I. Water supply record*

<table>
<thead>
<tr>
<th>Day</th>
<th>Sun</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Sat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water supply</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

* Circle as appropriate.

II. I (agree / disagree) that there is a serious water shortage in Jordan.

III. My family uses of water

<table>
<thead>
<tr>
<th>Uses of Water</th>
<th>Tally Chart</th>
<th>Frequency</th>
<th>Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. hand washing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. flushing toilet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. drinking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. washing clothes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. cleaning rooms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. car washing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. brushing teeth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. bath or shower.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

IV. I (was / was not) surprised at how much water my family actually used?

V. - When my family ran out of water they felt ........................................
    - I think that water (is / is not) used wisely.
VI. My family water bills for the former 12 months

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>... JD</td>
</tr>
</tbody>
</table>

- I think this (is / is not) a big number.
- To reduce water bills my family should ...........................................
  ......................................................................................................
  ....................................................................................................

VII. Running water without use

<table>
<thead>
<tr>
<th>Water sources which are left running when not in use</th>
<th>Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>.......... minutes</td>
</tr>
</tbody>
</table>

VII. Read the items of this questionnaire closely before start answering it. The questionnaire may serve you in identifying some conservation practices.

**Questionnaire**

<table>
<thead>
<tr>
<th>Statements</th>
<th>Agree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always turn off taps when not in use.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cars should be washed by a small container, not a hose.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is good to have showers instead of baths.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency shops should be called if a water leak is observed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Put a bottle inside toilet flushing container.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Fix loose taps to stop water dripping.

Water containers and pipes must always be new so that water does not leak from them.

Pupils should not leave water running after drinking or washing.

Boiled water should not be forgotten on gas cookers.

If everyone ensures that water taps are not dripping or leaking, millions of litres of water will be conserved.

VIII. I suggest the following conservation practices to reduce water waste:

At home:
1. ........................................................... .
2. ........................................................... .

At school:
1. ........................................................... .
2. ........................................................... .

In the community:
1. ........................................................... .
2. ........................................................... .

FOLLOW-UP ACTIVITY 7

Car washing station investigation

The problem is: .................................................................

The number of cars is (.........................) .

The used water was about ........... litres.

The suggested solution to this problem is: .................................
CAR PASSENGERS

ACTIVITY 10

Survey of cars

Team:.................... Street:.................. Date: ........../....../ 199...

<table>
<thead>
<tr>
<th>Number of cars</th>
<th>Carrying one person</th>
<th>Carrying more than one</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FOLLOW-UP ACTIVITY 8

- I think, if the number of world population is increased, global energy waste will (decrease / increase).
- My reasons are: ........................................................................
  ........................................................................
  ........................................................................
  ........................................................................
## ACTIVITY 1

**Animals and Plants**

<table>
<thead>
<tr>
<th>Animals</th>
<th>Plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flying</td>
<td></td>
</tr>
<tr>
<td>Not flying</td>
<td></td>
</tr>
</tbody>
</table>

## ACTIVITY 2

### I. Animals and Plants

<table>
<thead>
<tr>
<th>Animal/Plant</th>
<th>Name</th>
<th>Features</th>
<th>Classification</th>
<th>Picture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
II. From my observation I conclude the following:

1. ........................................................................................
2. ........................................................................................
3. ........................................................................................
4. ........................................................................................

FOLLOW-UP ACTIVITY 1

<table>
<thead>
<tr>
<th>Baby announcement card</th>
</tr>
</thead>
<tbody>
<tr>
<td>The birth of .............</td>
</tr>
<tr>
<td>First photo</td>
</tr>
<tr>
<td>Time of birth (Month / Season): .............................................</td>
</tr>
<tr>
<td>Place of birth (habitat): ....................................................</td>
</tr>
<tr>
<td>Special baby facts: ..............................................................</td>
</tr>
<tr>
<td>Mum and Dad's photos</td>
</tr>
</tbody>
</table>

364
STOP & THINK ! 1

I. Animals' and plants' basic needs to live

<table>
<thead>
<tr>
<th>Needs</th>
<th>Sunlight</th>
<th>Air</th>
<th>Food</th>
<th>Soil</th>
<th>Water</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animals</td>
<td>✔️</td>
<td>❌</td>
<td>✔️</td>
<td>❌</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Plants</td>
<td>✔️</td>
<td>❌</td>
<td>✔️</td>
<td>❌</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Picture</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Circle as appropriate.

II. To look after animals and plants the following actions should be done:

At home:
1. ........................................................... .
2. ........................................................... .
3. ........................................................... .

In the wild:
1. ........................................................... .
2. ........................................................... .
3. ........................................................... .

FOLLOW-UP ACTIVITY 2

I. Seasonal changes of animals and plants

<table>
<thead>
<tr>
<th>Season</th>
<th>Animals/Plants</th>
<th>Summer</th>
<th>Autumn</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ACTIVITY 3

I. Animals' activities

<table>
<thead>
<tr>
<th>Animal</th>
<th>Name</th>
<th>What does the animal do? / minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1-2</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

II. Human beings (need / need not) the same life processes and needs as animals.

III. Animals (have / have not) the right to live in their surroundings.

IV. To care for farm animals I should do the following actions:
1. ............................................................. .
2. ............................................................. .
3. ............................................................. .

STOP & THINK! 2

I. Benefits of animals and plants*

<table>
<thead>
<tr>
<th>Work/Item</th>
<th>Animals</th>
<th>Plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tools</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beauty</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clothing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
II. If all animals are hunted and all plants are cut down the following would happen:

1. ............................................................. .
2. ............................................................. .
3. ............................................................. .
4. ............................................................. .
5. ............................................................. .

III. Classify the following into two groups natural or made from raw material:
sugar, raffia, wood, tea, spaghetti, paper, cake, wool-coat, rope, meat, biscuit, milk, cotton, yoghurt, cheese.

<table>
<thead>
<tr>
<th>Natural</th>
<th>Raw</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

IV. I have collected the following items:

<table>
<thead>
<tr>
<th>Made from</th>
<th>Item 1</th>
<th>Item 2</th>
<th>Item 3</th>
<th>Item 4</th>
<th>Item 5</th>
<th>Item 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

V. I believe that garden flowers (should / should not) be picked.
STOP & THINK! 3

Animal and plant

<table>
<thead>
<tr>
<th>No</th>
<th>Animal or plant</th>
<th>Name</th>
<th>Group 1</th>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total score

ACTIVITY 4

The observed animals and plants

<table>
<thead>
<tr>
<th>Living thing</th>
<th>Location</th>
<th>Size</th>
<th>Characteristics</th>
<th>Activity</th>
<th>Comments</th>
<th>Sketch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birds</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

368
FOLLOW-UP ACTIVITY 3

The guessed items

<table>
<thead>
<tr>
<th>Items</th>
<th>1. ........</th>
<th>2. ........</th>
<th>3. ........</th>
<th>4. ........</th>
<th>5. ........</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>My Friend</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Myself</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

✿ STOP & THINK! 4

I. Names of some habitats where animals and/or plants live

<table>
<thead>
<tr>
<th>Animals</th>
<th>Plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal</td>
<td>Habitat</td>
</tr>
<tr>
<td></td>
<td>Plant</td>
</tr>
<tr>
<td>1.</td>
<td></td>
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<tr>
<td>2.</td>
<td></td>
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<tr>
<td>3.</td>
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<td>4.</td>
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<tr>
<td>5.</td>
<td></td>
</tr>
</tbody>
</table>

* Moist, dry, sun, shade.

B. Numbers of small animals in different habitats studied*

<table>
<thead>
<tr>
<th>Animal</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ant</td>
<td>3</td>
</tr>
<tr>
<td>2. Spider</td>
<td>4</td>
</tr>
<tr>
<td>3. Snail</td>
<td>2</td>
</tr>
<tr>
<td>4. Woodlouse</td>
<td>1</td>
</tr>
</tbody>
</table>

* Try to complete this graph by your findings and correct as appropriate.

369
III. Habitats within walking distance at school

<table>
<thead>
<tr>
<th>Animals/plants</th>
<th>How many seen</th>
<th>Where</th>
<th>What were they doing?</th>
<th>Habitat's picture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
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<tr>
<td>3.</td>
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<td>4.</td>
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<td>5.</td>
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<tr>
<td>6.</td>
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</tr>
</tbody>
</table>

The type and number of animals and plants change / do not change from one part of the habitat to another one, because ........................................
...........................................................................................................................................................
...........................................................................................................................................................

IV. Food chains

<table>
<thead>
<tr>
<th>Living thing</th>
<th>Living thing's food</th>
<th>Food for living thing's food</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
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<tr>
<td>2.</td>
<td></td>
<td></td>
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<tr>
<td>3.</td>
<td></td>
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<tr>
<td>4.</td>
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<tr>
<td>5.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

V. Animals and plants need......................................................... to live?
VI. Some examples of what animals and humans eat

<table>
<thead>
<tr>
<th>Living things</th>
<th>What they eat</th>
<th>Producer / consumer</th>
<th>Picture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cows</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orange trees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sparrows</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cats</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grass</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turtles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wolves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robins</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flowers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rabbits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humans</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

VII. Plants get their food from .................................................................

VIII. A food chain

IX. Humans' activities that would disrupt animals or plants' habitat

<table>
<thead>
<tr>
<th>Humans' activity</th>
<th>What would happen to animals and plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
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<tr>
<td>2.</td>
<td></td>
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<tr>
<td>3.</td>
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<tr>
<td>4.</td>
<td></td>
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<tr>
<td>5.</td>
<td></td>
</tr>
</tbody>
</table>
X. People should / should not investigate more than one place or one way to conduct their activities, and they should / should not think of nature too.

XI. Habitats that are being destroyed around my home

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Kind</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
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<td>2.</td>
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<td>3.</td>
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<td>4.</td>
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<td>5.</td>
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</tbody>
</table>

ACTIVITY 5

I. I have collected the following things from the pond:

1. ................................................. .
2. ................................................. .
3. ................................................. .
4. ................................................. .
5. ................................................. .

II. If a part of a chain is damaged or disappears the following would happen:

1. ................................................. .
2. ................................................. .
3. ................................................. .
III. People may affect ponds' ecosystem as follows:
   1. ................................................. .
   2. ................................................. .

IV. The pond's life can be protected in two ways:
   1. ................................................. .
   2. ................................................. .

V. Levels of a food chain in the pond.
   
   decomposers:
   consumers:
   producers:

FOLLOW-UP ACTIVITY 4

I. The natural materials that birds need to build their nests are:
   1. ................................................. .
   2. ................................................. .
   3. ................................................. .
   4. ................................................. .
   5. ................................................. .

II. The shape of the nest is .......................................... .

III. The bird must have been as big as ........................... .
IV. The picture below shows a nest and all its parts:

V. Pictures of different bird nests

FOLLOW-UP ACTIVITY 5

A spider's web
PROTECTING ANIMALS AND PLANTS

STOP & THINK ! 5

I. The following are some animals and plants that have become extinct:

1. ................................................. .
2. ................................................. .
3. ................................................. .
4. ................................................. .
5. ................................................. .

II. The ways that cause animals and plants to become extinct:

- Natural causes:
  1. ................................................. .
  2. ................................................. .
  3. ................................................. .
  4. ................................................. .
  5. ................................................. .

- Human causes:
  1. ................................................. .
  2. ................................................. .
  3. ................................................. .
  4. ................................................. .
  5. ................................................. .
III. Some human actions in my local environment may cause animals and plants to become extinct:

1. ................................................. .
2. ................................................. .
3. ................................................. .

IV. I suggest the following practices for conserving animals and plants in my local environment:

animals:

1. ................................................. .
2. ................................................. .
3. ................................................. .

plants:

1. ................................................. .
2. ................................................. .
3. ................................................. .

V. Animals and plants in danger!

Name: Report

Date: / / 199
VI. Conserving animals and plants

Our plan of action

Name: ___________________________ Date: __/__/199

Aims:
1. 
2. 
3. 

Actions:
1. 
2. 
3. 

Evaluation:

ACTIVITY 6

Sounds of animals and plants under a tree

<table>
<thead>
<tr>
<th>Description of a Sound</th>
<th>Living thing which Makes it</th>
<th>Loud or Soft</th>
<th>High or Low</th>
<th>Distant or Nearby</th>
<th>Duration /Minutes</th>
<th>Guessed Meaning</th>
</tr>
</thead>
<tbody>
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</table>
TEACHER'S MANUAL
Dear teachers,

This programme has been developed to meet the requirements of the educational reform plan in Jordan. During the development of this programme, careful consideration has been given to the development stage of fourth grade children (9-10 year). Therefore, learning should be meaningful and relevant for them.

The main and the most important part of this programme is the instructional material which has been designed to meet the major aim of this programme. That is, to promote positive attitudes towards the environment in children.

It is believed that the main task of this instructional material and its approaches of teaching is to present children with the broad range of experiences which help them to develop their knowledge and understanding of the environment, and attitudes and skills for its exploration.

The instructional material involve children in out-of-door activities. This method of teaching is different from other approaches which our children in Jordan are familiar with, particularly lecturing. The children will, therefore, be involved mentally and physically in exploring objects and events in the environment around them.
In working through this instructional material, children will develop their own ideas, hypotheses, investigate issues and problems, collect data, and interpret findings. It is hoped that this instructional material will ensure children's scientific ideas and findings. Children, moreover, should change their ideas depending upon their results, but not only by accepting ideas which they hold, are better or correct. The role of the teacher is to lead children toward more scientific and creative thinking.

The instructional material contains three units: Pollution, Waste, and Animals and Plants. The units, however, contain the general objectives and plenty of activities to achieve such objectives. The format of the activities is as follows:

- **STOP & THINK!** to motivate pupils and start learning.
- **ACTIVITY** to manipulate, understand, investigate and solve problems.
- **FOLLOW-UP ACTIVITY** to emphasise learning and findings.
- **REMEMBER!** to clarify environmental concepts and issues.

These activities were established in a manner that enables children to deal with each individual activity from a simple starting point. Some of these activities may be dealt with as self-study. Furthermore, cooperative and collaborative learning should be encouraged.
Assessment is essential for evaluating the effectiveness of this environmental education programme in general, and the instructional material in particular. The assessment should therefore be built on the objectives of each unit. It should be carried out daily and activity-based, and should be collected as a natural part of pupils' work by using some of the following techniques: observing how pupils carry out a practical activity, discussing their work, assess their skills and understanding, and evaluating drawings, diagrams, posters, leaflets, writing tasks and designs.

It would be appreciated if you could provide the advisory committee of this programme with any comments and opinions.

Thank you very much.

The advisory committee of FGEEP
UNIT 1

POLLUTION
STOP & THINK ! 1

Objectives:
After this session the pupil should be able to define pollution.

Resources:
- writing materials.
- Library books and posters about pollution.

Suggested procedure and techniques:
- Tell your pupils that they have to think about the newspaper headlines. Guide them the concept they are going to define (pollution).
- Draw pupils' attention to the questions which follow their definition.
- The opportunity should be given to them to use the library.
- Try to demonstrate a film or slides related to pollution in general.

ACTIVITY 1

Objectives:
- After this activity the pupil should be able to identify two environmental problems.

Resources:
some selected pictures which illustrate environmental problems, e.g. fumes which are released from car exhausts, dirty water containers and cars' horns of a wedding party.

Suggested procedure and techniques:
- Show the selected pictures. Ask the pupils to look at them in order to identify two serious problems.
- Pupils should be offered enough time to write about some of the environmental problems shown in the pictures.
- After the completion of this task, by the pupils:
  a. write the identified problems on the black board.
  b. Divide the problems into three categories air, water, and noise?

ACTIVITY 2

Objectives:
After this activity the pupil should be able to organise data.

Resources:
Ten statements regarding pollution which are mentioned in the pupil's manual.

Suggested procedure and techniques:
- Let the pupils read the statements individually and add any statement which could concern any type of pollution.
- Divide your pupils into groups depending on their number.
- A pupil from each group reads the statements. The group decides the type of pollution each statement is related to (air, water, noise). Their decision is then recorded.
- The correct answers are as follows: air(a, c, i, f, j), water(b, e, h), noise(d, g)
- Provide your pupils with the appropriate feedback (tell them how well they have done).
STOP & THINK ! 2

Objectives:
After this session the pupil should be able to define air pollution.

Resources:
- Writing materials.
- Library books about air and air pollution.

Suggested procedure and techniques:
- Tell your pupils that they have to think about the air which is all around them, and guide them to the concept they are going to define (air pollution).
- Draw pupils' attention to the questions which follow their definition.
- The opportunity should be given to them to use the library to read and to see some texts or pictures related to air pollution.
- Try to show a video film or slides related to air pollution.

FOLLOW-UP ACTIVITY 1

Objectives:
After this activity the pupil should be able to use his senses to identifying some smells.

Resources:
- A piece of cloth.
- Different smells from various thing or materials, such as salt, sugar, lemon, and so on.
Appendix 1-C

- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

**Suggested procedure and techniques:**
- Explain the task to the pupils.
- Provide your pupils with the appropriate feedback.

**STOP & THINK ! 3**

**Objectives:**
After this session the pupil should be able to divide air pollutants into two categories, people-made or natural.

**Resources:**
- Writing materials.

**Suggested procedure and techniques:**
- Group discussion about the two types of air pollutants, people-made and natural.
- Motivate your pupils to write about additional sources of both type of air pollution.

**ACTIVITY 3**

**Objectives:**
After this activity the pupil should be able to investigate an air pollution problem.

**Resources:**
- Writing materials.
Appendix 1-C

- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

**Suggested procedure and techniques:**
- Take your pupils around the school.
- Let them collect some leaves from different areas.
- Use the answer-sheet to direct pupils' observations.
- The pupils have to check the leaves, keeping in mind the items they are going to fill in.
- Ask your pupils about their investigations:
  1. How clean the leaves of the plants you've observed?
  2. Are the plants in some areas cleaner than those in other areas?
  3. Which leaves are the dirtier? Why?
  4. Does the dust hurt the leaves? [34-110]

- Do concentrate on the importance of the leaves for the plants wherein plants make food. The leaves need sun-light to make the food. If plants are covered by dust or dirt it couldn't make food or keep healthy. Air pollution makes plants turn yellow, retards growth, and even kills the plants. [29-10]

**ACTIVITY 4**

**Objectives:**
After this activity the pupil should be able to identify a new source of air pollution. (Carbon that exists due to the fumes released from motor vehicle engines.)
Resources:
- A small piece of white cloth.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

Suggested procedure and techniques:
- Visit the school parking lots with your pupils.
- Place the white piece of cloth over the tail pipe of a car.
- Start the engine.
- Remove the cloth after 5 minutes.
- Let the pupils examine the cloth.
- Let them answer the questions stated on their workbook. [1-65]

FOLLOW-UP ACTIVITY 2

Objectives:
After this activity the pupil should be able to investigate air pollution from (cars, trucks, buses) in his/her surroundings.

Resources:
- Pencils or pens.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

Suggested procedure and techniques:
- Explain the task to the pupils.
- Provide your pupils with the appropriate feed back.
- Discuss the results of the pupils' investigations.
STOP & THINK ! 4

Objectives:
After this session the pupil should be able to understand that air pollution affects living things and non-living things in different ways.

Suggested procedure and techniques:
- Provide your pupils with an idea about the ways air pollution affects living and non-living things as an introduction to activity 5.
- Show some pictures related to the topic, e.g. walls that have become black.

ACTIVITY 5

Objectives:
After this activity the pupil should be able to discuss the ways that air pollution can damage both living things and non-living things, particularly its effect on people.

Resources:
- Pencils.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

Suggested procedure and techniques:
- Tell your pupils that they are going to interview their parents in order to discuss the effects of air pollution on living things and non-living things.
- Discuss the results with your pupils.
STOP & THINK ! 5

Objectives:
After this session the pupil should be able to discover whether or not air is polluted at his/her school.

Suggested procedure and techniques:
- Group discussion about air pollutants at the school.
- Pupils should be given the chance to discover whether air is polluted at their school or not.
- Motivate your pupils to write about proofs of their discovery in their workbooks.

ACTIVITY 6

Objectives:
After this activity the pupil should be able to identify the effects of air pollution on his/her health.

Resources:
No resources are needed.

Suggested procedure and techniques:
- Tell your pupils that a doctor will visit the school to talk about the effects of air pollution on their health.
- Encourage your pupils to prepare some questions at home ready to be put to the doctor.
- Invite a doctor to the school to talk about the effects of air pollution on the pupils' health. Have pupils put their questions.
ACTIVITY 7

Objectives:
After this activity the pupil should be able to investigate air pollution at his/her school.

Resources:
- White cards.
- Vaseline.

Suggested procedure and techniques:
- Take the pupils around the school in order to discover the sources of air pollution at school.
- Encourage your pupils to do the experiment mentioned in the pupil's textbook (activity 7).
- Discuss your pupils findings and conclusions with them.
- Give the pupils the necessary instructions for their safety.

FOLLOW-UP ACTIVITY 3

Objectives:
After this activity the pupil should be able to:
- Draw four sources of air pollution at school.
- Investigate whether the pilot of a candle, a match, and a lighter cause air pollution or not.
- Develop a plan of action to carry out car anti-pollution campaign.
- Design and assemble a booklet from the information gathered on air pollution.
Distribute the booklet to inform parents on the problems and possible solutions of air pollution.

Resources:
- Pencils and pens.
- Used or recycled paper.
- Colours.
- Plates.
- Candles, matches, and lighters.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

Suggested procedure and techniques:
- Explain the tasks which the pupils are going to do.
- Give the pupils clear instructions for their safety.
- Participate in your pupils' campaign as a supervisor.
- Help your pupils in designing the booklet.
- Provide the pupils with the appropriate feedback.

ACTIVITY 8

Objectives:
After this activity the pupil should be able to:
- Investigate all ways which his family use clean water.
- Analyse the collected data. [31-59]
- Design a special book showing the benefits of water.
- Categorise his/her family's uses of clean water into three groups to support life, for enjoyment, and non-human uses.
**Draw a picture to illustrate each category.**

**Resources:**
- Pencils or pens.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).
- Old newspapers and magazines.
- Scissors and glue.

**Suggested procedure and techniques:**
- When your pupils return to the class, list all uses of clean water mentioned by the pupils.
- Help them to design a book from collected pictures that show the benefits of clean water.
- Let your pupils categorise the water uses of their families into three groups, and draw a picture related to each group.
- Do emphasise the importance of conserving water.
- Discuss with your pupils the fact that "human beings can live without food longer than without water.

**STOP & THINK ! 6**

**Objectives:**
After this session the pupil should be able to define water pollution.

**Resources:**
- Writing materials.
- Library books related to water pollution.

**Suggested procedure and techniques:**
- Discuss the meaning of water pollution with your pupils. Keep in mind the questions mentioned in the textbook.

**FOLLOW-UP ACTIVITY 4**

**Objectives:**
After this activity the pupil should be able to identify the pollutant and the polluter.

**Resources:**
- Two aquariums.
- Clean water.
- Sand.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

**Suggested procedure and techniques:**
- Explain the experiment to the pupils.
- Ask them about the pollutant and the polluter.

**ACTIVITY 9**

**Objectives:**
After this activity the pupil should be able to:
- Describe 5 causes of water pollution.
- Describe 3 reasons why it is important for each of us to help prevent pollution

**Resources:**
- A big jug, or any glass container.
- Colour liquid.
Appendix 1-C

Suggested procedure and techniques:
- Have a big jug or any glass container.
- Tell your pupils to consider it as a lake.
- Ask them whether the water is clean or not.
- Put in one drop of any coloured liquid into the lake, e.g. ink.
- Ask the pupils whether the water is coloured or not by one drop.
- Let each pupil put in a drop of the same liquid into the lake.
- Ask them:
  - Is the colour is much different?
  - Can they swim in the lake or not?
  - Can they drink the water or not?
  - Why is the lake polluted since each one has put only a small drop of pollutant into it?
- Why it is important for each one of us not to pollute water?
- When finished, identify the causes of water pollution. Discuss them with your pupils.
- Do emphasise that running water is less easily polluted than non-running water such as lakes, springs, and ponds, which are more available in Jordan.
- Discuss visible and invisible water pollutants. [34-135]
## FOLLOW-UP ACTIVITY 5

**Objectives:**

After this activity the pupil should be able to:

- Collect data related to water pollution.
- Analyse data related to water pollution.
- Write about water pollution.

**Resources:**

- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

**Suggested procedure and techniques:**

- Explain the tasks which the pupils are going to care out.
- Provide your pupils with the appropriate feedback.

## ACTIVITY 10

**Objectives:**

After this activity the pupil should be able to use a problem solving approach in dealing with some water pollution problems.

**Resources:**

- Pencils or pens.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

**Suggested procedure and techniques:**

- Visit a polluted spring near the school with your pupils.
- The pupils could follow six steps in solving the problem of the polluted spring:
1. Identify different types of water pollution in the spring.
2. Discover the sources of pollution.
3. Define the problem.
4. Collect information from those who use the spring.
5. Organise and analyse the collected data.
6. Generate alternative solutions.
7. Develop a plan of action. If the implementation of the plan is possible, do encourage the pupils to implement their plans. For example, pick up litter and remove paper and cans. Moreover, the pupils could distribute leaflets to the near surroundings.

STOP & THINK ! 7

Objectives:
After this session the pupil should be able to:
- Specify 5 effects of water pollution on living things and non-living things.
- Collect data related to the effect of water pollution.
- Organise and analyse the collected data.

Suggested procedure and techniques:
- Discuss some effects of water pollution on living things and non-living things.
- Let your pupils list as many effects as possible to the water pollution.
- Write all these effects on the blackboard.
- Let the pupils categorise the effects into three groups: (human survival, spoil human fun, spoil non human life).
FOLLOW-UP ACTIVITY 6

Objectives:
After this activity the pupil should be able to extend his/her knowledge about the effects of water pollution on his/her health.

Resources:
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

Suggested procedure and techniques:
- Explain the task to your pupil. Let them prepare some questions before visiting a doctor.
- Chick the questions before the visit.

STOP & THINK ! 8

Objectives:
After this session the pupil should be able to:
- Describe three ways he/she would do to keep water cleaner.
- Understand that the earth will be able to continue to support a diversity of living things only if human beings protect the earth.

Suggested procedure and techniques:
- Discuss some ways of keeping water cleaner.
- Arrange a group discussion, to help pupils understand that the earth will be able to continue to support a diversity of living things only if human beings protect the earth. Motivate them to decide whether or not they believe that the earth needs such protection.
FOLLOW-UP ACTIVITY 7

Objectives:
After this activity the pupil should be able to:

- Draw three pictures showing many ways water is polluted, to be displayed at the school.
- Write and draw three ways of how he/she would avoid the dangers of polluted water, at home, while playing, and in a vacation.
- Develop and implement a plan of action to overcome water pollution at home, school, and in the community.

Resources:

- The school library.
- Colours.
- Paper.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

Suggested procedure and techniques:

- Explain the three tasks to your pupils.
- Help your pupils in developing and implementing their plans.
- Provide them with the appropriate feedback.
ACTIVITY 11

Objectives:
After this activity the pupil should be able to talk about four types of sounds he/she often hear.

Resources:
None.

Suggested procedure and techniques:
- Explain the task to the pupils.
- Let each of them talk about types of sounds to his/her group.
- Provide your pupils with the appropriate feedback.

STOP & THINK! 9

Objectives:
After this session the pupil should be able to define noise pollution.

Resources:
- Writing materials.
- Library books related to noise pollution.

Suggested procedure and techniques:
- Help your pupil to define and identify noise pollution by discussing these in the classroom.
- Provide your pupils with the appropriate feedback.
ACTIVITY 12

Objectives:
After this activity the pupil should be able to:
- Identify the names of various sounds.
- Classify sounds as noisy and not noisy.

Resources:
- Tapes.
- A tape-recorder.

Suggested procedure and techniques:
- Tape 10 sounds, such as a small piece of music, fire truck sirens, a donkey, running water, conversation, radio(low volume), gas truck's horn .. etc.
- Play the recorder to the pupils and let them identify and classify the sounds.

FOLLOW-UP ACTIVITY 8

Objectives:
After this activity the pupil should be able to conclude whether or not his/her area and house are noisy.

Resources:
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

Suggested procedure and techniques:
- Explain the task to the pupils.
- Provide your pupils with the appropriate feedback.
ACTIVITY 13

Objectives:
After this activity the pupil should be able to:
- Collect data about noise pollution.
- Organise and analyse data related to noise pollution.
- Make an environmental decision.

Resources:
- Pencils.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

Suggested procedure and techniques:
- Explain the task to the pupils.
- Provide your pupils with the appropriate feedback.

FOLLOW-UP ACTIVITY 9

Objectives:
After this activity the pupil should be able to:
- Collect and/or draw 5 sound makers.
- Make different sounds.
- Decide whether the sounds made are noisy or not.

Resources:
- Sound makers.
Appendix 1-C

Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

**Suggested procedure and techniques:**
- Explain the task to the pupils.
- Provide your pupils with the appropriate feedback.

**STOP & THINK ! 10**

**Objectives:**
After this session the pupil should be able to specify the effect of noise pollution on humans and non-humans.

**Resources:**
- Pictures about the effects of noise pollution on humans and non-humans.

**Suggested procedure and techniques:**
- Discuss with your pupils the effects of noise pollution on humans and non-humans.
- Provide your pupils with the appropriate feedback.

**ACTIVITY 14**

**Objectives:**
- After this activity the pupil should be able to investigate the effects of noise pollution on hearing.
- Organise the collected data.
- Analyse the collected data.
Resources:
- Pencils.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

Suggested procedure and techniques:
- Explain the task to the pupils.
- Provide your pupils with the appropriate feedback.

FOLLOW-UP ACTIVITY 10

Objectives:
After this activity the pupil should be able to identify sounds and their effects on humans and non-humans.

Resources:
- A tape recorder.
- Sound makers.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

Suggested procedure and techniques:
- Explain the task to your pupils.
- Ask them to present a summary of the results of their discussion, in the classroom.
- Provide your pupils with the appropriate feedback.
STOP & THINK ! 11

Objectives:
After this session the pupil should be able to:
- Identify his/her responsibility to reduce noise pollution.
- Specify five ways to control noise pollution at home, school and in the environment.
- Draw three ways of how he/she can avoid the dangers of sound pollution at home, while playing, and in a vacation.

Suggested procedure and techniques:
- Discuss with your pupils their responsibility to reduce sound pollution.
- Discuss with them the ways of lessening noise pollution at home, school, and in the community.
- Provide your pupils with the appropriate feedback.

FOLLOW-UP ACTIVITY 11

Objectives:
After this activity the pupil should be able to:
- Design a leaflet to encourage people to avoid noise pollution.
- Design models of a fire truck, a jet plane, and an industrial machine.
- Display some of the collected items which minimise noise pollution, e.g. ear protection devices.

Resources:
- Writing and drawing materials.
- Carton and paper.
- Scissors and Glue.

**Suggested procedure and techniques:**

- Help your pupils to design a good leaflet and distribute it. Let them draw some effective pictures to express their ideas.
- Ask your pupil to write down their parents' suggestions so that these can be displayed in the school.
- Explain to the pupils how they can design a fire truck, a jet plane, or an industrial machine (a cardboard cut-out or silhouette will do).
- Display what your pupils have collected in order to give the other pupils the chance to experience what those who were enrolled in the environmental programme have done.

**ADDITIONAL INVESTIGATION**

One of the most serious pollution problems in Jordan is **land pollution.** As your pupils learned about air, water, and noise pollution, they also have to learn about land pollution.

Do help them to achieve this aim in the light of the following points:

- Develop a special unit in land pollution on the basis of the previous units. You should emphasise three main aspects:
  - **the sources of the problem (its causes).**
  - **the effects of the problem on humans and non-humans.**
how to help reduce the problem at home, at school, and in the community.

- Motivate your pupils to use the library to find more information.
- Specify your resources.
- Prepare appropriate audio-visual material, e.g. pictures, films, transparencies, and slides.
- Let your pupils choose one case of land pollution problems in their area and investigate it. Make sure it is safe to do so first.
- Help them to work out the following problem-solving steps:
  1. Identify the problem.
  2. Define it.
  3. Collect information about it.
  4. Organise and analyse the collected data.
  5. Generate alternative solutions.
  6. Develop a plan of action.
- Evaluate your work and provide your pupils with the appropriate feedback.
UNIT 2

WASTE

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Objectives:
After this session the pupil should be able to:
- Define waste material.
- Identify various types of waste material. [37-21]

Resources:
- Writing materials.
- Sources of information about disposal such as books, leaflets, posters, pictures.
- Film about waste material.
- Sheets. (the pupil should use his workbook wherein special sheets are prepared).

Suggested procedure and techniques:
This activity involves pupils in recording types of waste produced in their homes, in order to help them in defining waste material.
- Ask your pupils to make a record of all waste products in their home over a period of one week such as food, newspapers, dirty water, plastic, paper, bottles, glass, textile, metal, and other waste material. [43-12]
- Encourage them to include all the things that they consider to be waste. [35-68, 79]
- Why do you consider these items as waste material?
- Motivate them to use the school library to collect information and to support their work.
Let them draw a bin and write the approximate percentage of different waste material items in their home.

- Demonstrate a film about waste material.
- Encourage them to rewrite their definitions to waste material.

ACTIVITY 1

Objectives:
- After this activity the pupil should be able to:
- Specify the relations between human activities and producing local changes in the environment.
- Undertake a litter survey in the classroom, school grounds, local streets and shopping centres.
- List in word or pictures the different collected items. [42-4]
- Categorise the collected items into two groups: useful and not useful. (sort it according to given and chosen criteria e.g. natural and manufactured material.
- Mention that human activities produce a wide range of waste products. [42-4]
- Compile data in a chart.

Resources:
- Collecting bags or containers.
- Writing and drawing materials.
- Appropriate books, pictures, videos about waste products.
- Graph paper. [42-4]
Appendix 1-C

- Samples of waste material (biodegradable and non-biodegradable litter).
- sheets. (the pupil should use his workbook wherein special sheets are prepared).

Suggested procedure and techniques:

This activity involves pupils in a litter survey.

- Organise a brainstorming session to establish the meaning of litter.
- Undertake a litter survey in the classroom, school grounds, local streets and shopping centres. [43-6]
- Discuss the proposed form of survey details such as time, location, predicted types of litter they may find, how to classify types of waste, and a suitable way of recording their observations such as tables, drawings, graphs, and maps. [43-6]
- Divide your pupil into groups.
- Provide your pupils with clear instructions for their safety. They should take care near traffic, and litter should not be handled.
- Let them clean the classroom and record their collections.
- Take them a walk around the school to facilitate their task.
- Let them picking up litter and/or garbage.
- Let them record the number and the name of items that they have collected.
- Produce a graph of the collected items. [42-5]
- They should categorise the collected items into two groups: useful or not useful, then they should classify the useful items into groups according to the table which is prepared in his/her workbook.
- Organise small group presentations to the collected data.
- Suggest ideas about the original use of the collected items. [42-5]
- Draw your pupils' attention to the effects that careless disposal of litter can have on the local environment. [43-5]
- Encourage your pupils to write a report summarising their findings.
- Discuss your pupils with the following questions:
  1. What kind of things that have been used and thrown away in the classroom?
  2. What is the reason of litter in the classroom?
  3. What kind of things that have been used most and thrown away by the whole class?
  4. What kind of things that have been used and thrown away around the school?
  5. What might happen if less of this material is used?
  6. Do you feel children can help to keep our country beautiful?
  7. Would it be easy to do something for our earth every day of our lives?
  8. Do you think every one should start to care for our earth?
  9. Who is responsible for the maintenance of the earth? [3-41, 40, 64, 63]
- Discuss the issue of man's over-production has caused society to throw away valuable resources. [31-64]
- Arrange a visit to a local tip to add more interest to the topic. [43-3]
- Provide your pupils with the appropriate feedback.
FOLLOW-UP ACTIVITY 1

Objectives:
- After this activity the pupil should be able to discuss the idea that humans can be "caretakers" of the earth, rather than "careless" about the earth.
- Investigate litter, garbage, and defacement around the school.

Resources:
- Writing materials.
- Sheets. (the pupil should use his workbook wherein special sheets are prepared).

Suggested procedure and techniques:
- Explain the task to your pupils.
- Encourage them to carry out the activity as groups.
- Hold a class discussion about their findings.
- Discuss them about pupils and how they can be "caretakers" of the earth, rather than "careless" about the earth.
- Reinforce new ideas.
- Encourage creative opinions.
- Provide them with the appropriate feedback.
ACTIVITY 2

Objectives:
After this activity the pupil should be able to:
- Investigate a problem of an illegal waste material dumping.
- Look for problems caused by the careless disposal of waste items at dumping areas.
- Design a poster and write a leaflet to persuade people not to throw waste material wherever they want.

Resources:
- Writing and drawing materials.
- Camera.
- Sheets. (the pupil should use his workbook wherein special sheets are prepared).

Suggested procedure and techniques:
- Take your pupils to a bad or illegal dumping area.
- Help your pupils to investigate this problem by asking them some of the following questions:
  1. Is it good for those who throw waste material here to spoil such area?
  2. Can this area attract flying insects and undesirable animals?
  3. Who can enjoy living in this area?
  4. What happens when an area starts being used as a dump?
  5. What is the availability of a legal dump in this area?
  6. Do you think that the way in which the council collect waste material is appropriate? Have you thought by a new one?
- Encourage your pupils to send letters to explain the problem to council members.
- Invite some of those who live in the dumping area to visit it.
- Let your pupils design a poster and write a leaflet to persuade people not to throw waste material in this area, to use litter bags in stead of throwing garbage directly in containers, and to assist in keeping this area beautiful. [31-139,140] [43-5 ]

### ACTIVITY 3

**Objectives:**
- After this activity the pupil should be able to:
- Identify three problems refuse collectors face.
- Appreciate the role of refuse collectors and its importance.
- Write three actions he/she should follow to assist refuse collectors so as to keep the environment beautiful.

**Resources:**
- Writing materials.
- Sheets. (the pupil should use his workbook wherein special sheets are prepared).

**Suggested procedure and techniques:**
- Arrange a visit to a refuse collector to talk about his problems with people in collecting garbage.
- Encourage your pupils to prepare some questions in order to be asked to the visitor.
- Administrate a discussion about the role of refuse collectors and how we can assist them.
- Let your pupils write some of their suggestions.

ACTIVITY 4

Objectives:
After this activity the pupil should be able to:
- Investigate some of bin problems at home, at school, and in the community. - Formulate a hypothesis about litter bin designs.
- Design and make a bin with a removed lid in order to be used in the class for old pencils, plastic pots packets and so on. [31-140]

Resources:
- Writing and drawing materials.
- Carton, Scissors, Glue.
- Sheets. (the pupil should use his workbook wherein special sheets are prepared).

Suggested procedure and techniques:
- Let your pupils start thinking about bin problems by checking the classroom's bin. Discuss its design, siting, and the material that it is made of. Extend this step to the school playground.
- Take your pupils to streets around the school, let them check different kinds of litter bins and compare the suitability of materials, that they are made of, for various purposes.
- Involve them in raising and investigating questions of the "how", "why", and "what will be happen if ".

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- Encourage them to formulate hypotheses about litter bin designs efficiency, why that with a lid is the best, what will be happen if it is made of plastic, how it will serve us in Winter if it is not waterproof, which pieces of litter will blow away more easily from a bin, light pieces or heavy ones, what is the relation between the bin efficiency and keeping litter in a windy day.

- Help them in testing one of their hypotheses. Let them suggest alternative solutions an control variables. For example, the efficiency of a bin in keeping litter in a windy day may depend on many variables such as its depth. Test this variable while controlling other ones such as the location of the bin, the direction of wind, wind source, the distance of the wind source, length of time tested, is it rainy, the shape and the size of the bin, if it has a lid or not, and so on.

- Have a fan or a hair drier and test such hypothesis. Draw your pupils' attention to the variables that are controlled by you. Let them record their observations.

- Encourage your pupils to formulate special ideas for themselves and to pursue such ideas.

- Divide your class into groups, let them share feedback and discussion, and analyse the collected data in a table. [43-16,17,18]

- Encourage them to interview people to ask them about the number or quality of bins provided, or the quality of litter in the area.

- Let them design and make a bin with a removed lid in order to be used in the class for old pencils, plastic pots packets and so on.
- Predict what would happen if there were no bins and the litter was left on the ground.
- Always provide your pupils with the appropriate feedback.

STOP & THINK ! 2

Objectives:
After this session the pupil should be able to:
- Discuss (talk about) two methods of waste material disposal.
- Talk about the effects of waste material disposal on land, air, and water.
- Draw what happens to a particular waste material when it leaves his/her home.

Resources:
- Writing and drawing materials.
- Sheets. (the pupil should use his workbook wherein special sheets are prepared).

Suggested procedure and techniques:
- Discuss your pupils with waste material from their houses and what happens to it when it is thrown away and leaves their home.
- Divide your students into groups in order to discuss waste material methods.
- Draw your pupils' attention to the effects of waste disposal on the environment.
- Let them write some of these effects and draw them.
- Encourage them to think about classifying waste material at school and at home before throwing it away.
- Ask your pupils to make a series of drawings to show what they think happens to waste material from their houses. [35-68]

FOLLOW-UP ACTIVITY 2

Objectives:
After this activity the pupil should be able to:
- Compare compacted objects with non-compacted ones.
- Explain why waste material is compacted in a refuse truck.

Resources:
- Writing materials.
- Sheets. (the pupil should use his workbook wherein special sheets are prepared).
- Containers: shoe box, plastic aquarium, metal box and so on.
- Empty objects: carton boxes, cans, rolls, toothpaste boxes, and tubes.

Suggested procedure and techniques:
- Explain the task to your pupils.
- Hold a class discussion about your pupils' findings.
- Provide them with the appropriate feedback.
ACTIVITY 5

Objectives:
After this activity the pupil should be able to:
- Plan, publicise, and assist in carrying out an anti-litter campaign. [31-140]
- Design an anti-litter poster.
- Write a message to support anti-litter policy at school.
- Suggest an alternative place to rubbish containers so as to keep the school tidy. [42-5]

Resources:
- Writing and drawing materials.
- Sheets. (the pupil should use his workbook wherein special sheets are prepared).
- Trash bags, cleaning tools, brushes, and paints.
- Plastic gloves.

Suggested procedure and techniques:
- Hold a general discussion about cleanliness.
- The pupils can discuss how they think they could improve their local environment.
- Have your pupils write a short plan to an anti-litter campaign and publicise such plan to the other pupils in the school.
- Let them carry out their plan.
- Help them in designing an anti-litter poster.
- Let each pupil write a message to support anti-litter policy at school.

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- Encourage them to suggest an alternative place to rubbish containers so as to keep the school tidy.
- Help them in improving their local environment: clean up a street and paint its kerb, pick up trash, and collect and dispose of non-returnable or recycled bottles around the school. [37-21; 42-4]
- Reinforce your pupils and provide them with the appropriate feedback.

**STOP & THINK ! 3**

**Objectives:**

After this session the pupil should be able to:

- Identify conservation as an effective way people can do to stop producing waste.
- Identify recycle, re-use, and reduction as main actions to conservation.

**Resources:**

- Writing materials.
- Sheets. (The pupil should use his workbook wherein special sheets are prepared).

**Suggested procedure and techniques:**

- Hold a general discussion about waste and how should people conserve natural resources.
- Let them write three conservation main actions such as recycle, re-use, and reduction.
- Discuss them with the importance of their involvement in the conservation process, as solving waste problems is the responsibility of each individual in the community.
- Reinforce pupils' good and new ideas.

STOP & THINK ! 4

Objectives:
After this session the pupil should be able to define recycling.

Resources:
- Writing materials.
- Sheets. (the pupil should use his workbook wherein special sheets are prepared).
- Books, stories, posters, and so on which related to recycling.

Suggested procedure and techniques:
- Hold a general discussion about recycling, do concentrate on the questions that mentioned in the textbook.
- Try to demonstrate some pictures which illustrate recycling.
- Take your pupils to the school library and let them read some of the related literature.
- Let them write their definitions on their workbooks.
- Encourage them to work as groups, and to discuss their definitions.
- Reinforce pupils' good definitions and provide them with the appropriate feedback.
FOLLOW-UP ACTIVITY 3

Objectives:
After this activity the pupil should be able to:
- Carry out a survey, at home and at school, of things that have been recycled or re-used for any purposes.
- Make a list of things that can be recycled.
- Interview his/her parents about the need to recycle and to re-use material.

Resources:
- Writing materials.
- Sheets. (the pupil should use his workbook wherein special sheets are prepared).

Suggested procedure and techniques:
- Persuade your pupils by the importance of people's attitudes as a major factor in how much material is recycled. Remind them by the limitation of the earth's resources.
- Explain the task to your pupils.
- Pay their attention to some questions which might help them to carry out their interviews.
- Encourage them to discuss their findings.
- Provide them with the appropriate feedback.
STOP & THINK! 5

Objectives:
After this session the pupil should be able to identify some of what we can save if we recycle waste material.

Resources:
- Writing materials.
- Sheets. (the pupil should use his workbook wherein special sheets are prepared).

Suggested procedure and techniques:
- Hold a general discussion about recycling and its for benefit in saving lots of things as an important way in conserving natural resources.
- Let them write some of things which we can save if waste material is recycled.
- Reinforce pupils' good ideas and provide them with the appropriate feedback.

STOP & THINK! 6

Objectives:
After this session the pupil should be able to:
- Identify the reason of such advertisement.
- Identify re-use as an important way of conserving natural resources.
Resources:
- Writing materials.
- Sheets. (the pupil should use his workbook wherein special sheets are prepared).

Suggested procedure and techniques:
- Hold a discussion about re-using waste material as an important way in conserving natural resources. Emphasise what is mentioned in the textbook.
- Encourage them to hold group discussions and to write their ideas and answers.
- Visit a commercial metal scrap yard, encourage children to observe how old parts are re-used.[37-21]
- Reinforce pupils' good ideas and provide them with the appropriate feedback.

ACTIVITY 6

Objectives:
After this activity the pupil should be able to:
- Think positively about waste.
- Sort waste material to reusable items and non-reusable ones

Resources:
- Large bags or containers.
- Writing materials.
Appendix I -C

Suggested procedure and techniques:
- Have your pupils collect litter by using large bags or containers.
- Open the bags.
- Let your pupils list all items which were found in the bags.
- Ask them about waste material that we threw away at school or at home and whether we could have saved some items or not.
- Let them sort the items to reusable and non-reusable ones.
- Encourage your pupils to suggest craft activities using items that have been thrown away.
- Discuss your pupils with their findings and provide them the appropriate feedback.

ACTIVITY 7

Objectives:
After this activity the pupil should be able to:
- Carry out an interview about how to reduce waste material.
- Collect data about how to reduce waste material.
- Analyse the collected data.
- Draw conclusions depending upon data analysis.
- Write and distribute a leaflet to encourage people to reduce waste.

Resources:
- Writing and drawing materials.
Appendix 1-C

Sheets. (the pupil should use his workbook wherein special sheets are prepared).

Suggested procedure and techniques:
- Discuss your pupils with waste material and how to reduce it. Emphasise the points that mentioned in the textbook to help them in carrying out their interviews.
- The pupils should analyse the collected data and draw conclusions about the extent to which waste material has been reduced at his/her home and local surroundings.
- Tell your pupils that to start by themselves and by their parents to reduce waste. Let each pupil individually write a plan of action for his/her actual steps toward that.
- Encourage your pupils to write a leaflet about waste material and how to reduce it.

FOLLOW-UP ACTIVITY 4

Objectives:
After this activity the pupil should be able to:
- Suggest new ways of packaging which help to reduce waste.
- Design a package for a certain item which will produce less waste when the

Resources:
- Writing materials.
- Glue, used carton, scissors.
Sheets. (the pupil should use his workbook wherein special sheets are prepared).
- Different items that parents used to buy during their weekly shopping trip.

Suggested procedure and techniques:
- Help your pupils to carry out this activity and encourage them to suggest new ways of packaging which help to reduce waste.
- Encourage them to ask some questions about the really necessary parts of packaging, the same amount of packaging for similar items, and about for what are the different parts of packaging.
- Encourage pupils to suggest new ways of packaging which help in reducing the amount of waste material.
- Help your pupils in designing a package for a certain item with less waste if the item is used.
- Display the production of your pupils.
- Discuss your pupils with their findings and provide them the appropriate feedback.

FOLLOW-UP ACTIVITY 5

Objectives:
After this activity the pupil should be able to:
- Suggested three ways of cutting down the amount of waste at his/her house. [35-82]

Resources:
- Writing materials.
- Sheets. (the pupil should use his workbook wherein special sheets are prepared).
- The school library should be used to help children consider ways of reducing waste.

**Suggested procedure and techniques:**

- Help your pupils to carry out this activity and encourage them to suggest three ways of cutting down the amount of waste at his/her house.
- Explain the task to your pupils as follows:
  - Recording the amount of waste thrown away at his/her home for a week.
  - Putting the three suggested ways of reducing the amount of waste into action for another week and record what is actually thrown away.
  - Comparing the two weeks and discuss the value of the actions taken.
- Discuss your pupils with their findings and provide them with the appropriate feedback.

**STOP & THINK! 7**

**Objectives:**

After this session the pupil should be able to:

- Identify new types of waste (fuel, electricity, and water) at home and at school.
- Discuss a conservation notice.
- Specify three actions his/her school should start to conserve fuel, electricity, and water.
- Suggest three steps his/her family should do to conserve natural resources, particularly fuel, electricity, and water.

**Resources:**
- Writing materials.
- Sheets. (the pupil should use his workbook wherein special sheets are prepared).

**Suggested procedure and techniques:**
- Discuss your pupils with new types of waste (fuel, electricity, and water) at home and at school.
- Let them read the notice which mentioned in the textbook.
- Ask them the questions which are mentioned in the textbook too.
- Encourage your pupils to share ideas and produce them.
- Provide them with the appropriate feedback.

**ACTIVITY 8**

**Objectives:**
After this activity the pupil should be able to:
- Specify the relations between the way people live their lives, and the amount and type of conserving or wasting natural resources.
- Investigate electrical items in his/her house.
- Draw a sketch to his/her house to identify electrical means in each room.
- Categorise items into two groups: Items which need a lot of electricity and that which need less electricity.
- Read the electricity meter correctly.
- Analyse electricity bill items.
- Suggest three ways to reduce his/her electricity bill.

**Resources:**
- Writing materials.
- Sheets. (the pupil should use his workbook wherein special sheets are prepared).
- Electricity bills.
- Electricity meters.
- Water meters.

**Suggested procedure and techniques:**
- The starting point should be in the classroom and at school. Take your pupils around the school and have a survey to the items that need electricity to work.
- Have each child fill out the electrical items data sheet at home.
- Encourage each pupil to draw a sketch to his house which shows electrical items in each room.
- Analyse the electrical items for the whole class.
- Let your pupils categorise the electrical items into two groups: items that need a lot of electricity and items that need less electricity.
- Let each pupil read the electricity meter at home and record his/her reading.
- Write all pupils' readings and add them to each other.
- Ask the pupils whether the number is big or not.
- Ask them whether we can live without electricity or not.
- Ask them what would our lives be without electricity.
- Let each pupil bring old electricity bills and analyse their items.
- Ask them whether their parents pay much money for electricity or not.
- Discuss them by the ways of reducing such bills.
- Let each child express his/her ideas by writing a message to parents so as to encourage them reduce electricity waste and conserve it.

FOLLOW-UP ACTIVITY 6

Objectives:
After this activity the pupil should be able to:
- Record electricity waste in his/her house.
- Discuss that there is an electricity shortage in Jordan.
- Suggest three conservation practices to reduce electricity waste at home.

Resources:
- Writing materials.
- Sheets. (the pupil should use his workbook wherein special sheets are prepared).

Suggested procedure and techniques:
- Explain the task to your pupil.
Appendix I-C

- Encourage them to share the ideas about how to reduce electricity waste.
- Discuss them with their findings.
- Provide them with the appropriate feedback.

ACTIVITY 9

Objectives:
After this activity the pupil should be able to:
- Describe and discuss the serious water shortage in Jordan.
- Record water bills for his/her house to the former year.
- Record water sources that are left running when not in use.
- Suggest five conservation practices to reduce water waste at home, at school and in the community.

Resources:
- Writing materials.
- Sheets. (the pupil should use his workbook wherein special sheets are prepared).
- Water bills.
- Water meters.
- Pictures for some of the water sources in Jordan.

Suggested procedure and techniques:
- Explain the task to your pupil.
- Encourage them to share the ideas about how to reduce water waste.
Pay your pupils' attention to the questionnaire which is illustrated in their workbook to help them in suggesting some conservation practices.

- Let them suggest five conservation practices to reduce water waste at home, at school, and in the community.
- Discuss them with their findings. Emphasise on water shortage in Jordan.
- Help them in designing a poster and distribute it, to encourage people reducing water waste.
- Provide them with the appropriate feedback.

FOLLOW-UP ACTIVITY 7

Objectives:
After this activity the pupil should be able to:
- Write alternative solutions to a water waste problem by using problem-solving techniques.
- Discuss the statement that "human activities and life styles must be changed if waste problems are to be solved".

Resources:
- Writing materials.
- Sheets. (the pupil should use his workbook wherein special sheets are prepared).

Suggested procedure and techniques:
- Explain the task to your pupils.
Appendix I -C

- Discuss their findings. Emphasise on the idea that "changing human activities and life styles is essential to solve waste problems".
- Provide them with the appropriate feedback.

ACTIVITY 10

Objectives:
After this activity the pupil should be able to:
- Choose the best mean of transportation which is less wasting fuel.
- Collect data about the number of cars and the number of persons using those cars.
- Express his/her ideas statistically.
- Draw conclusions regarding his/her collected data.
- Show a personal feeling of responsibility about environmental matters.

Resources:
- Writing materials.
- Pictures for various means of transportation.
- Sheets. (the pupil should use his workbook wherein special sheets are prepared).

Suggested procedure and techniques:
- Discuss your pupils with the different means of transportation such as horses, cars, airplanes, trains, buses, rockets, boats, ships, and bikes.
Ask them about the form of transportation their parents often use to go to their work, shopping, and vacation.

List all these means and get the total number of each mean individually.

Remind them by transportation means as a source of air pollution.

Ask them whether various kinds of transportation needs a lot of energy or not.

Divide your pupils into teams in order to survey the number of cars and the number of persons in them.

Discuss pupils with the total number of cars that had one person in them, and whether they waste fuel or not.

Ask your pupils the following questions:

- What is the best transportation method for you?
- Does it save energy?
- Do you like public transportation? Why?
- Do you think that there are other sources of fuel waste at home, at school, and in the community?
- Who is responsible for fuel waste?
- What practices people should do to conserve fuel at home, at school, and in the community?
FOLLOW-UP ACTIVITY 8

Objectives:
After this activity the pupil should be able to:
- Specify the relation between the increased numbers of world population and global energy waste.

Resources:
- Writing materials.
- Sheets. (the pupil should use his workbook wherein special sheets are prepared).

Suggested procedure and techniques:
- Encourage you pupils to hold such a discussion.
- Explain the task to them.
- Provide them with the appropriate feedback.
UNIT 3

ANIMALS & PLANTS
ANIMALS & PLANTS

ACTIVITY 1

Objectives:
After this activity the pupil should be able to:
- Observe living things in a picture.
- Classify the observed living things into animals and plants.
- Classify animals into two groups: flying animals and not flying ones.

Resources:
- Writing materials.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).
- A picture that includes various kinds of animals and plants.

Suggested procedure and techniques:
- Demonstrate a picture that contains various kinds of animals and plants.
- Provide your pupils sufficient time to observe living things which they can see in the picture.
- Ask your pupils about the names of the observed living things.
- Let them classify living things into animals and plants.
- Let them classify animals into two groups: flying and not flying.
- Hold a class discussion about your pupils' findings.
- Provide them with the appropriate feedback.
ACTIVITY 2

Objectives:
After this activity the pupil should be able to:
- Sort animals and plants into groups according to their observable features.
- Analyse the collected data.
- Draw conclusions from the collected data.
- Draw the observed animals and plants.

Resources:
- Writing and drawing materials.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).
- Living things such as plants and animals.
- Magnifying lenses.
- Pictures that contain some animals and plants.
- Animal and plant books. (school library).

Suggested procedure and techniques:
- Encourage your pupils to collect pictures of some animals, and plants.
- Assemble their collections in the classroom.
- Let them list all these living things.
- Let them sort their observations according to the worksheet.
- Encourage them to draw conclusions about the observed characteristics of animals and plants.
- Hold a class discussion about your pupils' findings.
- Provide them with the appropriate feedback.
FOLLOW-UP ACTIVITY 1

Objectives:
After this activity the pupil should be able to:
- Find out about some characteristics of different baby mammals.

Resources:
- Writing and drawing materials.
- Paper.
- Pictures and books of baby mammals.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

Suggested procedure and techniques:
- Encourage your pupils to read reference books about baby mammals.
- Display a chart with information about mammals and their birth.
- Let each pupil choose the mammal he/she wants to write about.
- Draw your pupils' attention to the worksheet in their workbooks.
- Explain the task to your pupils. Let them fill in the worksheet item by item and draw the baby mammal and its parents.
- Hold a class discussion and presentations about your pupils' work.
- Pin up your pupils' work in order to be read from other pupils.
- Provide them with the appropriate feedback.
STOP & THINK! 1

Objectives:
After this session the pupil should be able to:
- Draw the main conditions that animals and/or plants need to sustain life.
- Treat animals and plants with care and consider their comfort and basic welfare.
- Identify how living things (animals and plants) are looked after.

Resources:
- Writing and drawing materials.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).
- Readings books about animals and plants.
- Some pictures of small dead animals, and plants.

Suggested procedure and techniques:
- Hold a discussion with your pupils about animals and plants with the emphasis on the following points:
  - The importance of plants for humans.
  - People keep animals for food, clothing, work, and as companions, and for entertainment.
  - Despite the pets that share our lives, the wild environment provides more diversity and stimulation for animals.
  - The relation between animals and plants. Animals need an external source of food.
  - The conditions that animals and plants need to live.
- Display some pictures of dead animals and plants, and ask for reasons.
- Encourage your pupils to draw ideas about animals and plants and how they can be looked after.
- Let them draw the main conditions that animals and plants need to sustain life.
- Hold a class discussion about your pupils' findings.
- Provide them with the appropriate feedback.

**FOLLOW-UP ACTIVITY 2**

**Objectives:**

After this activity the pupil should be able to:

- Draw the seasonal changes of animals and plants.
- Be aware of the relations between weather and the changes in animals and plants.

**Resources:**

- Writing and drawing materials.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

**Suggested procedure and techniques:**

- Encourage your pupils to use the school library to find out about the seasonal changes of animals and plants.
- Let them draw such changes.
- Explain the task to your pupils
- Hold a class discussion about your pupils' findings.
- Provide them with the appropriate feedback.
ACTIVITY 3

Objectives:

After this activity the pupil should be able to:

- Describe the basic life processes of animals: feeding, breathing, scratching, fighting, washing, catching, jumping, burrowing and exploring.
- Compare animals' and humans' activities.
- Write three actions he/she can do to care for farm animals.
- Make a chart of the observed animals' activities.

Resources:

- Writing materials.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).
- Books and stories about farm animals.
- Watches.

Suggested procedure and techniques:

- Encourage your pupils to read about farm animals.
- Tell them the exact date and time of the visit.
- Hold a classroom discussion about animals' activities and their basic life processes.
- Emphasise the fact that human beings have similar life processes to animals.
- Emphasise the idea that animals are living things and they have the right to live in their surroundings.
- Let your pupils write three actions they would do to care for farm animals.
- Discuss the way in which they are going to record data.
- Let them write reports about their visit and distribute them to their families.
- Encourage them to share ideas, analyse the collected data, and draw conclusions.
- Hold a class discussion about your pupils' findings.
- Provide them with the appropriate feedback.

STOP & THINK! 2

Objectives:
After this session the pupil should be able to:
- Identify the roles of animals and plants in humans' life.
- Be aware of the role animals and plants play in humans' life.
- Care for garden plants.
- Draw some natural and/or raw materials which are made of animal and plant products.
- Design a mask showing an animal or a plant.

Resources:
- Writing and drawing materials.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).
- Carton, glue, and scissors.
Materials which manufactured from animals and/or plants.
- Books about the value of animals and plants to human beings.

**Suggested procedure and techniques:**
- Encourage your pupils to hold a group discussion about benefits of animals and plants, and the role which they play in our lives.
- Discuss with your pupils the importance of animals and plants for humans and what would happen if all animals are hunted and all plants are cut down.
- Encourage your pupils to hold a discussion with their parents about their daily meals particularly food in its natural form derived from animals and plants.
- Let your pupils collect items made from animals and plants.
- Let them sort such items into groups: items that are made from animals and plants naturally, or items that made from other materials.
- Discuss with your pupils garden flowers and whether they should be picked and put in a vase or should be left to be enjoyed in gardens.
- Help your pupils in designing a mask for an animal or a plant.
- Provide them with the appropriate feedback.
STOP & THINK! 3

**Objectives:**

After this session the pupil should be able to:

- Compare the characteristics and aspects of several different animals and plants.
- Describe the different ways in which the animals and plants grow up.

**Resources:**

- Blackboard.
- Writing materials.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

**Suggested procedure and techniques:**

- Explain the game to your pupils.
- List as many names of animals and plants as possible on the blackboard.
- Divide your class into two groups.
- Give five clues to each animal or plant. The first clue is worth 5 points, the second 4 points, the third 3 points and so on. The winner is the group who guess the most animals and plants and score maximum points.
- Start the game by reading the first clue to the first group. If they don't guess correctly, read the second clue and so on. Encourage pupils to share reading the clues, with you.
- Hold a class discussion about your pupils' findings.
- Provide them with the appropriate feedback.
ACTIVITY 4

Objectives:
After this activity the pupil should be able to:
- List the names of living things observed on and around a tree.
- Describe a variety of living forms on and around a tree.
- Understand the interrelationships among living things, with the tree as an environment to such living things.

Resources:
- Writing and drawing materials.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

Suggested procedure and techniques:
- Explain the task to your pupils.
- Let your pupils exchange information in order to identify the main factors that attract different living things to live on or around the tree.
- Provide them with some essential instructions such as, being quiet, not to damage any aspect of nature by plucking flowers or leaves, or throwing stones on fruit on trees branches, to hide themselves if the observed animal is shy, to move slowly and quietly if they have to get closer, not to disturb birds' nests, and to leave the place clean.
- Tell your pupils that they are going to record their findings in a special sheet in their work books.
- Hold a class discussion about your pupils' findings.
- Provide them with the appropriate feedback.
FOLLOW-UP ACTIVITY 3

Objectives:
After this activity the pupil should be able to:
- Use all the senses of perception together rather than relying heavily on sight alone.
- Become more aware of the world of trees.

Resources:
- Writing materials.
- A large piece of textile as a blindfold.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

Suggested procedure and techniques:
- Explain the task to your pupils. Answer any questions.
- Provide them with the appropriate feedback.

STOP & THINK ! 4

Objectives:
After this session the pupil should be able to:
- Define a habitat for animals and/or plants.
- List different types of habitats within walking distance of school.
- Draw a picture of all the living things that live in one habitat.
- Produce graphs which compare numbers of animals in different habitats.
- Describe the adaptation of different kinds of animals and plants to certain habitats.
- Establish which animals or plants are to be seen in the selected habitat.
- Draw a food chain which includes human beings.
- Observe animals and plants carefully and record their numbers.
- Interpret results and findings.
- Describe ways in which people can change a habitat, on purpose or by accident.

Resources:
- Writing and drawing materials.
- Pictures of different animal and plant habitats.
- Plastic or wood frames (60cm x 40cm).
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

Suggested procedure and techniques:
- Let your pupils:
  1. name different habitats where animals and/or plants live, such as forests, oceans, deserts, fields, coasts, lakes, seas, ponds, springs, rivers, and swamps.
  2. match some animals and plants which live in such habitats.
  3. list different types of habitats within walking distance of school, names of animals and plants which were found in such habitat, and what they were doing if they are animals.
  4. identify animals such as minibeasts, small animals, frogs, toads, insects, aquatic animals if possible.
5. check whether or not the type and number of animals and plants change from one part of the habitat to another.

6. hold group discussions about animals and plants which live in the same habitat, and describe the adaptation process of different kinds of animals and plants to certain habitats.

7. work out food chains for each area studied by answering questions such as: What do animals and plants need to live? Give some examples of what different animals eat. How do you think this animal gets its food? Do you think this animal eats anything else? why might this be? Where do you think plants get their food? How do you think this happens? Are there any other ways in which plants can get food?

- List some animals, plants, and humans on the board and ask what do they eat? Write the answers alongside each living thing.

- Have your pupils draw pictures of living things and what they eat. Ask them about living things that are able to make their own food (producers), and living things which are not able to do so but must eat other living things (consumers).

- Let them draw a food chain which includes human beings.

- Encourage them to draw some animals' and plants' habitats.

- Discuss humans' activities that would disrupt such habitat. What then would happen to animals and plants? Should people investigate more than one place or one way to conduct their activities? Should people think of nature or ignore it?
- Investigate some habitats that are being destroyed around your home. Which kinds of habitat are they?
- Explain each task to your pupils.
- Hold a class discussion about your pupils' findings. Encourage your pupils to interpret results and findings.
- Provide them with the appropriate feedback.

ACTIVITY 5

Objectives:
After this activity the pupil should be able to:
- Describe a food chain in a pond.
- Identify and draw three levels of food chains in a pond, such as producers, consumers and decomposers.
- Write about two ways in which human beings can affect the pond's ecosystem.

Resources:
- Writing and drawing materials.
- Pictures and books about ponds.
- Slides or films about ponds and life in them.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

Suggested procedure and techniques:
- Take your pupils to a pond to collect and record samples of water, plants, and other living things.
- Show your pupils slides or films that illustrate various kinds of animals and plants in ponds.

- Assemble some samples of the pond community to be observed by your pupils which illustrate the interdependence of plants and animals and their relationship to the non-living world, and food chains.

- Explain an example of a food chain and its importance to pond life, and what would happen if a part of the chain is damaged or disappears. Emphasise the effect of people's and work or recreation around the pond on the pond's ecosystem. How do such activities change the pond's life?

- Let your pupils suggest two ways of protecting the pond's life.

- Encourage your pupils to draw a picture to show the levels of a food chain in the pond.

- Provide them with the appropriate feedback.

FOLLOW-UP ACTIVITY 4

Objectives:
After this activity the pupil should be able to:

- Observe and understand a birds' need for natural materials.
- Draw a bird's nest.

Resources:

- Writing and drawing materials.
- A used bird's nest, cards, glue, a tray, pictures of bird nests.
Suggested procedure and techniques:
- Explain the task to your pupils.
- Talk about bird nests to your pupils.
- Hold a class discussion about your pupils' findings.
- Provide them with the appropriate feedback.

FOLLOW-UP ACTIVITY 5

Objectives:
After this activity the pupil should be able to:
- Observe a spider's web accurately.
- Draw a spider's web.
- Show a positive attitude towards spiders, and an appreciation to their good work.

Resources:
- Writing and drawing materials.
- A spider's web picture.
- Magnifying glasses.
- Scissors, glue, and carton.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

Suggested procedure and techniques:
- Take your pupils around the school surroundings.
- Let them see the starting point of the web.
- Let them see how the web is joined to leaves, branches, and buildings. Encourage them to watch a spider, using magnifying glasses. Direct your pupils' attention to a broken web and feel how sticky it is.
- Demonstrate a spider's web picture to your pupils.
- Let them draw a web.
- Let them draw a spider and stick it on the web.
- Hold a class discussion about your pupils' findings.
- Provide them with the appropriate feedback.

PROTECTING ANIMALS AND PLANTS

STOP & THINK! 5

Objectives:
After this session the pupil should be able to:
- Discuss causes of the extinction of animals and plants, including human causes.
- Suggest some practices to conserve animals and plants.

Resources:
- Writing and drawing materials.
- Pictures, slides, and films of some animals and plants that have become extinct.
- Books and stories about animals and plants that have become extinct.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

**Suggested procedure and techniques:**

- Hold a group discussion about animals and plants that have become extinct and the effect of human activities on the environment, which cause extinction of some animals and plants.

- Let your pupils write down three human actions in which their local environment has been affected and the impact of such actions on animals and plants extinction and survival.

- Encourage your pupils to suggest some practices locally for conserving animals and plants in their local environment such as:
  
  1. Planting flowers.
  2. Provision of water sources.
  3. Provision of nesting boxes.
  4. Not to pick flowers, damage plants or pluck leaves.
  5. Care for house pets.
  6. Distribute leaflets to persuade people not to hurt animals or plants.
  7. Send letters to the government about the importance of setting aside protected areas for some kinds of animals and plants.
  8. Not to use chemicals on land.
  9. Encourage parents not to buy fur clothes or furniture made from rain forest woods.
- Let your pupils write reports about animals and plants that have become extinct.
- Encourage them to establish "animal and plant friends groups" in the school and in their local community.
- Encourage them to carry out a plan of action to encourage friends, neighbours, and parents to start animals and plants conservation practices throughout their life.
- Hold a class discussion about your pupils' findings.
- Provide them with the appropriate feedback.

**ACTIVITY 6**

**Objectives:**

After this activity the pupil should be able to:

- Identify different sounds under a tree.
- Explain the meanings of some animals' sounds such as danger signal, call to potential mates, and to identify persons or other animals.
- Be aware of number and variety of sounds under a tree, particularly animal sounds.

**Resources:**

- Writing materials.
- Books about animals and their sounds.
- Sheets. (the pupils should use their workbooks wherein special sheets are prepared).

**Suggested procedure and techniques:**
- Prepare your pupils to visit a tree in order to identify different sounds under it. Provide them with clear instructions so as not to disturb wildlife or to hurt themselves.

- Tell your pupils that they are going to identify different sounds while being under a tree.

- Discuss the different sounds your pupils may hear under the tree.

- Tell them that animals can communicate in different ways by sounds. Such sounds may mean different things such as danger signal, call to potential mates, for identifying persons or other animals, and when sender and receiver are not in sight each other.

- Let them listen individually to different sounds while being under the tree.

- Encourage them to record sounds that they have heard and describe such sounds as: distant or nearby, loud or soft, high or low, duration, frequency of call, and pleasant or unpleasant.

- Hold a class discussion about your pupils' findings and let them imitate some sounds of what they have heard.

- Provide them with the appropriate feedback.
Appendix 2

LOUGHBOROUGH UNIVERSITY
DEPARTMENT OF EDUCATION

FOURTH GRADE ENVIRONMENTAL EDUCATION PROGRAMME (FGEEP) IRBID AREA - JORDAN

MEASUREMENT INSTRUMENTS
Appendix 2-A

AN ENVIRONMENTAL ATTITUDES SCALE
FOR PRIMARY SCHOOL CHILDREN

(ENGLISH VERSION)
INSTRUCTIONS

- We are going to read some statements which describe a group of children. Each statement contains a description of two different types of children, you have to choose the group of children you think you are most like (the children on the right or on the left) and fill the underneath appropriate square or circle depending on whether you are a lot like the described children in the statement [the square], or only a little like them (the circle).

- Please ask about any difficult word or statement which you cannot understand.

- Statements will be read one by one, listen carefully then fill a square or a circle please.

- Please fill in the following information before you start answering:
Name:  

Date of birth:  

Sex:  

male  female  

Family Size:  (father and mother included)
1. Some pupils would like to **plant** an apple tree. **but** Other pupils would like to **eat** an apple.

2. Some pupils **like** to wear the clothes of their elder brothers or sisters when they grow up. **but** Other pupils **don't like** to wear the clothes of their elder brothers or sisters when they grow up.

3. Some pupils would like their parents to be **smokers**. **but** Other pupils would like their parents to be **non-smokers**.

4. Some pupils **like** to burn leaves in Winter. **but** Other pupils **don't like** to burn leaves in Winter.

5. Some pupils watch birds in **cages**. **but** Other pupils prefer to watch birds on **tree branches**.

6. Some pupils **like** stroking animals. **but** Other pupils hold animals by **the tail**.

7. Some pupils **throw** plastic bags in the rubbish bin. **but** Other pupils re-use plastic bags when buying new things.

8. Some pupils **take part** in their school's rubbish collecting. **but** Other pupils hate smelly rubbish and **don't take part** in their school's rubbish collecting.

9. Some pupils **like to play in** the street. **but** Other pupils like to play in **the park**.

10. Some pupils like to put used paper in a wastebasket. **but** Other pupils throw used paper on the ground.
<table>
<thead>
<tr>
<th></th>
<th>Some pupils <strong>hate</strong> seeing smoke released by chimneys into the air.</th>
<th>Other pupils <strong>enjoy</strong> watching the smoke from chimneys in the air.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Some pupils <strong>save</strong> cans for recycling.</td>
<td>Other pupils <strong>put</strong> cans in the rubbish bin.</td>
</tr>
<tr>
<td></td>
<td>Some pupils prefer to put newspapers <strong>in the rubbish bin</strong>.</td>
<td>Other pupils <strong>re-use</strong> newspapers.</td>
</tr>
<tr>
<td></td>
<td>Some pupils <strong>like</strong> the sound of cars' horns.</td>
<td>Other pupils are <strong>disturbed</strong> when they hear cars' horns.</td>
</tr>
<tr>
<td></td>
<td>Some pupils <strong>use</strong> handkerchiefs.</td>
<td>Other pupils use <strong>paper tissues</strong>.</td>
</tr>
<tr>
<td></td>
<td>Some pupils prefer a <strong>warm</strong> to a <strong>hot</strong> house in Winter.</td>
<td>Other pupils prefer a <strong>hot</strong> to a <strong>warm</strong> house in Winter.</td>
</tr>
<tr>
<td></td>
<td>Some pupils leave the TV <strong>switched on</strong> when it is not being used.</td>
<td>Other pupils <strong>turn off</strong> the TV when it is not being used.</td>
</tr>
<tr>
<td></td>
<td>Some pupils <strong>turn off</strong> the water while brushing their teeth.</td>
<td>Other pupils leave the water running while brushing their teeth.</td>
</tr>
<tr>
<td></td>
<td>Some pupils find the countryside <strong>boring</strong>.</td>
<td>Other pupils find the countryside <strong>interesting</strong>.</td>
</tr>
<tr>
<td></td>
<td>Some pupils feel <strong>sad</strong> when cats are hungry.</td>
<td>Other pupils don't care if cats are hungry.</td>
</tr>
<tr>
<td>21. Some pupils like to see animals that are slaughtered for food.</td>
<td>but</td>
<td>Other pupils hate to see animals that are slaughtered for food.</td>
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<tr>
<td>22. Some pupils feel happy hunting butterflies.</td>
<td>but</td>
<td>Other pupils are worried about butterflies becoming extinct.</td>
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<tr>
<td>23. Some pupils enjoy watching bird nests.</td>
<td>but</td>
<td>Other pupils enjoy playing with bird nests.</td>
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<tr>
<td>24. Some pupils use spray pesticide to kill insects.</td>
<td>but</td>
<td>Other pupils don't use spray pesticide to kill insects.</td>
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<tr>
<td>25. Some pupils like to have more than three brothers and sisters.</td>
<td>but</td>
<td>Other pupils like to have less than three brothers and sisters.</td>
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<tr>
<td>26. Some pupils use a small bucket to wash the car.</td>
<td>but</td>
<td>Other pupils use a hose to wash the car.</td>
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<td></td>
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<tr>
<td>27. Some pupils like to listen to a quiet television.</td>
<td>but</td>
<td>Other pupils like to listen to a loud television.</td>
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<tr>
<td>28. Some pupils use a large amount of water when having a bath.</td>
<td>but</td>
<td>Other pupils use a small amount of water while having a bath.</td>
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<tr>
<td>29. Some pupils believe that keeping streets clean is the responsibility of cleaners.</td>
<td>But</td>
<td>Other pupils believe that keeping streets clean is the responsibility of all citizens.</td>
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<td></td>
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<tr>
<td>30. Some pupils like the smell of flowers on branches.</td>
<td>but</td>
<td>Other pupils like to pick flowers to be put in a vase.</td>
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</tbody>
</table>
### SCORING THE SCALE

<table>
<thead>
<tr>
<th>Item</th>
<th>Direction</th>
<th>Scoring</th>
<th>Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>positive</td>
<td>4 3 2 1</td>
<td>animals &amp; plants</td>
</tr>
<tr>
<td>2</td>
<td>positive</td>
<td>4 3 2 1</td>
<td>waste</td>
</tr>
<tr>
<td>3</td>
<td>negative</td>
<td>1 2 3 4</td>
<td>Pollution</td>
</tr>
<tr>
<td>4</td>
<td>negative</td>
<td>1 2 3 4</td>
<td>Pollution</td>
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<tr>
<td>5</td>
<td>negative</td>
<td>1 2 3 4</td>
<td>animals &amp; plants</td>
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<tr>
<td>6</td>
<td>positive</td>
<td>4 3 2 1</td>
<td>animals &amp; plants</td>
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<tr>
<td>7</td>
<td>negative</td>
<td>1 2 3 4</td>
<td>waste</td>
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<td>8</td>
<td>positive</td>
<td>4 3 2 1</td>
<td>Pollution</td>
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<td>9</td>
<td>negative</td>
<td>1 2 3 4</td>
<td>animals &amp; plants</td>
</tr>
<tr>
<td>10</td>
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جامعته للفيبر

دائرته التربية

مقياس الاتجاهات البيئية لأطفال المدرسة الابتدائية
تعليقات

- سوف تقرأ بعض العبارات التي تصف مجموعة من الأطفال. تُنشئ كل عبارة على وصف لثنين
- مختلفين من الأطفال، المطلوب منك اختيار مجموعة الأطفال التي تعتقد بأنك تُحبها كثيرًا (المجموعة التي
- على اليمن أو النّبّ على اليسار) ثم املاً تحت المجموعة التي احتوتها (المربع) إذا كنت تُحب هذه
- المجموعة جدًا أو (الدائرة)، إذا كنت تُحبها فقط.

- نرجو أن تسأل عن أي كلمة أو عبارة لا تستطيع فهمها من فضلك.

- سوف تقرأ العبارات الواحدة ثم الأخرى، راحين الاستماع جيدًا ثم الإجابة بما تراه مناسباً.

- نرجو أن تُ hopping المعلومات المكتوبة في رأس الصفحة الأولى من المقياس قبل البدء بالإجابة.

شكرًا نظركم.
الاسم:
الموقع:
القبيلة:
الدائن:
الجنس:
الثقافة:
الغذاء:
العلوم:
الفنون:
الفنون المسرحية:
التاريخ:
الثقافة الأصلية:
الثقافة الغربية:
الثقافة الإسلامية:
الثقافة الأخرى:

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## تصحيح المقياس

يتضمن المقياس 15 فقرة إيجابية و15 فقرة سلبية تم توزيعها عشوائياً، حيث صُممت 4244 لللفترات الإيجابية و142 للفترات السلبية، ويُبين الجدول التالي أسماء هذه الأقسام وتصحيحها والمال الذي ينتمي إلى:

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Appendix 2-B

LOUGHBOROUGH UNIVERSITY

DEPARTMENT OF EDUCATION

AN ENVIRONMENTAL KNOWLEDGE SCALE
FOR PRIMARY SCHOOL CHILDREN

(ENGLISH TRANSLATION OF THE ARABIC INSTRUMENT)
INSTRUCTIONS

We are going to read some statements, they will be read one by one, listen carefully then choose the true alternative from the options after each statement and tick the appropriate letter (A, B or C) alongside each statement’s number in the answer sheet. Example:

1. I live in:
   a. Syria.
   b. Jordan. ✓
   c. Lebanon.

   Answer Sheet

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<th>C</th>
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- Please ask about any difficult word or statement which you cannot understand.
## ANSWER SHEET

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1. To avoid the dangers of water pollution at home, the following should be done:
   a. drinking water from taps directly.
   b. drinking pure mineral water.
   c. keeping containers clean.

2. Most air pollution in cities is caused by:
   a. planes.
   b. cars.
   c. factories.

3. An item which can not be recycled is:
   a. food waste.
   b. newspapers.
   c. cans.

4. The main problem with landfills is that they:
   a. prevent farming nearby land.
   b. are far from cities.
   c. take up too much space.

5. Hunting birds leads to:
   a. making use of their meat.
   b. reducing their numbers.
   c. keeping them in cages to enjoy their singing.

6. The benefit of recycled paper is:
   a. producing soft paper.
   b. saving energy.
   c. becoming whiter.

7. The benefit of animals and plants in our lives is that they:
   a. do not understand and feel.
   b. provide us with medicines.
   c. live without our assistance.

8. Bird's nest contains the following:
   a. feather, hair, and straw.
   b. leaves and branches of trees.
   c. soil and sand.
9. The following activity endangers animals’ or plants’ habitats:
   a. constructing roads.
   b. ploughing land.
   c. planting trees.

10. The following is the most dangerous to the earth’s environment:
    a. constructing buildings.
    b. establishing new roads.
    c. overpopulation.

11. The benefit of recycling is:
    a. saving energy.
    b. finding new products.
    c. producing expensive goods.

12. Leaves of trees fall in:
    a. spring.
    b. winter.
    c. autumn.

13. Noise pollution of aeroplanes causes:
    a. realisation of the aeroplane’s arrival.
    b. broken windows.
    c. viewing the aeroplane in the sky.

14. Many species of animals are extinct because:
    a. they killed for their meat.
    b. enough food is not available for them.
    c. their natural habitat was destroyed.

15. Water might be polluted if it is:
    a. mixed with additional materials.
    b. farms are irrigated with it.
    c. boiled on a fire.

16. Dust-storms can be considered:
    a. caused by human actions.
    b. artificial.
    c. natural.
17. The following activity is an example of re-use:
   a. filling soft drinks in bottles.
   b. buying soft drinks in bottles.
   c. making new bottles from old.

18. The following is a cause of water pollution:
   a. the existence of water underground.
   b. using water to clean dirty clothes.
   c. using lead pipes.

19. Environmental problems are dangerous to:
   a. all living things in the world.
   b. poor people.
   c. weak animals.

20. The air pollution caused by cars can be reduced if:
   a. petrol of high quality is used.
   b. people use bikes more.
   c. new cars are bought.

21. Making nice weather in towns and cities in Summer can be achieved by:
   a. living in tents.
   b. planting trees.
   c. using fans.

22. The pollution that causes tears is:
   a. air.
   b. water.
   c. land.

23. The most pollution of water sources is caused by:
   a. dams.
   b. leaks from sewers.
   c. waste water from factories.

24. Covering shelves in kitchens with newspapers is an example of
   a. recycling.
   b. re-use.
   c. making unnecessary waste.
25. Burning trees in barbecues is an environmental problem because it:
   a. produces poisonous gazes.
   b. costs much money.
   c. causes trees to be fallen.

26. To reduce electricity consumption at home, I suggest:
   a. disconnecting electricity from the meter.
   b. buying a new fridge.
   c. using electricity saving-lamps.

27. The name of the pollution that causes the dark colour of buildings is:
   a. land.
   b. air.
   c. water.

28. "The Oak eats the Snake, and the Snake eats the mouse". This is an example of:
   a. food chain.
   b. animal’s food.
   c. food competition.

29. One of the effects of waste burial is:
   a. air pollution.
   b. releasing bad gas smells.
   c. releasing harmful materials into the soil.

30. Making new products from waste is called:
   a. recycling.
   b. re-use.
   c. reduction.
### Scoring the Scale

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جامعة لقب ره
دانة التربية

مقياس المعرفة البيئية لأطفال المدرسة الابتدائية
تعليمات

سوف نقرأ بعض العبارات واحدة تلو الأخرى، استمع جيداً ثم اختر الإجابة الصحيحة من البديلين التي تتلو العبارة بوضع إشارة √ على الحرف المناسب منها (أ - ب - ج) على ورقة الإجابة.

مثال:

إني أعيش في:

أ. سوريا.

√ ب. الأردن.

ج. لبنان.

ورقة الإجابة

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يرجى الاستفسار عن أي كلمة أو عبارة صعبة لا تستطيع فهمها من فضلك.

يرجى أن تضع المعلومات المكتوبة في رأس الصفحة الأولى من المقياس قبل البدء بالإجابة.

شكرًا تعاونكم.

481
بسم الله الرحمن الرحيم

الاختبار البياني للصف الرابع

عورقة الإجابة - المدرسة - التاريخ: 1996م

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482
% 1. لتجنب أخطار النفايات في المنزل يجب القيام بما يلي:
   a. شرب الماء من الحنفية مباشرة.
   b. شرب المياه المعالجة.
   c. تنظيف الخزانات باستمرار.

2. معظم تلوث الهواء في المدينة من الثيوب:
   a. السيارات.
   b. الجرائد.
   c. المصانع.

3. الشيء الذي لا يمكن إعادة تصنيعه من الثيوب هو:
   a. بقايا الطعام.
   b. الجرائد.
   c. علب المرطبات.

4. مشكلة النفايات الرئيسية في إنها:
   a. تمنع زراعة الأرضية الحارة للثيوب.
   b. تحتاج لساحة كبيرة من الأرض.

5. إذا استفاد الخياصر والطيار يؤدي إلى:
   a. انقراضها وإقبال من أعدادها.
   b. وضعها في أقصى سلم تقريبي.

6. فائدة إعادة تصنيع النفايات للكتابة على هم:
   a. يوفر الطاقة عند تصنيعه.
   b. يصبح لون أبيض.

7. من أمثال الحيوانات والنباتات في حياتنا أنها:
   a. لا تلقف وتعمل بها ما يشاء.
   b. تعتمد بالألوية.
   c. تعيش دون مساعدتها.

8. يحتوي شم الطيور على الأشياء التالية:
   a. البذور والخضار والفرامل.
   b. الرش والشعر والفض.

9. العمل التالي يهدمو موطن الحيوانات أو النباتات:
   a. شق الطريق.
   b. حرارة الأرض.
   c. زراعة الأشجار.

10. أي من النباتات الأكثر خطورة على بيئة الأرض:
    a. بناء المعاد.
    b. شق الطريق.
    c. كثرة السكان.
Appendix 2-B

11. من فوائد إعادة التصنيع:
   1. توفير الوقود.

12. تسريع أوراق الشجر في فصل اسما:
   1. الربيع.

13. يؤدي التلوث الضوضائي (الضجيج) الناتج عن الطائرات إلى:
   1. تكسر زجاج المنازل.

14. معرفة زمن وصول الطائرة إلى:
   1. رؤية الطائرة في السماء.

15. يمكن أن يثير باء إذا:
   1. دينها كان لهو أنها.

16. تجربة عواصف القباع نوع من ملوثات الهواء:
   1. الاصطناعية.

17. من أسباب تلوث الماء:
   1. استعمال الماء لفسل الملابس غير النظيفة.

18. تشكّل المشكلات البيئية خطرا على:
   1. كل الكائنات الحية في العالم.

19. يقل تلوث الهواء الناتج عن السيارات إذا عملنا على:
   1. إنتاج بنزين ممتاز.

20. يمكن تنظيف درجة الحرارة في المدن بالزراعة إذا صيفا عن طريق:
   1. استخدام المراوح.

21. عمل الجِنِّ.

22. زراعة الأشجار.
Appendix 2-B

22. ينتج دم العين عن تلوث:
   1. الهواء.
   2. الماء.
   3. التربة.

23. إن أكثر تلوث نصادر الماء سيبي:
   1. السدود المائية على الأنهار.
   2. الكسور التي تحدث في المجاري.
   3. المياه العادمة التي تغذى المصانع.

24. إن تغليف رقم المطبخ بالجرائد دليل على:
   1. إعادة التصميم.
   2. إعادة الاستخدام.
   3. عمل نفايات غير ضرورية.

25. إن حرق أشجار الشواء يعد مشكلة بيئية للسبب التالي:
   1. ينتج غازات سامة ومواد أخرى في الهواء.
   2. يُكلف نفوداً كثيرة.
   3. يؤدي إلى طرق الشجر.

26. تخفيف استهلاك الكهرباء في المنزل، أقترح ما يلي:
   1. قطع الكهرباء من المداد.
   2. شراء ثلاثية من نوع جديد.
   3. استخدام مصابيح (النبي).

27. إن تلوث المباني باللون الأسود دليل على تلوث:
   1. الأرض.
   2. الهواء.
   3. الماء.

28. يبتكر الصقرُ الثعان، ويتكلم الثعابُ الفارَّ، هذه الحالة اسمها:
   1. السلسلة الغذائية.
   2. صراع على الطعام.

29. من أثر دفع النفايات في البيئة:
   1. تلوث الهواء.
   2. اتجاه غازات كربونية.
   3. تسبب مواد ضارة إلى التربة.

30. عمل منتجات جديدة من النفايات يسمى:
   1. إعادة التصميم.
   2. إعادة الاستخدام.
   3. تخفيف الاستهلاك.
تصحيح المقياس

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486
PARENTS' QUESTIONNAIRE

(ENGLISH TRANSLATION OF THE ARABIC INSTRUMENT)
Dear parents:

This research aims at developing an environmental education programme for our children at primary schools. To be successful and give full benefit to our children and our country, the programme needs a co-operation of parents, children, teachers, and the researcher. Your co-operation will reinforce such a programme and help maximise its advantages.

It would be appreciated if you could read closely the statements of this questionnaire and answer as appropriate depending upon your own ACTUAL (NOT IDEAL) behaviour. Your answers will be kept completely confidential and used for the purposes of this research only.

Thank you.
## GENERAL INFORMATION

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PARENTS’ QUESTIONNAIRE

According to your actual (not ideal) behaviour, Please fill the (☐) appropriate to each statement, underneath one of the following: 1 if you always do the action, 2 if you occasionally do it, or 3 if you never do the action.

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<tr>
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<th>1</th>
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<td>1</td>
<td>Feel the countryside boring.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2</td>
<td>Leave an outside light on at night.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>3</td>
<td>Feel happy if my children wear their elder brothers' clothes.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4</td>
<td>Clean water containers regularly.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>5</td>
<td>Feel happy when I see flowers in a vase.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>6</td>
<td>Like to kill house insects by pesticides.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>7</td>
<td>Think that smoking brings pleasure.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>8</td>
<td>Like to play my radio or tape-recorder loudly.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>9</td>
<td>Prefer plastic or paper plates for parties.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>10</td>
<td>Use saving electricity lamps.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>11</td>
<td>Feel that the car is cleaner if washed by a hose but not a bucket.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>12</td>
<td>Sort garbage before throwing it away.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
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<td>13</td>
<td>Like to use public transport.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
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<td>Switch lights off when I leave a room at night.</td>
<td>☐</td>
<td>☐</td>
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<td>15</td>
<td>Prefer paper napkins to cloth ones.</td>
<td>☐</td>
<td>☐</td>
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<td>16</td>
<td>Leave water running when brushing my teeth.</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>17</td>
<td>Put garbage in a bin with plastic bags.</td>
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<td>☐</td>
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<td>Like to re-use plastic bags for shopping several times.</td>
<td>☐</td>
<td>☐</td>
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<td>19</td>
<td>Worry about the over consumption of energy.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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<td>20</td>
<td>Feel that food grilled on tree branches is very delicious.</td>
<td>☐</td>
<td>☐</td>
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جامعة لقب
دار الدراسة

إستمرارات التحليات الأهلية البيضاء
بسم الله الرحمن الرحيم

اعزائي الآباء والأمهات،

يُنَبِّئ الأفكار في برنامج بحثي لطلابنا في المرحلة الأساسية الدنيا (9-10 سنوات) وتعد الاستبانة هذه، أحد أجزاء البرنامج المهمة، إذا أوجدوها في بيئة ثقافيا، وفقاً للسلوك الفعلي (وليس المالي) الذي تُقوّم به معرفة إشراف (١٠٠٠) أمام العلاقة في المربع الناسب لسلوك.

سوف تستخدم الإجابات سوية وأعراض البحث العلمي فقط.

عماد السعدي

### الجزء الأول: معلومات عامة

1. **الاسم الذي أجاب هذه الاستبانة:**
   - الأب
   - الأم
   - الأب والأم معاً

2. **موقع الإقامة:**
   - مدينة
   - ريف
   - خليج

3. **نوع الأسرة شهريًا:**
   - ١٠٠-١٠٠٠
   - ٠٠-٣٩٩
   - ٣٩٩-٢٠٠٠
   - ٢٠٠٠-٣٩٩٠
   - ٣٩٩٠-٤٠٠

4. **عدد أفراد الأسرة:**
   - ٠-٢
   - ٣-٥
   - ٦-٨
   - ٩-١١
   - ١٢ فأكثر

5. **مؤهل الأب العلمي:**
   - أقل من الثانوية
   - ثانوية
   - كوليج

6. **مؤهل الأم العلمي:**
   - أقل من الثانوية
   - ثانوية
   - كوليج

### الجزء الثاني: الاستبانة

| الرقم | السؤال | اختيار
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<td>أشعث بالخارج على سيارات پושאن.</td>
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شاكراً لكم تعاونكم.

492
Appendix 3

The Advisory Committee of the Programme

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<tr>
<td>1</td>
<td>Adnan Abu Al-Hayja</td>
<td>MA-Social Studies</td>
<td>Teacher (social studies)</td>
</tr>
<tr>
<td>2</td>
<td>Adnan Hamad</td>
<td>MA-Educational Administration</td>
<td>Supervisor (primary education-Area Education Officer recently)</td>
</tr>
<tr>
<td>3</td>
<td>Ahmad Abbas</td>
<td>Ph.D.-Education</td>
<td>Area Education Officer (former)</td>
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<td>4</td>
<td>Ahmad Nadaf</td>
<td>BA-English Language</td>
<td>Head teacher</td>
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<tr>
<td>5</td>
<td>Atif Yousef</td>
<td>Ph.D.-Library and information</td>
<td>Librarian (private sector)</td>
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<tr>
<td>6</td>
<td>Faisal Azzeh</td>
<td>Dip-Education</td>
<td>Teacher (primary education)</td>
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<td>7</td>
<td>Haroun Ababneh</td>
<td>Dip-Education</td>
<td>Science teacher</td>
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<td>8</td>
<td>Moh’d Jamra</td>
<td>MA-Education</td>
<td>Head teacher</td>
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<tr>
<td>9</td>
<td>Musa Hujab</td>
<td>BA-Geography</td>
<td>Supervisor (social studies)</td>
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<td>10</td>
<td>Nabil Abdel-Aziz</td>
<td>MA-measurement and Evaluation</td>
<td>Teacher (science)</td>
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<td>Nasser El-Ali</td>
<td>Ph.D.-Education</td>
<td>Assistant Professor</td>
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<td>12</td>
<td>Omar Raghep</td>
<td>BA-Accounting</td>
<td>Teacher (science)</td>
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<td>13</td>
<td>Rafi’ Obeidat</td>
<td>Higher Dip-Education</td>
<td>Head teacher</td>
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493
Appendix 4

Participants

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<tr>
<td>1.</td>
<td>Ali Fayez</td>
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<td>2.</td>
<td>Baseema Abu Al-Hayja*</td>
<td>Teacher</td>
</tr>
<tr>
<td>3.</td>
<td>Dr. Ibrahim Shahna’a</td>
<td>School Doctor</td>
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<tr>
<td>4.</td>
<td>Haroun Ababneh*</td>
<td>Teacher</td>
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<td>5.</td>
<td>Hussein Theib*</td>
<td>Head Teacher</td>
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<td>6.</td>
<td>Kalthoum Al-Rusan*</td>
<td>Teacher</td>
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<td>7.</td>
<td>Khalid Nasrallah*</td>
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<td>Khawlah Ababneh*</td>
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<td>Mohammad Al-Jamra*</td>
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<td>Nur Assabah Abu Al-Hayja*</td>
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<td>11.</td>
<td>Rafe’ Obeidat*</td>
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<td>Riyad Badran*</td>
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<td>Su’ad Massad*</td>
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<tr>
<td>14.</td>
<td>Zareifeh Natour*</td>
<td>Head Teacher</td>
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* Experimental groups.
Appendix 5

The panel of Judges

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<td>Prof. Ivan Reid</td>
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<td>Schofield Professor-Loughborough</td>
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<tr>
<td>2</td>
<td>Patrick Bailey</td>
<td>Geography</td>
<td>Consultant in Education</td>
</tr>
<tr>
<td>3</td>
<td>Dr. Roy Alexander</td>
<td>Geography</td>
<td>Instructor/Chester College</td>
</tr>
<tr>
<td>1</td>
<td>Adnan Hamdaqa</td>
<td>Methods of Teaching Science</td>
<td>Supervisor-U.N.R.W.A.</td>
</tr>
<tr>
<td>2</td>
<td>Dr. Ahmad Abbas</td>
<td>Science Education</td>
<td>Area education officer-U.N.R.W.A.</td>
</tr>
<tr>
<td>3</td>
<td>Prof. Ahmad Odeh</td>
<td>Measurement and Evaluation</td>
<td>Deputy dean of the Faculty of Education-Yarmouk University</td>
</tr>
<tr>
<td>4</td>
<td>Dr. Ali Khraisha</td>
<td>Curriculum Development (Social Studies)</td>
<td>Assistant Professor-Yarmouk University</td>
</tr>
<tr>
<td>5</td>
<td>Ali Uthman Subeih</td>
<td>MA Methods of Teaching Social Studies</td>
<td>Supervisor-Government</td>
</tr>
<tr>
<td>6</td>
<td>Dr. Khatab Abu Libdeh</td>
<td>Methods of Teaching Maths</td>
<td>Head teacher-Private School</td>
</tr>
<tr>
<td>7</td>
<td>Mohammed Sawalha</td>
<td>Child Psychology</td>
<td>Assistant Professor-Yarmouk University</td>
</tr>
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<td>9</td>
<td>Dr. Nasser El-Ali</td>
<td>Educational Psychology</td>
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<td>Science teacher</td>
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<td>Curriculum Development</td>
<td>Full Professor-Yarmouk University</td>
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<td>Dr. Yousef Sawalmeh</td>
<td>Measurement and Evaluation</td>
<td>Associate Professor-Yarmouk University</td>
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## Participating Schools

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Appendix 7

The Programme’s Symbol
Appendix 8

The Certificate of Participation

LOUGHBOROUGH UNIVERSITY

DEPARTMENT OF EDUCATION

CERTIFICATE OF PARTICIPATION

This certifies that

MR. ADNAN ABU AL-HAYJA

HAS EFFECTIVELY PARTICIPATED
IN THE 4TH GRADE ENVIRONMENTAL EDUCATION PROGRAMME
IN IRBID/JORDAN FOR THE ACADEMIC YEAR 1995/1996

PROF. IVAN REID (supervisor) ____________________________ Date 1/1/1997
Appendix 9

A Sample of Children’s Product (A)
Appendix 9

A Sample of Children’s Product (B)

15 December 1911

Samar E. El-Araby

Table 1: Sample Products of Children’s Batteries

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>Batteries</td>
<td>8</td>
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<tr>
<td>Tractors</td>
<td>11</td>
</tr>
<tr>
<td>Toys</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>22</td>
</tr>
</tbody>
</table>

1. Batteries

2. Tractors

3. Toys

Notes:

- The table above shows a sample of children’s products, specifically batteries, tractors, and toys.
- The total quantity of the products is 22.

Evaluation:

Based on the sample, it is observed that batteries are the most common product, followed by tractors and then toys.

Discussion:

- Batteries are essential for various devices and are often used by children.
- Tractors might be more suitable for older children, while toys are for younger children.

Conclusion:

The sample provides a good representation of children’s products, but further analysis is needed to determine the overall demand for these items.
Appendix 9

A Sample of Children’s Product (C)

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</table>

Aجابة: ملء سبيل للغزات وإرجاع

ماذا يحدث للفتات بعد أن يخرج من منزلك؟

فخل في طريق صرف هذه اللوازم واتباعاً لل規定 (ناقش والدك بذكاء).

طريقة الوحيدة لجمع النفايات في المنطقة التي نعيش فيها، هي وضعها في حاويات المنازل. ثم في حاويات النفايات، ثم تأخذها السيارات حيث تُرفع أو تُحرق.

أُرسل هذه المنازل:

بعد اخبار النفايات بالسيارات تُصرف بطريقة:

أ- النفايات في حفرة كبيرة تُعطي شروط النفايات واتباعها ثم تُزيلها كمربلة.
ب- الحرق في نفايات خارج الأماكن الآمنة بالسكان.
## Appendix 10

### Organisations Contacted

<table>
<thead>
<tr>
<th>No</th>
<th>Organisations</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The International Environmental Education Program</td>
<td>UNESCO, 7 Place de Fontenoy, 75352, Paris, 07 SP, France.</td>
</tr>
<tr>
<td>2</td>
<td>EE UNIT/EPD/HQ</td>
<td>O. Hall, EE section, UNESCO, 7 Place de Fontenoy, 75352, Paris, 07-SP, France</td>
</tr>
<tr>
<td>3</td>
<td>UNESCO/EPD</td>
<td>7 Place de Fontenoy, 75700, Paris, France</td>
</tr>
<tr>
<td>4</td>
<td>Fish and Wildlife Service (Dept. of Interior)</td>
<td>International Institute for Environment and Development, Washington, DC.</td>
</tr>
<tr>
<td>5</td>
<td>Friends of The Earth</td>
<td>26-28 Underwood Street, London N1 7JQ</td>
</tr>
<tr>
<td>6</td>
<td>Friends of The Met. Office</td>
<td>Education Service Sutton House, London Road, Bracknell, Berkshire RG1 2SY</td>
</tr>
<tr>
<td>7</td>
<td>The Alliance for Environmental Education (AEE)</td>
<td>P. O. Box 368, The Planes, VA 22-171-0368 U.S.A.</td>
</tr>
<tr>
<td>8</td>
<td>The Association for Science Education</td>
<td>College Lane, Hatfield, Herts., AL10 9AA U.K</td>
</tr>
<tr>
<td>9</td>
<td>The Centre for Environmental Education</td>
<td>Thaltej, Ahmedabad, India 380-054</td>
</tr>
<tr>
<td>10</td>
<td>The Council for Environmental Education</td>
<td>Faculty of Education and Community Studies, University of Reading - London Road, Reading RG1 5AQ</td>
</tr>
<tr>
<td>11</td>
<td>The Department of Public Instruction</td>
<td>125 South Webster Street P. O. Box 7841, Madison, WI 53707, U.S.A.</td>
</tr>
<tr>
<td>13</td>
<td>The Heritage Education.</td>
<td>English Heritage Education Service, Keysign House, 429 Oxford Street, London W1R 2HD</td>
</tr>
<tr>
<td>14</td>
<td>The International Centre for Conservation Education (UK).</td>
<td>Greenfield House, Guiting Power, Cheltenham GL54 5TZ</td>
</tr>
<tr>
<td>15</td>
<td>The National Association for Environmental Education (UK).</td>
<td>University of Wolverhampton, Walsall Campus, Gorway, Walsall WS1 3BD</td>
</tr>
<tr>
<td>16</td>
<td>The Outreach Department of Teaching and Learning.</td>
<td>300 East Building, New York University, 239 Green Street New York, U.S.A.</td>
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<td>17</td>
<td>The Publication office at ERIC/CSMEE.</td>
<td>The Ohio State University, 1200 Chambers Road, Room 310, Columbus, OH 43212, U.S.A.</td>
</tr>
<tr>
<td>18</td>
<td>The Royal Danish School of Environmental Studies.</td>
<td>Copenhagen, Denmark</td>
</tr>
<tr>
<td>21</td>
<td>The Zero Population Growth.</td>
<td>(ZPG), INC. 1400 16th Street, NW, Suite 320, Washington, DC 20036</td>
</tr>
<tr>
<td>22</td>
<td>Jordan Environment Society (JES)</td>
<td>Irbid branch, Yarmouk University, Irbid, Jordan</td>
</tr>
<tr>
<td>23</td>
<td>The Royal Society for the Conservation of Nature (RSCN)</td>
<td>P. O. Box 6354, Amman 11183, Jordan</td>
</tr>
</tbody>
</table>
Appendix 11

Letters of Correspondence (A)

ا.aji 6-ا

يايملاجيك,

كلية التربية والفنون
مكتب السيد

السيد مدير التربية اربد الأولي
السيد مدير التربية اربد الثانية
السيد مدير التربية بني كنامة
السيد مدير التربية لمدارس وكالة النعوت

تحية طيبة وبعد,

يرجى السيد عماد السعدي السماوت على نفقة الجامعة للحصول على درجة الدكتوراه من تطبيق دراسته على المدارس التابعة لمدريدكم وهي بعنوان:

"تطوير برنامج لبناء اتجاهات إيجابية لدى الأطفال نحو البيئة" ارجو الموافقة والإيعاز لمن يلزم تشديد مهمة الباحث السعدي

واقبلوا الاحترام

عميد كلية التربية والفنون

نحالة / قسم المناهج والتدريب

503
Appendix 11

Letters of Correspondence (B)

United Nations Relief and Work Agency-Irbid Area

الموضوع: الباحث عماد السعدي

السادة مدير المدارس ومديريها الخزمين

أرجو تسهيل مهمة الباحث وتقديم العون والمساعدة له.

وشكراً.

مدير التربية والتعليم

د. أحمد عباس
Letters of Correspondence (C)

THE HASHEMITE KINGDOM OF JORDAN
MINISTRY OF EDUCATION

Letters of Correspondence (C)

THE HASHEMITE KINGDOM OF JORDAN
MINISTRY OF EDUCATION

Appendix 11

Letters of Correspondence (C)
Appendix 12

Publications


