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THE STATUS OF ENVIRONMENTAL EDUCATION IN THE
EGYPTIAN SECONDARY SCHOOLS AS PERCEIVED BY
SCIENCE AND SOCIAL SCIENCE TEACHERS
AND ADMINISTRATIVE PERSONNEL

By

Arafa Ahmed Hassan

A DISSERTATION

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

DOCTOR OF PHILOSOPHY

Department of Administration and Curriculum

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ABSTRACT

THE STATUS OF ENVIRONMENTAL EDUCATION IN THE EGYPTIAN SECONDARY SCHOOLS AS PERCEIVED BY SCIENCE AND SOCIAL SCIENCE TEACHERS AND ADMINISTRATIVE PERSONNEL

By

Arafa Ahmed Hassan

This study was designed to assess the current (1982) state of environmental education in the Egyptian secondary schools from the perspective of science teachers, social science teachers, Ministry of Education personnel, and school principals. Accordingly, answers were sought to seven questions stated for the purpose of the present study.

Procedure and Methodology

The study utilized a survey technique in which both a questionnaire and an interview card were developed as instruments for the collection of data.

A sample of 320 secondary school teachers in Egypt (200 science teachers and 120 social science teachers) responded to an 86 item environmental education questionnaire. The sample was chosen by a stratified sampling technique which assured representation of the different types of schools present in Egypt. Teachers surveyed were from 50 secondary schools in 12 governorates throughout Egypt. The validity and reliability of the questionnaire were established.

During the period of data collection, five Ministry of Education personnel and ten secondary school principals were interviewed to

collect their opinions regarding the status of environmental education in the Egyptian secondary schools.

The statistical techniques used for data analysis utilized Multivariate Analysis of Variance (MANOVA); Univariate F-test; descriptive statistics (mean and standard deviation); Frequencies, and Chi-square.

Conclusion

The data of the teachers' questionnaire revealed that the present science and social science curricula in the Egyptian secondary schools were perceived as being moderately effective in the development of the students' awareness and knowledge of environmental issues and problems. These curricula were perceived as being ineffective or of limited effectiveness in several areas including: opportunities for students to develop their attitudes towards environmental issues and problems, the development of the students' skills needed to solve environmental problems, and the development of the students' participation in environmental activities and planning.

A multidisciplinary approach was perceived by the teachers sampled to be the most appropriate means of incorporating environmental education into the Egyptian secondary schools.

The nine environmental concepts proposed in this study were acceptable to the teachers sampled as a framework for environmental

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education programs at the secondary level. These concepts are: ecosystem, population, economics and technology, environmental decisions, environmental ethics, man's stewardship of the environment, contamination of the environment, public health and environmental quality, and modern agriculture and food supply. Some teaching methods of environmental education presented in this study were perceived by the teachers as not presently being used to teach environmental education in the Egyptian secondary schools. Pre-service and in-service teacher training programs were perceived by the teachers sampled to be insufficient in providing teachers with the information and skills needed to educate students about environmental concerns.

In light of this perceived importance, the teachers in the sample identified the major constraints that preclude the implementation of environmental education in the Egyptian secondary schools to be the lack of: 1) facilities and instructional aids; 2) inservice training; 3) well defined goals and objectives; 4) funds; 5) adequate training of teachers in environmental education; 6) programs; 7) students' interest; 8) time.

The data from the interviews with Ministry of Education personnel and secondary school principals revealed that these leaders are supportive of environmental education as an important part of the school programs. They recognize that a considerable amount of continued effort is needed to improve environmental education in the Egyptian secondary schools.

This survey of perceptions of teachers and administrative personnel showed discrepancies between the theoretical model in Chapter

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II and the current status of environmental education in the Egyptian secondary schools. The survey also showed that teachers and administrative personnel recognize that changes will be required if Egyptian secondary schools are to provide effective, comprehensive environmental education which our youth need. Several recommended actions are offered to help guide the formation of educational policy in Egypt.

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

In the name of Allah the most merciful and the most beneficent

DEDICATION

To my father, for his friendly and wise guidance.

To my mother, for her unquestioning love and support.

To my brother Hamed, (May Allah forgive him and let his
soul rest in peace) for his encouragement and support.

ACKNOWLEDGEMENTS

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Special gratitude goes to my parents for their friendly, wise guidance and my deep appreciation is also due to my wife Fatima for her patience, encouragement and understanding, and to my children; Hoda; Waleed; Amr; and Hatim, who sacrificed their precious moments of fatherly companionship.

The author wishes to extend his thanks and appreciation to the science and social science teachers in the Egyptian secondary schools, and Ministry of Education personnel and school principals, who contributed their time, experience and perspectives toward the completion of the questionnaire and interview card that provided the data base for this study.

Finally, the author would like to thank Tena French for her patience and persistence in typing this thesis, and to thank Joanne Racle for her great help in revising the final draft of this dissertation.

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CHAPTER I
THE PROBLEM

Introduction

For more than two decades, we have heard reports and discussions from all over the world from the educational and scientific establishments concerning environmental problems. It is true to say that man's success in the development and use of the resources of the biosphere in order to enhance his own well-being has resulted in increased pressure on the natural resources of the environment, either directly, by over-exploitation of non-renewable resources, or indirectly, by producing more waste products than can be absorbed and processed by the natural environment.¹ In addition, many related problems, such as over-population, food shortages, land mis-use, desertification, the energy crisis, and the many different forms of pollution have become apparent over the past two decades.

The improvement of the quality of the environment and the quality of human life have become a major preoccupation of people and governments in both developed and developing countries throughout the world.² The challenge to the educational systems of the world is to provide people with sufficient understanding of the natural, technological, economic, and social components of our environment so that they can make informed personal and collective decisions that will serve the long term intuitive of our world population. This

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investigation serves to: (1) analyze past and present work in environmental education at an international scope and (2) examine educators' perceptions of current thought and practice concerning environmental education in the Egyptian secondary schools. Information derived from this study will provide a basis for the development of policy decisions and resource utilization strategies that will improve environmental education in the Egyptian secondary schools.

The Problem of Study

Many environmental problems have resulted from technological and economic progress in Egypt, such as the side effects of the Aswan High Dam, desertification, land mis-use, oil pollution of coastlines, air pollution, and over-population. To find solutions to these problems not only requires professional training but also the development of environmentally literate citizens who can make the informed decisions that are necessary to maintain a balance between the quality of life and the quality of the environment. Therefore, it is clear that there is a need to investigate the status of environmental education in the Egyptian secondary schools in light of international efforts in this field so as to develop an educational model that will reflect the interdisciplinary nature of environmental education.

The Need to Study

Awareness of the dangers that threaten the environment has brought the world community together through the auspices of the United Nations to work for the purpose of developing comprehensive strategies that will meet environmental needs. This awareness has led to a global concern for environmental quality and a worldwide environmental education movement arose during the 1970's. In 1972, this global concern led to the United Nations Conference on the Human Environment, which was held in Stockholm, Sweden. In this conference stress was placed on the role of "education, of the public at varying levels and in different types of formal and non-formal education systems, as well as the education and training of particular professional groups whose actions and decisions have a definite bearing on the environment."³

In 1975 a questionnaire entitled, "Assessment of Resources for Environmental Education: Needs and Priorities for Member States" was distributed by the environmental section of UNESCO to 136 Member States. A major component of this questionnaire dealt with trends in environmental education programs. A number of significant findings were derived from this study. Among these were:⁴

1. Current world educational programs are insufficient in number or in scope to make environmental education a national preoccupation. This insufficiency is particularly evident in developing countries.
2. There exists a persistent lack of truly interdisciplinary approaches in environmental education programs. Educational

programs dealing with environmental problems and issues have not been developed in a general manner in any of the countries studied.

3. There is a definite lack of concrete, problem-solving approaches toward environmental issues. This situation tends to isolate environmental education programs from the surrounding community, resulting in only limited efficiency.
4. There exists a tendency in environmental education programs to deal only with the scientific and technological dimension of the environmental problems. This tends to preclude the consideration of social and economic perspectives and to make the comprehension of complex phenomena and problems a difficult task.

These findings make it clear that there is a real need to develop environmental education programs on the basis of an integration between socio-economic perspectives and the natural aspects of the environment. In other words, environmental education programs should consider the environment in its totality--natural and man-made, technological and sociological. Economic, political, cultural, historical, and ethical factors should be considered. In short, the need for a study of environmental education programs in Egyptian schools can be summarized as follows:

- a. There has been a tremendous increase in information about environmental issues and problems. This information needs to be analyzed and organized so that it can be incorporated into environmental programs in Egypt.

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- b. The development of environmental education goals and objectives at the international level should be considered in the development of environmental education programs in Egypt.
- c. There is a need to reorient environmental education at the Egyptian secondary school level in order to meet the rapidly changing needs of individuals and society in Egypt.

Purposes of the Study

The goals of this study are:

1. To investigate and analyze international efforts in the field of environmental education.
2. To identify the main elements of a conceptual framework (model) for environmental education at the secondary level of education.
3. To use that conceptual framework (model) as a paradigm to assess the current (1982) state of environmental education in the Egyptian secondary schools.

Significance of the Study

This study is an endeavor to provide a paradigm which might be helpful to curriculum developers at the secondary level in the development of environmental programs that respond to the requirements of contemporary human life and specifically to the needs of individuals and society in the Egyptian environment. The significance of this study can be summarized as follows:

1. To identify existing goals and objectives of environmental

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education at the international level in this field in order to develop a new set of goals and objectives for environmental education in the Egyptian secondary schools.

2. To provide curriculum developers with an analysis of environmental education concepts and strategies to be used in Egypt in order to improve environmental programs at the secondary level.
3. To clarify the strengths and weaknesses that exist in present secondary school environmental education programs.
4. To offer recommendations based on the findings of this study and similar studies which may be utilized in the development of policies and programs for environmental education for Egyptian secondary schools.

Procedure

This study is to be descriptive and analytical. It will involve the following procedures.

1. Examination and analysis of some international programs that deal with environmental education (emphasis will be on the UNESCO programs) in order to:
 - a. Identify some new trends in teaching environmental education at the secondary school level, and
 - b. Use these trends as criteria to assess environmental education programs in the Egyptian secondary schools.
2. The examination of existing environmental education programs at the secondary school level in Egypt (grades 10-12) by

studying:

- a. The goals and objectives of these programs, and
 - b. Approaches used in teaching of environmental education in the secondary schools.
3. Describe and develop a conceptual framework (guidelines) for the development of environmental education programs in secondary schools in Egypt.
 4. Construct a questionnaire for science teachers and social science teachers in the Egyptian secondary schools based on the model developed in step 3. The purpose of this questionnaire is to collect data on secondary science and social science teachers' perceptions of existing environmental education programs.
 5. Develop an interview card to collect the opinions of some Ministry of Education personnel and secondary school principals regarding environmental education in the Egyptian secondary schools.
 6. Analyze the environmental education programs in the Egyptian secondary schools in light of data collected from the teachers' questionnaire and the interview cards.
 7. Make recommendations based on information acquired, regarding policies and programs for environmental education in Egypt.

Assumptions of the Study

Five major assumptions were stated to be considered in this study.

These assumptions are:

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1. The quality of human life in any given environment depends on many factors including both the quality of the environment and educational experience.
2. The goals of education change as social needs change, and environmental education programs should reflect the changes in society as they occur.
3. There exists some common features and criteria for environmental education among the different countries of the world.
4. Secondary school environmental education programs, models and guidelines developed in other nations can be used as a guide in this study for the development of some criteria to assess the state of environmental education in Egypt.
5. This is an environmental education study; thus, the question of value judgment is raised throughout the dissertation. Whenever, a question of value is raised, it should be understood that the researcher takes an environmentalist position which seeks a balance between the quality of human life and the quality of the environment.

Research Questions

The study addressed seven research questions. These research questions are:

1. To what extent do teachers perceive that science and social science curricula in the Egyptian secondary schools achieve the environmental education goals and objectives outlined in

the model proposed in Chapter II?

2. How do secondary science and social science teachers perceive the incorporation of environmental education into school curricula?
3. To what extent do secondary science and social science teachers perceive that environmental education curricula in the Egyptian secondary schools include content that is suggested in the proposed model?
4. To what extent do secondary science and social science teachers perceive that environmental education teaching methods used in the Egyptian secondary schools reflect those proposed in the model?
5. To what extent do secondary science and social science teachers perceive that teacher training programs at the Egyptian secondary level reflect the ideals presented in the proposed model?
6. What are the constraints perceived by secondary science and social science teachers which limit the development of environmental education programs in the Egyptian secondary schools?
7. How do Ministry of Education personnel and secondary school principals perceive the present status of environmental education in the Egyptian secondary schools?

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Research Hypotheses

The research hypotheses in this study are specifically designed to test differences between the two groups of the research sample concerning the state of environmental education in the Egyptian secondary schools. For the purpose of this study, ten null hypotheses are stated as follows:

There is no significant difference between the opinions held by science teachers and by social science teachers concerning:

1. The effectiveness of the subject matters they teach in developing students' awareness of environmental issues and problems.
2. The effectiveness of the subject matters they teach in developing students' knowledge of environmental issues and problems.
3. The effectiveness of the subject matters they teach in developing students' attitudes towards environmental issues and problems.
4. The effectiveness of the subject matters they teach in developing students' skills in environmental education.
5. The effectiveness of the subject matters they teach in developing students' participation in environmental planning and activities.
6. The incorporation of environmental education into the Egyptian secondary schools curricula.
7. Environmental education curriculum content in the Egyptian

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secondary schools.

8. Teaching methods of environmental education in the Egyptian secondary schools.
9. Teacher training of environmental education in the Egyptian secondary schools.
10. Major constraints which preclude the implementation of environmental education in the Egyptian secondary schools.

Delimitations of the Study:

This investigation was basically concerned with the teachers' perception regarding the state of environmental education at the secondary level. For the purpose of this study, the following four major limitations were stated:

1. This study was conducted in the Egyptian secondary school (grades 10-12). No attempt was made to acquire information from teachers at other levels.
2. There was no attempt to evaluate the actual interaction between teachers and students in the classroom. However, the aim of the teacher's questionnaire was to obtain information regarding the status of environmental education at the secondary level in Egypt.
3. Consideration should be given to the extent of validity of teachers' perceptions as a source of data on which to make judgments about the effectiveness of existing environmental education programs and recommended changes. In other words, We should consider the human limitations that are involved in

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teachers' perceptions.

4. In consideration of the small sample size of Ministry of Education personnel (5) and secondary school principals (10), we should be cautious about the conclusions derived from their responses.

Definition of Terms:

Conservation: Refers to the wise use and protection of available natural resources in the environment by man.⁵

Conservation Education: Refers to the development of concepts and attitudes in human beings which are reflected in their behavior relative to conservation.⁶

The Environment: Is the sum of conditions and factors which have an effect on and are affected by living things in one way or another.⁷

Environmental Education: Is 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, attitudes, motivations, commitments and skills to work individually and collectively toward solutions of current environmental problems and the prevention of new ones.⁸

Environmental Management: An ecological approach to the development of an area or in its protection in order to provide the greatest yield in improved quality of life for mankind.⁹

Environmental Science: Is concerned with all aspects of environmental quality and how man interacts with his environment.¹⁰

Integrated Approach: Refers to the teaching of core topics at

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appropriate grade levels in schools where they are organized and developed horizontally and vertically to enable students utilizing the contributions of interdisciplinary studies to understand and solve environmental problems.¹¹

Mono-disciplinary Approach: Refers to the creation of discrete courses or series of courses to be implemented at specific grade levels.¹²

Multidisciplinary Approach: Refers to the incorporation of specific instructional activities (environmental education) in other, interrelated subject areas.¹³

Quality of Environment: Refers to physical, social, and economic factors or conditions that make life possible or impossible in any given environment.¹⁴

Secondary School: A period of education planned for young people of ages approximately 12-17 in which the emphasis tends to shift from mastery of the basic tools of learning to the use of tools needed to explore areas of thought and living. It prepares students academically to live in general life or to continue their academic work in higher education.¹⁵

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CHAPTER I NOTES

1. UNESCO, Environmental Education in the Light of Tbilisi Conference. UNESCO, Paris: 1980, p. 14.
2. _____. "The Intergovernmental Conference on Environmental Education." Connect, Vol. II, No. 2, Paris: July, 1977, p. 1.
3. Ibid, p. 1.
4. UNESCO. Needs and Priorities in Environmental Education: An International Survey. Paris, Aug., 1977, (cited by: Hungerford and Peyton, 1980, p. 5).
5. Brandwein, Paul F. "Conservation," The Science Teacher, XXXIV, April, 1967. p. 13.
6. Smith, Julian W. and others. Outdoor Education. (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1963), p. 26.
7. Sarhan, El-Demerdash, Mouneer Kamel. Curriculum, 3rd ed., (Cairo: Dar Al-Hana, 1972), p. 46. (In Arabic).
8. Stapp, William B. and Cox, Dorothy A. Environmental Education Activities Manual. (Farmington Hills: Michigan, 1979), p. 4.
9. Sale, Larry and Lee, Ernest W. Environmental Education in the Elementary School. (New York: Holt, Rinehart and Winston, Inc., 1972, p. 83.
10. Foster, Philips W. Introduction to Environmental Science. (Homewood, IL, Learning Systems Co., 1972, p. 1.
11. Slesnick, Irwin L. "Population Education: A Response to a Social Problem," The Science Teacher, XXXVIII (Feb., 1971), p. 22.
12. Hungerford, Harold R. and Peyton, Robert Ben. Strategies for Developing an Environmental Education Curriculum: A Discussion Guide for Training Workshops in Environmental Education, (Prepared for the UNESCO) Michigan State University, E. Lansing, MI 1980, p. 12.
13. Ibid., p. 12.
14. Sale, Larry L. and Lee, Ernest W. Environmental Education in. . . 1972, op. cit., p. 83.

15. Dictionary of Education, New York: McGraw Hill Book Co., Inc., 1973, p. 522.

CHAPTER II

REVIEW OF RELATED LITERATURE

A review of the literature related to environmental education makes it obvious that there is a considerable amount of material in different disciplines that deal with various aspects of environmental education. This voluminous literature clearly illustrates the interdisciplinary nature of environmental education. Most of the literature reviewed also showed that some commonalities exist among developed and developing countries in the way they view environmental issues and problems. For the purpose of this study, the areas of environmental education considered were: the concept of environmental education; goals and objectives; guidelines for curriculum development; formal environmental education; methodologies; and teacher training.

Concept of Environmental Education

Historical Development

The term environmental education is fairly new. However, its roots extend back in time to that moment when man first became aware of the need to deal effectively with living and non-living things. This interrelationship between man and the environment has resulted in some kind of evaluation of his role in the maintenance or deterioration of that environment.¹ The historic concerns for the interactions of man with the environment are many and various. They appear in the ritual

and folklore of numerous tribes and in the early writings of ancient civilizations.

The roots of environmental education can be traced to conservation movements throughout the world which date back centuries in time. Various movements, across different cultures, emerged and disappeared as human communities became concerned about the use of available natural resources in their environment.²

The beginnings of the conservation movement in North America have been traced back to 1626 when an ordinance was passed in Plymouth Colony to control the cutting and sale of timber on colonial lands.³ Since that time, many attempts have been made to develop a philosophy of what constitutes an acceptable behavior concerning the relationship between man and his environment.

The formal teaching of environmental sciences or environmental education, at times referred to as nature study, goes back to the beginning of this century. Nature study was initiated at Cornell University and its major purpose was to get children to know and love the environment by observing the living and non-living things surrounding them.⁴ The spirit of nature study requires that students be intelligently directed to study their environment through simple observation.⁵ The nature study movement lasted in the United States until about 1930 and was characterized by nature observations, a respect for natural systems and an appreciation of nature's beauty.⁶

During the period 1955-1965, a significant achievement in environmental education was the development of "outdoor education" which included the use of the outdoors as a laboratory for learning and

the acquisition of knowledge and skills in such subject areas as biology, geography, and mathematics⁷. Study outside of the classroom is one means of implementing certain objectives such as linking learning with the actual needs of students. It offers an opportunity for direct experience leading to a greater appreciation of the environment, a clearer interpretation of the phenomenon under study, and wiser use of natural resources.⁸

In the late 1960's, environmental education as a distinct entity came onto the world scene because of an increased concern over environmental issues. Industrialization, exploding populations, depletion of natural resources, and environmental degradation provided new imperatives for environmental education. It became vital for man to recognize that he is the only living thing on this earth that can consciously manipulate and gain knowledge about environmental consequences resulting from his behavior and actions.⁹

Since 1970 there has been considerable development of the activities recognized internationally as environmental education. This international concern led to the United Nations conference on the Human Environment, which was held in Stockholm, Sweden in 1972. In this conference, participants emphasized "the role of education, of both the public and the specialist, in the solution and prevention of the world's environmental problems. Recommendation 96 particularly called upon different organizations of the United Nations, especially UNESCO to take the necessary steps to establish an international program in environmental education, interdisciplinary in approach, in school and out of school, encompassing all levels of education and directed

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towards the general public."¹⁰

In October 1977, the United Nations succeeded in holding the first conference on environmental education, organized by UNESCO in collaboration with the United Nations Environment Program (UNEP), in Tbilisi, Georgia, U.S.S.R. This conference resulted in an important document (The Tbilisi Declaration) which deals with a substantive structure for environmental education and recommends policies and strategies to be followed in developing and developed countries according to their needs and circumstances. The Tbilisi Declaration emphasized the role of education in facing the challenges of environmental problems and the need for environmental education to get citizens actively involved at all levels in working toward the resolution of these problems. To achieve these ends, it is necessary that all individuals acquire the knowledge, skills, attitudes, and commitments needed to improve and protect the environment. Hence, this declaration was the first document to crystallize the overall goal and ultimate guideline for environmental education - that of citizens' responsibility for, and participation in, solving environmental problems.¹¹

This historical overview shows that environmental education as a distinct entity came onto the world scene only recently because of increased public awareness concerning the danger that environmental problems present to the world.

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Definitions of Environmental Education

The Michigan Legislature has defined environmental education as the "teaching . . . of attitudes and skills involving the relationship of man with the quality of his cultural and bio-physical environment."¹²

The Wisconsin Environmental Council referred to environmental education as "the educational process of developing concepts, attitudes, values and actions appropriate to foster man's harmonious relationship with man and interdependence with the natural and man-made surroundings including the social, political, cultural, economic, aesthetic and bio-physical dimensions of the total environment."¹³

The U.S. Environmental Education Act of 1970 stated that environmental education is "the educational process dealing with man's relationship with his natural and man-made surroundings, and includes the relation of population, pollution, resource allocation and depletion, conservation, transportation, technology, and urban and rural planning to the total human environment."¹⁴

Stapp stated that environmental education is "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, attitudes, motivations, commitments, and skills to work individually and collectively toward solutions of current problems and prevention of new ones."¹⁵

UNESCO referred to environmental education as "the process of recognizing values and clarifying concepts in order to develop skills

and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture and his bio-physical surroundings. Environmental education also entails practice in decision making and self-formulation of code of behavior about issues concerning environmental quality."¹⁶

These definitions show that environmental education as a process includes different levels of goals (knowledge, attitudes, skills, participation). It is concerned with both the quality of human life and the quality of the environment. Also, it should utilize a problem solving (inquiry) approach to develop problem solvers among the world population. However, it is important to note that these definitions are complex, broad in scope, and subject to wide interpretation.

The Nature of Environmental Education

Behind any educational process there should be a philosophy. The people who are in charge of educational establishments should share certain values in order to ensure the survival of the system to which they are devoted. That is, education is primarily a vehicle for fostering cultural and social evolution, or, in some cases, involution.¹⁷

Today, there is a growing concern among the world population that science alone cannot guarantee the progress of man. "Progress and development have been the idols of industrialized society, but the time has come to realize that progress measured in terms of increase in the gross national product, or of technological innovations, is not enough. A new meaning, a more human meaning, must be attributed to the word

'progress'."¹⁸ The success attained by science have made us lose a balanced perspective on life and on living with our surroundings. Modern man has put an equation sign between technological advance and progress and thus his primary concern is no longer with the human race.¹⁹

The scientific community has begun to realize that modern societies face a number of problems - such as population expansion, food shortages, environmental decay, and nuclear war - which present major obstacles to the progress of the human race and for which science and technology provide no complete solutions.²⁰

If we accept the definition of progress as "the end point, temporary or permanent, of any social action that leads from a less to a more satisfactory solution of the problem of man in society,"²¹ then we must admit that science is not the only way to achieve that progress. That is, science represents only one approach to human knowledge; scientific advance may contribute to man's progress, but, again, scientific progress must be considered only as a component of a more complex problem facing humankind.²²

The foregoing statements make it clear that the time has come to launch a far-reaching strategy of research on our own nature and our authentic needs. This strategy should be quite different from the fictitious ones that have led us astray in recent times. It should identify the basic components of human desires, and how man can live in harmony with his environment. To do so, "we must engage in a drastic re-examination and re-orientation of our ways of thinking, of our priorities, our scientific, social, economic, cultural, ethical and

political structures."²³

The philosophic belief underlying environmental education is that we must seek nothing less than a basic reform in the way our societies all over the world look at problems and make decisions concerning how humanity can best cope with its complex and ever-changing environment. While this is a responsibility of society at large, educational systems should have a key role to play in bringing about this reform. We should train professionals who can deal with technical requirements for preserving high environmental quality. At the same time, it is vital that the entire society develop a new understanding and awareness of man's relationship with his environment. This will require the development and teaching of the environmental philosophy and related concepts at every stage of the formal and non-formal educational process.²⁴

Environmental education, by its nature, is an interdisciplinary subject matter, it is problem-focused; the problems treated can be and should be solved by applying concepts and analytical techniques from many disciplines of knowledge.²⁵

In short, environmental education is important to all individuals all over the world. It is an action process, it relates to, and builds upon, the work of almost all other disciplines; it is concerned with the dynamic interaction between man and his environment in its totality, and it is directed at the improvement of the quality of the environment for all living things.²⁶

Environmental education should, in some degree, be the concern of teachers of all subjects. For example science and social studies

teachers should be more involved with environmental education while those teaching languages and arts could be concerned to a lesser extent.

Goals and Objectives of Environmental Education

The Tbilisi Conference was the starting-point for an international environmental education program consistent with the wishes of all member states of the United Nations. This conference clarified the actual nature of environmental education by laying down its goals and characteristics as well as strategies to be adopted at the national and international levels. It considered environmental education to be an essential component in comprehensive lifelong education if educational systems are to become more relevant and more realistic.²⁷

Ultimate Goals of Environmental Education²⁸

Schmieder clarified these positions by presenting the following statements of goals for environmental education:

1. To foster a clear awareness of, and concern for, economic, social, political and ecological interdependence in urban and rural areas.
2. To provide every person with opportunities to acquire the knowledge, values, attitudes, commitments and skills needed to protect and improve the environment.
3. To create new patterns of behavior for individuals, groups and society as a whole, towards the environment.

He then elaborated these goals by showing that environmental

education objectives can be organized into the following categories:²⁹

- I. Awareness: to help social groups and individuals acquire an awareness of and sensitivity to the total environment and its allied problems.
- II. Knowledge: to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of, the environment and its associated problems.
- III. Attitudes: to develop among individuals and social groups social values, strong feelings of concern for the environment and the motivation for actively participating in its protection and improvement.
- IV. Skills: to help individuals and social groups acquire the skills needed to solve environmental problems.
- V. Participation: to help individuals and social groups develop a sense of responsibility and urgency regarding environmental problems, so as to ensure appropriate action to solve these problems.
- VI. Evaluation Ability:³⁰ to help individuals and social groups evaluate environmental measures and education programs in terms of ecological, political, economic, social, aesthetic, and educational factors.

Schmieder further elaborated the following basic environmental

education objectives for society as a whole:³¹

1. To develop a public and national environmental ethic regarding ecological balance and the quality of life.
2. To develop a citizenry that: (a) has a basic understanding of humanity's relation to and interaction with the total environment; (b) understands the need to work on solutions to environmental problems; and, (c) is individually committed to improve the environment.
3. To provide citizens with accurate, up-to-date, information about the environment and its associated problems so that they can make the best possible decisions regarding its utilization.
4. To provide the motivation and training that will enable citizens to acquire and spread the knowledge and skills that will help society solve interrelated environmental problems and prevent their recurrence.
5. To seek a balance between short-range needs and possible long-range implications when making environmental decisions.
6. To make the public aware that every citizen is an environmental decision maker on one scale or another.

He also identified environmental education objectives for individuals as follows:³²

1. To develop a set of basic values regarding human nature interactions that will guide one through life.
2. To develop a lifelong commitment to the improvement of the human environment and the quality of life.

3. To understand the relationship between the needs of society and its interaction with the environment.
4. To be knowledgeable and informed about the possible future consequences of environmental problems and decisions.
5. To understand the interdependence of living things.
6. To think critically, seek evidence, and to challenge the way things are.

An analytical view of these goals and objectives shows that they reflect the interdisciplinary nature of environmental education mentioned in the previous section. Also, these goals and objectives provide a framework for environmental education programs within any given society. Therefore these goals will be very helpful in developing goals of environmental education at the secondary school level in Egypt.

Guidelines for Curriculum Development in Environmental Education

Environmental education should get every member of the population involved in the process of lifelong education regarding environmental problems. It should start as early as possible with children and be made relevant to the child's environment.

Curriculum developers should design environmental curriculum content and process to achieve environmental literacy among the entire population. The behavioral description of an environmentally literate citizen is one who is capable of developing and living a lifestyle that is humanly successful and environmentally sound.³³

Guiding Principles of Environmental
Education Programs

The Tbilisi Declaration outlined the guiding principles for environmental education programs as follows:³⁴

1. Environmental education programs should consider the environment in its totality - natural man-made, political, economic, technological, social, cultural, historical, moral and aesthetic.
2. Environmental education programs should be a continuous life-long process, beginning at the pre-school level and continuing through all formal and non-formal stages of education.
3. Environmental education programs should be interdisciplinary in their approach, drawing on the specific content of each discipline to make possible a holistic and balanced perspective.
4. Environmental education programs should emphasize active participation in preventing environmental problems and in working toward the solution of existing problems.
5. Environmental education programs should enable individuals to play a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences.
6. Environmental education programs should focus on current and potential environmental situations.
7. Environmental education programs should explicitly consider

environmental aspects in plans for development and growth.

8. Environmental education programs should promote inter-relationships between peoples and their environment.
9. Environmental education programs should examine environmental issues from local, national and international points of view so that students achieve insights into environmental conditions in other geographical areas.
10. Environmental education programs should focus on the individual's own community and relate topics being discussed to state, regional, national and international issues and perspectives.
11. Environmental education programs should relate environmental sensitivity, knowledge, problem-solving and values at every grade level, but with special emphasis on environmental sensitivity in the early years.
12. Environmental education programs should emphasize the complexity of environmental problems and the need to develop critical thinking and problem-solving skills.
13. Environmental education programs should utilize diverse learning environments and a broad array of educational approaches to teaching/learning about and from the environment with due stress on practical activities and first-hand experience.

These guidelines should be considered by curriculum designers in order to develop environmental education curriculum at all grade levels. More emphasis could be put on problem-solving skills and

participation at the secondary level in order to actively involve students in solving environmental problems. However, it is important to note that these guidelines are broad enough so that they can be utilized to establish and to develop environmental education programs in any given society including Egypt.

Approaches to Environmental Education Curriculum Development

Since environmental education -- properly applied -- is a comprehensive lifelong education, there should be a variety of possible approaches toward curriculum development and implementation to help students cope with changes in a rapidly changing world.

The terminology used in referring to the different approaches or models for environmental education curriculum development is confusing due to the fact that standard usage of terms appearing in environmental education literature has not yet been established. For the purpose of this study, the following definitions for mono-disciplinary (interdisciplinary), and multidisciplinary approaches will be considered.

A. Mono-disciplinary (Interdisciplinary) Approach

This approach refers to the creation of a discrete course or a series of courses in environmental education to be implemented at specific grade levels. In other words, this approach requires a complete curriculum reform as was done in Sweden in 1968. The Swedish National Board of Education appointed a special committee on

environmental education in schools to produce an environmentally oriented curriculum that would provide a basis for the efficient environmental education at all school levels. Curricula prepared for the students of grades 1-6 deal with the study of the environment making use of observations around the school. The students of grades 7-9 could choose projects according to their individual interests. Non-graded working teams were formed to study environmental problems on a national or world scale, with most of the facts and observations collected in an around the community where the schools are located. Grades 10-12 devoted time to activities such as analysis of air, water and soil samples with regard to physio-chemical factors. Also the program included the study of some special problems, and decision-making concerning problems at the national and international level with regard to community planning.³⁵

The interdisciplinary approach seeks to give a comprehensive picture of environmental problems. It is not merely the sum of different disciplines needed to study such environmental problems but it is concerned with grasping the process in its entirety and then proceeding to analyze and solve the problem at hand. The interdisciplinary approach also implies that first consideration should be given to the system of which the phenomenon causing the problem forms a part. That is, in order to explain a phenomenon it is necessary to establish a comprehensive frame of reference incorporating the specific contributions of different disciplines and showing their interdependence.³⁶

Experience in research and teaching shows that the interdis-

ciplinary approach is the proper method for pure and applied research into environmental problems and should be considered in environmental education programs.³⁷ However, we should realize that the integration of an interdisciplinary approach into educational practice is a difficult task and should be implemented gradually. It presupposes an easy communication among educators, a new type of training coupled with an adequate organization of teaching which takes into consideration the conceptual and methodological relationships which exist among various disciplines.³⁸

B. Multidisciplinary (Infusion) Approach

The multidisciplinary approach refers to the incorporation of environmental education instructional activities into such interrelated subject areas³⁹ as biology, chemistry, physics, geology, economics, political science, and social science. This approach requires a team of teachers who can relate subject matter areas to environmental education where the environmental themes can be studied through existing disciplines. Individual subjects can be the source of different activities which, in total, will emphasize the complex interrelationships that exist among all elements under investigation. For instance, water-related activities, studied through different disciplines can help explain how people transform and sometimes damage the environment by acting shortsightedly. Teachers from several disciplines could discuss the planning and implementation of multiple activities, then assign to each student a link in the chain leading to identified common goals. Such teamwork will help to improve

methodology and the quality of the pedagogical approach since psychological attitudes, the effectiveness of the methods, interest in the themes, etc. will be discussed while the curriculum is being developed.⁴⁰

The multi-disciplinary approach will allow students to apply environmental education concepts and problem-solving skills to different situations over a long period of time.⁴¹ Close contact of learners with their environment through multi-discipline and team teaching approaches will allow them to make the utmost use of sensorial perception, with no interference or distortion. Also, it will sensitize them to the problems they perceive directly.⁴² For these reasons, the multi-disciplinary (infusion) approach could be appropriate at all age levels.⁴³

The major features of the mono-disciplinary and multi-disciplinary approaches⁴⁴ (models) are summarized in Table 1.

Formal Environmental Education

Literature selected for review in this section deals with formal environmental education in general. However, major emphasis will be given to environmental education at the secondary level since this study is designed for this purpose.

Environmental Education at the Primary Level

A study of environmental topics in primary schools should appeal to a child's sensory facilities (perception of space, shapes, distances, colors) and should involve field trips and games. In this

Table 1. Mono-disciplinary vs Multi-disciplinary
Approaches for Environmental Education Curriculum Development*

Considerations	Mono-disciplinary Characteristics	Multi-disciplinary Characteristics
Definitions ⁴⁵	A variety of related disciplines grouped in one or more courses, offered sequentially and concerned with grasping the process in its entirety in order to solve the environmental problems at hand.	Environmental education integrated into a variety of disciplines offered simultaneously, in order to solve the environmental problems, but without making explicit possible relationships among them.
Implementation	Easier to implement as a single subject if time available; teacher training is less of a problem.	Requires more teachers to be trained; greater coordination of curriculum necessary; requires less time and content in existing curriculum.
Teachers Competencies	Requires fewer teachers but teachers require more in-depth training in environmental education.	Requires that teachers of all disciplines should be trained to adapt and use E.E. materials but not to the depth as in mono-disciplinary approach.
Demand on Curriculum Load	Requires additional time to integrate this subject into the existing school schedule.	May be effectively implemented with minimal demands on existing curricular load.
Ease of Curriculum Development	Components of curriculum design easier to identify and sequence.	Components must be effectively identified, sequenced, and accommodated by the existing curriculum.
Age Level Appropriateness	May be more appropriate at secondary than elementary levels. For some types of E.E. goals, may be essential at secondary tertiary levels.	Appropriate at all age levels with some exceptions at secondary and tertiary levels.

Table 1 (Continued)

In-depth Coverage of Environmental Issues	More effective in providing in-depth coverage of environmental issues due to time available and teacher expertise.	More comprehensive, but requires extensive curriculum coordination to achieve in-depth coverage through the program.
Effectiveness In Teaching For Transfer	More difficult to be used in effectively teaching for transfer. Requires special efforts to do so.	More effective in teaching for transfer when properly used. Infusion permits decision-making to take place in other disciplines in an environmental context.
Evaluation	A comprehensive evaluation is much easier to accomplish in a single subject curriculum.	Comprehensive evaluation difficult due to the number of different disciplines involved.
Budget	Budget consideration depends upon the nature of the course being developed. A highly sophisticated course requires many field trips. Laboratory equipment could prove costly.	Budget required could be greater than in a single subject curriculum due to numbers of receivers involved in different disciplines across various grade levels.

*Adapted from Hungerford, Harold R., and Peyton, Robert B., 1980.

respect, a study of the child's immediate environment - such as home, school, community - is extremely important. Environmental education should help to develop a sense of responsibility in the child who may, for example, be given an animal to take care of or be required to keep his toys or books in order. Later on, the child's awareness could be directed towards investigation of his school playground, neighborhood or town. Children should be confronted at as early an age as possible with relatively complex problems which may concern them and be asked to suggest their own solutions to these problems. Lastly, children should be given the opportunity to take part in measures to protect and improve their environment⁴⁶

In primary schools, environmental topics should be introduced in a context of general education, as a part of general cultural activities. Basic environmental concepts can be acquired along with the rudiments of biology, chemistry, physics, and human science, provided that their formulation comes as a part of an active attempt to solve a clearly stated problem.⁴⁷

In short, learning about environmental concerns at the primary level should include various aspects of environmental issues and problems. These environmental aspects should be learnable by and teachable to the young through programs of general education⁴⁸ in order to achieve the concept of 'continuity' between the learning experiences in the primary level and the secondary level.

Environmental Education at the Secondary Level

Secondary school students at the intermediate level between primary school and university or college, represent an age group which varies according to the school system (United States, ninth to twelfth or tenth to twelfth years of study;⁴⁹ Egypt, tenth to twelfth years of study).

At the secondary level, the student's attention should be drawn to environmental degradation, and to the ways in which environmental difficulties have affected the quality of human life. The students should come to realize that it is necessary to balance long-term environmental aims against the short term interests of individuals.⁵⁰

It is essential that more attention should be given to greater participation and integration of parents, students and teachers not only in school affairs but also in solving environmental problems that exist in their community. This is one of the main aims of environmental education at the secondary level, i.e. that all community members should work together to tackle environmental problems. In linking these different groups more closely, the secondary school can play an important role in narrowing the 'generation gap' between adults and young people.⁵¹

Goals and Objectives of Environmental Education at the Secondary Level⁵²

1. To develop ecological thinkers with open-minded attitudes toward social responsibilities. Students should be motivated

to make decisions based upon consideration of political, technological and social factors, keeping in mind the importance of environmental and social quality.

2. To foster the development of values based on the broad interests of the community.
3. To enable students to understand the impact of science and technology on society.
4. To develop the students' ability to draw information from a variety of sources.
5. To provide students with a comprehensive background concerning environmental issues and problems that will meet their needs in different environments.
6. To develop in students the ability to utilize the varied learning resources in their community.
7. To stir the students' initiative and to get them involved in solving environmental problems.

Environmental Education Programs at the Secondary Level

Environmental education is typically defined as: (a) problem-focused; (b) interdisciplinary in subject matter; (c) value-oriented; (d) community-oriented; (e) concerned with man's relationship with other living and non-living things; (f) based on student-initiated activities and involvements; and (g) present and future oriented.⁵³

If we accept the above statements to be the major features of

environmental education at the secondary level, then, the response to environmental education by educators and educational establishments should be radical. For example, the distinctions made between some of the courses related to environmental issues might be eliminated. Courses such as art, music, photography, poetry, and sociology might be placed in a larger, trans-disciplinary unit called perception.⁵⁴

Guidelines for environmental education programs in the secondary school should be defined with alternatives that might be applicable to different learning situations, such as are offered in communities or countries with different social and cultural backgrounds. For instance, students in urban environments should be more 'ecologically' and rural students should be more 'sociologically' oriented.⁵⁵

Based on the previous argument, programs for environmental education at the secondary level should be structured on the basis of the following considerations: (a) they should be based on scientific knowledge; (b) they should combine problems of the natural environment with those of the social environment; and (c) they should be designed in such a way as to teach the individual how to aid in the preservation and improvement of his environment, and to maintain these attitudes throughout life.⁵⁶

Programs for the secondary school level should make students aware of those environmental concerns which are important to them. The students should perceive the physical, biological, economic, political, social, cultural and aesthetic issues embedded in environmental problems. This can best be achieved when students are motivated through a wide range of first-hand educational experiences such as

out-door activities. For example, teachers can stimulate and guide student interest groups or actions groups through environmental activities--organized by the school -- to create leadership in the environmental field.

Program content for environmental education in the secondary school should include the following topics and disciplines: ecological relationships of plants and animals; man's use of the natural resources through agriculture, horticulture, forestry and other forms of land management; landscape, topography, geology, pedology, ecology, and meteorology.

Secondary school students, as future participating citizens, should acquire a thorough awareness of, and appreciation for, both the natural and man-made environments, and of environmental dangers to which they may be exposed. Thus, they should be introduced to such topics as: problems of population growth; the meeting of human needs (food, housing, health, education, jobs); the finite nature of the earth's resources; depletion of natural resources; and the questions of economic growth, recycling, poverty and the inequality of wealth distribution, the dangers of warfare; the responsibility of every individual in facing and seeking solutions to these problems.

Since the aim of environmental education is to raise awareness, stimulate critical thinking, and to change attitudes manifested in behavior, one method of evaluating environmental programs should be to measure change in behavior implicit in the students' responses to environmental problems, and the ability to recognize future implications of decisions taken by decision-makers concerning the

environment.

Methodologies of Environmental Education

This section deals with the review of literature related to the instructional concerns of environmental education. The literature selected for review in this section can be organized as follows: concepts to be developed and organized; teaching methods and learning techniques; and, instructional facilities and resources. In other words, to provide some answers -- based on review of literature -- to the questions of "What to teach", "How to teach", and "Where to teach" environmental education in general and at the secondary school level in particular.

Development and Organization of Environmental Education Concepts

The American Association of School Administrators⁵⁷ compiled some basic scientific and social concepts which are important to a sound program in conservation education. The arrangement was arbitrary, being based on an apparent logic rather than the significance of items. Many other plans have been formulated to develop and organize environmental concepts, from the primary through the secondary level. White⁵⁸ developed a list of 274 understandings in an attempt to associate conservation understandings with community resources in particular geographic regions for grades 4-12.

Hawlett⁵⁹ developed twelve major conceptual categories that provide the framework for the K-12 integrated environmental education

program. Topics considered are: energy, ecosystems, limiting environmental factors, water supply, clear air, distribution of natural resources, factors influencing land use, values and attitudes, the power of man, economics, decision-making and land stewardship.

Stapp and Cox⁶⁰ developed a viable environmental education program for grades K-12. This program is based on five major concepts underlying actual activities which take place in the classroom. Many important ideas and contributions have come from students, teachers, and community members over a period of ten years during which different aspects of environmental education were developed and introduced into one or more school systems. Most of the activities were used in the classroom and were modified according to student-teacher responses and designed to assist the learners in acquiring specific knowledge, attitudes, and skills needed to further their understanding of five major concepts basic to the development of an environmentally literate citizenry. The five major environmental education concepts are: ecosystem; population; economics and technology; environmental decision-making; and environmental ethics.

For each of the five concepts, specific understandings have been identified as appropriate for lower elementary, middle elementary, upper elementary, junior high, and senior high school levels.

Teaching and Learning Strategies

The nature of environmental education - as a vehicle for changing behavior - requires that teachers not only use a variety of human and natural resources but also that they change teaching methods. It is

essential that the learner be helped to see what effect he has on his environment and that he understands his role in the balance of nature. What is needed to achieve this goal is a closer association with reality - a reality that can not be found inside the classroom.⁶¹

Outdoor Education Approach

To teach effectively about the environment, we should make room for outdoor education. Study outside the classroom is a means of implementing certain objectives whereby curriculum becomes experience for a learner. This experience adds to the full measure of his life. Teachers should be aware of the extent to which broad experiences help in the development of basic tools of communication, thinking, and critical intellectual capabilities.⁶² Teaching outdoors calls for a system of learning that is based on experience, on inquiry, on discovery, and on analysis. It is a system that involves the whole learner; his affective, physical, cognitive, and aesthetic nature.⁶³ The natural environment as a living laboratory provides students with first-hand experiences rather than an abstract approach to subject matter.⁶⁴ Significant questions can be raised when an individual is confronted, in a natural environment, with a situation that captures his attention and that presents an immediate involvement and interaction between the learner and the environmental event.⁶⁵

Hefferman⁶⁶ stated that "education is not something which takes place exclusively within the four walls of the classroom. The neighborhood, the wide community, and the natural environment reasonably accessible to the school should be the learning laboratory

for children and youth."

Asche and Shore⁶⁷ conducted a study with fifth-grade students from a Montreal inner-city school. The treatment consisted of a full year program which stressed environmental problems and included planned field trips to a nature center. They concluded from their study that formal environmental education programs can have a positive effect on a students' conservation behavior. A decrease in destructive behavior was also noted.

Three studies of attitudes toward and effects of field trips have been reported by Falk and Balling.⁶⁸ The three studies indicated that educators view field trips as important, that field trips have clear cognitive and affective benefits, and that certain characteristics of learner and field trip setting influence students attitudes, behavior, and learning. Carlson and Baumgartner⁶⁹ studied the effects of attending a natural resource camp on youths' environmental attitudes. The authors conclude that a one-week intensive session, taught by professionals, appears to alter favorably some environmental attitudes.

Environmental Inquiry Approach

The inquiry method is "an approach to teaching and learning that encourages youngsters to ask the questions that will lead them to the answers they seek, that emphasizes the process and the 'spirit' of science as much as the content."⁷⁰ This approach enables students to recognize and state environmental problems, to ask questions concerning these problems in a manner that will allow them to pursue answers, and to recognize that these answers are both the final product and the

starting point for further study.⁷¹ If our students are to survive in and adapt to a rapidly changing social and technological world, they must have the ability to analyze information, to arrive at logical conclusions, and to act wisely based on these conclusions. They must be creative and critical thinkers.⁷²

Through environmental investigation based on the inquiry method, students can manipulate concrete materials to discover answers to environmental problems. This can be done through: (a) field trips, (b) collecting trips, and (c) field investigations or field studies organized by environmental education school teachers outside the classrooms.⁷³

The community survey or inventory is a type of field investigation that is significant - as a process and product - to teach environmental education programs. Stapp⁷⁴ and Bennett and MacGown⁷⁵ stated that through this process the learner becomes aware of local environmental problems and knowledgeable of methods of solving these problems. Thus, this method can serve as a means of determining the environmental needs and goals of the community surrounding the school.

The Study of Values in Environmental Education

Environmental problems are merely symptoms of underlying social and cultural problems of belief and value. Harman⁷⁶ wrote that "the various aspects of the world macropopulation are appearing more and more like surface manifestations of a pathogenic condition lying beneath the surface." Based on this argument, it is clear that environmental education should include the recognition and

clarification of beliefs and attitudes that determine the choices and decisions which will enable students to deal wisely and intelligently with issues concerning the use or abuse of environmental resources. Hence, changes in thinking and environmental perception are needed to solve environmental problems. This means that individuals and institutions are faced with the necessity to make decisions that affect the quality of the environment, and that these decisions are, to a varying extent, influenced by the dominant valuative norms present in individuals or institutions. Therefore, it is important to study values and their relationship to environmental problems⁷⁷

The importance of value study in environmental education has been noted by Stapp,⁷⁸ Cummings,⁷⁹ Knapp,⁸⁰ and others. Stapp notes that:

Two basic processes that are an integral part of environmental education are 'problem solving' and 'valuing'. These processes, particularly the latter, lead to the learning of skills which are necessary for coping with problems in general. The skills include problem definition, generating alternative solutions, and evaluating these alternatives and their effects.⁸¹

Cummings⁸² has examined the process of environmental education and noted the central importance of valuing. He proposes a methodological model which involves a decision-making approach and extends to an actual behavioral response. In decision making, problem solving is integrated with a valuing process. Valuing is the link between thinking and action. Thinking may help students to see the alternatives which are relevant, and valuing helps them to choose alternatives.

Project Learning Tree⁸³ has integrated values clarification into its environmental education approach. This project emphasizes

"students interaction with the natural and social environment. Using the outdoors as a learning laboratory whenever possible is emphasized throughout the materials at all grade levels."⁸⁴

The study of values in environmental education can be categorized into three approaches: 1) value clarification, 2) value analysis, 3) and moral development.

1) Value Clarification Approach

Value clarification is a fruitful approach to value study in environmental education, and it is one that is broadly utilized. This approach places emphasis upon the active process of valuing rather than emphasizing any particular set of values. It allows learners to examine the range of alternative value positions available to them and gives them the chance to choose among them.⁸⁵

The process consists essentially of posing a problem of valuing to the student in an environment which is open and free from threat; urging the student to identify his positions on the problem; providing the opportunity to view a range of alternative value positions; and allowing affirmation and action upon the value position taken. This approach involves no normative judgment of right and wrong or good and bad, but gives the students insight into the difficult value issues before them, into their personal position in the issues, and gives practice in the process of perceiving and evaluating alternatives. Therefore the students can gain skill in the decision making process which is so essential in the solution of environmental problems.⁸⁶

Raths, Harman, and Simon⁸⁷ developed the following objectives of the value clarification approach:

1. To encourage students to make choices and to make them freely.
2. To help students discover and examine available alternatives when faced with choices.
3. To help students weigh alternatives thoughtfully, reflecting on the consequences of each alternative.
4. To encourage students to consider what it is that they prize and cherish.
5. To give students opportunities to make public affirmation of their choices.
6. To encourage students to act, behave, and live in accordance with their choices.
7. To help students examine repeated behaviors or patterns in their lives.

The challenge of the value clarification approach to studying values is to find ways to integrate value clarification exercises into the curriculum at all levels. The most effective way to utilize this approach is simply to move to an exercise in science, social sciences, or humanistic studies which will explicate valuative options. This is consistent with the view of environmental education which holds that the entire environmental education process should be integrated into existing curricula in such a way as to unify these curricula, rather than be a separate course or unit.⁸⁸

2) Value Analysis (Inquiry) Approach

This approach has been developed essentially for social studies education. It emphasizes making value judgments about policy decisions. It goes beyond value clarification and calls not only for clarification of a student's value position but to explore in a systematic manner the issue under investigation and to involve students in a systematic, step-by-step analysis of environmental problems in order to learn skills in the areas of discussion, data collection and hypothesis testing.⁸⁹

The objective of value analysis is to make or judge policy decisions through the application of processes of reasoning or rational judgment. These processes are organized into the following steps:⁹⁰

1. Identifying and clarifying the value system.
2. Gathering and organizing the facts or statements claimed to be facts.
3. Assessing the truth of facts.
4. Showing the relationship between the facts and the value question.
5. Arriving at a possible solution or decision acceptable to the individual or individuals making the decision.

This approach to value inquiry, which includes value clarification, can be of great help to value study in environmental education. It can assist in resolution of confusion of values in the student. It can reveal the environmental consequences of behaviors associated with specific values.⁹¹ Value analysis is useful to the environmental

educator interested in getting students involved in an interdisciplinary study of environmental policy issues. The emphasis on point of view, definition, and fact-gathering provides for an application of information from the study of science. Emphasis upon judging policy issues provides for application of learning from the social studies. Combining the two through value analysis, provides for an organized, interdisciplinary study of environmental issues.⁹²

3) Moral Development Approach

A third possible approach to values study in environmental education is based on the work of Kohlberg.⁹³ The moral development theory states that the concepts of "fairness" and "reciprocity" are central to a person's thinking about issues such as truth, duty, sharing, and property rights.⁹⁴ Kohlberg has developed a typology of moral thinking in children in a longitudinal and cross-cultural study and suggests an approach to moral education in which the teacher presents the student with a moral problem (dilemma) and asks how that person would resolve it. The student's response to a number of such dilemmas indicates his level of moral development and the teacher can then structure new dilemmas which may open new levels of moral reasoning for the student. In the early stages morality is egotistic and culture-bound, while at higher levels it is universal and consistent. It consists of comprehensive and integrated principles at these higher levels which 'have gone by the name of justice.'⁹⁵

Moral development can be stimulated by experiences of moral conflict, by exchanges of different views, and by exposure to moral

reasoning at a higher level.⁹⁶

The moral development approach has several implications for environmental education. It can give teachers a clearer understanding of their students' moral reasoning. The teacher can pose dilemmas at the appropriate stage that will stimulate growth toward higher levels of moral reasoning that difficult environmental problems require for their solution.⁹⁷

In general, study of these theories, strategies, and processes of value education can be of great help to environmental educators. Value clarification can be used to assist the way students prize and act toward elements of the environment. Value analysis can offer special assistance to the teacher of environmental issues in the evaluation of policy decisions, preparation of position papers, and analysis of positions. Moral development can help those concerned with development of an environmental ethic.⁹⁸

Environmental Simulation Games Approach

A basic idea behind the simulation and game approach is that of connecting learning with the decision-making process. One assumption of environmental education is that the purpose of knowledge is to improve our decisions. This approach, the association of learning with the decision-making process is believed to increase the retention of information and to better suite those students who learn poorly from lectures and textbooks. Also, it helps students to apply knowledge they have already acquired to solve environmental problems included in simulation games situations.⁹⁹

Rasmussen¹⁰⁰ indicates that simulation games can enable students to gain insight into concepts, attitudes, and processes typical of the physical or social phenomena being simulated. Swinerton¹⁰¹ indicates that simulation games can be used where students play decision-making roles. That is, under simulations, a student faces situations calling for value judgments, interactive decision-making and actual problem-solving.

Holobinko and others¹⁰² described two commercially produced games for the life sciences as follows: in Pollution Game, students discover that there is a positive correlation between success and being a polluter; and in the Plant Management Game, students become involved in different aspects of an environmental problem such as food supply, population expansion, the quality of life and the quality of the environment.

The International Environmental Education Program (IEEP)¹⁰³ has conducted four studies to analyze relevant aspects in the incorporation of environmental education into formal and non-formal education processes, with due consideration given to different socio-cultural, economic and ecological contexts. The first study concerns the utilization of modular approaches in environmental education. The study proposes a series of specific modular examples, already applied in different school sittings, relating to environmental concerns, such as water conservation, urban environment, health and nutrition. The second study relates to the use of gaming and simulation in environmental education. The study proposes guidelines for the creation of original games by curriculum developers or teachers and

provides a series of existing, easily conducted games related to environmental concerns, such as conservation of natural resources, anti-pollution measures, urban problems, health and nutrition, and disaster preparedness.

Fennessey, Livingston, Edwards, Kidder and Nafziger¹⁰⁴ examined the use of simulation and gaming strategies compared to conventional instruction in the teaching of ecology. They used 1,874 students in 60 third, fourth, and eighth grade classes in parochial schools. The authors noted no significant differences between the groups which were attributable to the treatment. They concluded that conventional strategies are as effective as simulations. Further research along these lines appears to be justified.

Multimedia Approach

Since environmental education should be a life-long process, study of the environment should utilize all possible teaching and learning aids to help students grasp the major environmental concepts needed to live in a rapidly changing society.

Richard¹⁰⁵ indicates that enrichment activities making use of different instructional media such as newspapers, magazines, slides, wall posters, filmstrips, films, textbooks, equipment for laboratory work, tapes, and field observation can stimulate students to become more involved in environmental studies, and which can in turn, result in behavioral changes.

Television news programs, periodical news magazines and daily newspapers largely report to the public on recent, factual develop-

ments. In this way, they convey information on environmental topics and it is from these resources that citizens learn about such matters as, oil spills, fish distruction, or the results of important research on environmental problems.¹⁰⁶ Environmental educators should design their programs in such a way as to utilize all available instructional media in order to achieve the goals and objectives of environmental education.

Hall¹⁰⁷ compared three instructional methods-wilderness inquiry, classroom guided discovery, classroom didactic-in addressing what, where, and how ecology should be taught to elementary-school children. He found that a wilderness inquiry method, combined with a novel and relevant setting, yielded superior statistical and non-statistical results over a classroom-guided-discovery and a classroom-didactic treatment in ecological thinking, feeling, and perceiving scores yielded by evaluation instrument.

Environmental Education Teacher Training

Integration of environmental education curriculum into existing school programs depends upon many factors. One important factor is the people who make teaching their profession. Teachers, through their efforts can give life to environmental education curriculum. They can best help to achieve the goals and objectives of environmental education by helping students to develop their own individual understanding, skills and attitudes.¹⁰⁸

The European Working Conference on Environmental Conservation Education, emphasized the importance of teacher education when the

participants stated that ". . .teacher training forms one of the most important and significant aspects in the development of environmental education programs." They recommended that:¹⁰⁹

- a). . .the training of teachers provide essential basic knowledge of ecological facts and an adequate background in sociology and its relationship to human ecology;
- b). . .efforts should be made to develop in teachers a critical awareness of environmental problems that will enable them to develop responsible attitudes concerning environmental matters in their students;
- c). . .environmental conservation be recognized as an essential part of teacher training, and that programs started in preservice training should be continued by inservice training;
- d). . .as teacher training in environmental education involves the use of many techniques and methods, including those relating to interdisciplinary approaches and team teaching;
- e). . .media banks be established at the national and international level for the exchange of information, training aids and teaching materials.

Preservice Teacher Training

Stapp¹¹⁰ states that if we are to initiate and implement environmental education curriculum in the school program, a comprehensive preservice teacher training program should be developed. He summarized the requirements of a preservice teacher training program as follows: "it is imperative that future teachers obtain training in

the following areas: basic competencies in the environmental sciences, theoretical education foundation; instructional skills; and opportunities to combine these areas in a closely supervised educational work-study program prior to assuming a professional teaching career."¹¹¹

Inservice Teacher Training

Rowe, Budd and Hurd¹¹² view the inservice teacher training program as the "translating device" needed to put any new curriculum into practice.

The Biological Science Curriculum Study (BSCS)¹¹³ emphasized the need for inservice teachers to be reoriented and reeducated in order to break away from the traditional role of the teacher as a giver of information and imparter of knowledge. Instead, teachers are in need of more training in diagnosing, prescribing and counseling; in being aware of both, the students' and society's needs; and, in organizing and directing learning situations inside and outside the school.

Bennett¹¹⁴ stated that "there are two basic purposes of teacher inservice education programs, subject matter understanding and preparation in teaching methods." He proposed that the principle elements of inservice training in environmental education should be:

- a). . .to convey the rationale and objectives of environmental education curriculum.
- b). . .to teach new developments in ecological, economic, policy, and human ecosystem foundations in relation to the curriculum.

- c). . .to give experience in the use of equipment by teachers.
- d). . .to advise teachers on teaching techniques, test construction, student assessment, course evaluation and preparation of audio-visual aids.
- e). . .to give experience in environmental field trips, to provide first-hand experience concerning available resources.
- f). . .to discuss local, national, regional, and international environmental problems in order to develop more awareness of such problems in teachers.

Guidelines for Environmental
Education Teacher Training¹¹⁵

Teacher training both in preservice and inservice programs should instill in teachers the kind of sensitivity towards environmental education that they will be expected to give their students.¹¹⁶ This means that teachers themselves should not only possess the requisite knowledge, cognitive skills, and affective attributes but also that they be able to transfer such skills and attitudes to their students.

Following are some guidelines for the development of teacher training programs in environmental education:

1. Basic ecological foundations.
2. Field trips and laboratory experiences for teachers in environmental science.
3. Information about environmental issues and problems.
4. Competencies in environmental problems identification, investigation, evaluation, and citizenship action.

5. Opportunities to develop value clarification skills and knowledge of the roles of human values in environmental issues.
6. To provide instructional activities and experiences similar to those that might be utilized in their classrooms.
7. To provide instruction on the philosophy and goals of environmental education and the nature of different approaches such as interdisciplinary and multidisciplinary approaches, and how to implement these models.
8. To provide specific training in the use of environmental education as a vehicle to develop environmental literacy.
9. To provide teachers with opportunities to develop skills in identifying, inventorying, and using of local resources effectively.

At this point, it should be mentioned that the literature reviewed in this Chapter presents the views of selected experts in the field of environmental education. That is, the emphasis throughout the literature review has been placed on the environmental point of view rather than the economic or political. However, it should be kept in mind the environmental positions expressed by the experts in the field do not ignore other issues which affect human well being.

It is worth mentioning that the following framework or model for environmental education in the Egyptian secondary schools was derived from the set of environmental positions that are presented in the literature review. The teachers' questionnaire was also developed based on this model.

A Proposed Framework (Model) for Environmental Education in the Egyptian Secondary Schools

The present framework, or model, is based on the literature review of the international work in the area of environmental education. This model will be used as a guideline to assess the current state of environmental education in the Egyptian secondary school.

For the purpose of this study the researcher will adopt Stapp's¹¹⁷ definition of environmental education since it is the most comprehensive definition.

Definition

Environmental education is "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, attitudes, motivations, commitments, and skills to work individually and collectively toward solutions of current problems and prevention of new ones."

Goals and Objectives of Environmental Education¹¹⁸

The present study will adopt the following goals and objectives laid down by the Tbilisi Conference because they clarify the actual nature of environmental education. These goals are also consistent with the foregoing definition of environmental education. It is important for each nation, according to its culture, to utilize such goals to provide a sense of direction for environmental education

curriculum development and instruction. These goals and objectives are:

1. To develop in students a clear awareness of, and concern about, environmental issues and problems in urban and rural areas.
2. To provide students with knowledge to understand, protect, and improve their environment.
3. To help students acquire positive attitudes and values needed to maintain balance between the quality of human life and the quality of the environment.
4. To help students acquire skills required to solve environmental problems.
5. To help students participate effectively in an individual or group actions to work toward resolutions of environmental problems.

Approaches to Environmental Education Curriculum Development

Since environmental education--properly understood--is a comprehensive lifelong education, there should be a variety of possible approaches to incorporate environmental education into existing school curricula. For the purpose of this study the researcher will adopt the following approaches since they are the most frequent approaches in the development of environmental education programs.

A. Mono-disciplinary (Interdisciplinary) Approach

This approach refers to the creation of a discrete course or

series of courses of environmental education to be implemented at specific grade levels. This approach requires a complete curriculum reform. It seeks to give a more comprehensive picture of environmental education.

B. Multi-disciplinary (Infusion) Approach

This approach refers to the incorporation of environmental education instructional (units) activities into existing subject areas. This approach requires a team of teachers who can relate subject matter areas to environmental education.

Environmental Education Curriculum Content

The content of environmental education in the Egyptian secondary schools should reflect the interdisciplinary nature of environmental education as well as international developments in this area. Based on the literature reviewed in this Chapter, the researcher has come up with the following concepts to be covered by environmental education curriculum content at the secondary school level in Egypt. These concepts are believed by environmental educators to be the most comprehensive base for environmental education curriculum content.

The concepts are:

- 1 - The concept of ecosystem.
- 2 - The concept of population.
- 3 - The concept of economics and technology.
- 4 - The concept of environmental decision-making.
- 5 - The concept of environmental ethics.
- 6 - The concept of stewardship of the environment.

- 7 - The concept of environmental contamination.
- 8 - The concept of public health and environmental quality.
- 9 - The concept of modern agriculture and food supply.

Methodology of Environmental Education

The researcher suggests the following methods to be used in teaching environmental education in the Egyptian secondary schools in order to achieve the proposed goals and objectives of environmental education in this model. These methods are:

- 1. Outdoor education approach.
- 2. Environmental inquiry and problem solving approach.
- 3. Value clarification approach.
- 4. Environmental simulation games approach.
- 5. Multimedia approach.

Teacher Training

Environmental education teacher training both in preservice and inservice form one of the most significant aspects in the development of environmental education programs. Since sound teacher education is required for those people who make teaching their profession and strive to achieve the goals of environmental education, this study, along with other studies, suggests that teacher training programs in Egypt should provide teachers with:

- 1. Basic ecological, economic, social and political foundation in relation to environmental education.
- 2. Rationale and objectives of environmental education.

3. Experiences in the use of equipment needed to teach environmental materials.
4. Teaching techniques, test construction, student assessment, course evaluation and preparation of audio-visual aids.
5. Experiences in environmental field trips.
6. Opportunities to develop students' knowledge, skills in identifying, inventorying, and use of local resources effectively.

Constraints and Suggestions

In this section, the researcher presents major constraints that he believes might preclude the implementation of environmental education in the Egyptian secondary schools. The constraints are believed to be the most common constraints based on the results of different studies reported in the reviewed literature and the researcher's own observations. These constraints are listed in the teachers' questionnaire (Appendix C and D).

This conceptual framework (model) will be used as a guideline to direct the whole study. The teachers questionnaire was designed in the light of this model to collect data about the current state of environmental education in the Egyptian secondary schools. Elements of this model were developed in greater detail in the questionnaire to be presented to science and social science teachers in the Egyptian secondary schools.

Summary

The main concern of this Chapter was the review of the literature related to the environmental education programs at the secondary school level. Presented in this Chapter were the concept of environmental education and its historical development, goals and objectives of environmental education, guidelines for curriculum development, approaches to environmental education, and environmental education teacher training, and a proposed framework (model) for environmental education in the Egyptian secondary school.

CHAPTER II NOTES

1. Hungerford, Harold R. and Peyton, Robert Ben. Strategies for developing an environmental education curriculum: A discussion guide for training workshops in environmental education. (Prepared for the UNESCO), Michigan State University, E. Lansing, MI, 1980, p. 3.
2. Ibid., p. 4.
3. Nash, R. The American Environment: Readings in the History of Conservation. (Reading, Mass., Addison-Wesley, 1968), pp. 2-5.
4. Balzer, Levon. "Environmental Education in the K-12 Span," The American Biology Teacher, (April, 1971) pp. 220-225.
5. Jackman, W.S., Nature Study, 3rd Yearbook. National Society of Scientific Study of Education. (Chicago: University of Chicago Press, 1904), p. 11.
6. Hungerford, H.R., and Peyton, R.B., Strategies for developing an environmental education. . . ., Op. cit., p. 4 (In Chapter I).
7. Smith, Julian W. "A Decade of Progress in Outdoor Education." Outdoor Education: A Book of Readings. Edited by Donald R. Hammerman and William M. Hammerman. Minneapolis, Minn: Burgess Publishing Comp., 1973, p. 107.
8. Smith, Julian W. and others. Outdoor Education. (Englewood Cliffs, N.J.: Prentice Hall, Inc., 1963, p. 19.
9. U.S. Department of Health, Education and Welfare, Environmental Education, Education that Cannot Wait. Washington, D.C. Office of Education, 1971, pp. 6-7.
10. UNESCO. "The Intergovernmental Conference on Environmental Education." Connect, Vol. II, No. 2 (Paris, July, 1977), p. 1.
11. UNESCO. "The Tbilisi Declaration," Connect, Paris: Vol. III, No. 1, Jan., 1978, pp. 1-8.
12. State of Michigan Legislature, Senate Concurrent Resolution No. 69, April, 1971.
13. Wisconsin Environmental Education Plan. A brochure distributed at the National Conference of the Conservation Education Association,

Murray, Kentucky, Aug. 12-16, 1973.

14. Advisory Council on Environmental Education. Second Annual Report. Washington, D.C. Office of Education, Department of Health, Education and Welfare, 1973.
15. Stapp, William B., and Cox, Dorothy A. Environmental Education Activities Manual. (Farmington Hills: Michigan, 1979), p. 3.
16. UNESCO. "Defines Environmental Education," Environmental Education News for School People, VII (March, 1973), p. 3.
17. Traverso, Adriano Buzzati, "Some Thoughts on the Philosophy of Environmental Education," Trends in Environmental Education, UNESCO, (Belgium, 1977), p. 14.
18. Ibid., p. 15.
19. Ibid., pp. 16-17.
20. Ibid., p. 17.
21. Sklair, Leslie, The Sociology of Progress, London: Routledge and Kegan Paul, 1970.
22. Traverso, Adriano B. "Some Thoughts on the Philosophy. . .", op. cit., p. 17.
23. Ibid. p. 18.
24. Schmieder, Allen A. "The Nature and Philosophy of Environmental Education: Goals and Objectives." Trends in Environmental Education, UNESCO, (Belgium, 1977), p. 23.
25. Gallagher, J.J. "A Renewed Emphasis for Environmental Education." Journal of Environmental Education. (Washington, D.C.) Vol. 9, No. 1, Fall 1977, pp. 2-3.
26. Schmieder, Allen A. "The Nature and Philosophy. . ." Op.Cit., p. 26.
27. UNESCO, Environmental Education in the Light of Tbilisi. . ., Op. Cit., p. 5.
28. "The Tbilisi Declaration," Op. Cit., p. 3.
29. Ibid. p. 3.
30. Schmieder, Allen A. "The Nature and Philosophy. . .," Op. Cit., pp. 27-28.

31. Ibid., p. 28.
32. Ibid., p. 28.
33. Roth, Charles. "A Massachusetts Audubon Society Program." Processes for Quality Environment. By: Robert S. Cook and Georg T. O'Hearn, Green Bay, Wis.: University of Wisconsin, 1971. p. 108.
34. Stapp, William B. "An Instructional Model for Environmental Education." Prospects. (Paris, UNESCO) Vol. VIII, No. 4, 1978, pp. 497-498.
35. Forselius, Sten. "Environmental Education in the School Curricula: the Swedish Example." Prospects, (UNESCO: Paris) Vol. II, No. 4, Winter 1972, pp. 477-484.
36. UNESCO. Environmental education in the Light of Tbilisi. . . , Op. Cit., pp. 27-28.
37. Moroni, Antonio. "Interdisciplinary and Environmental Education." Prospects, (UNESCO: Paris). Vol. VIII, No. 4, Winter, 1972, p. 483.
38. UNESCO. E.E. in the Light of Tbilisi. . . , Op. Cit., p. 28.
39. Stapp, William B. Development, Implementation,. . . Op. Cit., p. 9.
40. Goudswaard, Johannes and Teitelbaum, Mirta de. "Learning Environments for Environmental Education," Trends in Environmental Education, UNESCO, (Belgium, 1977) p. 51.
41. Hungerford, Harold and Peyton, Robert. Strategies for Developing. . . Op. Cit., p. 15.
42. Goudswaard, J. and Teitelbaum, M. "Learning Environment for. . ." Op. Cit., p. 52.
43. Hungerford, H. and Peyton, R. "Strategies for Developing. . ." Op. Cit., p. 13.
44. Ibid., pp. 12-14.
45. Moroni, Antonio. "Interdisciplinary and Environment. . ." Op. Cit., p. 480.
46. UNESCO, "Environmental Education in the Light of. . . , Op. Cit., p. 43.
47. Ibid., p. 43.

48. Janapala, Alles and Chiba, A. "Environmental Education at the Pre-school and Primary level." Trends in Environmental Education, (UNESCO: Paris, 1977), p. 93.
49. Eichler, Arturo. "Environmental Education at the Secondary School Level." Trends in Environmental Education, (UNESCO: Paris, 1977), p. 101.
50. UNESCO, "E.E. in the Light of. . .," Op. Cit., p. 43.
51. Eichler, Arturo. "E.E. at the Secondary School. . .", Op. Cit., p. 104.
52. Ibid., pp. 103-104.
53. Ibid., pp. 104-107.
54. Ibid., p. 105.
55. Ibid., p. 105.
56. Ibid., p. 106.
57. American Association of School Administrators, Conservation Education in American Schools. Twenty-ninth Yearbook, (Washington, D.C.: American Association of School Administrators, 1951). pp. 72-74.
58. White, Roy C. "A Study Associating Selected Conservation Understandings with Available Community Resources from Grades Four Through Twelve." A Review of Research Related to Environmental Education (Columbus, Ohio: The Ohio State University, 1972), p. 8.
59. Paz, Concepcion Medel. A Conceptual Framework for Environmental Education Adapted to the Philippine Environment. (Unpublished Ph.D. dissertation: Michigan State University, E. Lansing, Michigan, 1974), p. 47.
60. Stapp, William and Cox, Dorothy. Environmental Education Activities.
. ., Op. Cit., p. 33.
61. Chavez, Simon J. "Outdoor Education, Dayton Style." Environmental Education, Vol. 2, No. 2 (Winter, 1970), p. 9.
62. Brehm, Shirley A. A Teacher's Handbook for Study Outside the Classroom, Columbus, Ohio: Charles E. Merrill Publishing Comp., 1969, pp. 3-4.
63. Chavez, Simon J. "Outdoor Education. . .", Op. Cit., p.9.

64. Blough, Glen O. "Science and Outdoor Education or Nobody Can Really Know How I Feel," Outdoor Education. By: Donald R. Hammerman and William M. Hammerman. Minneapolis, Minnesota: Burgess Publishing Comp., 1973, p. 164.
65. Grass, Phyllis and Railton, Easter P. Teaching Science in an Outdoor Environment. Berkeley, Calif.: University of California Press, 1972, p. 11.
66. Hefferman, Helen. "They Grow Nine Feet Tall," Journal of Outdoor Education, Vol. 1, No. 2 (Winter, 1967), p. 3.
67. Asche, J., and Shore, B. "Conservation Behavior as the Outcome of Environmental Education." The Journal of Environmental Education. Vol. 6, No. 4, Summer, 1975, pp. 32-33.
68. Falk, John H., and Balling, John D., Setting a Neglected Variable in Science Education: Investigation into Outdoor Field Trips. Final Report. Edgewater, MD: Chesapeake Bay Center for Environmental Studies, 1979, ERIC Document (ED) pp. 195-441.
69. Carlson and Baumgartener, D. "The Effects of Natural Resource Camps on Youths" The Journal of Environmental Education, Vol. 5, No. 3, Spring, 1974, p. 7.
70. DeRose, James J., David Lockard, and Lester Paldy. "The Teacher is the Key: A Report on Three NSF Studies," The Science Teacher, Vol. 46, No. 4, (April, 1979) p. 32.
71. Herron, M.D. "The Nature of Scientific Inquiry." School Review, Vol. 79, No. 2, (Feb., 1971) pp. 171-212.
72. Nagalski, Jan L. "What is Basic About Biology?" The American Biology Teacher, Vol. 42, No. 2, (Feb., 1980), pp. 113-115.
73. Brehm, Shirley A. "A Teacher Handbook for Study Outside. . . , Op. Cit., pp. 9-18.
74. Stapp, William B. "Community Profile and Lifestyle Survey," A Handout in a Seminar-Workshop on Problems of Human Environment at Higgins Lake, Michigan, Teachers' Environmental School, July 15-19, 1973 (Mimeographed), cited by: (Paz, 1974), p. 54.
75. Bennett, Dean B; and MacGown, Richard H. "The Community Environmental Inventory," Maine Environmental Education Project, Yarmouth, Maine: 1972, (Mimeographed) (Cited by: Paz, 1974). p. 54.
76. Harman, Willis. "Alternative Futures and Education Policy," Stanford Research Institute, Educational Policy Research Center, (Palo Alto, California, 1970), p. 8.

77. Miles, John C. "The Study of Values in Environmental Education," Journal of Environmental Education. Vol. 9, No. 2, (Winter, 1978), pp. 5-6.
78. Stapp, William B. "Development, Implementation and evaluation. . .," Op. Cit., p. 12.
79. Cummings, Stanley I., "Methodology for Environmental Education," The Journal of Environmental Education, Vol. 6, No. 2, (Winter, 1974), pp. 16-20.
80. Knapp, Clifford, "Teaching Environmental Education with Focus on Values," Cited by: (Miles, 1978), p. 7.
81. Stapp, William B. "Development, Implementation. . .", Op. Cit., p. 12.
82. Cummings, S.I. "A Methodology for E.E., . . .", Op. Cit. pp. 17-18.
83. Project Learning Tree, Supplementary Activity Guide for Grades 7-12, The American Forest Institute, Inc., Washington, D.C., p. v, vi.
84. Ibid. p. vi.
85. Miles, John C. "The Study of Values in Environmental. . .", Op. Cit., pp. 7-8.
86. Ibid., p. 9.
87. Rath, Louis, Merrill Harman, and Sidney B. Simon, Values and Teaching. (Columbus, Ohio: Charles E. Merrill Publishing Co., 1966), pp. 38-39.
88. Miles, John C. "The study of Values in. . .", Op. Cit., p. 10.
89. Glenn, Allen D, Gennaro, Eugene D., "An Interdisciplinary Approach for Exploring Values and Values Questions for Social Studies and Science Teachers," The High School Journal, Vol. 58, No. 5, (Feb., 1975), p. 212.
90. Harshman, Ronald. "Value Education Processes for an Environmental Education Program," Journal of Environmental Education. Vol. 9, No. 2 (Winter, 1979), p. 31.
91. Miles, John C., "The study of Values in E.E. . .", Op. Cit., p. 13.
92. Harshman, Ronald. "Value Education Process. . .", Op. Cit., p. 33.
93. Kohlberg, Lawrence. "The Child as a Moral Philosopher," in Chazan, Barry I; Soltis, Jonas F. (eds.), Moral Education, Teachers

College Press, 1973.

94. Harshman, Ronald. "Value Education Process. . .", Op. Cit., p. 33.
95. Miles, John C. "The Study of Values. . .", Op. Cit., p. 9.
96. Gary, Charles E. "Development of Moral Judgment (or Reasoning)" (Mimeograph. Normal, Ill.: Dept. of History, Illinois State University, 1976), (Cited by: Harshman, 1978-79), p. 33.
97. Miles, John C. "The Study of Values. . .", Op. Cit., 14.
98. Harshman, Ronald. "Value Education Processes. . .", Op. Cit., p. 34.
99. Wolsk, David. "Methodologies of Environmental Education," Trends in Environmental Education, (UNESCO: Paris, 1977), p. 42.
100. Rasmussen, Fred A. "Science Teaching and Academic Gaming," The American Biology Teacher, Vol. 31, No. 9, (Dec., 1969), p. 560.
101. Swinerton, E. Nelson, "Environmental Gaming Simulations," The Journal of Environmental Education, Vol. 3, No. 4, (Summer, 1972), p. 50.
102. Holobinko, Paul; Rasmussen, F.A.; and Showalter, V. "Synopsis of Games and Simulations in the Commerical Edition of the ERC Life Science", (Cited by Troost, and Altman, 1972), pp. 394-395.
103. "International Environmental Education Since Stockholm and. . ." Op. Cit., p. 3.
104. Fennessy, G.M., Livingston, S.A., Edwards, Kidder and Nafziger "Simulation, Gaming and Conventional Instruction in the Teaching of Ecology." The Journal of Environmental Education, Vol. 5, No. 4, (Summer, 1974), pp. 21-24.
105. Richard, Paul W. "Enrichment in Biology: The American Biology Teacher, Vol. 31, No. 7, (Oct., 1969), pp. 444-47.
106. Ceropsky, Jan. "Instructional Resources for Environmental Education," Trends in Environmental Education (UNESCO: Paris, 1977), p. 73.
107. Hall, Garry L. "The Teaching of Ecology in a Novel and Relevant Wilderness Setting and its Effect on Ecological Thinking, Feeling, and Perceiving of Elementary School Youth." Unpublished Ph.D. Dissertation, University of Montana Dissertation Abstracts International 41, (1980), No. 8:3524-A.

108. Selim, M. Saber. "Environmental Education at the Tertiary Level for Teachers," Trends in Environmental Education, (UNESCO: Paris, 1977), p. 127.
109. European Working Conference on Environmental Conservation Education, Morges, International Union for Conservation of Nature and Natural Resources. (Supplement to the IUCN Bulletin, Vol. 3, No. 3, March, 1972), p. 128.
110. Stapp, William B. "Preservice Teachers Education," in Noel Melnnis and Don Albrecht (eds.), What Makes Education Environmental? Louisville, Ky., Data Courier Inc., and Environmental Educators Inc., 1975, (cited by: Selm, 1977), p. 130.
111. Ibid., p. 130.
112. Rowe, Mary Budd and Hurd, de Hart, "The Use of Inservice Programs to Diagnose Sources of Resistance to Innovation," Journal of Research in Science Teaching, Vol. IV, No. 1, 1966, pp. 3-13.
113. Biological Science Curriculum Study (BSCS) Special Publication No. 7, Life Science in the Middle School, by Clark, George M., (Boulder, Colorado: University of Colorado, 1969), p. 20.
114. Bennett, Dean. "In-service Teacher Education," in Noel Melnnis and Don Albrecht (eds.), What Makes Education Environmental?, Louisville, Ky., Data Courier Inc. and Environmental Educators Inc., 1975.
115. Hungerford, Harold, and Peyton, Robert. Strategies for Developing . . . , Op. Cit., 47-48.
116. UNESCO. "African Regional Workshop in Environmental Education," Connect, Vol. IV, No. 1, (Paris, March, 1979), p. 4.
117. Stapp, William B. and Cox, Dorothy A. Environmental Education Activities Manual, (Farmington Hills, Michigan, 1979), p. 3.
118. Adapted from "The Tbilisi Declaration," Connect, (UNESCO, Paris, Jan., 1978), Vol., III, No. 1, p. 3.

CHAPTER III

PROCEDURE AND METHODOLOGY

This study is an investigation of the current (1982) state of environmental education in the Egyptian secondary schools as compared with an idealized model based on international trends in this field.

The study utilized a survey technique in which both a questionnaire and an interview card were developed as instruments for the collection of data. Presented in this Chapter are: a description of the teachers questionnaire; the interview card used for school principals and Ministry of Education personnel; a description of the research sample; data collection; and the statistical techniques used for data analysis.

Data Collection Instruments

Two survey instruments were developed for the purpose of collecting data required in this study; a teachers' questionnaire and an interview card for principals and Ministry of Education personnel.

Teachers Questionnaire

Purpose of the Questionnaire

The questionnaire was developed to sample the opinions held by science teachers and social science teachers concerning the research

questions and to test the research hypotheses as regards the status of environmental education in secondary schools in Egypt.

Developing the Questionnaire

The researcher tried to phrase the statements of the questionnaire precisely and unequivocally so as to eliminate bias and to enable the respondents to understand every statement clearly. Most items on the questionnaire were multiple choice with five responses per item. However, in order to collect opinions and suggestions not listed in the questionnaire, some items were open-ended. The development of the questionnaire involved several steps. First, a comprehensive review of the literature related to international developments in environmental education was undertaken in order to acquire the sound background required for the construction of a questionnaire that would be relevant to the study. Second, on the basis of the background and knowledge acquired from the literature review, a proposed model of goals and objectives, implementation, content, teaching methods, teacher training, and constraints of environmental education was formulated. This model was used to guide the construction of the questionnaire. Third, the questionnaire was presented for review to the researcher's doctoral committee and to some experts in designing educational measurements (Appendix A). In light of the comments and suggestions of these reviewers the questionnaire was revised several times and improved. Fourth, the approved and revised version of the questionnaire was translated into Arabic by the researcher. The accuracy of the translation was certified by one member of the

researcher's doctoral committee^{*}, and the Islamic Center of Michigan State University (Appendix B). Fifth, the approved English and Arabic versions were typed and the Arabic version made ready for administration to the research sample in Egypt after first testing its validity and reliability (Appendix C).

Final Version of the Questionnaire (Appendix D)

The final version of the questionnaire consists of seven parts and has a total of 86 items or statements divided among seven sections as follows:

I. General Information

The first part of the questionnaire includes seven items dealing with such information as the respondent's name and sex, subject matter, name of school and its location, years of experience in secondary schools, and educational background.

II. Goals and Objectives of Environmental Education

The second part of the questionnaire consists of 42 items (1-42) classified under five categories which deal with the following areas:

- a. Awareness of environmental issues and problems...8 items (1-8)

^{*}Dr. Mohamed Abou-El-Seoud, Professor; Natural Science Department.

- b. Knowledge of environmental issues and problems...10 items
(9-18)
- c. Attitudes towards environmental issues and problems...9 items
(19-27)
- d. Skills of environmental education...9 items (28-36)
- e. Participation in environmental planning and activities...6
items (37-42)

The last item (no. 42) is an open-ended statement included so as to collect goals and objectives not specified in the second part (items 1-41).

III. Incorporation of Environmental Education into School Curricula:

The third part of the questionnaire includes 5 items (43-47) which deal with the ways in which environmental education could be incorporated into the secondary school curricula in Egypt.

IV. Environmental Education Curriculum Content:

The fourth part of the questionnaire consists of 10 items (48-57).

The first nine items deal with the importance of some environmental concepts to environmental education curricula in the Egyptian secondary schools. The tenth item (# 57) is an open-ended statement included so as to obtain other information that was not specified in items 48-56.

V. Teaching Methods of Environmental Education

The fifth part of the questionnaire includes 9 items (58-66) which deal with the frequency of use of different methods of teaching environmental education in the Egyptian secondary schools.

VI. Teacher Training

The sixth part of the questionnaire includes 6 items (67-72) which deal with pre-service and in-service education of teachers in the area of environmental education. The last item (# 72) is an open-ended statement included so as to collect other suggestions not obtained from items 67-71.

VII. Constraints and Suggestions

The seventh part of the questionnaire consists of 14 items (73-86). The first thirteen items (73-85) deal with major constraints that have precluded the implementation of environmental education in the Egyptian secondary school. The last item (# 86) is an open-ended statement included so as to collect teachers' views on constraints or suggestions not specified in the questionnaire.

Validity of the Questionnaire

Since the validity of an instrument refers to its ability to measure what it set out to measure, the researcher used the following procedures to insure validity of the questionnaire. First, before and during the development of the questionnaire, the researcher reviewed current publications that deal with the validity of survey instruments.

Second, members of the researcher's doctoral committee were constantly sought out for advice throughout the process of development of the questionnaire. Third, the revised English version of the questionnaire was submitted to ten English-speaking graduate students at Michigan State University for their comments. It was observed that the respondents experienced no difficulty with the language of the questionnaire or the clarity of individual items. Fourth, the Arabic version of the questionnaire was submitted to ten Egyptian graduate students, in order to get their feedback. They experienced no difficulty with regard to the accuracy of language or the clarity of the items. Fifth, based on comments made by the researcher's doctoral committee and the graduate students to whom the questionnaire was submitted, the researcher revised the questionnaire in order to guarantee both accuracy and clarity. Sixth, after these extensive review procedures, content validity was assumed to exist. In its final Arabic version, the questionnaire was given to ten Egyptian secondary school teachers (six science teachers and four social science teachers) for their critical review. On their approval, the questionnaire was administered to the research sample.

In addition to the review procedure outlined above it is worth mentioning that the content validity of the questionnaire was also based on the comprehensive review of literature regarding international developments in environmental education carried out by the researcher. Based on the knowledge acquired from the literature review, a proposed model of goals and objectives, incorporation, curriculum content, teaching methods, teacher training, and constraints of environmental

education in Egyptian secondary schools was founded. This model was used to guide construction of the questionnaire and contributed to its validity.

Reliability of the Questionnaire

Reliability of any given instrument is defined as its ability to obtain the same result if administered to the same group (sample) on two different occasions. In other words, it is "the degree of consistency between two measures of the same thing."¹

To determine the reliability of the questionnaire, the researcher used a test-retest technique which included the following steps. First, the final version of the questionnaire was administered to a group (sample) of 15 Egyptian secondary school teachers (9 science teachers and 6 social science teachers). Their responses were coded and tabulated. Second, after more than one month of the elapsed time, the researcher repeated the first step using the same group. The scores obtained from the second step were coded and tabulated. Third, in order to determine the reliability of the questionnaire, a correlation coefficient was calculated between the scores obtained from steps one and two using Pearson's product moment correlation coefficient² for each section of the questionnaire (Table 2).

Table 2. Degree of Reliability of Different Parts (categories) of the Questionnaire.

Category	Correlation Coefficient
1. Goals and objectives of E.E.	
a. Awareness.	0.7974 ^{**}
b. Knowledge.	0.9161 ^{**}
c. Attitudes.	0.8743 ^{**}
d. Skills.	0.8452 ^{**}
e. Participation.	0.8124 ^{**}
2. Incorporating E.E.	0.8062 ^{**}
3. E.E. Curriculum Content.	0.9361 ^{**}
4. Teaching methods of E.E.	0.6328 [*]
5. Teacher training.	0.8513 ^{**}
6. Constraints and suggestions.	0.9237 ^{**}

Sample size (n)=15

^{**}Level of significance=0.01

^{*}Level of significance=0.05

Table 2. Indicates that, a high correlation exists among the responses of the sample to the different parts (categories) of the questionnaire. Based on these results, one can conclude that the questionnaire has a sufficient high level of reliability to make it acceptable for the purpose of this study.

A Computational Formula for Correlation Coefficient (r_{xy})

$$r_{xy} = \frac{n\sum x_1 y_1 - (\sum x_1)(\sum y_1)}{\sqrt{[n\sum x_1^2 - (\sum x_1)^2][n\sum y_1^2 - (\sum y_1)^2]}}$$

where:

n = sample size

$\sum x_1$ = sums of scores from the first administration of the questionnaire.

$\sum y_1$ = sums of scores from the second administration of the questionnaire.

Transforming Questionnaire Data

In order to make questionnaire data ready for computer processing the following procedure was used.

1. Check marks on questionnaires were converted to numeric data.

The following scores were given to each response in different parts of the questionnaire.

-Goals and objectives of Environmental Education (Part II)

Completely = 5, Considerably = 4, Moderately = 3,

Very Little = 2, Not at All = 1

-Incorporating Environmental Education into School Curricula

(Part III)

Strongly Agree = 5, Agree = 4, Uncertain = 3, Disagree = 2,

Strongly Disagree = 1

-Environmental Education Curriculum Content (Part IV)

Very Important = 5, Important = 4, Moderate = 3,

Very Little = 2, Not at All = 1

-Teaching Methods of Environmental Education (Part V)

Very Often = 5, Often = 4, Occasionally = 3, Seldom = 2,

Not at All = 1

-Teacher Training (Part VI)

Strongly Agree = 5, Agree = 4, Uncertain = 3, Disagree = 2,

Strongly Disagree = 1

-Constraints and Suggestions (Part VIII)

Strongly Agree = 5, Agree = 4, Uncertain = 3, Disagree = 2,

Strongly Disagree = 1

2. All responses of the research sample to the questionnaire were coded and results keypunched and made ready for computer processing in order to perform the statistical techniques used for data analysis. Two cards were prepared for each respondent.

Processing Data From Open-ended Questions and Interviews:

Narrative data from open-ended items of the teachers' questionnaire and interviews with Ministry of Education personnel and school principals were categorized and presented in Chapter IV.

It is worth mentioning that before coding data from the returned questionnaire, the researcher eliminated the incompleated questionnaires due to the failure of the respondents to provide serious and complete answers to all items of the questionnaire. There were 143 incomplete

(unacceptable) questionnaires.

As a result of many difficulties such as the limited time during the period of collecting data and some uncooperative teachers, the researcher failed to collect 137 questionnaires which had been distributed.

The incomplete and non-returned questionnaire may affect the characteristics of the research sample in one way or another. However, the researcher assumed the 320 teachers of the research sample still represented the teachers' population in the Egyptian secondary schools.

Interview Card

An interview card was developed to collect the opinions of some secondary school principals and Ministry of Education personnel concerning the state of environmental education in the Egyptian secondary schools. This interview card was used by the researcher to record information during a personal interview.

The interview card was developed by the researcher and revised by the members of the research committee. The revised version was then translated into Arabic by the researcher (Appendix E). The accuracy of the translation was certified by the same procedure as was used in development of the teachers' questionnaire.

The final version of the interview card consists of three parts (Appendix F).

A. General Information

The first part of the interview card includes four items dealing

with the name, sex, position, and educational background of the person being interviewed.

B. Suggested Goals of Environmental Education

The second part of the interview card contains five suggested goals for environmental education in Egyptian secondary schools. These goals were presented to the respondents in order to obtain their personal opinions concerning such goals.

C. Discussion

The third part of the interview card consists of five questions which seek the respondents' opinions concerning the extent to which the goals contained in part two (B) are currently being achieved in the Egyptian secondary schools.

Data Collection

The questionnaire was administered to the research sample (which consists of science and social science teachers in the Egyptian secondary schools) during March and April of 1982. Six hundred questionnaires were distributed, (to 330 science teachers and 270 social science teachers) during the period of data collection. Four hundred and sixty-three questionnaires were collected (265 science teachers and 198 social science teachers). One hundred and forty-three questionnaires were voided because they were incomplete due to the failure of the respondents to answer these questionnaires

seriously. Only three hundred-twenty questionnaires (53.3%) were returned completely answered and these comprised the research sample (Table 3).

The researcher experienced many difficulties during the period of collecting the questionnaires such as visiting the schools more than three times, and sometimes more than five times, to get some questionnaires back. As a result of such difficulties one hundred and thirty-seven questionnaires were not returned, among these were 40 questionnaires in Alexandria, Egypt.

During the period of data collection, the researcher succeeded in interviewing only 5 Ministry of Education personnel and 10 school principals (Table 4). Although the researcher attempted to interview more than that number, he failed to do so because of the busy schedules of these officials. The purpose of the interview was to collect the opinions of Ministry of Education personnel and school principals concerning environmental education in the Egyptian secondary schools.

Geographical Location

The questionnaire was distributed by the researcher to science and social science teachers in 50 secondary schools in 12 governorates throughout Egypt. The governorates included the Nile Valley and the

Table 3. Numbers of Questionnaires Distributed, Returned, Incomplete, and Completed.

Group	No. of Questionnaires Distributed		Returned		Incomplete		Complete	
	No.	Percent of group	No.	Percent of group	No.	Percent of group	No.	Percent of group
Science Teachers (S.T.)	330	80.3	265	80.3	65	19.7	200	60.6
Social Science Teachers (S.S.T)	270	73.3	198	73.3	78	28.8	120	44.4
Total	600	77.1	463	77.1	143	23.8	320	53.3

Table 3 shows that the proportion of completed questionnaires among the science teacher group (60.6%) was higher than it was among social science teacher group (44.4%). The total proportion of completed to distributed questionnaires was 53.3%.

Table 4. Distribution of the Interviewed Ministry of Education Personnel and School Principals by Educational Backgrounds, Years of Experience, and Governorators.

Position	No.	Educational Background			Years of Experience	Governorators			
		BS.+Ed.	BA.Ed.	MS		CA. GZ.	SO.	SH.	MT. SY.
M.E.P.	5	3	2	--	30-37	5	--	--	--
S.P.	10	6	4	1	28-34	3	1	2	1
Total	15	9	6	1		8	1	2	1

M.E.P. = Ministry of Education Personnel

S.P. = School Principals

BS + ED = Bachelor in Science Education

BA + ED = Bachelor in Art and Education

MS = Master in Science

CA = Cairo, GZ = Gizza, SO = Souhag, SH = Sharkia,

MT = Matruh, SY = Synai

Delta, the West desert, the Northern coast, and Synai. The geographical area of the study included rural, urban, desert, and coastal Egyptian environments (Table 5).

Table 5. Distribution of the Research Sample According to Governorators and Schools.

No.	Governorator	No. of schools	No. of teachers
1.	Cairo	12	81
2.	Giza	08	41
3.	Fayyum	02	14
4.	Asyut	02	12
5.	Sohag	04	32
6.	Oasis	02	08
7.	Kalubia	04	19
8.	Sarkia	06	43
9.	Alexandria	01	03
10.	Gharbia	04	26
11.	Matruh	02	14
12.	Synai	03	27
	Total	50	320

Table 5. Indicates that the research sample was distributed among 50 schools located in 12 governorators throughout Egypt.

Description of the Research Sample

The subjects involved in this study were two groups of secondary school teachers in Egypt. The first group consisted of two hundred science teachers. The second group consisted of one hundred twenty social science teachers. The total number of the research sample was three hundred twenty. Among the research sample there were two hundred fifty-one male and sixty-nine female respondents (Table 6). The research sample was chosen by a stratified sampling technique which insured representation of the different types of schools present in Egypt based on size, geographical location, and socio-cultural environment.

Selection of Research Sample

The procedure by which the stratified sample used in the present study was chosen involved several steps. First, different strata (parts) of the teacher population were determined. These strata represent major Egyptian environments (urban, rural, and desert areas).

Second, the size of the sample to be taken from each stratum (area) was specified on the basis of the proportion of each sub-population (area) to the total population of Egypt (i.e. rural areas represent 37% - 39% of the 44,000,000 population of Egypt during the period of data collection). Third, within each area, a number of governorators* were randomly selected. Fourth, in each governorator, a number of male and

*Governmental units which are larger than counties and smaller than states in the United States. There are 26 governorators in Egypt.

female secondary schools were randomly selected. Fifth, a number of large and small schools were selected. Sixth, in each school, the questionnaire was randomly distributed to science and social science teachers. Tables 6, 7 and 8 indicate proportion of teachers in the research sample according to sex and subject matters. Table 9 indicates the distribution of teachers in different strata (areas) according to subject matter.

Table 6. Proportion of Males and Females in the Two Groups of the Research Sample.

Group	Number	%	Male		Female	
			Number	%	Number	%
Science Teachers (S.T.)	200	62.5	166	83.0	34	17.0
Social Science Teachers (S.S.T.)	120	37.5	85	70.8	35	29.2
Total	320	100.0	251	78.4	69	21.6

Table 6. Shows that the majority of respondents in both groups of the research sample were male teachers. Also, it is noticeable that the proportion of female teachers in the social science group is higher than it was in the science teachers group.

Table 7. Proportion of Males and Females in the Research Sample According to Subject Matter.

Subject Matter	Male		Female		Total
	No.	%	No.	%	
Biology	60	74	21	26	81
Chemistry	57	86	09	14	66
Physics	49	92	04	08	53
History	42	70	18	30	60
Geography	43	72	17	28	60
Total	251	78	69	22	320

Table 7. indicates that the highest proportion of male teachers are physics teachers (92%) and the lowest proportion are of history teachers (70%).

Table 8. Numbers and Proportions of Teachers in the Research Sample According to the Subject Matters.

Group	Subject Matter	Number	Percent of total sample
Group #1 Science Teachers (S.T.)	Biology	81	25.3
	Chemistry	66	20.6
	Physics	53	16.5
Group #2 Social Science Teachers (S.S.T)	History	60	18.8
	Geography	60	18.8
Total		320	100.0

Table 8. shows that biology teachers represent the highest proportion of respondents (25.3%) and physics teachers represent the lowest proportion (16.5%) in relation to the total research sample.

Table 9. Distribution of the Research Sample in Different Governorators According to Subject Matter.

Area	Governorator	Science Teachers			Social science Teachers		Total Number	Percent of total sample
		Biology	Chemistry	Physics	History	Geography		
U								
R	A Cairo	12	23	16	16	14	81	25.3
B	R Gizza	13	10	07	06	05	41	12.8
A	E Alexandria	03	--	--	--	--	03	0.9
N	A							
R								
U	A Asyut	02	03	03	03	01	12	03.8
R	A Souhag	05	08	03	08	08	32	10.0
R	R Faium	07	01	04	--	02	14	04.4
A	E Kalubia	07	04	01	05	02	19	05.9
L	A Sharkia	10	10	10	03	10	43	13.5
	Gharbia	11	02	02	05	06	26	8.1
D								
E	Oasis	03	01	--	02	02	08	2.5
S	Matruh	03	02	03	04	02	14	4.4
E	Synai	05	02	04	08	08	27	8.4
R								
T								
	Total	81	66	53	60	60	320	100.0

Table 9 indicates that urban area teachers represent 39% (Cairo, Gizza, and Alexandria) of the total sample. The rural area teachers represent 45.7% (Asyut, Sahag, Faium, Kalubia, Sharkia, and Gharbia). The desert area teachers represent 15.3% (Oasis, Matruh, and Synai).

Table 10. Distribution of the Research Sample
According to Educational Background.

Degree	Number	Percent of total sample
BS.+Ed.	90	28.1
BA.+Ed.	18	5.6
BS.	91	28.4
BS.Ag.	19	5.9
BA.	102	32.0
Total	320	100.0

Teachers also holding advanced post-bachelors degree.

Spe. diploma Ed.	47	14.7
Gen. diploma Ed.	23	7.1
African stud. diploma	5	1.5
MA. Ed.	1	.3
MS.	1	.3
MA.	3	.9
Others	8	2.5

Table 10. Indicates that among the research sample of 320 teachers, only 33.8% have their bachelors degree and the education diploma (BS+ED., BA+ED.). The rest (66.2%) have their bachelors degree in science or art without educational background. Also 21.8% of the teachers have an educational background beyond their bachelors degree

(special or general diploma in education) and 1.5% of the teachers have diplomas in African study. Only 1.5% of the total sample have their master's degree in education, in science or in art (MA, ED, MS, MA). Finally 2.5% of the research sample have studies in other areas, such as instructional media and in-service training.

Data on years of experience of the samples are shown in Table 11. These data show that 65.6% of the teachers have spent 10 years or less teaching in secondary schools. 21.1% have spend 11 to 20 years, 12.4% have spent 21 to 30 years and 0.9% have spent 31 to 33 years of experience in the secondary level.

The Statistical Techniques Used for Data Analysis

The responses of the research sample to the questionnaire were coded and the results keypunched for computer processing. Prior to the process of analyzing the data, the research consultants of the Office of Research and Consultation at M.S.U.'s College of Education were contacted in order to determine which statistical procedures and techniques would be suitable for handling the data collected from this study. The punched cards were sent to M.S.U.'s Computer Center for analysis, using the statistical package for Social Science (SPSS)³.

The statistical techniques used for data analysis utilized multivariate analysis of variance (MANOVA); univariate F-tests; descriptive statistics (mean and standard deviation); frequencies, and Chi-square.

Table 11. Years of Experience of the Research Sample.

Years of experience in secondary level	Science Teachers			Social Science Teachers		Total	Percent of total sample
	Biology	Chemistry	Physics	History	Geography		
1-05	30	23	20	31	30	134	41.9
6-10	24	20	10	10	12	076	23.7
11-15	10	07	06	05	09	037	11.7
16-20	05	08	08	04	05	030	9.4
21-25	09	04	06	05	03	027	8.4
26-30	03	03	03	03	01	013	4.0
31-33	--	01	--	02	--	003	0.9
Total	81	66	53	60	60	320	100.0

Table 11 indicates that the highest proportion of the research sample (41.9%) have spent 5 years or less teaching in secondary schools. 23.7% have spent 6 to 10 years, 11.7% have spent 11-15 years, 9.4% have spent 16 to 20 years, 8.4% have spent 21 to 25 years, 4.0% have spent 26 to 30 years and 0.9% have spent 31 to 33 years of experience in the secondary level.

The multivariate analysis of variance (MANOVA) was used to determine significant differences among the two groups of the research sample for all ten clusters (categories) of the questionnaire. The MANOVA has been chosen for the following reasons:

1. The study has more than one dependent variable.
2. These variables are correlated as shown in Table 12.
correlations range from 0.0 to 0.72.
3. To control over type 1 error of false rejection of a true null hypothesis.

The Univariate F-tests were utilized to determine in which cluster(s) significant differences occurred.

Mean and standard deviation ratings were employed to analyze the overall perceptions of respondents on each cluster or category of the questionnaire to check whether or not the difference between the opinions of the two groups is significant or to test the independence between the two groups.

Frequency tables were utilized to indicate the response to each item of the 86-items included in the questionnaire except for the open-ended items. Chi-square was also used to check significance of differences of the responses of science and social studies teachers on individual items.

The results of these analysis will be presented in Chapter IV.

Summary

In this Chapter, the researcher dealt with the procedure and methodology used to investigate the current status of environmental

education in the Egyptian secondary schools. Seven research questions were identified to be answered, and ten research hypothesis were stated to be tested by this study. The data collection instruments (the teachers questionnaire and interview card used for school principals and Ministry of Education personnel), the research sample who responded to the questionnaire, the data collection process, and the statistical techniques used for data analysis were described.

CHAPTER III NOTES

1. Mehrens, William A. Measurement and Evaluation in Education and Psychology. (New York: Holt, Rinehart and Winston, Inc., 2nd. ed., 1978), pp. 88-95.
2. Glass, Gene V. and Stanley, Jullian C. Statistical Methods in Education and Psychology. (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1970), pp. 113-114.
3. Nie, Norman; Hull, H.; et al. Statistical Package for the Social Sciences. (New York: McGraw-Hill Book Co., 1975).

CHAPTER IV

RESULTS

The purpose of this Chapter is to present and analyze data derived from the responses of the research sample to a questionnaire that dealt with perceptions of the current state of environmental education in the Egyptian secondary schools. The research sample responding to the questionnaire was comprised of two groups, science teachers and social science teachers in the Egyptian secondary schools. In addition, personal interviews were conducted with Ministry of Education personnel and secondary school principals in order to obtain their opinions concerning the status of environmental education in the Egyptian secondary schools. All data and analyses, in this Chapter apply only to the secondary school level in Egypt.

Data and analyses of the results of the questionnaire are reported in six sections which correspond with the first six research questions stated in Chapter I. These six sections are listed below along with letter codes that will be used in several tables:

1. Goals and objectives of environmental education.
 - 1.a. Awareness of environmental issues and problems (AW).
 - 1.b. Knowledge of environmental issues and problems (KN).
 - 1.c. Attitudes towards environmental issues and problems (AT).
 - 1.d. Skills of environmental education (SK).

- 1.e. Participation in environmental planning and activities (PA).
2. Incorporating environmental education in school curricula (IN).
3. Environmental education curriculum content (EECC).
4. Teaching methods of environmental education (TM).
5. Teacher training of environmental education (TT).
6. Constraints and suggestions (CS).

Data from personal interviews with Ministry of Education personnel and secondary school principals are also reported near the end of this Chapter. These data correspond with the seventh research question stated in Chapter I.

The researcher used one or more techniques to answer the research questions or to test the research hypothesis. These techniques are:

1. The multivariate analysis of variance (ANOVA).
2. The univariate F-tests.
3. Mean and standard deviation.
4. Frequency tables and Chi-square.
5. Personal interviews with Ministry of Education personnel and secondary school principals.
6. The researcher's observations during the field study in Egypt.

Format of the Data Presentation

In order to make the argument easier for readers to comprehend the analysis of the questionnaire, the researcher used the following format

to present the results of the teachers' questionnaire. This format was also used to interpret and discuss the data of the teachers' questionnaire in Chapter V. The format of data presentation involved the following steps in each category:

1. Presentation of F-test results. This step involves the results of testing the ten null hypotheses.
2. Presentation of frequency tables. This includes the responses of the research sample to each item of the teachers' questionnaire.
3. Presentation of the open-ended items in their suitable places in each part of the questionnaire.

Prior to the beginning of the data presentation, it is important to note that although the return rate of the teachers' questionnaire of the research sample was high (77.1%) the number of usable (complete) questionnaires was 53.3% of the distributed questionnaires. The total proportion of useable (complete) questionnaires was (69%) of the returned rate. The non useable (incomplete) questionnaires may have influenced the character of the research sample in one way or another. That is, data contained in the non-useable questionnaires might have contained opinions that could have shed more light on the current status of environmental education in Egypt.

Of 600 questionnaires distributed, 320 served as the data base for subsequent analysis. One can only speculate on the opinions and perceptions of these individuals who did not return the questionnaires or returned unuseable ones. However, the researcher made the assumption that the 320 teachers who did respond fully provided an

adequate representation of the perceptions of Egyptian science teachers and social science teachers on these important matters.

Concerning interviews with Ministry of Education personnel and school principals, the researcher believes that one cannot draw firm conclusions based on that small sample (5 Ministry of Education personnel and 10 school principals). However, the results of interviews with those administrators provides some information regarding the attitudes of administrative personnel concerning the present status of environmental education at the secondary school level in Egypt.

Correlation coefficients among the ten categories of the questionnaire were calculated to determine whether a correlation among these categories exists and how they are correlated.

Table 12 contains the correlation coefficients which range from 0.0 to 0.72. The correlations were among the five categories of goals and objectives of environmental education (AW, KN, AT, SK, PA). The lowest correlations were among incorporation (IN) and environmental education curriculum content (EECC) on one hand and the first eight categories (AW, KN, AT, SK, PA, IN, EECC) on the other hand. Correlations among the last three categories (TM, TT, CS) and the ten categories were also low.

None of the negative correlations were statistically significant at the 5% level. The only correlations which account for more than 25% of the variance (e.g. $r .5$) are the correlations of awareness with knowledge and attitudes; knowledge with attitudes, skills, and participation; attitudes with skills and participation; and skills with participation.

Table 12. Correlation Matrix Between the Different Scales of the Questionnaire.

Scales*	AW	KN	AT	SK	PA	IN	EECC	TM	TT	CS
AW	1.00									
KN	.53	1.00								
AT	.57	.69	1.00							
SK	.47	.67	.72	1.00						
PA	.36	.52	.53	.62	1.00					
IN	.10	-.04	.00	.00	-.08	1.00				
EECC	.06	.01	.00	.00	-.06	.28	1.00			
TM	.27	.40	.37	.37	.36	-.01	-.10	1.00		
TT	.19	.28	.31	.28	.25	.22	.11	.25	1.00	
CS	.08	-.03	.02	.04	-.09	.09	.32	-.03	.02	1.00

*Abbreviations used in this table will be used in the present study to represent teachers' perception of environmental education in the Egyptian secondary schools. These abbreviations are:

AW = Awareness of environmental issues and problems.

KN = Knowledge of environmental issues and problems.

AT = Attitudes towards environmental issues and problems.

SK = Skills of environmental education.

PA = Participation in environmental planning and activities.

IN = Incorporating environmental education into school curricula.

EECC = Environmental education curriculum content.

TM = Teaching methods of environmental education.

TT = Teacher training of environmental education.

CS = Constraints and suggestions.

Results of the Teachers' Questionnaire

Results of Multivariate Analysis of Variance (MANOVA)

Multivariate analysis of variance (MANOVA) was used to determine whether significant differences occurred between the two groups that comprised the research sample for all ten categories, or clusters, of the questionnaire (as shown in Table 13). The alpha level of significance was set at .05 percent.

Table 13. Multivariate Test of Significance for the Two Groups of the Research Sample.

Test Name	Group	No.	F.	P.
Wilks Test	S.T.	200	3.63 [#]	.00014
	S.S.T.	120		

S.T.=Science Teachers

S.S.T.=Social Science Teachers

STD. DEV.=Standard Deviation

Table 13 indicates that there was a significant difference between the two groups of teachers based on the multivariate WILKS test. Therefore, the Univariate F-tests were employed to find out in which category(s) the difference occurred.

Results of the Univariate F-test

Univariate F-tests were employed to determine the category or categories in which significant differences of perceptions concerning environmental issues occurred between the two groups that comprised the

research sample.

The results of the second part of the questionnaire (goals and objectives of environmental education) are based on items 1-42 of the questionnaire and are classified into five categories, or clusters: awareness; knowledge; attitudes; skills; and participation. These categories correspond with the first five research hypotheses.

1. Goals and Objectives of Environmental Education

(First Research Question)

The research question addressed in this section of the questionnaire was:

"To what extent do teachers perceive that science and social science curricula in the Egyptian secondary schools achieve the environmental education goals and objectives outlined in the proposed model (Chapter II)?"

There were five categories within this section.

In order to answer the above question, the first five null hypothesis, concerning the five categories of goals and objectives of environmental education were tested. Frequency tables and Chi-square tests were employed. These are presented in Appendices G and H respectively.

1.a Awareness of Environmental Issues and Problems (AW).

Hypothesis #1.

H_0 : "There is no significant difference between the opinions held by science teachers and by social science teachers concerning the effectiveness of the subject-matters they teach in the development of students' awareness of environmental issues and problems."

The awareness category consists of 8 items (1-8). Table 14 is

based on the results of item 1-7. The results of item 8 is presented in Table 24 in Appendix G.

Table 14 indicates that there was a significant difference between the opinions held by the two groups of the research sample concerning the effectiveness of science and social science curricula in the development of students' awareness of environmental issues and problems. Consequently, null hypothesis #1 cannot be accepted. This table shows that current curricula are perceived as being more positive by social science teachers than science teachers regarding their effectiveness in the development of students' awareness of environmental issues and problems.

Table 14. Means, Standard Deviations, F-test of the Research Sample On "Awareness" Category.

Group	No.	Mean	Std.Dev	F.	P.
S.T.	200	3.59	.759		
S.S.T.	120	3.78	.684	5.19*	.02335
E.S.	320	3.66	.736		

S.T.= Science Teachers, S.S.T.= Social Science Teachers,
E.S.= Entire Sample.

STD.DEV.= Standard Deviation, Degree of Freedom = 1,318

*Significant at level .02

Figure 1 and Table 24 in Appendix G show that there was an agreement among the entire sample regarding the effectiveness of science and social science courses in developing students' awareness of environmental issues and problems. However, the Chi-square test in

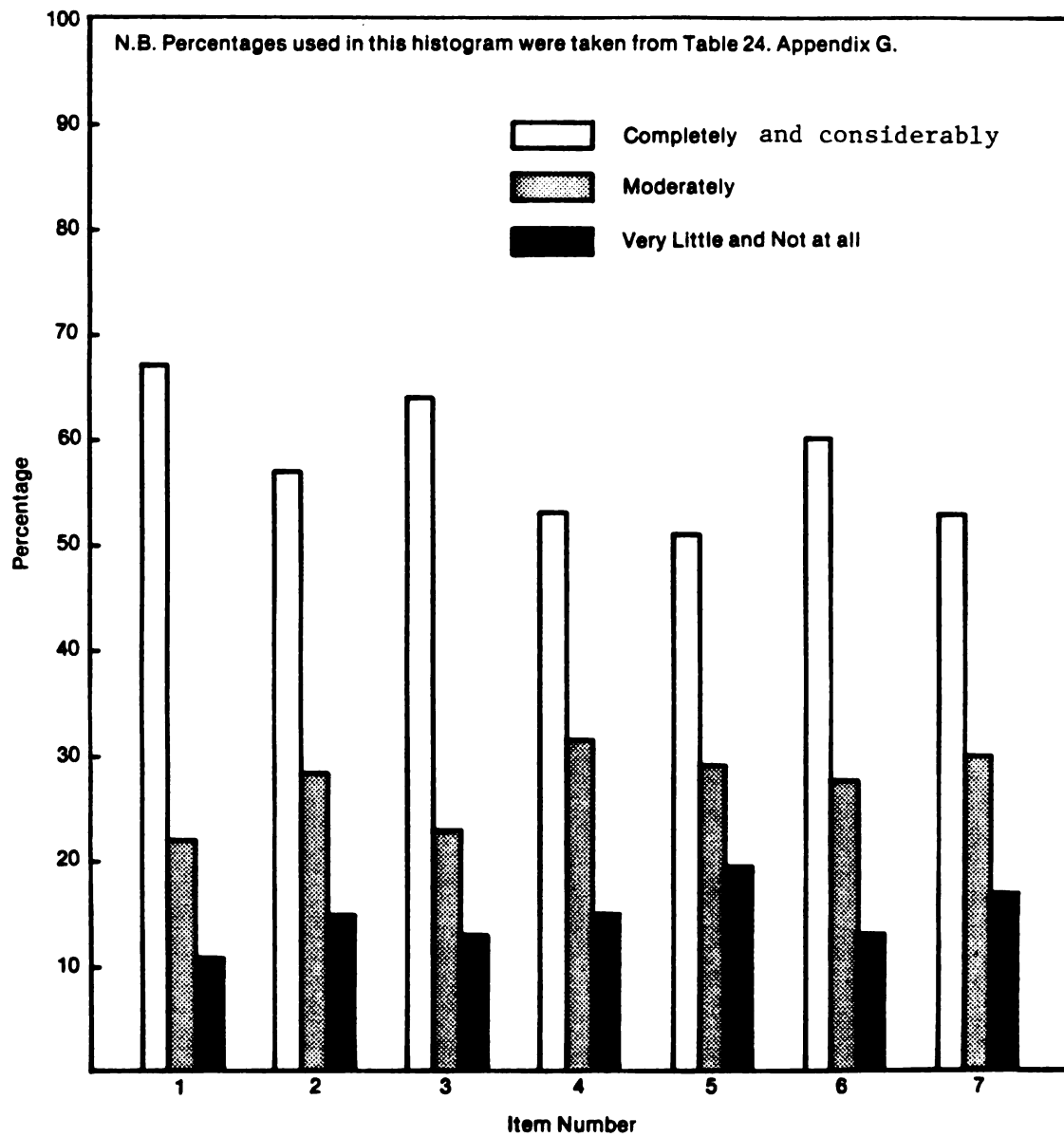


Fig. (1) Perceived effectiveness of science and social science curricula in increasing students' awareness of environmental issues.

Table 34 (Appendix H) indicates that a significant difference exists between science teachers and social science regarding items 5 and 7 of the questionnaire. This means that the two groups hold different opinions concerning "the significance of differing human values as an integral part of environmental decision-making" (item 5). "Likewise, each group perceives different affects on the interdependence of local and worldwide environmental problems and the need for cooperation among nations to seek solutions to these problems" (item 7).

Table 24 in Appendix G indicates that there was a high agreement among the entire research sample (90.6%) that "in future, the emphasis placed on the development of students' awareness of environmental issues and problems should increase substantially (item 8). This response by the entire research sample to item 8 suggests that existing science and social science courses should be altered to provide greater opportunities for students to develop awareness of environmental issues.

These findings indicate that the present science and social science curricula in the Egyptian secondary schools are perceived by teachers as being effective in the development of students' awareness towards environmental issues and problems. But teachers also see the need for more effort. These perceptions in turn reflect the extent to which the curriculum designers are concerned about developing students' awareness of environmental issues. It is true that the present science and social science curricula in the Egyptian secondary schools have responded to public concern about environmental problems. (More explanation will be given in Chapter V).

1.b. Knowledge of Environmental Issues and Problems: (KN)

Hypothesis #2

H_0 : "There is no significant difference between the opinions held by science teachers and by social science teachers concerning the effectiveness of the subject-matters they teach in developing students' knowledge of environmental issues and problems."

The knowledge category consists of 10 items (9-18). Table 15 is based on items 9-17. The results of item 18 are presented in Table 25 (Appendix G).

Table 15 indicates that there was no significant difference between the opinions held by the two groups of the research sample concerning the effectiveness of science and social science curricula in developing students' knowledge of environmental issues and problems. Consequently, Hypothesis #2 can not be rejected.

Table 15. Means, Standard Deviations, F-tests of the Research Sample on "Knowledge" Category.

Group	No.	Mean	Std.Dev.	F.	P.
S.T.	200	3.43	.657		
S.S.T.	120	3.43	.677	.00	.98078
E.S.	320	3.43	.664		

S.T.=Science Teachers, S.S.T.=Social Science Teachers,
E.S.=Entire Sample, Std.Dev.=Standard Deviation.
Degree of Freedom 1,318

Figure 2 and Table 25 indicate that more than 55% of the research sample agreed that the present science and social science curricula in the Egyptian secondary schools are perceived as being considerably or

completely effective in:

..."Developing students' knowledge to understand and identify environmental issues and problems around them" (item 9, 10).

..."Developing students' knowledge to relate data from other disciplines to the subject area in which environmental problems are studied" (item 11).

..."Developing students' knowledge to acquire some major environmental concepts such as interdependence of all living things in an ecosystem" (item 12). However, this item was perceived differently by the two groups, with science teachers reporting more emphasis on the achievement of environmental concepts than was the case for social science teachers Table 34 (Appendix H).

..."Providing students' with knowledge to recognize the limits of The Earth's energy resources and the effects of urbanization on their environment" (item 13, 14). Table 34 (Appendix H) shows that the value of Chi-square test was significant regarding item 14 which means that the two groups perceived this item differently in favor of social science teachers. This difference might be related to the fact that social science curricula offer some information about the effects of urbanization on social aspects of population whereas science curricula do not offer such information.

Figure 2 and Table 25 (Appendix G) also indicates that more than 75% of the entire sample perceived that the current curricula are

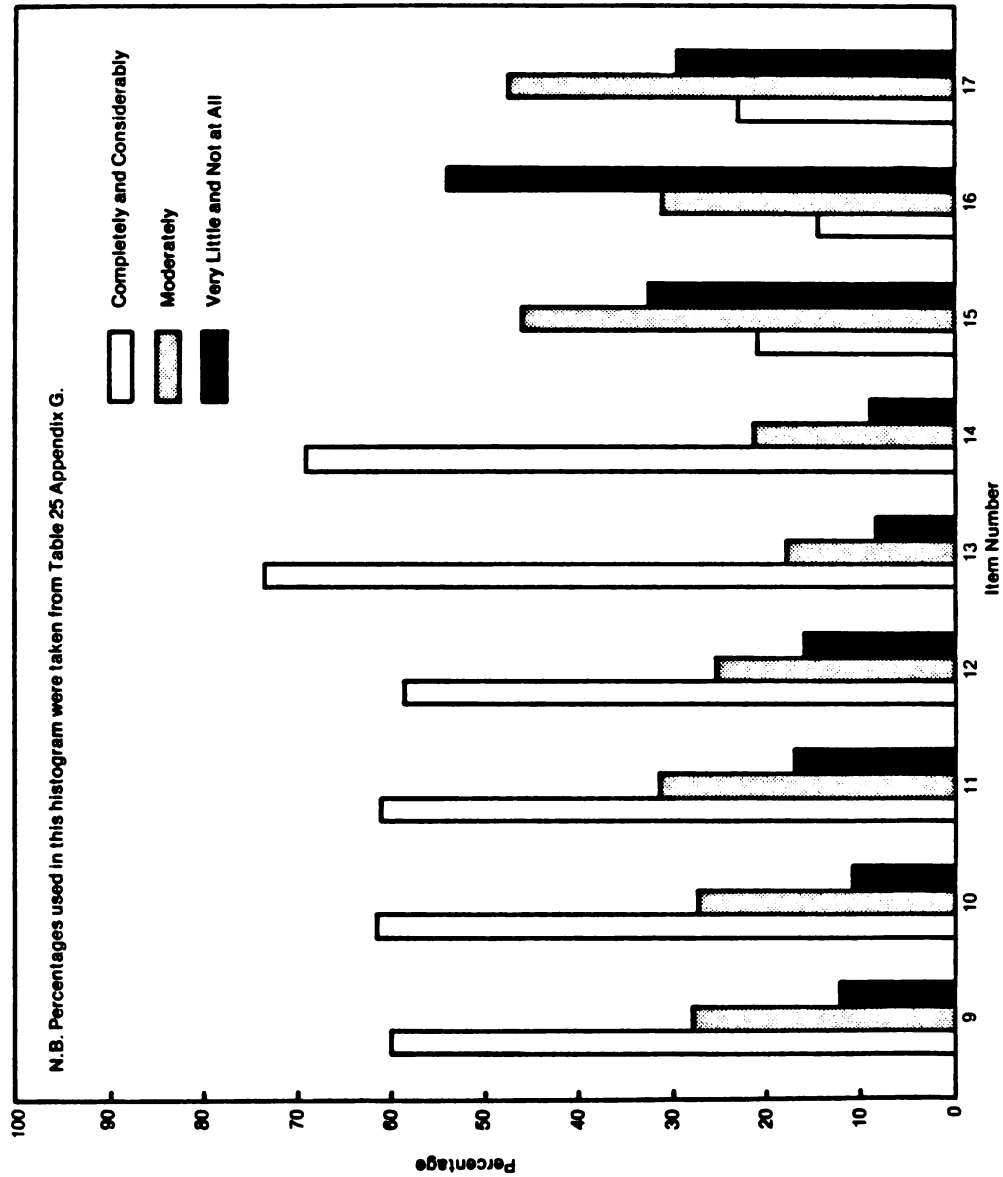


Fig. (2) Perceived effectiveness of science and social science curricula in increasing students' knowledge of environmental issues.

only of moderate or little effectiveness in developing students' ability to recognize the historical background of current environmental problems; how different cultures influence the quality of the environment; and local, national, and international efforts to protect the environment" (items 15, 16, 17). However, there was a significant difference between the two groups in Chi-square test (Table 34, Appendix H) with science teachers reporting less emphasis on historical and societal issues in their curricula than was the case for social science teachers.

Table 25 in Appendix G indicates that there was a large agreement among the entire research sample (85.3%) that "in the future, the emphasis placed on developing students' knowledge of environmental issues and problems should increase substantially" (item 18). This response shows that the research sample feels that the level of knowledge included in science and social science curricula in the Egyptian secondary schools should be increased.

1.c. Attitudes towards environmental issues and problems(AT)

Hypothesis #3

H_0 : "There is no significant difference between the opinions held by science teachers and by social science teachers concerning the effectiveness of the subject matters they teach in developing students' attitudes towards environmental issues and problems."

The attitude category consists of 9 items (19-27). Table 16 is based on items 19-26. The result of item 27 is presented in Table 26 (Appendix G).

Table 16. Means, Standard Deviations, F-tests of the Research Sample on "Attitudes" Category.

Group	No.	Mean	Std.Dev.	F.	P.
S.T.	200	3.45	.873		
S.S.T.	120	3.50	.823	.26	.60572
E.S.	320	3.47	.854		

S.T.=Science Teachers, S.S.T.=Social Science Teachers, E.S.=Entire Sample, Std.Dev.=Standard Deviation. Degree of Freedom 1,318

Table 16 indicates that there was no significant difference between the opinions held by the two groups of the research sample concerning the effectiveness of science and social science curricula in the development of students' attitudes towards environmental issues and problems. Consequently, hypothesis #3 can not be rejected.

Figure 3 and Table 26 in Appendix G indicate that:

About 54% of the research sample agreed that current science and social science curricula are "completely or considerably" effective in providing students with opportunities to "develop attitudinal changes toward environmental problems" (item 19) and to "develop much more interest in the protection and improvement of the environment" (item 20).

Less than 44% of the research sample agreed that current science and social science curricula are "completely or considerably" effective in providing students with opportunities to develop "the spirit of team work in solving environmental problems" (item 21) and to "develop the

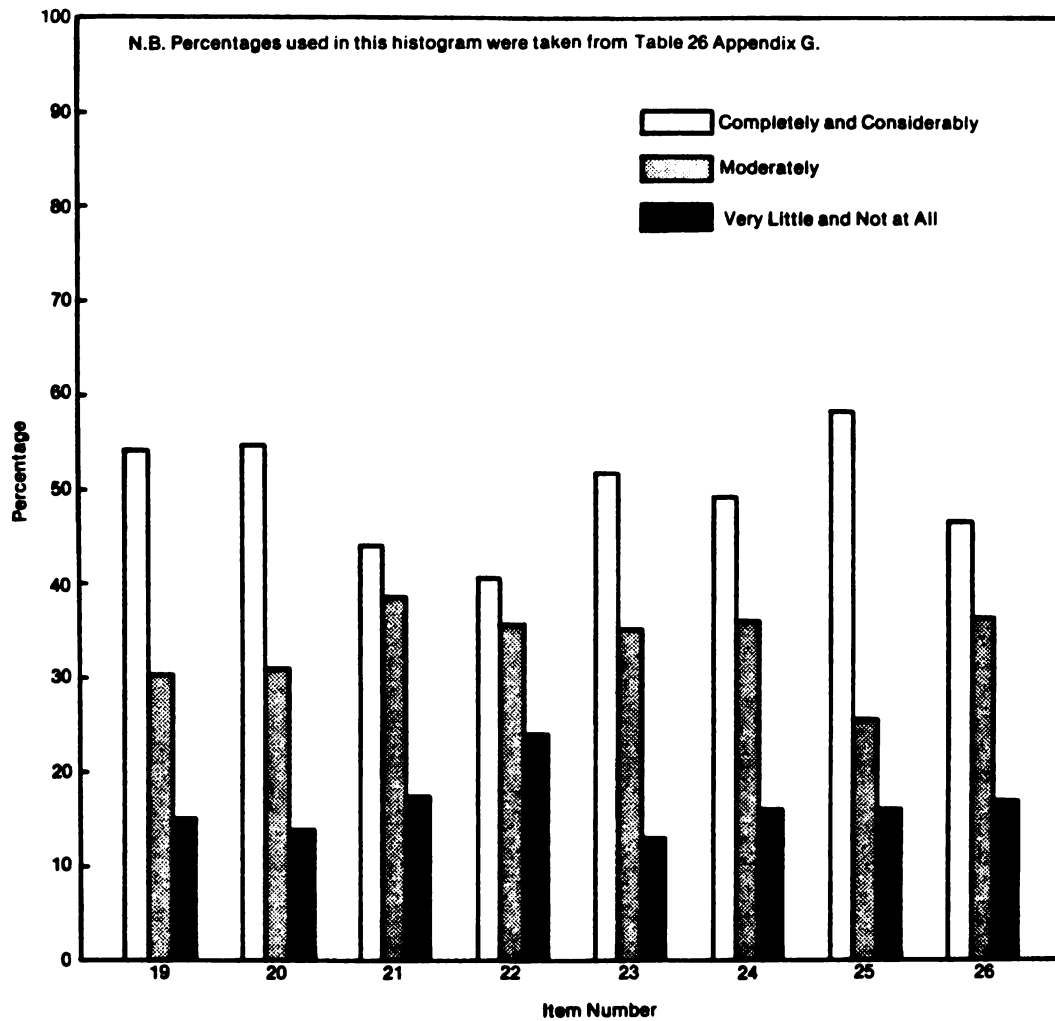


Fig. (3) Perceived effectiveness of science and social science curricula in developing students Attitudes towards environmental issues.

attitude of sharing environmental information with schoolmates, parents, and community" (item 22) while nearly 25% of the respondents believe that the curricula contributed little in this regard.

About 52% of the research sample agreed that current science and social science curricula are "completely or considerably" effective in providing students with opportunities to "develop positive attitudes towards environmental conservation" (item 23).

Less than 50% of the research sample agreed that current science and social science curricula are completely or considerably effective in providing students with opportunities to "develop moral and aesthetic values concerning the maintenance of a balance between the quality of human life and the quality of the environment" (item 24).

The majority of the research sample (57.5%) agreed that current science and social science curricula are "completely or considerably" effective in providing students with opportunities to "realize that science and technology without moral values are not enough to solve environmental problems" (item 25%).

Less than 45% of the research sample agreed that current science and social science curricula are "completely or considerably" effective in providing students with opportunities to "develop individual and collective responsibility for environmental protection and improvement" (item 26) while 37% felt that the curricula are moderately effective in this area.

Table 26 (Appendix G) also indicates that there was a high agreement among the entire sample (84.7%) that "in future, the emphasis placed on developing students' attitudes towards environmental issues

and problems should increase substantially.

1.d Skills of Environmental Education(SK)

Hypothesis #4

H_0 : "There is no significant difference between the opinions held by science teachers and by social science teachers concerning the effectiveness of the subject matters they teach in developing students' skills of environmental education."

The skills category is addressed by 9 items (28-36). Table 17 is based on items (28-35). The results of item 36 are presented in Table 27 in Appendix G.

Table 17. Means, Standard Deviations, F-test of the Research Sample on "Skills" Category.

Group	N	Mean	Std. Dev.	F	P
S.T.	200	3.13	.801		
S.S.T.	120	3.26	.869	1.85	.17388
E.S.	320	3.18	.828		

S.T. = Science Teachers, S.S.T. = Social Science Teachers,
E.S. = Entire Sample.

STD. DEV. = Standard Deviation. Degree of Freedom 1,318

Table 17 indicates that there was no significant difference between the opinions held by the two groups of the research sample concerning the effectiveness of science and social science curricula in the development of students' skills of environmental education. Consequently hypothesis #4 can not be rejected.

Figure 4 and Table 27 in Appendix G indicate that the majority of

the research sample perceive the present science and social science curricula in the Egyptian secondary schools as being only moderately effective or ineffective in:

Developing students' ability "to record, document, and report observations of environmental problems" (item 28).

Developing students ability "to investigate environmental issues and problems" (item 29).

Developing students' ability "to analyze values involved in environmental problems" (item 30). However, there was a significant difference between the two groups in Chi-square value (Table 34 in Appendix H, with social science teachers reporting more emphasis in analyzing values involved in environmental problems than was the case for science teachers. This difference may result from the nature of social science curricula.

The responses to items # 31, 32, 33, 34 and 35 indicate that secondary school students have a real need to develop their ability to synthesize, identify, evaluate, re-evaluate and clarify their own value positions regarding a discrete environmental issue based on the available information.

Table 27 in Appendix G indicates that there was a high agreement among the entire sample (84.4%) that "in the future, the emphasis placed on developing students' skills to solve environmental problems should increase substantially" (item 36).

These findings make it clear that current science and social science curricula in the Egyptian secondary schools are perceived as

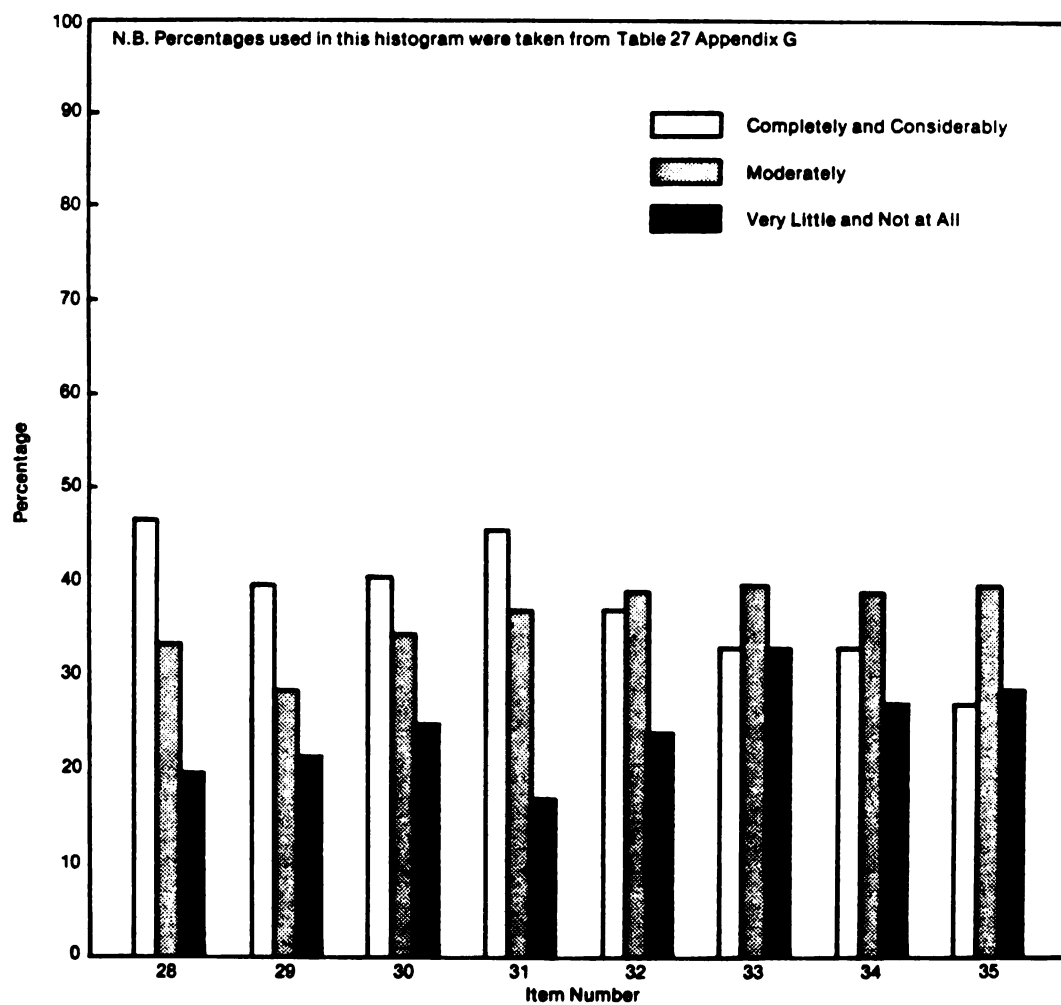


Fig. (4) Perceived effectiveness of science and social science curricula in developing students' skills of environmental education.

being ineffective in the development of students' skills in the solution of environmental problems.

1.e Participation in environmental planning and activities (PA)

Hypothesis #5

H_0 : "There is no significant difference between the opinions held by science teachers and by social science teachers concerning the effectiveness of the subject matter they teach in developing students' participation in environmental planning and activities."

The participation category consists of 6 items (37-42). Table 18 is based on items 37-41. Item 42 is an open-ended statement and its results will be presented and discussed later on in this Chapter.

Table 18 indicates that there was no significant difference between the opinions held by the two groups of the research sample concerning the effectiveness of science and social science curricula in developing students' participation in environmental planning and activities. Consequently, hypothesis #5 can not be rejected.

Table 18. Means, Standard Deviation, F-test of the Research Sample on "Participation" Category.

Group	N	Mean	Std. Dev.	F	P
S.T.	200	2.73	.987		
S.S.T.	120	2.76	1.068	.10	.75009
E.S.	320	2.74	1.017		

S.T. = Science Teachers, S.S.T. = Social Science Teachers,
 E.S. = Entire Sample.
 STD. DEV. = Standard Deviation. Degree of Freedom 1,318

Figure 5 and Table 28 in Appendix G indicate that the majority of the research sample agreed that the present science and social science curricula are perceived as being:

Of moderate, very little or no effectiveness in "developing students' participation in environmental investigation. . ." (item 37).

Of very little or no effectiveness in providing students with opportunities to "examine critically the ecological implications of technological advances before endorsing them" (item 38). Table 34 in Appendix H indicates that there was a significant difference between the two groups concerning item 38, with social science teachers showing stronger perceptions of ineffectiveness of current curricula.

Of very little or no effectiveness in providing students with opportunities to "participate effectively in an individual or group action to protect the environment" (item 39). Table 34 in Appendix H shows that there was a significant difference among the two groups in favor of social science teachers reporting more favorably to item 39. The researcher believes that the reasons behind this difference refer to the humane dimensions of social science curricula which make students more aware of the ecological implications of technological advances than do science curricula. Science curricula generally have "very little" to do with the humane dimensions of scientific and technological advances.

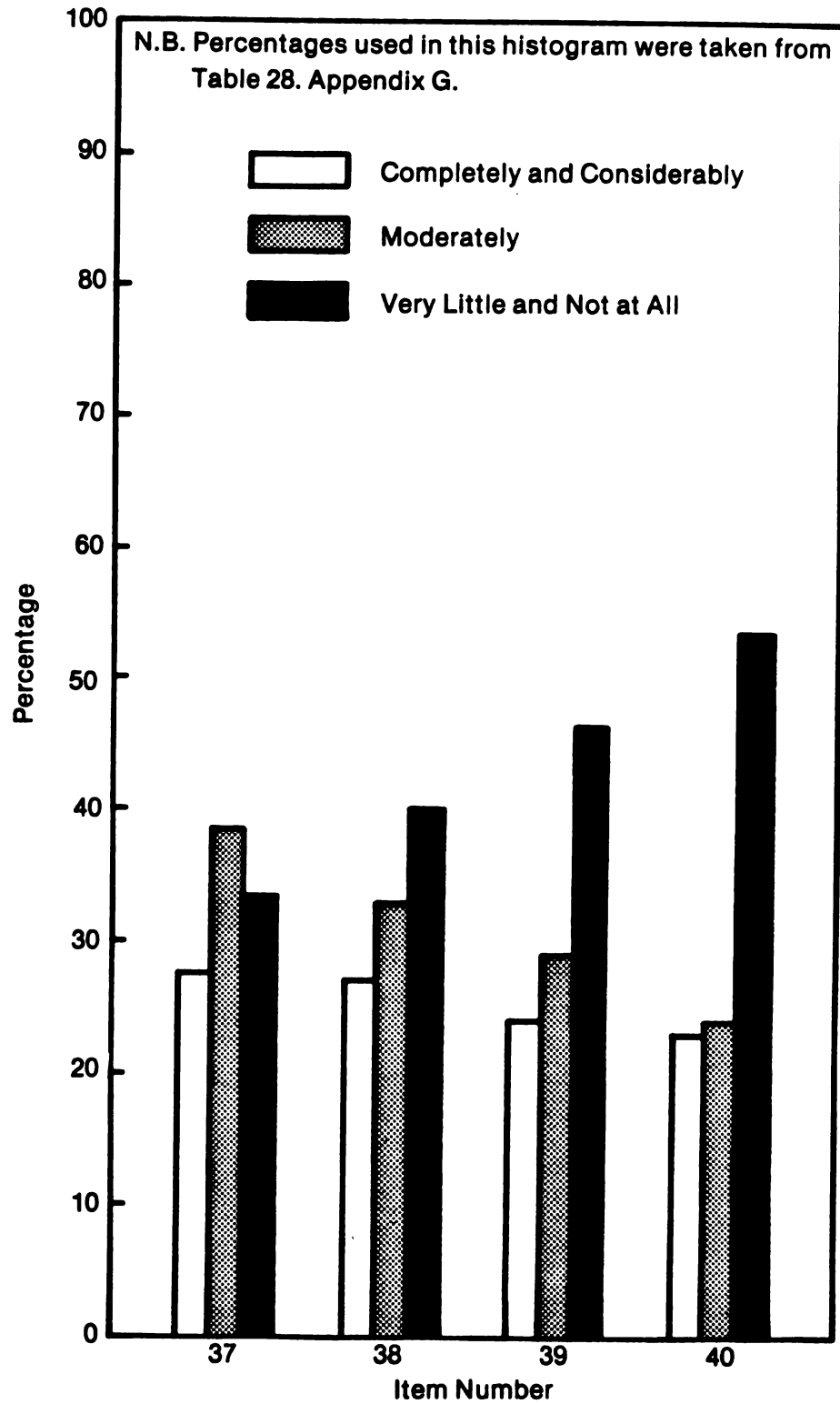


Fig. (5) Perceived effectiveness of science and social science curricula in developing students' Participation in environmental planning and activities.

Of very little or no effectiveness in providing students with "opportunities to evaluate actions taken by decision makers with respect to their influence on achieving a dynamic balance between the quality of life and the quality of the environment" (item 40).

Table 28 in Appendix G indicates that there was a high agreement among the entire sample (82.2%) that "in future, the emphasis placed on the development of students' participation in environmental planning and activities should increase substantially (item 41).

The foregoing findings show that current science and social science curricula at the secondary level are perceived as being ineffective in providing students with educational opportunities that enable them to participate effectively in environmental planning and activities. Thus, one may infer that there is a need to emphasize participation in environmental decision making when designing future environmental education programs in the Egyptian secondary schools.

Open-ended Item #42 (Goals and Objectives not Listed in the Questionnaire):

Item 42 was an open-ended statement in which respondents could make suggestions regarding other goals, not individual in provision lists. The responses to this were categorized by subject area (science or social science) and reported below:

Goals and Objectives Suggested by Science Teachers(N=200)

1. To increase direct interaction between students and their teachers in order to improve the environment (37)*.

2. To place more emphasis on the relationship among science, technological applications and their effectiveness on the environment (21).*
3. To help students recognize legislative consequences resulting from mis-use of the environment (11).*

Goals and Objectives Suggested by Social Science Teachers (N=120)

1. To help students recognize the effect of historical studies in clarifying social background which affect the environment (34).*
2. To put more emphasis on the importance of individual and collective actions in the protection and improvement of the environment (30).*

It is noticable that the above goals and objectives suggested by science teachers and by social science teachers were mentioned in one way or another in the questionnaire. However, the researcher presented them here to show that teachers are concerned about environmental education in the Egyptian secondary schools. Also, it is noticable that these goals emphasize the importance of social and behavioral studies in teaching environmental education.

*The number in parentheses refers to the number of teachers who cited that goal.

Summary

Figure 6 indicates perceived effectiveness of science and social science curricula in achieving goals and objectives of environmental education in the Egyptian secondary schools.

The researcher set up four scales to indicate the extent of achievement of goals and objectives of environmental education by science and social science curricula. These four scales are:

- High achievement (75% - 100%)
- Moderate achievement (50% - 75%)
- Low achievement (25% - 50%)
- Poor achievement (00% - 25%)

The following lists indicate items in each of the above categories.

A. Extent of Achievement of Goals as Perceived by Science Teachers:

Goals #(1, 2, 3, 4, 6, 9, 10, 11, 12, 13, 14, 19, 20, 23, 25) are perceived as being moderately achieved.

Goals #(5, 7, 21, 22, 24, 26, 28, 29, 30, 31, 32, 33, 34, 35, 37) are perceived as being at a low level.

Goals #(15, 16, 39, 40) are perceived as being poorly achieved.

B. Extent of Achievement of Goals as Perceived by Social Science Teachers:

Goals #(13, 14) are perceived as being highly achieved.

Goals #(1, 2, 3, 4, 6, 7, 9, 10, 11, 12, 19, 23, 25, 26, 28) are perceived as being moderately achieved.

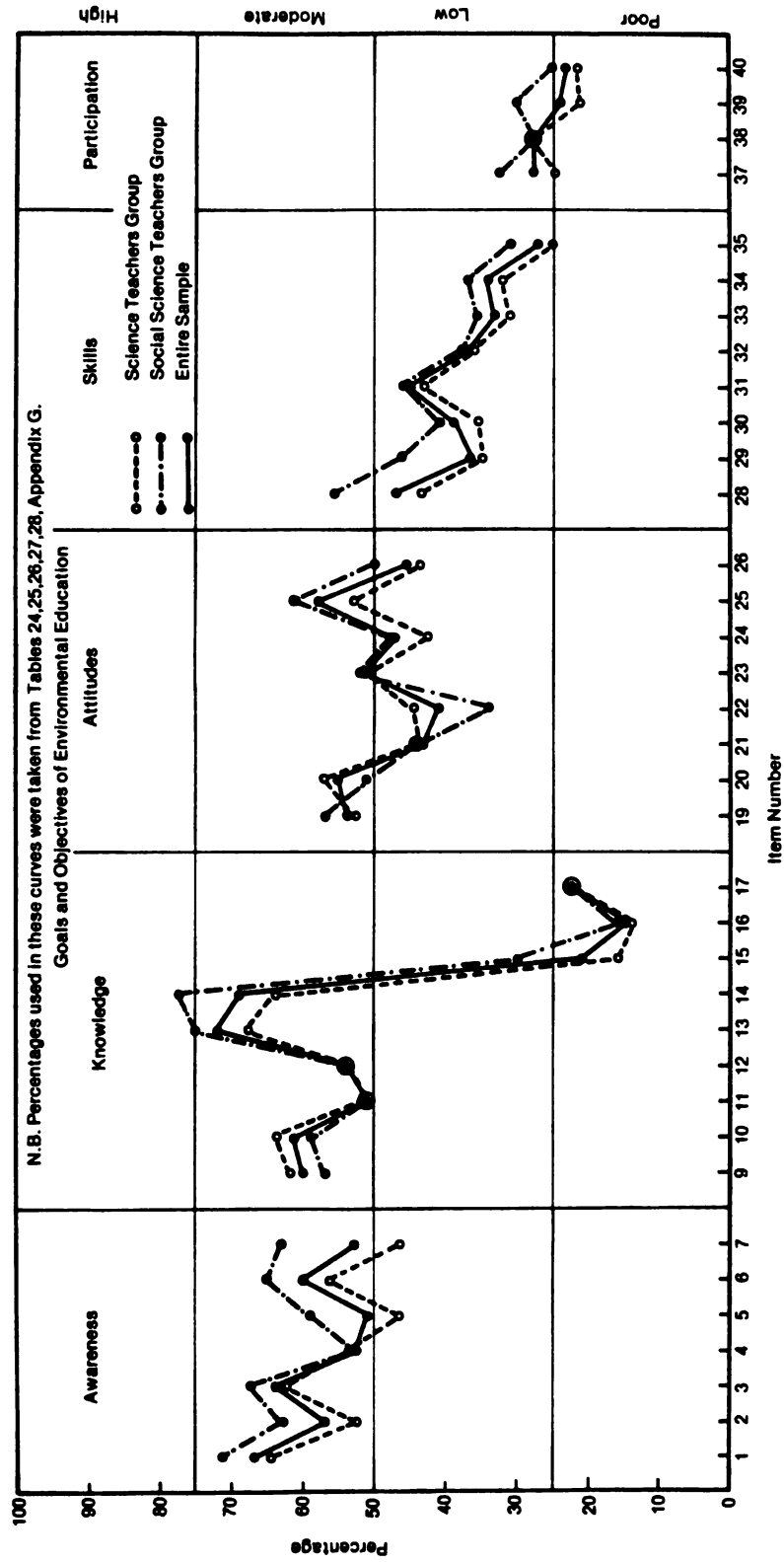


Figure (6) Perceived effectiveness of science and social science curricula in achieving goals and objectives of environmental education by science and social science teachers and the entire sample.

Goals #(21, 22, 30, 31, 32, 33, 34, 35, 37, 38, 39, 40) are perceived as being achieved at a low level.

Goals #(16, 17) are perceived as being poorly achieved.

C. Extent of Goals Achievement as Perceived by the Entire Sample:

Goals #(1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 19, 20, 23, 25) are perceived as being moderately achieved.

Goals #(21, 22, 24, 26, 28, 29, 30, 31, 32, 33, 34, 35, 37, 38) are perceived as being achieved at a low level.

Goals #(15, 16, 17, 39, 40) are perceived as being poorly achieved.

Goals Perceived as Being Best Achieved by the Present Curricula as Perceived By the Entire Sample*

1. To help students recognize the limits of the earth's energy resources (item #13).
2. To help students recognize the effect of urbanization on their environment (item #14).
3. To make students aware that man's cultural activities (religious, economic, social, political, etc.) influence the quality of the environment (item #1).

*Goals that have more than 65% of the respondents saying that current programs are either completely or considerably effective in their attainment.

Goals Which are Perceived as Being Least
Achieved by the Present Curricula **

1. To help students recognize how different cultures (such as Islamic or Western culture) influence the quality of the environment differently (item #16).
2. To provide students with knowledge to recognize the historical background development of current environmental problems (item #15).
3. To provide students with knowledge to recognize local, national, and international efforts to protect the environment (item #17).
4. To provide students with opportunities to evaluate actions taken by decision-makers with respect to their influence on achieving a dynamic balance between the quality of life and the quality of the environment (item #40).
5. To provide students with opportunities to participate effectively in an individual or group action to protect the environment (item #39).

**Goals that have less than 25% of the respondents stating that current programs are completely or considerably effective in helping students attain their objective.

2) Incorporating Environmental Education Curricula into School (IN)

(Second Research Question)

The research question addressed in this section of the questionnaire was:

"How do secondary science and social science teachers perceive the incorporation of environmental education into school curricula?"

To answer the above question, the sixth null hypothesis concerning incorporating environmental education into the Egyptian secondary schools was tested. Frequency tables and Chi-square test were also employed.

Hypothesis #6

H_0 : "There is no significant difference between the opinions held by science teachers and by social science teachers concerning incorporation of environmental education into the Egyptian secondary schools."

The incorporation part was addressed in the questionnaire by 5 items (43-47).

Table 19 indicates that there was a significant difference between the opinions held by the two groups of research sample concerning incorporation of environmental education into the Egyptian school curricula. Consequently, hypothesis #6 can not be accepted.

Table 19. Means, Standard Deviations, F-test of Research Sample in "Incorporation".

Group	N	Mean	Std. Dev.	F	P
S.T.	200	4.24	.435		
S.S.T.	120	4.06	.493	11.89*	.00064
E.S.	320	4.17	.466		

S.T. = Science Teachers, S.S.T. = Social Science Teachers,
E.S. = Entire Sample.

STD. DEV. = Standard Deviation. Degree of Freedom 1,318

The researcher believes that the significant difference existing between science teachers and social science teachers concerning incorporation of environmental education into the secondary school curricula may be ascribed to some misunderstanding between the two groups of the research sample concerning the reason behind items #44 and #45 of the questionnaire (more discussion will be given in Chapter V).

Figure 7 and Table 29 in Appendix G show that:

There was a high agreement (strongly agree or agree) among the research sample that "environmental education curricula in the Egyptian secondary schools should be designed by teachers, students, parents, and environmental science experts" (item #43). However, the value of Chi-square test (Table 34 in Appendix H) was significant, with science teachers reporting more agreement than was the case with social science teachers.

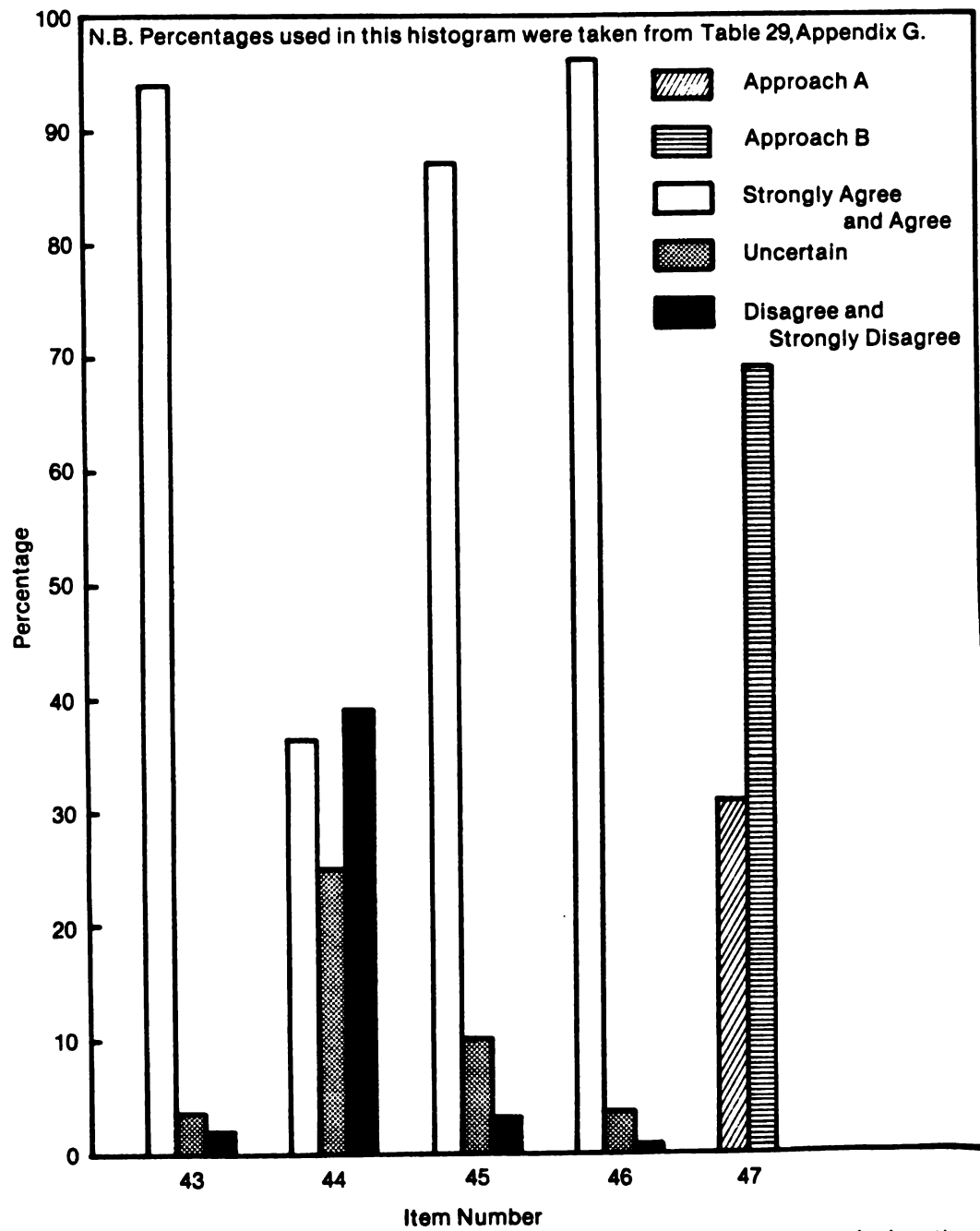


Fig. (7) Opinions of the research sample towards incorporating environmental education into school curricula.

About 38.8% of the research sample disagreed that "environmental education at the secondary level should be taught only through natural science courses" (item #44). At the same time, 36.5% of the entire sample agreed to teach environmental education only through natural science courses, where-as 25% were uncertain. Table 34 in Appendix H shows that Chi-square test was significant in favor of social science teachers reporting more disagreement than was the case with science teachers.

There was a large agreement (87.7%) among the research sample that "environmental education at the secondary level should be taught through science and social science courses" (item #45). However the value of Chi-square test (Table 34 in Appendix H) shows that there was a significant difference between the two groups in favor of social science teachers reporting more agreement than was the case with science teachers.

There was a large agreement (96%) among the research sample that "environmental education is important and should be incorporated into the school curriculum" (item #46).

68.8% of the research sample agreed that the most effective approach to the achievement of environmental education goals and objective in the Egyptian secondary schools is the "multidisciplinary approach" or "developing environmental education units (activities) and incorporating them into existing school curricula" (item #47).

It is notable that all Ministry of Education personnel (5) and school principals (10) agreed during the interview with the researcher that the multidisciplinary approach is the most effective approach to

the achievement of environmental education goals and objectives in the Egyptian secondary schools.

These findings indicate that teachers, Ministry of Education personnel, and school principals do care about incorporation of environmental education into the Egyptian secondary school curricula. Multidisciplinary approach is perceived as being the suitable approach. This approach should be considered when designing environmental education programs in Egypt.

3) Environmental Education Curriculum Content (EECC)

(Third Research Question)

The research question in this section of the questionnaire was:

"To what extent do secondary science and social science teachers perceive that environmental education curricula in the Egyptian secondary schools include content that is suggested in the proposed model?"

To answer the above question, the seventh null hypothesis concerning the importance of suggested concepts (contents) in the proposed model was tested. Frequency tables and Chi-square test were also employed.

Hypothesis #7:

H_0 : "There is no significant difference between the opinions held by science teachers and by social science teachers concerning environmental education curriculum content in the Egyptian secondary schools."

The environmental education curriculum content part is addressed by 10 items (48-57). Table 20 is based on items 48-56. Item 57 is an open-ended statement and its results will be presented and discussed later on in this Chapter.

Table 20 indicates that there was no significant difference between the opinions held by the two groups of the research sample concerning environmental education curriculum content. Consequently, hypothesis #7 can not be rejected.

Table 20. Mean, Standard Deviation, F-test of the Research Sample on "Environmental Education Curriculum Content".

Group	N	Mean	Std. Dev.	F	P
S.T.	200	4.37	.533		
S.S.T.	120	4.27	.583	2.26	.13365
E.S.	320	4.33	.553		

S.T. = Science Teachers, S.S.T. = Social Science Teachers,
 E.S. = Entire Sample.
 STD. DEV. = Standard Deviation. Degree of Freedom 1,318

The data reveal that the two groups of the research sample agreed upon the importance of suggested concepts of environmental education curriculum content. The researcher concludes that the concepts in the proposed model in Chapter II are acceptable to science teachers and social science teachers in the Egyptian secondary schools. This means that those concepts should be considered when designing future environmental education curricula for Egyptian secondary school students.

Figure 8 and Table 30 in Appendix G shows that there was a high agreement among the research sample concerning the nine suggested environmental concepts presented in the fourth part of the

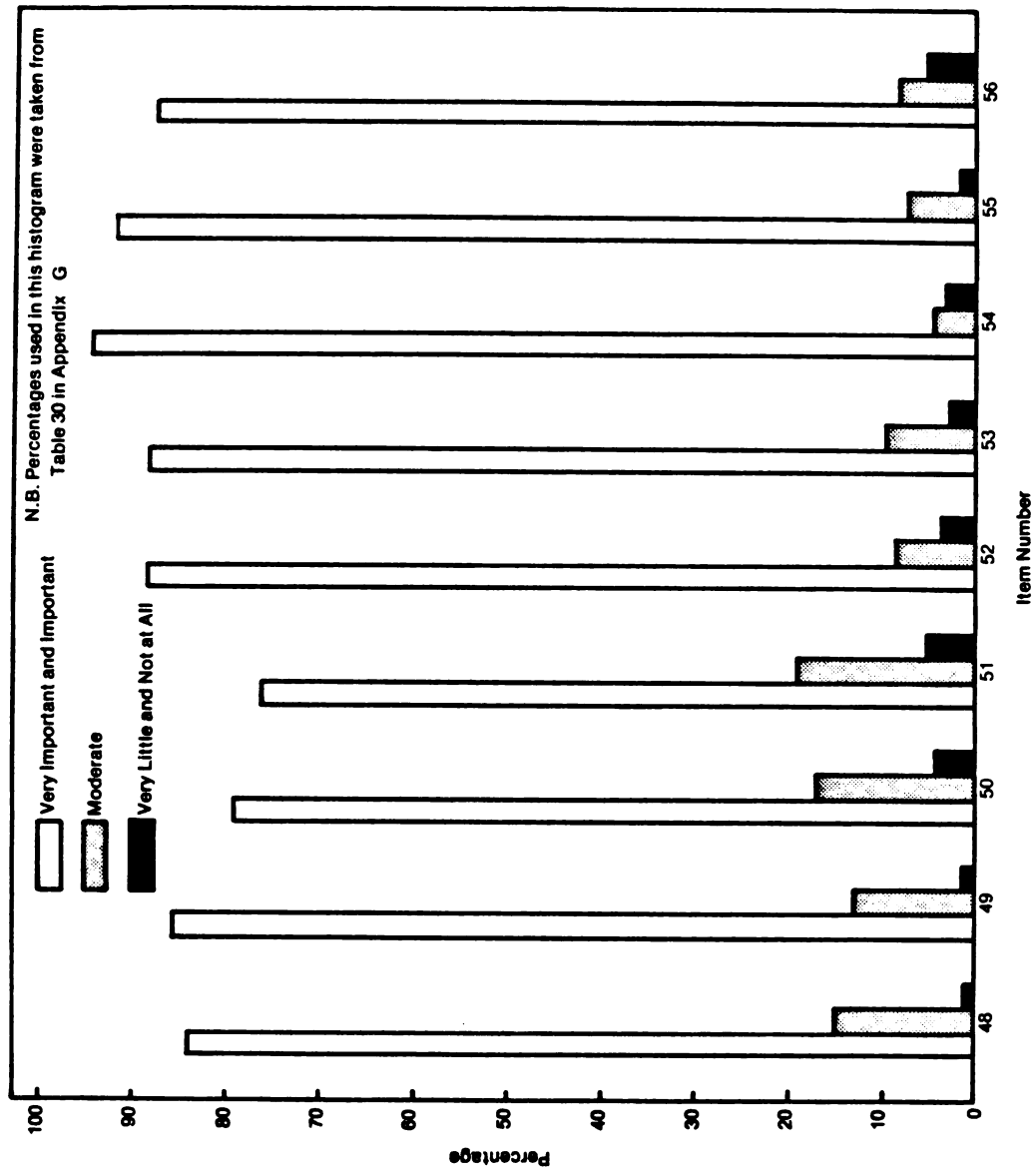


Fig. (8) Importance of environmental education concepts to be included in school curricula.

questionnaire. However, Table 34 in Appendix H shows that the value of Chi-square test was significant regarding "the concept of ecosystem" (item #48) and "the concept of population dynamics" (item #49). The significant difference between the two groups was in favor of science teachers. This means that science teachers place greater importance on "ecosystem" and "population dynamics" than social science teachers. This result explains why the two groups perceived item 48, and item 49 differently.

These findings emphasize the necessity of including these nine concepts in environmental education curriculum in order to effectively achieve the goals and objectives of environmental education in the Egyptian secondary schools.

Open-ended item #57 (Other concepts not listed in the questionnaire)

Item 57 was an open-ended statement. The responses to this item were categorized and reported as follows:

A. Concepts Suggested by Science Teachers: (N=200)

1. Over population and environment. (5)*
2. Using alternative sources of energy. (4)*
3. Religion and environment. (4)*
4. Social commitment towards environment. (3)*
5. Production and consumption and environment. (3)*
6. Islamic culture and environment. (3)*
7. International cooperation and environment. (3)*

8. Agricultural industry and natural resources. (3)*

B. Concepts Suggested by Social Science Teachers: (N=120)

1. Population and available natural resources. (3)*

2. Political decisions and environment. (3)*

3. Recycling of environmental waste. (3)*

4. Monuments conservation. (2)*

It is noticable that the concepts suggested by science teachers reflect the important role of religious values and social commitment to the protection of the environment. These concepts also reflect the need to enhance a balance between the quality of human life and the quality of the environment, where as the concepts suggested by social science teachers revolve around the effect of population and political decisions on the environment. These concepts also deal with the question of how to get rid of environmental wastes without harmful effects on the environment. Social science teachers presented the concept of "monument conservation," i.e., to protect these valuable structures such as ancient Egyptian, Christian, and Islamic monuments from underground water or chemical pollution resulting from industrial progress.

4) Teaching Methods of Environmental Education (TM)(Fourth Research Question)

The research question addressed in this section of the questionnaire was:

"To what extent do secondary science and social science teachers perceive that environmental education teaching methods used in the Egyptian secondary schools reflect those proposed in the model?"

To answer the above question, the eighth null hypothesis was tested. Also, frequency tables and the Chi-square test were employed.

Hypothesis #8

H_0 : "There is no significant difference between the opinions held by the science teachers and by social science teachers concerning teaching methods of environmental education in the Egyptian secondary schools."

The teaching methods part was represented by 9 items (58-66).

Table 21 is based on the results of these 9 items.

Table 21. Means, Standard Deviations, F-test of the Research Sample on "Teaching Methods".

Group	N	Mean	Std. Dev.	F	P
S.T.	200	2.56	.546		
S.S.T.	120	2.80	.860	8.58*	.00363
E.S.	320	2.65	.689		

S.T. = Science Teachers, S.S.T. = Social Science Teachers,
 E.S. = Entire Sample.
 STD. DEV. = Standard Deviation. Degree of Freedom 1,318

Table 21 indicates that there was a significant difference between the opinions held by the two groups of the research sample concerning teaching methods of environmental education. Consequently, hypothesis #8 can not be accepted.

Figure 9 and Table 31 in Appendix G reveal that: 50% of the research sample reported that they "occasionally" use an "outdoor laboratories" technique to teach environmental education through existing curricula (item #58). However, Table 34 in Appendix H shows that the value of the Chi-square test was significantly different between the two groups, with science teachers indicating more use of outdoor laboratories than was the case with social science teachers.

47.5% of the research sample reported that they "occasionally" use "the inquiry approach to help students deal directly with the environmental problems" (item #59). Also, there was a significant difference in the value of the Chi-square test between the two groups in favor of science teachers reporting more use of the inquiry approach than was the case with social science teachers.

The majority of the research sample reported that they "seldom or not at all" use "the team teaching approach to illustrate the interdisciplinary nature of environmental education (item #60). Also, there was a significant difference in the Chi-square test (Table 34 in Appendix H) between the two groups in favor of social science teachers indicating that they use the team teaching approach more often than was the case with science teachers.

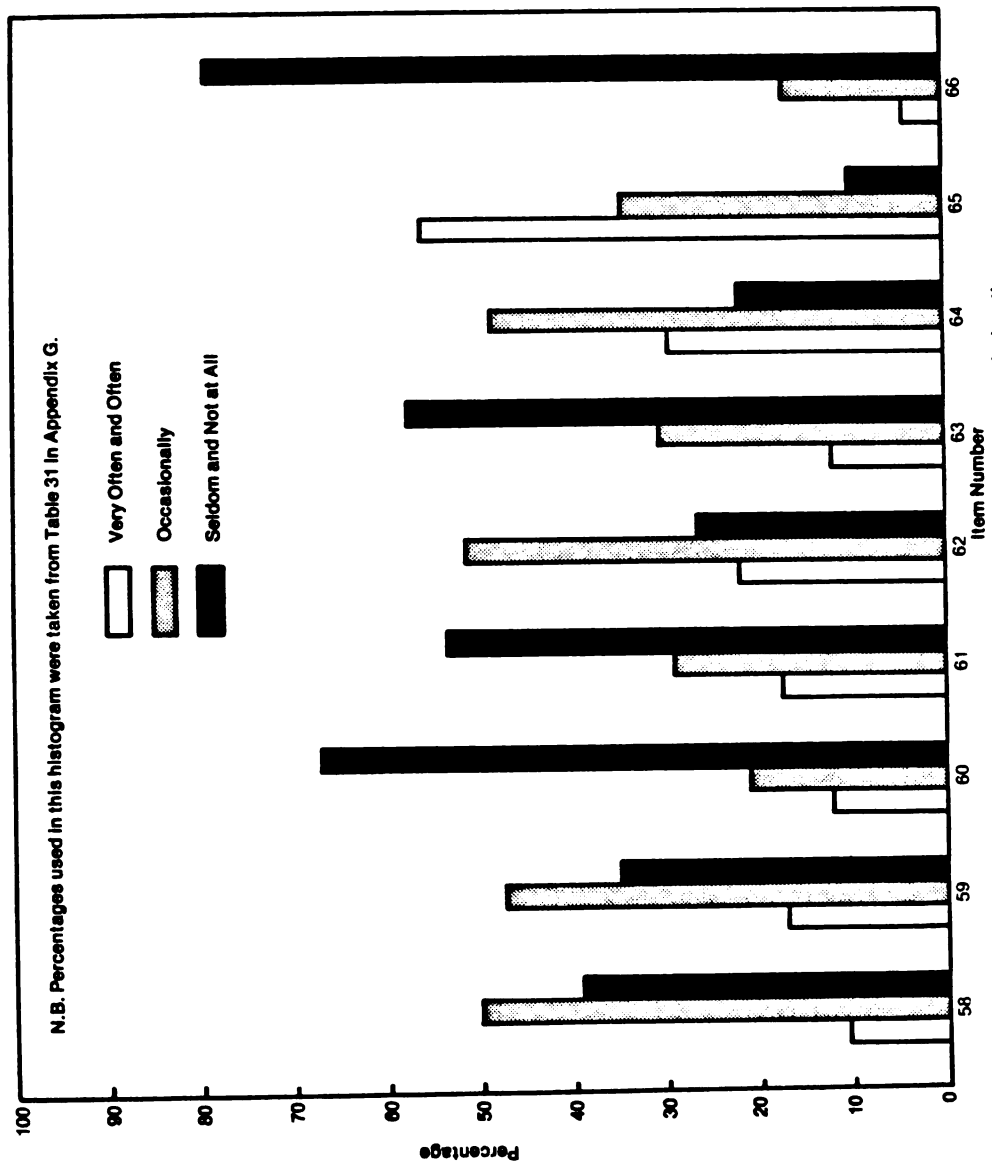


Fig. (9) Opinions of the research sample towards teaching methods of environmental education.

The majority of the research sample reported that they "seldom or not at all" use "simulation games to help students link learning with the decision-making process" (item #61). Table 34 in Appendix H shows that there was a significant difference in the value of the Chi-square test between the two groups in favor of social science teachers regarding item #61, with social science teachers reporting more use of simulation games than was the case with science teachers.

51.6% of the research sample reported that they "occasionally" organize field trips to help students gain first hand experiences about environmental issues and problems" (items #62). There was significant difference in the Chi-square test among the two groups in favor of social science teachers regarding item #62, indicating that they use the field trip technique more often than was the case with science teachers.

The majority of the research sample reported that they "seldom or not at all" use the "mapping of small places to help students apply learned concepts from such different disciplines as mathematics and geography" (item #63). Table 34 in Appendix H shows that there was a significant difference in the Chi-square test between the two groups, with social science teachers using the technique more frequently. The researcher believes that this difference can be ascribed to the fact that the majority of science teachers believe that the "mapping technique" can be used only in social science.

Less than 50% of the research sample reported that they "occasionally" use "value clarification techniques to help students clarify their own values and develop their own social, economic and

political awareness" (item #64). Table 34 in Appendix H shows that there was a significant difference between the two groups regarding item #64, with social science teachers indicating more frequent use of values clarification techniques than was the case with science teachers.

56% of the research sample reported that they "very often or often" use the "multi-media approach to help students grasp major environmental concepts" (item #65). Table 34 in Appendix H shows that there was a significant difference between the two groups regarding item #65, with 30.8% of the social science teachers saying they use the approach "very often" whereas only 12% of the science teachers reported using "multi-media" approach "very often."

A large majority of the entire sample (79.1%) reported that they "seldom or not at all" seek help from some experts to give some lectures about environmental problems" (item #66). However, there was a significant difference in the Chi-square test (Table 34 Appendix H) between the two groups, with science teachers appearing to use experts with somewhat greater frequency than was the case with social science teachers.

5) Teacher Training of Environmental Education (TT)

(Fifth Research Question)

The research question addressed in this section of the questionnaire was:

"To what extent do secondary science and social science teachers perceive that teacher training programs at the Egyptian secondary level reflect ideals presented in the

proposed model?"

To answer the above question, the ninth null hypothesis was tested. Frequency tables and Chi-square tests were also employed.

Hypothesis #9

H_0 : "There is no significant difference between the opinions held by science teachers and by social science teachers concerning teacher training of environmental education in the Egyptian secondary schools."

The teacher training part consists of 6 items (67-72). Table 22 is based on items (67-71). Item #72 is an open-ended statement and its results will be presented and discussed later in this chapter.

Table 22 indicates that there was no significant difference between the opinions held by the two groups of the research sample concerning teacher training of environmental education consequently, hypothesis #9 can not be rejected.

Table 22. Means, Standard Deviations, F-test of the Research Sample on "Teacher Training".

Group	N	Mean	Std. Dev.	F	P
S.T.	200	3.78	.527		
S.S.T.	120	3.74	.557	.37	.54174
E.S.	320	3.76	.538		

S.T. = Science Teachers, S.S.T. = Social Science Teachers,
E.S. = Entire Sample.
STD. DEV. = Standard Deviation. Degree of Freedom 1,318

Figure 10 and Table 32 in Appendix G indicate that:

Only 33.7% of the teachers polled were in agreement that

"preservice teacher training programs in their major areas have provided them with sufficient information to educate students about environmental concerns" (item #67). However, there was a significant difference in the Chi-square value (Table 34 in Appendix H) between the two groups, with social science teachers reporting stronger disagreement toward sufficiency of information given during preservice training programs than was the case with science teachers.

45% of the research sample "disagreed" while only 30% agreed that "inservice teacher training programs in their major areas have provided them with sufficient information to educate students about environmental concerns" (item #68). Thus teachers generally do not feel that existing inservice training programs provide them with adequate help relating to environmental education.

A large majority of the research sample (96%) agreed that "all teachers should have some preservice and inservice training in the areas of environmental concerns" (item #69). This response shows that teachers do recognize the importance of preparing qualified teachers to teach environmental education in the Egyptian secondary schools.

A large majority of the research sample (83.7%) agreed that "the best way to provide environmental education teachers with inservice training should be through workshops" (item #70). This response shows the importance of the workshop format in preparing qualified personnel.

A large majority of the research sample (71.8%) agreed that "the best way to provide environmental education teachers with inservice training

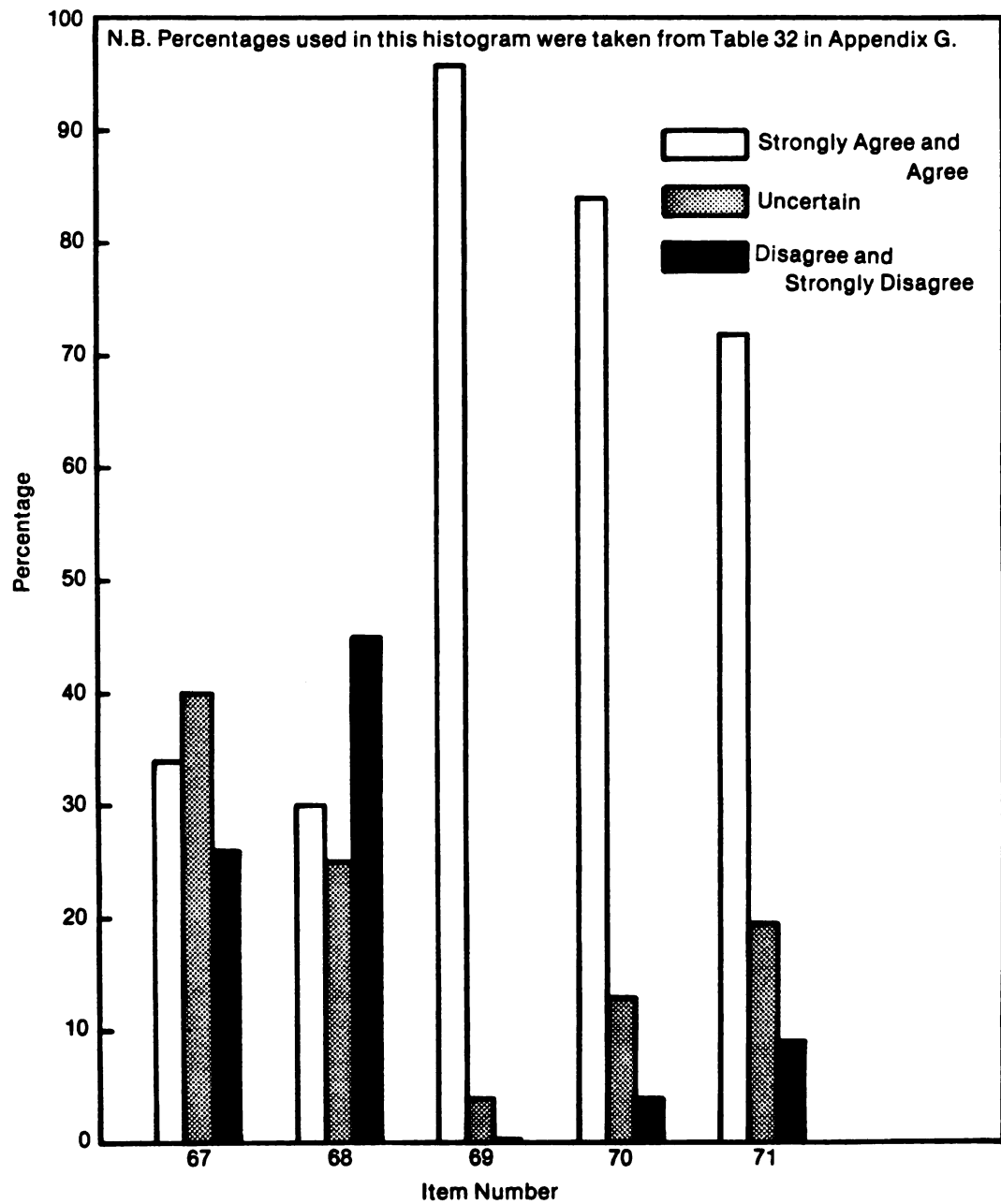


Fig. (10) Opinions of the research sample towards Teacher Training.

should be through mass-media" (item #71). This response shows that teachers perceive mass-media as being very helpful in providing up-to-date information about environmental issues and problems.

Open-ended item #72 (Other Suggestions for Teacher Training)

Item 72 was an open-ended statement. The responses to this item were categorized and are presented below:

Suggestions of Science Teachers:

1. Place more emphasis on environmental education during preservice training in colleges of education (8 teachers of 200).
2. Increase teachers' awareness concerning local, national, and international environmental issues and problems (7 teachers of 200).
3. Put more emphasis on environmental education programs during inservice training (7 teachers of 200).
4. Place more emphasis on environmental education programs during preservice and inservice training for primary school teachers in order to accumulate and continue environmental experiences in students through different levels of education (6 teachers of 200).
5. More emphasis should be placed on first-hand experience of local problems during preservice and inservice training (6 teachers of 200).

It is noticable that the suggestions of science teachers revolve

around developing and improving preservice and inservice programs in order to more effectively teach environmental education in the Egyptian secondary schools. These suggestions also emphasize the need for the integration and continuity of environmental experiences from the primary level through, the post-secondary level. The need for first-hand experience was also emphasized by science teachers in order to improve teacher training programs in the Egyptian secondary schools.

Suggestions of Social Science Teachers

1. Teacher training programs should consider the available facilities in the Egyptian secondary schools to teach environmental education (5 teachers of 120).
2. Teacher training programs should focus on environmental problems in the school locality (5 teachers of 120).
3. Teacher training programs should provide teachers with some possible ways to incorporate environmental concepts into school curricula (4 teachers of 120).
4. More emphasis should be placed on field trips during teacher training programs to enable teachers to gain first-hand knowledge of different Egyptian environments (3 teachers of 120).

The suggestions of social science teachers emphasized the need to incorporate environmental education into existing curricula in the Egyptian secondary school using facilities available in the Egyptian setting. As with science teachers, these suggestions also emphasized first-hand experiences regarding environmental problems in different

Egyptian environments.

6) Constraints and Suggestions (CS)

(Sixth Research Question)

The research question addressed in this section of the questionnaire was:

"What are the constraints perceived by secondary science and social science teachers that limit the development of environmental education programs in the Egyptian secondary schools?"

To answer the above question, the tenth null hypothesis was tested. Frequency tables and Chi-square tests were also employed.

Hypothesis #10

H_0 : "There is no significant difference between the opinions held by science teachers and by social science teachers concerning major constraints which preclude the implementation of environmental education in the Egyptian secondary schools."

The constraints and suggestions part is addressed by 14 items (73-86). Table 23 is based on items (73-85). Item #86 is an open-ended statement. Its results will be presented and discussed later in this chapter.

Table 23 indicates that there was no significant difference between the opinions held by the two groups of the research sample concerning major constraints which preclude the development of environmental education consequently, hypothesis #10 can not be rejected.

Table 23. Means, Standard Deviations, F-test of the Research Sample on "Constraints and Suggestions".

Group	N	Mean	Std. Dev.	F	P
S.T.	200	3.75	.522		
S.S.T.	120	3.74	.597	.03	.85325
E.S.	320	3.75	.550		

S.T. = Science Teachers, S.S.T. = Social Science Teachers,
E.S. = Entire Sample.

STD. DEV. = Standard Deviation. Degree of Freedom 1,318

Figure 11 and Table 33 in Appendix G reveal that a large majority of the research sample (87.5%) agreed that there is "a lack of well-defined environmental education goals and objectives in the Egyptian secondary schools" (item #73).

A majority of the research sample (69%) disagreed that "environmental education goals and objectives are unrealistic and unachievable" (item #74). However, there was a significant difference in the Chi-square test (Table 34 in Appendix H) between the two groups with a greater percentage of social science teachers perceiving environmental education goals as being unrealistic and unachievable.

A large majority of the research sample (80.3%) agreed that "environmental education goals and objectives are realistic but can not be achieved with facilities now available in the Egyptian secondary schools" (item #75).

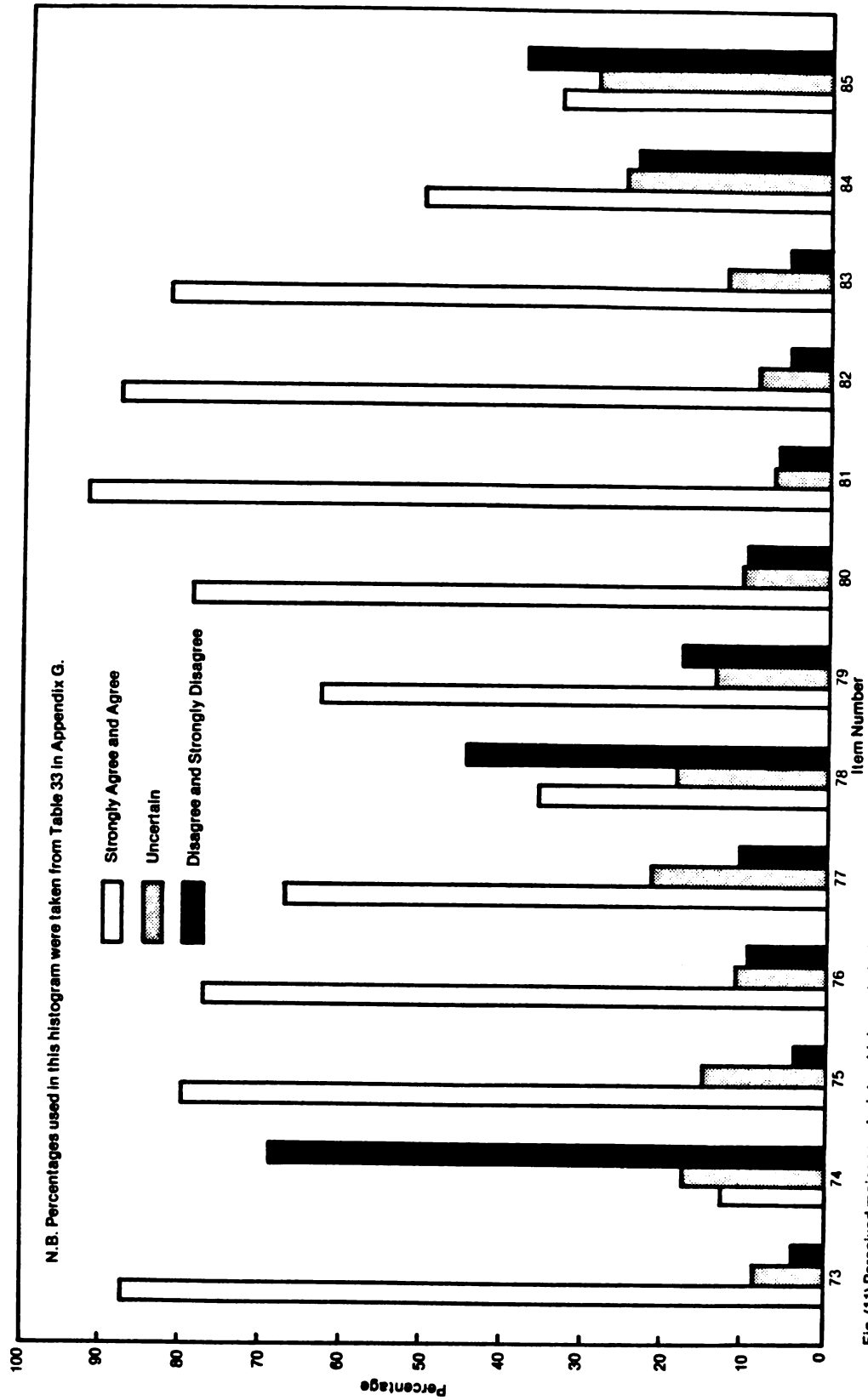


Fig. (11) Perceived major constraints which preclude the implementation of environmental education in the Egyptian secondary schools.

A large majority of the research sample (78.5%) agreed that there is "a lack of environmental education programs in the Egyptian secondary schools" (item #76). Table 34 in Appendix H shows that there was a significant difference in the Chi-square test between the two groups with science teachers showing more agreement than social science teachers on this item. This difference suggests that science teachers may be somewhat more aware than social science teachers of the lack of environmental education programs.

The majority of the research sample (67.5%) agreed that "environmental issues and problems which are included in environmental education programs do not meet the real need and interests of students in the Egyptian environments" (item #77).

45% of the research sample disagreed whereas only 36% agreed that "environmental education is too complicated, too vague, or too inconclusive to teach in a meaningful way" (item #78). At the same time, there was a significant difference in the Chi-square test (Table 34 in Appendix H) between the two groups, with social science teachers showing more agreement than science teachers on this item #78).

The majority of the research sample (63.1%) agreed that one of the major constraints which preclude the implementation of environmental education in the Egyptian secondary schools is the "lack of time needed to incorporate environmental education into already-crowded curricula" (item #79).

A large majority of the research sample (79%) agreed that there was "a shortage of classroom teachers prepared to effectively integrate environmental education into instructional programs in the Egyptian

secondary schools" (item #80).

A large majority of the research sample (97%) agreed that there was "a shortage of facilities and instructional materials needed to teach environmental education in the Egyptian secondary schools" (item #81). Table 34 in Appendix H indicates that there was a significant difference in the Chi-square test between the two groups. With science teachers reporting more agreement than social science teachers in this item (#81). This difference can be ascribed to the fact that science teachers are more directly affected by this shortage than social science teachers.

A large majority of the research sample (88%) agreed that there was "a lack of inservice training programs dealing with new trends in environmental education" (item #82).

A large majority of the research sample (82%) agreed that there was "a shortage of funding needed to develop effective environmental education programs for the Egyptian secondary schools" (item #83).

50% of the research sample agreed that there was "a resistance and apathy on the part of the community towards environmental concerns" (item #84). The other 50% of the entire sample were "uncertain or disagreed about this item.

38% of the research sample "disagreed", 33% agreed, and the rest were "uncertain" that there was "a resistance and apathy on the part of schools toward environmental concerns" (item #85).

The previous findings of the seventh part of the questionnaire make it clear that the major constraints* which preclude the implementation of environmental education in the Egyptian secondary schools as perceived by the research sample according to percentage (Figure 11) are:

1. A shortage of facilities and instructional materials needed to teach environmental education (97%). . . item #81.
2. A lack of inservice training programs dealing with new trends in environmental education (88%). . . item #82.
3. A lack of well-defined environmental education goals and objectives (87.5%). . . item #73.
4. A shortage of funding needed to develop effective environmental education programs (82%). . . item #83).
5. A shortage of classroom teachers prepared to effectively integrate environmental education into instructional programs (79%). . . item #80.
6. A lack of environmental programs (78.5%). . . item #76.
7. A lack of environmental issues and problems which meet the real needs and interests of the Egyptian students (67.5%). . . item #77.
8. A lack of time needed to incorporate environmental education into already crowded curricula (63.1%). . . item #79).

*Major constraints are these items that got more than 60% of the research sample agreement.

Open-ended Item #86 (General Suggestions)

Item 86 was an open-ended statement asking respondents to identify other constraints affecting environmental education. The responses were categorized and reported below:

Suggestions of Science Teachers (N=200)

1. Environmental education should be taught starting from primary level to higher level of education (12).*
2. Environmental education should be a life-long process "from birth to death" (10).*
3. School curricula should be organized in such a way as to provide students with opportunities to solve environmental problems in the school locality (10).*
4. Egyptian schools should be re-organized to meet the requirements of teaching environmental education (9).*
5. More emphasis should be placed on instructional media needed to teach environmental education in the Egyptian schools (9).
6. Policy makers (Ministry of Education personnel, directors, . . .etc.) should be retrained to direct the educational process towards solving environmental problems (7).*
7. Environmental education should be incorporated into the Egyptian schools as soon as possible (5).*

*The number in parentheses refers to the number of teachers who cited that suggestion.

8. Successful environmental education projects should be rewarded (5).*
9. Organize an "environmental preservation week" to enhance environmental awareness among people (4).*
10. Teachers who effectively contribute to environmental education programs, in schools should be rewarded (3).*
11. Cooperation among teachers of different disciplines should be considered seriously in order to make environmental education successful (3).*
12. "Environmental preservation laws" should be seriously applied in order to protect the environment (3).
13. There should be a balance between population growth, natural resources and the search for new resources (3).*

It is noticable that the suggestions of science teachers revolve around ideas such as viewing environmental education as a life-long process and providing schools with facilities and equipment needed to teach environmental education in the Egyptian secondary schools. The suggestions of science teachers emphasized the need to re-organize school curricula in order to incorporate environmental education into the Egyptian schools. The concept of integration among different disciplines was also emphasized. Inservice training for policy makers was also mentioned so that they can make the right decision at the right time.

Suggestions of Social Science Teachers (N=120)

1. More emphasis should be placed on religious values in order to motivate good behavior in environmental concerns (11)*.
2. Decentralize educational administration so that the specific needs of different Egyptian environments can be addressed (9)*.
3. Place more emphasis on the specific needs of different Egyptian environments (e.g. dry deserts) (5)*.
4. Develop a new testing system that can be used to evaluate the environmental behavior of students (4)*.
5. Articulate education with the surrounding environment (4)*.
6. Environmental education should be taught through all subject-matter (4)*.

Social science teachers emphasized the role of religious values in preserving the environment. Their suggestions emphasized the balance between the quality of human life and the quality of the environment. Social science teachers also emphasized in their suggestions the concept of decentralization and articulating education with the surrounding environment.

*The number in parentheses refers to the number of teachers who cited that suggestion.

Results of Interview with Ministry of Education
Personnel and Secondary School Principals

(Seventh Research Question)

The research question addressed in this section was:

"How do Ministry of Education personnel and secondary school principals perceive the status of environmental education in the Egyptian secondary schools?"

As stated earlier in Chapter III, the researcher was not satisfied with the results of the personal interviews with Ministry of Education personnel and school principals. However, the data are presented here so that readers may have some clues regarding administrators' views regarding environmental education. The responses to the six items of the interview card (Appendix E and F) were categorized and reported as follows:

Statement #1

"Other goals and objectives of environmental education not listed in the interview card (1-5) under Part B".

Ministry of Education personnel (5) and school principals (10) failed to add any goal to the five goals mentioned in Part B of the interview card. It is assumed that these five goals are adequate for the Egyptian setting.

Statement #2

"To what extent are these goals (1-5) achieved in the Egyptian secondary school? and where? (in which curriculum)?"

Responses of Ministry of Education Personnel

Three out of five Ministry of Education personnel responded to the first part of the second question by "little" and the other two responded by "very little". These responses show that Ministry of Education personnel believe that the goals of environmental education are achieved by existing school curricula to a small extent.

All five Ministry of Education personnel believe that goals of environmental education are achieved to a "little" extent in biology, geography, and agriculture education courses. The researcher believes that this is true, which explains why existing science and social science curricula are in real need of improvement in order to achieve the goals and objectives of environmental education in the Egyptian secondary schools.

Responses of School Principals

Seven out of ten school principals responded to the first part of the second question by "little" and the other three responded by "very little". This response means that school principals believe that the goals of environmental education are achieved by existing school curricula to a small extent.

All ten school principals believe that the goals of environmental education are achieved to a "little" extent in biology, geography, and agricultural education.

It is noticable that both Ministry of Education personnel and

school principals believe that existing school curricula have little effectiveness in achieving the goals and objectives of environmental education in the Egyptian secondary schools.

Statement #3

"Please, reorder the five goals mentioned under part B of the interview card".

All Ministry of Education personnel (5) and school principals (10) believe that the five goals of environmental education do not need re-ordering, and they are satisfied with these goals as they were listed on the interview card. The researcher concludes that the five categories of environmental education (awareness, knowledge, attitudes, skills, participation) are acceptable as they are.

Statement #4

"How to achieve environmental education goals and objectives in the Egyptian secondary schools".

Responses of Ministry of Education Personnel

1. Very well prepared environmental education teachers (2 out of 5).
2. Develop environmental education units on the basis of local Egyptian needs and international developments in the field of environmental education (2 out of 5).
3. Provide Egyptian schools with facilities and instructional media needed to teach environmental education (2 out of 5).

Responses of School Principals

1. Very well organized preservice and inservice programs for all teachers in order to familiarize them with new trends in teaching environmental education (3 out of 10).
2. Prepare and design flexible environmental education programs based on the real needs of Egyptian students and society (3 out of 10).
3. Provide schools with facilities and instructional materials needed to teach environmental education (3 out of 10).

It is obvious that both Ministry of Education personnel and school principals believe that to achieve environmental education goals and objectives we should have a very well prepared teacher, a good program, and adequate facilities. One of the school principals told the researcher during the interview: "My dear son: you are doing a fantastic job. However, if you do not give me a good teacher, a good curriculum, good facilities, and on the top of that flexible educational policy, you will never get good teaching for environmental education or any other subject matter."

The researcher strongly believes that the above statement summarizes the current state of environmental education in Egypt and in so many developing countries in the so-called third world.

Statement #5

"Where to teach environmental education in the Egyptian secondary schools."

1. In all subject matter areas (3 Ministry of Education personnel and 6 school principals).
2. In science and social science curricula (2 Ministry of Education personnel and 4 school principals).
3. The Synai desert environment should have special consideration in environmental education curricula (2 school principals).

Ministry of education personnel and school principals emphasized the need for a continuity of environmental education experience throughout all levels of education. Also, they emphasized the specific needs of students in local Egyptian environments.

CHAPTER V

INTERPRETATION AND DISCUSSION

The purposes of this Chapter are to: (1) interpret the research findings reported in Chapter IV, and, (2) to relate these findings to the environmental education literature on research, philosophy, and policy recommendations. Each section of the teachers' questionnaire will be addressed in the same order as presented in Chapter IV. This section will be followed by discussion of interview data of Ministry of Education personnel and school principals. Each part (section) will conclude with a general interpretation of the findings of the research and recommendations for policies and practices in environmental education that should result in improvement in both the quantity and quality of environmental education in Egyptian secondary schools. These policies and practices should better prepare students for their adult roles as citizens in a rapidly changing world.

In Chapter II, it was stated that the report of the Tbilisi Conference, 1977 was a "landmark" document in environmental education, especially for developing nations such as Egypt. It provided a synthesis of the understandings of the purposes of environmental education from a world perspective. Thus, the Tbilisi report has provided a useful framework for the design of data collection procedures, including the questionnaire used in the present study. It has also provided an important conceptual tool for use in

interpretation of the results of this study. Other relevant literature (not reported in Chapter II) will also be used in forming interpretation of the results of the present study.

Discussion of Results From Teachers' Questionnaire

1) Goals and Objectives of Environmental Education

It is important in planning environmental education programs and facilities to set up clear statements of goals and objectives. Vande Vissee and Stapp¹ have stated that ". . .without a clear statement of goals, an environmental education program would be a series of unrelated experiences. . ." One approach to the improvement of existing environmental education programs and the planning for future programs is to obtain baseline data concerning teachers' perceptions of existing programs and the comparison of this data with an idealized model derived from the literature of environmental education. This approach should produce recommendations for our environmental education programs with specific goals that will be more effective in developing students' ability to make choices among alternatives when dealing with environmental concerns. In this section, the results of the five categories of goals and objectives of environmental education are discussed. These five categories are: awareness, knowledge, attitudes, skills, and participation.

1.a Awareness of Environmental Issues and Problems(AW)

Students' awareness of environmental issues and problems is one among five categories of environmental education goals and objectives

identified in the proposed framework or model in Chapter II for environmental education in the Egyptian secondary schools. There is little doubt that the development of a conceptual awareness is prerequisite to teaching students, as future decision-makers, "how individual and collective actions influence the relationships between the quality of life and the quality of the environment and, also, how these actions result in environmental issues and problems which must be resolved through investigation, evaluation, values clarification, decision-making, and citizenship action."² Data from Chapter IV show that science and social science teachers sampled perceive the present curricula in Egyptian secondary schools as being effective in developing the students' awareness of environmental issues and problems (Table 14). These findings were not expected by the researcher. However, these are important findings for at least two reasons. First, the data show conformity with results which can be attributed to the action of the International Environmental Education Programme (IEEP). These results suggest that "today's concern for an education pertaining to environmental problems-which, before 1975, was a matter of interest for particular groups within a limited number of industrialized countries - finds an echo in all regions of the world".³ Second, the report of the Tbilisi Conference has shown that developing awareness is a critical first step in the foundation of positive attitudes and acquisition of knowledge and skills required for the preservation and improvement of the quality of the environment.⁴

Stapp and Cox⁵ claim that greater attention should be given to community environmental problems. To solve these problems requires a

more responsible performance from everyone. Hungerford and Peyton⁶ suggest that awareness is a prerequisite "to develop a conceptual knowledge of how individual and collective actions can influence the relationship between the quality of life and the quality of the environment."

The findings regarding awareness (Figure 1 and Table 24 in Appendix G) indicate that there has been some degree of response in Egypt to international developments in environmental education. At the same time, the two groups of teachers have different opinions regarding human values as being an integral part of environmental decision-making (item 5) and the interdependence of local and worldwide environmental problems (item 7). Also there was a consensus among the entire sample that, in future, the emphasis placed on the development of the students' awareness of environmental issues and problems should increase substantially (item #8). The researcher believes that the effectiveness of current science and social science curricula in developing the students' awareness might be less than possible due to the absence of well-organized environmental education programs. It is true that present curricula responded to the general concern about environmental problems. This means that there is not much discrepancy between the actual situation (present data) and desired states (model) of environmental education regarding awareness of environmental issues. However, this response needs to be developed and translated into more effective environmental education programs which would exceed present awareness levels and get students involved in the development of solutions to environmental problems. To do so, the researcher offers

the following recommendations:

- (1) Educational establishments should coordinate their efforts with other agencies to produce well designed programs that enhance environmental awareness among Egyptian citizens. For example, summer camps and seminars could be valuable tools to make students aware of environmental issues and problems in different Egyptian environments.
- (2) Mass media could be an effective tool to inform students, as well as adults, about local Egyptian and worldwide environmental problems and how these problems are inter-dependent. Mass media also would influence teachers' awareness regarding environmental problems and possible solutions.

1.b Knowledge of Environmental Issues and Problems (KN)

The students' knowledge of environmental issues and problems is another of the five categories regarding environmental education goals and objectives in the proposed model presented in Chapter II. Becoming aware of how to help solve environmental problems requires knowledge from scientific, technological, social, political, and economic areas of study. This knowledge is necessary to help students understand and recognize the complexity of environmental problems. Knowledge of how biophysical and socio-cultural factors influence the quality of the environment is the necessary baseline to produce an environmentally literate citizenary that is capable of living in harmony with the environment.

Data from Chapter IV (Table 15) indicate that both groups of teachers perceived the present curricula in the Egyptian secondary schools as being effective in developing students' knowledge of environmental issues and problems. At the same time these curricula are perceived as not being effective in the development of the students' knowledge of historical, societal, and international efforts to solve environmental problems (items 15, 16, 17 in Figure 2). These results conform with one of the major findings of the UNESCO questionnaire which reported that there exists a tendency in world environmental education programs to reduce the environment to its scientific aspects, which tends to exclude human impacts on the environment. This in turn limits the consideration of historical and social perspectives and makes the comprehension of environmental problems a difficult task.⁷ Regarding knowledge of environmental issues and problems, the report of the Tbilisi Conference emphasized that education should provide students with the information needed to understand the relationship between the various physical, biological, and socio-economic factors of the environment.⁸

Schmieder⁹ suggests that one of the basic environmental objectives of society should be to provide citizens with accurate, up-to-date, information about the environment and its associated problems so that they can make the best possible decisions regarding its utilization.

Although the overall findings of the knowledge category reveal that present curricula are effective in the development of students' knowledge of environmental education, the two groups of teachers perceived different effects of the curricula on acquiring major

environmental concepts, recognizing the effect of urbanization on the environment, and the historical background of environmental problems (item 12, 14, 15 in Table 34). The researcher ascribes this difference between the two groups to differences between natural and social science. That is, any given environmental problem does not have to be treated equally in the two disciplines. These findings may be interpreted to mean that secondary school programs in Egypt should provide students with a stronger knowledge base in environmental issues since knowledge about environmental problems is a necessary condition for appropriate actions. Evidence for this assertion is the large agreement among the entire sample that, in future, the emphasis placed on the development of the students' knowledge of environmental issues and problems should increase substantially (item 18).

Based on the overall findings of the knowledge category, and the revised literature, the researcher suggests the following:

- (1) The concept of integration should be considered among natural science, social science and other disciplines in order to make facts scattered among these several disciplines more meaningful in the broader context of environmental education.
- (2) More emphasis should be placed on teaching environmental concepts in their historical, cultural, societal, and international contexts when designing future environmental education programs in Egypt while retaining strength in scientific, ecological, and technological dimensions.

1.c Attitudes Towards Environmental Issues and Problems (AT)

The students' attitudes towards environmental issues and problems represent the third category of environmental education goals and objectives in the proposed model for environmental education in the Egyptian secondary schools presented in Chapter II. Formal education establishments play an important role in instilling the ethical dimensions of environmental education in students. There is little doubt that attitudes and values are parts of environmental education, therefore, they should be integrated properly in school programs.

Data from Chapter IV (Table 16) indicates that the two groups of teachers perceived the present curricula in the Egyptian secondary schools to be only moderately effective or ineffective in providing students with opportunities to develop their attitudes towards environmental issues and problems.

Figure 3 shows that the degree of agreement among the entire sample did not exceed 57.5%. Items which exceed the limit of 50% of agreement were items #19, 20, 23, 25. These four items dealt with the development of positive attitudes and moral values towards environmental conservation. The researcher believes that the development of positive attitudes toward the environment represents a positive sign but is not sufficient in itself to protect the environment. At the same time, nearly one half of the entire sample perceived the present curricula as being ineffective or only moderately effective in providing students with opportunities to develop the spirit of team work, sharing environmental information, moral and aesthetic values,

and individual and collective responsibility to maintain balance between the quality of human life and the quality of the environment (items 21, 22, 24, 26). The researcher believes that these last four attitudes and values are important in solving environmental problems.

The overall findings of the attitudes category indicate that the present science and social science curricula in the Egyptian secondary schools are perceived as being moderately effective in providing students with opportunities to develop their attitudes towards environmental issues and problems. However, these perceptions of adequacy need to be interpreted in the context of other data such as a study reported by Alaimo and Doran.¹⁰ This study suggested that curriculum materials had little influence on modifying junior high-school students' attitudes toward environmental problems. Miller and Bachman¹¹ reported that the environmental attitudes of United States high school senior classes showed little change over the four-year period of 1976-1979 concerning pollution, overpopulation, and energy conservation.

It appears that changing students' attitudes is difficult and that insufficient efforts have been made in the present curricula to develop students' attitudes towards environmental issues and problems. This study points out an area of discrepancy between the actual and desired states of Egyptian environmental education regarding the development of students' attitudes towards environmental issues. The present data indicate the need for concerted efforts to reorganize environmental education programs in order to make them more effective in this regard. This is what the entire sample emphasized in their response to item #27

in the questionnaire. To develop students' attitudes towards the environment, the writer offers the following recommendations:

- (1) Educational and religious establishments should work together to create programs that develop moral and aesthetic values and attitudes in the students to maintain the quality of human life and the quality of the environment.
- (2) Outdoor studies and activities should be utilized in future environmental education programs to develop in students feelings of individual and collective responsibility for environmental protection and improvement.

1.d Skills of Environmental Education (SK)

The students' skills of environmental education is the fourth category of environmental education goals and objectives in the proposed model presented in Chapter II. Since the 1977 Tbilisi Intergovernmental Conference, environmental education has received increasing attention as a vehicle for the development of students skills to identify, investigate, and solve environmental problems. These abilities and others are most critical in environmental education.

The report of the Tbilisi Conference states that, "environmental education programs have to do more than condition students to know what exists. The emphasis on learning what is presently known must be tempered so that both teachers and students can find better solutions to present problems, solve unanticipated problems, and create new knowledge."¹²

Data from Chapter IV (Table 17) indicate that the two groups perceived the present science and social science curricula in the Egyptian secondary schools as being ineffective in the development of the students' skills of environmental education. Figure 4 illustrates in detail that the majority of the entire sample perceived the present curricula as being ineffective or moderately effective in the development of the students' ability to record, investigate, analyze, synthesize, identify and evaluate alternative solutions for environmental problems and to investigate, record, and analyze data on problems.

The lack of emphasis in the present Egyptian secondary school curricula on objectives which focus on helping students to develop their ability to attack and seek solutions for environmental problems is contrary to the recommendations for environmental education objectives laid down by the 1977 Tbilisi Declaration. The data of the skills category conform with the findings of the UNESCO questionnaire which suggested that there exists a definite lack of a problem-solving approach in world environmental education programs.¹³ It is also reported in the UNESCO survey questionnaire that the Arab states suffer from a lack of organizations and programs in environmental education.¹⁴

Roth¹⁵ reported that "the presence of environmental education in public school curricula in the United States can often be characterized by loose organization and little sense of direction." Childress¹⁶ found in his survey of 301 United States environmental education programs and projects that less than 40 percent of the programs

surveyed considered the following to be primary objectives:

1. Development of the students' ability in environmental data collecting techniques.
2. Development of the role of contributing factors (technology, legislation. . .) to the cause of environmental problems.
3. Evaluation of the ways in which various value systems modify and shape the environment.
4. Synthesis of alternative solutions to environmental problems into a comprehensive plan.

In comparison between the actual state (present data) and the desired one (provided by the model) regarding students' skills, one can conclude that important skills required to understand and solve environmental problems are not adequately engendered in current programs. It appears that a great deal remains to be done to promote and develop the students' ability to solve environmental problems in Egypt. The evidence for this conclusion is the consensus among the entire sample that in the future, the emphasis placed on the development of the students' skills to solve environmental problems should be increased substantially (item 36). Based on the findings of the skill category, and the reviewed literature, the researcher suggests the following recommendations:

- (1) Skills for analyzing and solving environmental problems should be seriously considered when designing environmental education programs in the Egyptian secondary schools.
- (2) Environmental education programs should be designed in such a way that enable students to practice their ability to record,

document, and report observations of environmental problems.

Environmental education programs will have to include appropriate approaches and techniques in order to develop problem solving abilities.

- (3) Environmental education programs should include unanticipated problems and open-ended questions so that the students will realize that there is always much more to study.

1. e Participation in Environmental Planning and Activities (PA)

The students' participation in environmental planning and activities is the fifth category of environmental education goals and objectives in the proposed model presented in Chapter II. This model provides some statements about the desired state of students' participation in pro-environmental actions. The present crisis in environmental education "has often centered on the lack of development of curricula designed to foster positive environmental behavior. Many environmental educators have stated that the ultimate goal of environmental education must be the resolution of environmental problems. However, most existing environmental education curricula do not include specific components that identify and develop competencies in environmental problem solving."¹⁷

Data from Chapter IV (Table 18) indicate that the science and social science teachers sampled perceived the present curricula in the Egyptian secondary schools as being ineffective in providing students with opportunities to participate in environmental planning and activities. Figure 5 shows in detail (item by item) that the entire

research sample perceived the present curricula as being ineffective or moderately effective in providing students with opportunity to take positive environmental actions in order to solve environmental problems. These curricula are ineffective in providing students with opportunities to examine critically the ecological implications of technological advances, or to evaluate actions taken by decision-makers with respect to their influence on the environment. This lack of participation in pro-environmental behavior might not only be ascribed to the ineffectiveness of school curricula but also to the inability of the larger Egyptian society to handle environmental problems. This should come as little surprise, since schools tend to reflect the dominant values of any society.

In Egypt, as might be the case all over the world, schools tried to avoid religious involvement, preferring instead to rely on science for solutions to environmental problems. Science can only tell us how nature works. What is missing in most modern education is any clear prescriptions of how to live in harmony with nature. Swan¹⁸ pointed out that "harmony" is based upon sympathetic understanding and only partially upon rationale, logical, deductive understanding.

This is exactly what religion is all about. For example, in Islam, one can find so many verses in The Holy Qur'an which talk about how to deal with and use natural resources wisely and not to kill animals and destroy plants even during war unless there is a real need for food or shelter. Spiritual studies have for centuries asserted that health, meaning, and purpose can only be achieved when people can align themselves with nature and then develop their minds." Stapp¹⁹

suggested that it is the goal of environmental education to create pro-environmental behavior by "producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of, and skilled in how to become involved in helping to solve these problems, and motivated to work towards their solution." Hungerford and Peyton²⁰ emphasized that "the curricular deficiency in environmental problem solving could be best improved by a methodology which incorporated environmental action training.

The researcher believes that, since participation is the most important category of environmental education goals and objectives, one can understand how serious is the deficiency of the present curricula in providing Egyptian secondary school students with opportunities to participate in seeking solutions to environmental problems. This might explain the high agreement among the entire sample that, in the future, the emphasis placed on the development of students' participation in environmental planning and activities should be increased substantially (item 41). These findings conform with those reported by Pettus and Schwab²¹ about the Virginia public schools. They found that environmental education was oriented toward factual science and mainly focused on awareness of environmental problems and with their effects on people. The researcher would agree with Pettus and Schwab when they pointed out that curricula should be focused on action-oriented projects in order to help students plan solutions for solving present and future environmental problems.

The present data indicate that the actual state of the students'

participation in pro-environmental behavior is still far behind the desired state as outlined in the proposed model presented in Chapter II. Based on the findings of the participation category and the reviewed literature, the researcher suggests the following recommendations:

- (1) An environmental action training strategy should be created to develop students who are not only knowledgeable and committed to solve environmental problems but who also possess the competencies necessary to address and remediate present environmental problems effectively and to prevent new ones in the future. This could be done through simulation, role playing, and simulation gaming.
- (2) Active involvement of students in political processes should be encouraged to promote citizenship participation in decision-making processes regarding environmental issues and problems.
- (3) Mosques and churches should coordinate their efforts with schools in order to promote effective participation of students in environmental planning and activities. This could be done at interval periods of the school year or during summer vacation.

Conclusion

Study of Figure 6 leads us to the following conclusions:

A-The goals and objectives of environmental education perceived by teachers as being adequately addressed in current science and social

science curricula in the Egyptian secondary schools were those relating to awareness and knowledge. This conclusion reveals that existing curricula in these two areas mostly revolve around the cognitive domain of educational objectives. However existing curricula suffer from a lack of historical, societal, and international perspectives when dealing with environmental problems.

B-Goals and objectives concerning attitudes towards environmental issues and problems occupied the second position compared to awareness and knowledge in achievement in science and social science curricula in the Egyptian secondary schools. This conclusion means that existing science and social science curricula have less effectiveness in achieving affective goals and objectives of environmental education as compared to cognitive goals and objectives.

C-The goals and objectives of environmental education, as perceived by teachers as receiving least attention in current curricula were those relating to skills and participation. This conclusion shows that existing science and social science curricula in the Egyptian secondary schools suffer from a lack of opportunities and educational situations needed to develop students' skills of pro-environmental actions.

(2) Incorporating Environmental Education into School Curricula (IN)

Few people doubt the need to include environmental education in school curricula. However, "there is no universal model for the incorporation of environmental education into educational processes. The approaches, procedures, and progressive stages of integration must

be laid down in the light of the specific conditions, ultimate goals and educational and socio-economic structures of each country."²²

The proposed model presented in Chapter II provides two possible approaches to the incorporation of environmental education into secondary school curricula. These are the mono-disciplinary and multi-disciplinary approaches. Data from Chapter IV (Table 19) indicate that the two groups of teachers perceived the incorporation of environmental education into the Egyptian secondary schools differently. The researcher believes that the significant difference existing between the two groups may be ascribed to:

1. The bias of each group of teachers to their subject matter.

Teachers want to teach what they already know. In other words, teachers of each discipline tend to emphasize the role of their discipline in environmental education. This also could lead each group of teachers to minimize the role of the other disciplines in environmental education.

2. There was some kind of misunderstanding between the two groups of teachers concerning item 44 (teaching EE only through science courses) and item 45 (teaching EE through science and social science courses). The lack of integration between science and social science courses might be the reason behind this misunderstanding. Teachers of both disciplines have little experience with integration between science and social science because they were taught the two disciplines as separate entities.

Figure 7 shows that there was a consensus among the research

sample that environmental education curricula should be designed by teachers, students, parents, and environmental science experts (item 43).

There was a consensus among the research sample that environmental education is important and should be incorporated not only into science and social science but also into other school curricula (items 45, 46). However, a significant Chi-square value (Table 34 in Appendix H) was found between the two groups of teachers concerning item 43 and 45. Social science teachers reported more emphasis is needed on mutual cooperation in designing environmental education curricula (item 43) and indicated environmental education should be taught through both science and social science courses (item 45) than was the case with science teachers. These results conform with those reported by Hepburn²³ that coordinated modular interdisciplinary environmental instruction offered in both social studies and science courses is more effective than the same type of instruction offered only in a science or a social studies course.

A multidisciplinary approach was perceived by the research sample to be the most appropriate approach to incorporate environmental education into the Egyptian secondary schools (item 47). The present data indicate that there is a gap between the actual and desired status regarding the incorporation of environmental education into secondary school curricula. However, this gap needs to be further investigated by researchers and by curriculum designers in order to determine the most appropriate approach to the incorporation of environmental education in the Egyptian secondary schools. Hungerford and Peyton²⁴ claim

that the multidisciplinary approach could be "appropriate at all age levels with some exceptions at secondary and tertiary levels." To the best of the researcher's knowledge, no studies have been done to support the counter claim that the multidisciplinary approach is not the appropriate approach at the secondary level. Further studies should be done to determine the most effective approach for incorporating environmental education into the Egyptian secondary schools. These studies should consider the specific conditions, ultimate goals, and the educational and socio-economic structure of the Egyptian setting. However, the researcher, by and large, suggests that a multidisciplinary approach could be utilized to incorporate environmental education into the Egyptian secondary school curricula. This could be done through the creation of some units that deal with environmental concepts which could be incorporated into existing school curricula. This approach requires less radical change in school programs than developing new courses and, therefore, it may be more acceptable to policy makers, teachers, and school administrators.

(3) Environmental Education Curriculum Content (EECC)

The goal of environmental education is not to dispense odd bits of information in the classroom or to fill the students' minds with unrelated facts. Environmental education involves teaching through action. Knowledge, attitudes, and skills assume their full significance in contact with environmental problems, giving the students an opportunity to take part in the socio-political decisions that affect their environment.²⁵

The proposed model in Chapter II provides nine environmental education concepts to serve as guidelines for environmental education curriculum content in the Egyptian secondary school.

Environmental concepts provide foundation upon which curriculum planners and developers construct environmental education programs. In problem-focused environmental education, environmental concepts could provide a frame of reference against which environmental problems of any given environment may be identified.²⁶

Data from Chapter IV (Table 20) indicate that the research sample perceived the nine concepts presented in the fourth part of the questionnaire as being important to environmental education in the Egyptian secondary schools.

Figure 8 shows that there was a consensus among the research sample that the nine concepts are important to environmental education. These concepts are ecosystem, population, economics and technology, environmental decisions, environmental ethic, man's stewardship, contamination, public health and environmental quality, and modern agriculture and food supply. Only the concepts of "ecosystem" and "population" were perceived differently by the two groups (Table 34). Science teachers place greater importance on these concepts (ecosystem and population) than social science teachers. This difference in perception may be ascribed to the different nature of the educational background of each group. Stapp and Cox²⁷ stated that the first five concepts mentioned above are basic to environmental education programs if they are to develop an environmentally literate citizenry. These concepts include the awareness, knowledge, and understanding of living

and non-living things and their interactions; the social, economic, cultural, political and aesthetic influences of the populations of people; the need for, and processes of decision making; and the development of an environmental ethic which would motivate the learner to adopt a life style based on the balance between the quality of human life and the quality of the environment. Roth²⁸ identified three environmental concepts covering twelve major areas. These areas are: environmental management, management techniques, economics, environmental problems, environmental ecology, adaptation and evolution, natural resources, socio-cultural evolution, culture, politics, the family, and psychological aspects. Naylon²⁹ supported the interdisciplinary nature of environmental education. He recommended that environmental education programs should be focused upon the socio-ecological aspects of the environment.

Since the overall data show conformity with international studies in this area, one can conclude that the nine environmental concepts proposed in this study are acceptable to teachers. Based on this conformity, the writer suggests that these concepts should be considered by curriculum designers as guidelines for future environmental education programs in the Egyptian secondary schools.

(4) Teaching Methods of Environmental Education (TM)

The future development of environmental education will not lie merely in bringing about a number of changes in educational systems and teaching methods. This task will require the application of new

concepts, new methods, and new techniques as part of an overall effort stressing the interdisciplinary nature of environmental education.³⁰ A comprehensive view is lacking in most educational programs today, which tend to emphasize specialization and encourage too narrow a view of reality. Consequently, most teachers are unfamiliar with the interdisciplinary approaches directed towards solving environmental problems.³¹ To be effective, environmental education programs should draw students' attention to contemporary environmental problems and to the dangers to which they expose the world. Because these problems can only be understood and addressed effectively from an interdisciplinary perspective, teaching methods and techniques should be modified to help students acquire the knowledge, attitudes and skills needed for comprehending, identifying, analyzing and proposing solutions to environmental problems.³²

The proposed model presented in Chapter II provides some statements about the methodology of environmental education. These statements were included in the teachers' questionnaire in order to obtain information about the actual situation regarding the use of environmental education teaching methods in the Egyptian secondary schools.

Data from Chapter IV (Table 21) indicate that the two groups of teachers hold different perceptions concerning teaching methods of environmental education in the secondary schools. Figure 9 shows that the majority of the research sample reported that they occasionally or rarely use teaching methods presented in the questionnaire. The only exception was the response to item 65 that deals with "multi-media

approach." However, Table 34 in appendix H shows significant difference in Chi-square value between the two groups in their response to all items of teaching methods (58-66). These differences might be ascribed to the different nature of each discipline or to the misunderstanding among teachers that some specific teaching method can be used only in teaching one discipline and not in teaching another. The inquiry approach (item 59) offers a case in point. These results suggest that a great deal remains to be done in the area of teaching methods of environmental education. Environmental education methods should be considered seriously in any effort to improve environmental education in Egypt.

These findings may be ascribed to the following:

1. Teaching methods of natural science and social science are quite different due to the different nature of each discipline. The two disciplines are taught separately. Teachers of each discipline use teaching methods which emphasize the specific nature of the discipline regardless of the interdisciplinary nature of environmental education. Consequently, existing science and social science curricula do not include educational situations that require teaching methods such as are presented in part five of the teachers' questionnaire.
2. There was no time available to use various instructional media due to the crowded school schedule.

A review of findings from literature dealing with teaching methods of environmental education could shed some light on the current

situation of this area in relation to the present study. Asche and Shore³³ reported that formal environmental programs can have a positive effect on a students' conservation behavior. Falk and Balling³⁴ indicated that educators view field trips as important and have clear cognitive and affective benefits, and that certain characteristics of learner and field trip setting influence students attitudes, behavior and learning.

Carlson and Baumgartner³⁵ reported that attending a one-week intensive session in a natural resource camp appears to alter favorably some environmental attitudes of those youths who attended that camp. Stapp³⁶ and Cummings³⁷ stated that problem solving and valuing are integral parts of environmental education. In decision making, problem solving integrates with the valuing process. Valuing is the link between thinking and action. Project Learning Tree ³⁸ has adopted values clarification techniques in its environmental education approach. This project emphasizes students' interaction with natural and social environment through outdoor activities. The International Environmental Education Program (IEEP)³⁹ emphasized the use of gaming and simulation in environmental education. The study proposes guidelines for the creation of original games by curriculum developers or teachers and provides a series of existing, easily conducted games related to environmental concerns. Hall⁴⁰ found that a wilderness inquiry method combined with a novel and relevant setting, yielded superior statistical results over the conventional methods in ecological thinking.

The overall findings reveal that teaching methods in existing Egyptian science and social science teaching methods are not compatible with the methods contained in the environmental education model defined in Chapter II. Existing programs should be reorganized to allow the development and implementation of teaching strategies and techniques of environmental education that would be suitable for the Egyptian setting. Teaching strategies could incorporate a holistic approach and encompass the various natural, social, cultural and economic aspects of the environment. Based on the findings of the present study and other studies in the reviewed literature, the researcher presents the following recommendations:

- (1) Environmental education programs should repudiate the individual character of each traditional discipline to avoid the differences stemming from their respective methodologies which make it difficult for the learner to apprehend the environmental problems. To do so, outdoor activities (field trips, mapping, residence camps, etc.) should be given more attention in future environmental education programs.
- (2) A team teaching approach should be utilized, at the same or different times, in teaching about the environment and its associated problems.
- (3) The value clarification technique should receive more attention when dealing with environmental problems.
- (4) Teachers in training should be given an understanding of as wide a range as possible of environmental education materials and aids, with special reference to low cost materials and

local circumstances.

(5) Teacher Training of Environmental Education (TT)

Without underestimating the importance of other factors, one can say that the possibilities of integrating and incorporating environmental education into school curriculum depend essentially on the training of personnel responsible for putting the programs into effect.⁴¹ That is, without well trained and motivated teachers, the best designed curricula, physical facilities, and instructional materials will not lead to successful environmental education.

"Teachers need to be made aware of environmental problems in the context of general human development and to understand the importance of inter-disciplinary dialogue and coordination with other educators who are contributing to environmental education."⁴² The Tbilisi Conference (1977) has also emphasized the need for training of personnel; recommendations 10 and 11 recognized the importance of pre-service education and the need for teachers to understand the importance of environmental education in their teaching.⁴³

The model presented in Chapter II provides some statements about the desired state regarding training of teachers for environmental education programs for the Egyptian secondary schools.

Data from Chapter IV (Table 22) indicate that both groups of teachers sampled perceived the present teacher training programs in the Egyptian secondary schools as being ineffective in providing teachers with sufficient information to educate students about environmental concerns.

The relatively high means of the two groups (Table 22) may be attributed to the high agreement of the research sample on items 69, 70, and 71. These responses highlight the serious need for reform of environmental education teacher training programs for Egypt's secondary school.

Figure 10 shows the response of the research sample to each item of the teacher training part. These responses provide evidence in support of the above interpretation. It is notable that there was a significant difference in Chi-square value (Table 34 Appendix H) between the two groups regarding item 67 (pre-service training). Science teachers reported more satisfaction with their pre-service training programs regarding environmental information than was the case with social science teachers. This difference suggests the need for more active involvement of perspective social studies teachers in environmental education programs.

The current situation of teacher training programs of environmental education can be revealed through a review of findings from literature dealing with pre-service and in-service environmental education for teachers in different countries as follow:

Affective Domain

Stapp⁴⁴ reported that it appears that most of the activity in the pre-service teacher training affective domain is included as a part of the coursework in general environmental study curricula. European countries reported little that indicated extensive efforts to increase

teacher awareness of the environment as a means of enhancing their effectiveness in imparting environmental sensitivity to primary school children or to secondary school students.

In Czechoslovakia,⁴⁵ student teachers of nursery school level are taught to use the over all framework of school studies to impart a more holistic environmental view in students.

In Norway,⁴⁶ some teacher education schools have found that training in the team teaching method is an effective means of positively affecting teachers' values. There is a need for a psychological and sociological foundation in social change skills as a means of equipping teachers to deal successfully with value aspects of environmental education.

Cognitive Domain

In many European countries the cognitive domain of environmental study is usually covered as a part of traditional teacher education, especially in natural and social science. Although there are some encouraging aspects of environmental education in teacher education colleges, most of the courses are discipline oriented. The integration of environmental topics across disciplinary boundaries is left to individual students, who often have little background in these areas and limited ability to relate the information from one field to another.⁴⁷

Methodology in Environmental Education

In England, environmental studies methodologies have been taught

at teacher training colleges since the 1960's.⁴⁸ The Federal Republic of Germany includes environmental protection in general methodologies.⁴⁹ The International Union for the Conservation of Nature and Natural Resources (IUCN) recognizes that effective environmental education programs should include studies of real situations in order to emphasize interpersonal interaction between teachers and students.⁵⁰

Towler,⁵¹ found that more institutions and students in Canada are involved in courses dealing with environmental content than with methodologies relating to techniques for the teaching of content. He concluded that, in Canada, there is a great need for pre-service teacher education in environmental education methods.

Stapp⁵² pointed out that varying degrees of integration of environmental studies with other subjects and interdisciplinary methodological approaches may be found. Most teacher education Colleges in Norway and England offer integrated science courses. England recognizes that environmental education lends itself to team teaching methods. In Italy, a lack of interdisciplinary teacher cooperation is a major constraint in present environmental education efforts. The Swedish Curriculum for the Comprehensive School includes collective teaching as an important component of the curriculum. Troms Teacher Training College in Norway emphasizes group work during methodological training in the study of relevant literature and discussion.

Hounshell and Liggett⁵³ conducted a study to investigate the effectiveness of in-service training programs for teachers on the students' knowledge and attitudes. The authors conclude that teacher in-service training supplemented by follow-up class activities, yields

increased student knowledge of environmental concerns and fosters positive environmental attitudes.

Fouda⁵⁴ provided an instructional model for secondary school teachers in Egypt. Through this model, the subject matter of the concept of mutualism among living things in nature, which forms a unit in the tenth grade curriculum, was broken down into component concepts, examples, and factual details. The components resulting from the analysis were organized in a hierarchy and sequenced in two instructional designs based on the learning theories of Ausubel and Gagne. She concluded that providing secondary school teachers with such models would benefit teachers as well as students.

The data of this study indicate that teachers perceive that existing Egyptian pre-service and in-service teacher training programs are ineffective in providing teachers with sufficient information to educate students about environmental concerns. The present data show a big gap between the actual and desired states in the area of teachers' training for environmental education in Egypt. Based on the findings of this study and other studies in the reviewed literature, the researcher offers the following recommendations to improve existing environmental teacher training programs in the Egyptian secondary schools. These recommendations are:

1. Teachers should be familiarized and trained to handle values in classrooms in order to develop students' awareness of the environment. This could be essential in helping students to realize their underlying values as determinants of attitudes and behavior.

2. Practicing teachers should be provided with sound competencies in cognitive domain of environmental education. This may include the philosophy and theory underlying environmental education; ecological, physical, and biological sciences; economics; natural resources policy; psychological and sociological studies; and community field studies.
3. Practicing teachers should be helped to incorporate environmental concepts into the traditionally discipline centered curricula. In other words, interdisciplinary cooperation and group work (workshops) could be utilized during environmental education teacher training programs.
4. Team teaching technique should be included in teacher training programs as an integral part of interdisciplinary approach of environmental education.
5. Teachers should be trained in ways to make use of local environmental field studies in order to help their students gain direct learning experiences. This should help prepare teachers to better facilitate and appreciation by students for their environment.
6. Local environmental problems should be studied in teacher training programs. That is, the development of problem-solving skills in teachers is essential if they are to help develop the same skills in their students.
7. Special mass-media programs should be organized and utilized in teacher-training programs in order to provide teachers with up-to-date experiences in the area of environmental

education.

(6) Constraints and Suggestions (CS)

Despite the cultural, social, and political differences existing among countries all over the world, there appear to be some common constraints that affect the implementation of environmental education into school curricula in nearly all schools. It is vital for environmental educators to identify constraints confronting environmental education and team with fellow educators to help solve common problems.⁵⁵ The 1975 UNESCO World Survey of Environmental Education found that at the world-wide level the dominant environmental education needs are: funds; instructional aids; physical facilities; programs; and, personnel.⁵⁶

Data from Chapter IV (Table 23) indicate that the research sample recognized most of the thirteen constraints presented in part VII of the questionnaire as being the major constraints that preclude the implementation of environmental education in the Egyptian secondary schools.

Figure 11 illustrates in detail that members of the research sample perceived the present status of environmental education in the Egyptian secondary school to be inhibited by the lack of; 1) facilities and instructional aids (97%); 2) in-service training (88%); 3) well-defined goals and objectives (87.5%); 4) funds (82%); 5) pre-trained teachers (79%); 6) programs (78.5%); 7) students' interests (67.5%); 8) time (63.1%); 9) community participation (50%); 10) clarity of environmental education (36%); and 11) school participation (33%).

There was a significant difference in Chi-square values between the two groups regarding some items. Science teachers indicated a greater realization and understanding of the reliability and achievability of environmental education programs (item 74). They also indicated greater concern over lack of environmental education programs (item 76); lack of clarity of environmental education (item 78); and a lack of facilities and instructional aids (item 81) than was the case with social science teachers.

Review of the literature reveals similarities between the present findings and those of others.

Childress⁵⁷ had conducted a study to investigate factors that have served as constraints to the development of environmental education curricula. He found that the constraints felt to be "primary" by his research subjects were: inadequate funding at all levels; lack of time to develop curricula; and, inadequate pre-service and in-service teacher training.

Pettus and Schwab⁵⁸ conducted a study designed to determine the effects past efforts have had on environmental education in public schools in Virginia and what the future needs are as perceived by school principals. They found that instructional guides and materials were identified as needed to develop or improve environmental education. Trained personnel ranked second and financial support ranked third. The authors suggested that better training and materials as well as greater financial support are needed in environmental education.

Towler⁵⁹ conducted a national survey of Canadian practices in

preservice environmental education. He pointed out that serious needs exist for improved communications, continued research, more funding, better teaching materials, more attention, and better leadership in teacher training institutions.

The most striking findings of the UNESCO - UNEP preliminary world survey of environmental education⁶⁰ indicate that:

In Africa, the three most important needs are: (i) environmental education centers, (ii) environmental education organizations and associations, and (iii) environmental education personnel.

In the Arab states, the two major needs in environmental education are (1) organizations and associations, and (2) personnel.

At the world level,⁶¹ the dominant environmental education needs are for: (1) funds for innovation, (2) personnel, and (3) programs.

Stapp and Cox⁶² suggest that the major constraints affecting the development and implementation of environmental education programs are: a) the lack of interdisciplinary approach; b) already crowded curricula; c) value questions; and d) a shortage of well prepared classroom teachers.

Other constraints affecting the success of environmental education programs are: inflexible scheduling; resistance and apathy on the part of the community, administrators, teachers, or learners; lack of community reinforcement of parents; and youth oppression.⁶³

Based on the overall findings of this study and the reviewed literature one can conclude that a great deal remains to be done to develop comprehensive environmental education programs in the Egyptian secondary schools. This study points to:

- (1) The need for physical facilities and instructional aids to teach environmental education.
- (2) The need for effective in-service teacher training programs in the area of environmental education. Mass media and summer studies could be very helpful in this respect.
- (3) The need for well defined goals and objectives of environmental education in order to guide the development of more effective environmental education programs.
- (4) The need for more funds to establish future environmental education programs that reflect international developments in this area.
- (5) The need for more effective pre-service teacher training programs. Interdisciplinary experiences should be an integral part of a teacher's educational program while at university.
- (6) The need for more carefully organized environmental education programs that meet students interests and local environmental problems.
- (7) The need for more flexible schedules in order to incorporate environmental education into school curricula.
- (8) The need for community and school participation in the development of comprehensive environmental education programs.

Discussion of Results from Interview with Ministry
of Education Personnel and School principals

There is no doubt that Ministry of Education personnel and school principals in a developing country such as Egypt can play an important role in promoting environmental education. Ministry of Education personnel play a key role in establishing the importance of the need for teaching about the environment, developing curricula, designing materials, and in-service teacher training. School principals also play an important role in supervising environmental education programs and reporting about the effectiveness of these programs in their schools.

Data from Chapter IV show that Ministry of Education personnel and school principals perceive the five goals (awareness, knowledge, attitudes, skills, and participation) of environmental education as being adequate for the Egyptian setting. This finding reflects how much the Egyptian educational administrators and planners are concerned about what is going on in the area of environmental education.

Ministry of Education personnel and school principals perceive the existing school curricula as being ineffective in achieving environmental education goals and objectives. The data show conformity with data of the teachers' questionnaire.

The respondents emphasized the needs for very well prepared teachers, well designed programs, and adequate facilities in order to achieve environmental education and objectives. They, also suggested that environmental education should be taught not only in science and social science curricula but in all school curricula.

Ministry of Education personnel and school principals emphasized the real need for environmental education at all levels of education. They also emphasized the need to study local environmental problems in different Egyptian environments.

The over-all findings of the interview with Ministry of Education personnel and school principals show conformity with the findings of the teachers' questionnaire and the review of findings from international literature in the area of environmental education.

Pettus and Schwab⁶⁴ in their study to assess the status of environmental education in Virginia public schools found that of 313 principals responding to a questionnaire, 218 (72%) indicated that their schools provided some type of environmental education. Furthermore, they found that a greater percentage of lower level (K-7) and smaller schools (less than 800 students) provided environmental education than upper level (7-12) and larger schools (1201 students and up). A greater percentage of principals of schools identified as already providing environmental education was in favor of including environmental education in the training programs and including it as required material.

Ploutz⁶⁵ stated that school principals play a major role in curriculum development within their schools. He found that there was a smaller chance that there would be a good elementary science (i.e., outdoor education) program in a school with an administrator who did not support the effort.

The Tbilisi Conference⁶⁶ stated that "the training of qualified personnel is considered to be a priority activity. This holds good for

both initial and in-service training, for the purpose of familiarizing teachers, administrative personnel and educational planners with environment linked subject matter and educational and methodological guidelines."

Stapp and Cox⁶⁷ suggest that in-service teacher training programs should include all teachers and administrators in the development of goals and objectives, design of curriculum and incorporation of environmental education programs into school curricula.

Based on the overall findings of the interview with Ministry of Education personnel and school principals one can conclude that a considerable amount of continued effort is needed to improve environmental education in the Egyptian secondary school. There is a need to enlarge the understanding of administrative personnel and educational planners regarding environmental problems and issues. School principals need more experiences that will enable them to help their teachers and to coordinate and monitor environmental education programs in their schools.

Administrative personnel should be exposed to meetings, workshops, and discussion sessions in order to acquaint them with available human and material resources so that they can make the right decision about environmental programs at the right time. This conclusion seems to be in contradiction with the data presented in this section. However, the researcher perceived that administrative personnel may have agreed with most items of the interview card just because of their busy schedule. It seemed that some administrators agreed with the points partially because it was easier and less time consuming to do so rather than

because it was essential to their personal belief structure. This may suggest a flaw in the design of the interview card which allowed agreement with the researcher's position to be the easier action for the administrators interviewed.

For these reasons, and because the sample of administrators is small, one must be cautious in making inferences based on the data from this section of the study. However, the data acquired suggest that further study of attitudes, values, and beliefs of school administrators and Ministry of Education personnel regarding environmental education would be interesting and important in order to plan effectively for change in school programs.

CHAPTER V NOTES

1. Vande Visse, E. and Stapp, W.B. "Developing a K-12 Environmental Education Program." (Cited by: Hungerford, H.; Peyton, Ben, R.; and Wilke, R.J. Journal of Environmental Education, Vol. II, No. 3, 1980), p. 43.
2. Hungerford, Harold; Peyton, Ben R.; and Wilke, Richard J. "Goals for Curriculum Development in Environmental Education." The Journal of Environmental Education, Vol. 11, No. 3, Spring, 1980, p. 44.
3. "International Environmental Education Since Stockholm and Tbilisi, . . ." Connect, Paris: UNESCO, Vol. VII, No. 1, March, 1982, p. 2.
4. UNESCO, "E.E. in Light of Tbilisi. . .," Op. Cit., p. 24.
5. Stapp, W. and Dorothy A. Cox. Environmental Education Activities. . .," Op. Cit., p. 4.
6. Hungerford, H. and Peyton, R. Strategies for Developing E.E. . . , Op. Cit., p. 21.
7. UNESCO. Needs and Priorities in E.E.. . ., Paris, 1977, Op. Cit., p. 5.
8. _____, E.E. in the Light of. . ., Paris, 1980, Op. Cit., p. 24.
9. Schemieder, Allen A. "The Nature and Philosophy. . . Op. Cit., p. 27-28.
10. Alaimo, Samuel J., and Doran, Rodney L. A Longitudinal Study of Factors Influencing Value Preference in Environmental Problems. (Cited by Lucko, Bernard J., et. al., 1982), p. 8.
11. Miller, John D., and Bachman, Jerald G. Ecological Concern Among High School Seniors, 1976-1979. Ann Arbor, MI.: University of Michigan, Institute for Social Research, Monitoring the Future Occasional Paper Series, Paper 7, 1980. ERIC Document (ED) 201-484. (Cited by Lucko, Bernard J., et al., 1982), p. 9.
12. Cohen, Michael R. "Problem Solving as a Goal of Energy and Environmental Education." The Journal of Environmental Education, Vol. 13, No. 1, Fall, 1981, p. 17.

13. UNESCO. "Needs and Priorities. . .," 1977, Op. Cit., p. 5.
14. UNESCO. "The Belgrade Charter: A Global Frame-work for Environmental Education," Connect, Vol. 1, No. 1, Jan. 1976, p. 5.
15. Roth, R.E. A Review of Research Related to Environmental Education 1973-1976: Columbus, Ohio: ERIC/SMEAC Center for Science, Mathematics and Environmental Education, 1976. (Cited by: Hungerford et al., 1980), p. 42.
16. Childress, R.B. "Public School Environmental Education Curricula: A National Profile." Journal of Environmental Education, Vol. 9, No. 3, Spring, 1978, p. 6.
17. Ramsey, John; Hungerford, H.R.; Tomera, Audrey N. "The Effects of Environmental Action and Environmental Case Study Instruction on the Overt Environmental Behavior of Eighth Grade Students," The Journal of Environmental Education, Vol. 13, No. 1, Fall 1981, p. 24.
18. Swan, James A. "Environmental Education: A New Religion?" The Journal of Environmental Education, Vol. 10, No. 1, Fall, 1978, p. 45.
19. Stapp, W. B. et al. "The Concept of Environmental Education," The Journal of Environmental Education. Vol. 1, No.1, 1969, p. 31.
20. Hungerford, H.R., and Peyton, R.B. Teaching Environmental Education. Portland, Maine: J. Weston Walch, Pub., 1978, (Cited by: Ramesy, et. al. 1981), p. 24.
21. Pettus, Alvin and Schwab, Karl. "A Survey of Virginia Public School Principals on the State of Environmental Education." The Journal of Environmental Education, Vol. 10, No. 2, Winter, 1978-1979, p. 41.
22. UNESCO. E.E. in the Light of. . .," Paris, 1980, Op. Cit., p. 35.
23. Hepburn, Mary A. "Environmental Knowledge and Attitude Changes in High School Program of Interdisciplinary Social Studies and Science Education." In Craig B. Davis and Arthur Sacks (eds.), Current Issues in Environmental Education IV. Columbus, OH: Eric Clearinghouse for Science, Mathematics, and Environmental Education, 1978, 175-185. Eric Document (ED) 167-407.
24. Hungerford, H. and Peyton, R. "Strategies for Developing. . .," Op. Cit., p. 13.
25. UNESCO., E.E. In the Light of. . .," Paris, 1980, Op. Cit.,

p. 44.

26. Ibid., p. 44.
27. Stapp, W. and Cox, D. Environmental Education Activities. . . ,
Op. Cit., pp. 14-15.
28. Roth, Robert E. "Fundamental Concepts for Environmental
Management Education K-16." The Journal of Environmental
Education. Vol. 1, No. 3, (Spring, 1970), pp. 69-73.
29. Naylor, Michael J., "Needed: A Real World Program of
Environmental Education" The American Biology Teacher.
Vol. 32, No. 7, Oct., 1970, pp. 404-409.
30. UNESCO. "The Tbilisi Declaration. . . ," Op. Cit. p. 5
31. _____. "E.E. in the Light of . . . ," Op. Cit., p. 42.
32. Ibid., p. 43.
33. Asche, J., and Shore, B. "Conservation Behavior as the Outcome
of. . . ," Op. cit., pp. 32-33.
34. Falk, John H., and Balling, John D. Setting a Neglected Variable
in Science Education: Investigation into Outdoor Field Trips.
Final Report. Edgewater, MD: Chesapeake Bay Center for
Environmental Studies, 1979. ERIC Document (ED) 195-441.
35. Carlson, J.E., and Baumgartner, D. "The Effects of Natural
Resource Camps on Youths." The Journal of Environmental
Education, Vol. 5, No. 3, Spring, 1974, p. 7.
36. Stapp, William B. Development, Implementation and Evaluation of
Environmental Education Programs (K-12). University of Michigan,
1973, p. 12.
37. Cummings, Stanley I., "Methodology for Environmental Education,"
The Journal of Environmental Education, Vol. 6, No. 2, (Winter,
1974), pp. 17-18.
38. Project Learning Tree, Supplementary Activity Guide for Grades 7
through 12, The American Forest Institute, Inc., Washington,
D.C., 1977, pp. V-VI.
39. "International Environmental Education Since Stockholm and
Tbilisi," Connect, Paris: UNESCO, Vol. VII, No. 1, March, 1982,
p. 3.
40. Hall, Garry L. "The Teaching of Ecology in a Novel and Relevant
Wilderness Setting and its Effects on Ecological Thinking, Feeling
and Perceiving of Elementary School Youth." Unpublished Ph.D.

Dissertation, University of Montana. Dissertation Abstracts International 41 (1980) No. 8:3524-A.

41. UNESCO, Environmental Education in the Light. . .," Op. Cit., p. 47.
42. Stapp, W.B., et al. "An Analysis of Pre-service Environmental Education of Teachers in Europe and an Instructional Model for Furthering this Education." The Journal of Environmental Education, Vol. 12, No. 2, Winter, 1980-81, p. 3.
43. Stapp, W. B. et al., "An Analysis of Pre-service e.e. . .," Op. Cit., p. 4.
44. Ibid., p. 4.
45. National Swedish Board of Education. Curriculum for the Comprehensive School. Stockholm, Sweden: 1971, pp. 1-122. (Cited by: Stapp, et al., An Analysis of Pre-service. . ., 1980-81), p. 4.
46. Stapp, W. B., et. al. "An Analysis of Pre-service. . .," Op. Cit., p. 4.
47. Stapp, W. B., et. al. "An Analysis of Pre-service. . .," Op. Cit., p. 4.
48. Ibid., p. 5.
49. Ibid., p. 5.
50. Ibid., p. 5.
51. Towler, John O. "A Survey of Canadian Preservice Training in Environmental Education." The Journal of Environmental Education. Vol. 12, No. 2, Winter 1980-81, p. 11.
52. Stapp, W.B. "An Analysis. . .," Op. Cit., p. 5.
53. Hounshell, Paul B., and Liggett, Larry "Environmental Education One Year Later." The Journal of Environmental Education, Vol. 8, No. 1, Fall, 1974.
54. Fouda, Sohier Z. "Effectiveness of Two Instructional Designs Based on Gagne's Learning Hierachy and Ausubel's Subsumption Theory and Two Modes of Presentation in Teaching the Concept of 'Mutualism in Nature' to Tenth Grade Girls in the Egyptian High Schools." Unpublished Ed.D. dissertation, Temple University. Dissertation Abstracts International 1980 No. 8:3488-A.
55. Stapp, William B., and Cox, Dorthy A. Environmental Education

- Activities Manual. (Farmington Hills: Michigan, 1979), p. 6.
56. UNESCO. "The Belgrade charter: A Global. . .," Op. Cit., p. 5.
 57. Childress, R.B. "Public School Environmental Education. . .," Op. Cit., pp. 9-11.
 58. Pettus, A. and Schwab, K. "A Survey of Virginia. . .", Op. cit., pp. 35-39.
 59. Towler, John O. "A Survey of Canadian Pre-service. . .," Op. Cit., p. 16.
 60. UNESCO. "Regional Needs and Priorities in Environmental Education," Connect, Vol. 1, No. 3, Sept. 1976, p. 3.
 61. UNESCO. "The Belgrade Charter. . .," Op. Cit., p. 4.
 62. Stapp, W. B., and Cox, D.A. "Environmental Education Activities. . .," Op. Cit., pp. 6-7.
 63. Ibid., p. 7.
 64. Pettus, A. and Schwab, K. "A Survey of Virginia. . .," Op. Cit., pp. 39-41.
 65. Victor, E. and Lerner, M.S. Reading in Science Education for the Elementary School. Toronto: The McMillan Company, 1969. (Cited by: McCaw, Steven C., The J. E.E. Vol. II, No. 2, Winter, 1979-80), p. 18.
 66. UNESCO. "National Training Activities in Environmental Education," Connect, Vol. IV, No. 2, June, 1979, p. 1.
 67. Stapp, W.B. and Cox, D.A., "Environmental Education Activities. . .," Op. Cit., p. 26.

CHAPTER VI

SUMMARY, CONCLUSIONS, RECOMMENDATIONS

This chapter contains: a summary of the study; conclusions derived from data analysis; recommendations for policy makers and educational planners relevant to environmental education in Egypt and other developing countries, especially the Arab countries; and, suggestions for further study.

Summary of the Study

The Problem

The overall purpose of this study was to assess the current state (1982) of environmental education in the Egyptian secondary schools as perceived by science and social science teachers and Ministry of Education personnel and school principals. Accordingly, answers were sought to the following questions:

1. To what extent do teachers perceive that science and social science curricula in the Egyptian secondary schools achieve the environmental education goals and objectives outlined in the model proposed in Chapter II?
2. How do secondary science and social science teachers perceive the incorporation of environmental education into school curricula?
3. To what extent do secondary science and social science

teachers perceive that environmental education curricula in the Egyptian secondary schools include content that is suggested in the proposed model?

4. To what extent do secondary science and social science teachers perceive that environmental education teaching methods used in the Egyptian secondary schools reflect those proposed in the model?
5. To what extent do secondary science and social science teachers perceive that teacher training programs at the Egyptian secondary level reflect the ideals presented in the proposed model?
6. What are the constraints perceived by secondary science and social science teachers which limit the development of environmental education in the Egyptian secondary schools?
7. How do Ministry of Education personnel and secondary school principals perceive the state of environmental education in the Egyptian secondary schools?

Research Hypotheses

For the purpose of this study, ten null hypotheses were stated to test difference between the two groups of the research sample concerning the status of environmental education in the Egyptian secondary schools. These ten null hypotheses were stated in Chapter I.

Procedure

Science and social science teachers in the Egyptian secondary schools were chosen as the respondents for the questionnaire because it was believed that they were in a better position than any other group to know what situations existed in their respective schools relative to the status of environmental education. Ministry of Education personnel and secondary school principals were interviewed because of their important role in promoting environmental education.

A sample of 320 secondary school teachers in Egypt (200 science teachers and 120 social science teachers) responded to an environmental education questionnaire (600 questionnaires were distributed).

The sample was chosen by a stratified sampling technique which assured representation of the different types of schools present in Egypt based on size, geographical location, and socio-cultural environment.

The questionnaire has a total of 86 items divided among 10 categories. The validity and reliability of the questionnaire were insured. The questionnaire was administered to the research sample during March and April of 1982. The questionnaire was designed to solicit responses that would help answer the questions addressed in the study.

During the period of data collection, 5 Ministry of Education personnel and 10 school principals were interviewed to collect their opinions concerning the status of environmental education in the Egyptian secondary schools. The interview card consisted of questions

which sought the respondents' opinions relative to the concerns addressed.

The statistical techniques used for data analysis utilized Multivariate Analysis of Variance (MANOVA); Univariate F-test; descriptive statistics (mean and standard deviation); Frequencies, and Chi-square.

Results of Teachers' Questionnaire

In order to answer the first six research questions, the ten null hypotheses were tested using the F-test technique. The suggestions which were made by some respondents with regard to open-ended questions #42, 57, 72, and 86 have been examined in the context of the conclusions and recommendations. The results of testing the ten null hypotheses were as follows:

1. There was a significant difference between the opinions held by the two groups of the research sample concerning:
 - a) The effectiveness of science and social science curricula in the development of students' awareness of environmental issues and problems (Table 14).
 - b) The incorporation of environmental education in school curricula (Table 19).
 - c) Teaching methods of environmental education in the Egyptian secondary schools (Table 21).

There was no significant difference between the opinions held by the two groups of the research sample concerning:

- a) The effectiveness of the present curricula in the

development of the students' knowledge, attitudes, skills, and participation in environmental planning and activities (Table 15, 16, 17, 18).

- b) Environmental education curriculum content, teacher training, and major constraints that preclude the development and implementation of environmental education in the Egyptian secondary schools (Table 20, 22, 23).

Conclusions

Based on the results derived from the responses of the Egyptian secondary school teachers to the questionnaire used in this study, the following conclusions can be drawn:

1. The present science and social science curricula were preceived as being moderately effective in the development of the students' awareness of environmental issues and problems. The data regarding the awareness category indicate that there has been some degree of response in Egypt to international developments in the area of environmental education.
2. The present curricula were perceived as being moderately effective in the development of the students' knowledge of environmental issues and problems. At the same time these curricula were perceived to be ineffective in the development of students' knowledge of historical, societal, and international efforts to solve environmental problems.
3. The present curricula were perceived to be ineffective or only moderately effective in providing students with opportunities

to develop their attitudes towards environmental issues and problems. These curricula were perceived to be of little help in providing students with opportunities to develop the spirit of team work, sharing environmental information, moral and aesthetic values, and individual and collective responsibility that is needed for effective citizenship.

4. The present curricula were perceived to be ineffective in the development of the students' skills which are needed to solve environmental problems. The persons sampled perceived a serious lack in present curricula regarding the development of the students' ability to investigate; record; analyze; synthesize; identify; and evaluate alternative solutions for environmental problems.
5. The present curricula were perceived to be ineffective in providing students with opportunities to participate in positive environmental actions in order to protect the environment and solve its associated problems. There exists a definite lack in these curricula of a means to provide students with opportunities to examine critically the ecological implications of technological advances, or to evaluate actions taken by decision-makers with respect to their influence on the environment.

Regarding curriculum content for environmental education in the Egyptian secondary schools the goals which were perceived as being effectively achieved were those relating to awareness and knowledge. This conclusion implies that existing science and social science

curricula appear to emphasize awareness and knowledge. Goals and objectives regarding attitudes towards environmental issues and problems occupied the second position compared to awareness and knowledge in existing curricula. The least achieved goals and objectives of environmental education in science and social science curricula were those relating to skills and participation. This conclusion indicates that existing curricula in the Egyptian secondary schools suffer from a lack of opportunities and educational situations needed to develop the students' skills needed for effective participation in pro-environmental actions and assessing the outcomes of actions that influence environmental quality.

6. There was a large agreement (87.7%) among the research sample that environmental education in the Egyptian secondary schools should be taught through science and social science curricula and other related disciplines. A multidisciplinary approach was perceived by the research sample to be the most appropriate means of incorporating environmental education into the Egyptian secondary schools.

7. The nine environmental concepts proposed in this study as a framework for environmental education curriculum content in the Egyptian secondary schools were highly acceptable to the teachers sampled. These concepts were: ecosystem; population; economic and technology; environmental decisions; environmental ethic; man's stewardship of the environment; contamination; public health and environmental quality; and, modern agriculture and food supply. The research sample, in

their responses to open-ended item #57, added a small number of other concepts to be included in future environmental education programs. These concepts reflect the important role of religious values and social commitment to the protection of the environment. These concepts also emphasized the importance of recycling environmental wastes and conservation of our nation's historical monuments.

8. Some teaching methods of environmental education presented in this study were perceived as not being used to teach environmental education in the Egyptian secondary schools. The use of outdoor laboratories, the inquiry approach, the value clarification technique, and field trips were perceived as being used "occasionally" to teach environmental topics in science and social science curricula. The team teaching approaches, simulation and gaming, mapping of small places, and help from some experts to lecture about environmental problems were perceived to be used rarely or not at all to teach about environmental concerns. This conclusion indicates a narrowness of teaching methods and instructional materials used to teach environmental education in the Egyptian secondary schools.
9. Pre-service and in-service teacher training programs were perceived by the research sample to be insufficient in providing teachers with environmental information and skills needed to educate students about environmental concerns. The research sample, in their responses to open-ended item #72,

provided some valuable suggestions to improve pre-service and in-service programs. These suggestions emphasized the need for first-hand experience and the integration and continuity of environmental experiences from the primary level through the post-secondary level.

10. The respondents recognized most of the thirteen constraints presented in this study to be the major constraints that preclude the implementation of environmental education in the Egyptian secondary schools. These constraints were the lack of; 1) facilities and instructional aids (97%); 2) in-service training (88%); 3) well defined goals and objectives (87.5%); 4) funds (82%); 5) pre-trained teachers (79%); 6) programs (78.5%), 7) students' interest (67.5%); 8) time (63%); 9) community participation (50%); 10) clarity of environmental education (36%); 11) school participation (33%). These results indicate that a great deal remains to be done in order to develop a comprehensive environmental education program in the Egyptian secondary schools.

Results of Interview with Ministry of Education Personnel and School Principals

The summary of the results from interviews with Ministry of Education personnel and secondary school principals in Egypt is presented in this section. These results were the answer to the seventh research question.

1. The five goals (awareness, knowledge, attitudes, skills, and

participation) of environmental education were acceptable to all Ministry of Education personnel and secondary school principals. Thus, we may conclude that these goals are adequate for the Egyptian setting.

2. Existing Egyptian secondary schools curricula were perceived to be only partially effective in achieving environmental education goals and objectives. These data conform with those obtained from the teachers' questionnaire.
3. The respondents emphasized the needs for very well prepared teachers, well designed programs, and adequate facilities in order to achieve environmental education goals and objectives. They also suggested the need to teach environmental education in all school curricula.
4. Ministry of Education personnel and secondary school principals emphasized the real need for environmental education at all levels of education. They also emphasized the need to study local environmental problems in different Egyptian environments.

Based on overall findings of interviews with Ministry of Education personnel and school principals one can conclude that these leaders are supportive of environmental education as an important part of the school program. They recognize that a considerable amount of continued effort is needed to improve environmental education in the Egyptian secondary school.

In conclusion, this study reflects teachers and administrative personnel perceptions of the current status of environmental education

in the Egyptian secondary schools, but it did not assess the impact of environmental education programs on the students' awareness, knowledge, attitudes, skills, and participation. It points up the need for physical facilities and instructional aids, more effective pre-service and in-service teacher training programs, well defined goals and objectives, more funds, more carefully organized environmental education programs, flexible school schedules, improved communications between policy makers and curriculum designers; more community and school involvement, and more attention to local environmental problems.

Recommendations

Based on the conclusions derived from the results of this study, and the reviewed literature, the following recommendations can be made for policies and practices in environmental education that should result in improvement in both the quantity and quality of environmental education in the Egyptian secondary schools. These recommendations are:

1. A concerted effort should be made by educational establishments and other agencies to enhance environmental awareness among secondary school students and other Egyptian citizens in order to increase their involvement in the solution of environmental problems. Maintaining awareness of environmental programs requires a continuing effort, especially regarding some of the more subtle and elusive problems.
2. Special attention should be paid in environmental education

programs to understanding the complex relationships between technological and socio-economic development and the improvement of the environment. More emphasis should be placed on the development of students' knowledge of historical, societal and international efforts to solve environmental problems.

3. In future environmental education programs, more emphasis should be placed by curriculum designers on those religious, ethical, aesthetic, and economic values that will help students to protect and improve the environment. Religious establishments together with educational institutions can play a valuable role in the development of moral and aesthetic values and attitudes needed to protect and improve the environment.
4. Environmental education programs should provide students with the wide range of skills required to investigate, understand, and seek solutions for environmental problems. To carry out this task, environmental education should build its activities around local environmental problems and focus analysis on these problems by means of an interdisciplinary approach which will permit a deep, thorough understanding of environmental problems. Programs should include unanticipated problems and open-ended questions so that the students will realize that there is always much more to study.
5. A strategy should be created that will develop students who are not only knowledgeable and committed to the solution of

environmental problems but who also possess the competencies necessary to address and remediate present environmental problems effectively and to prevent new ones. Attainment of this task could be augmented through role playing, simulation, and gaming. Active involvement of students in the political process might be an effective method to promote citizenship participation in the decision-making process regarding environmental issues and problems.

6. Environmental education should be incorporated not only into science and social science curricula but also into other school curricula. In this regard, emphasis should be placed on the multi-disciplinary approach to environmental education. Areas of responsibility should be clearly defined so that important concepts, attitudes, values, and skills are integrated in such a way that they will help students acquire the kind of background needed for effective citizenship.
7. The researcher suggests that the nine environmental concepts presented in this study should be utilized by curriculum designers, along with the other concepts proposed by the research sample, as a framework for future environmental education programs.
8. Designers of future environmental education programs should include appropriate aspects and educational situations that meet the requirements of an interdisciplinary approach and methodology. More emphasis should be placed on the use of outdoor laboratories, the inquiry approach, and field trips to

teach environmental topics. The team teaching approach, simulation and gaming, mapping of small places, and seeking help from experts to lecture about environmental problems should be considered seriously in order to provide a comprehensive view of environmental issues and problems.

9. Both pre-service and in-service teacher training programs should provide teachers with sound competencies in cognitive and problem solving domains and the ability to be effective evaluators of affective, cognitive, and behavioral outcomes of environmental education.
10. Committees composed of personnel from scientific, academic, educational, and other concerned agencies should be formed to identify ways to overcome mutual problems and to coordinate efforts in order to meet more effectively the environmental education needs of Egyptian students. Mass media personnel, environmental educators, teachers, parents, and students should be included in these committees.
11. Leaders in the Ministry of Education should take the initiative in raising awareness of importance of environmental education in school programs and seeking more funds, time, and effort to carry out successful environmental education programs.

Suggestions for Future Research

As a result of this study, the researcher feels that there is a need for further studies in the area of environmental education in

Egypt. The following suggestions for further research can be made:

1. This study dealt only with secondary school level; it should be replicated in elementary schools in order to determine the framework of environmental education at this level.
2. This study should be replicated using secondary school students in different environments (urban, suburban, and rural) in order to determine their perception concerning environmental education programs that would meet their needs.
3. This study only elucidates perceptions of teachers and administrators; therefore it is important to appraise the effectiveness of environmental education programs by examining their effects on the students' knowledge, attitudes, and behaviors.
4. This study sampled only a small group of Ministry of Education personnel and secondary school principals. A more thorough study is needed to understand the relationships between knowledge, attitudes and beliefs of educational leaders and their efforts to instill curriculum for environmental education.
5. To illuminate the relationship between learning outcomes and methods used, it is desirable to investigate the effectiveness of different teaching methods on the students' ability to solve environmental problems.
6. To illuminate the relationship between environmental education as being lifelong education and a decision-making process, it is vital to conduct longitudinal studies of the influence of

formal and non-formal environmental education on adult behavior towards the environment.

7. In order to sensitize public opinion to environmental issues and problems and to major projects in course of execution or being planned, it is important to investigate the effectiveness of mass-media on students' participation in pro-environmental behavior.

Finally, the researcher hopes that the results of this study will be of value to policy makers in Egypt and the data presented will help provide a basis for more effective environmental education programs at the secondary level.

The researcher believes that we in Egypt should build on our accomplishments in environmental education to reorganize the present curricula so that they more fully reflect the interdisciplinary nature of this field. A possible way to accomplish this is to revise goals and objectives of existing curricula in light of the model provided in this study and local environmental education needs. The present levels of students' awareness and knowledge of environmental issues and problems should be viewed as a strong beginning by Egyptian teachers and administrative personnel. This could provide the basis for the design and development of comprehensive environmental education programs in the Egyptian secondary schools. Our present accomplishments are important, but much more needs to be done to prepare our youth for effective citizenship in a world that is strongly affected by environmental problems.

Bibliography

BIBLIOGRAPHY

Advisory Council on Environmental Education. Second Annual Report.
Washington, D.C. Office of Education, Department of Health,
Education and Welfare, 1973.

Alaimo, Samuel J., and Doran, Rodney L. A Longitudinal Study of
Factors Influencing Value Preference in Environmental Problems.
(cited by Lucko, Bernard J., et. al., 1982).

American Association of School Administrators, Conservation Education
in American Schools. Twenty-ninth Yearbook, (Washington, D.C.:
American Association of School Administrators, 1951).

Asche, J., and Shore, B. "Conservation Behavior as the Outcome of
Environmental Education." The Journal of Environmental Education,
Vol. 6, No. 4, Summer, 1975.

Balzer, Levon. "Environmental Education in the K-12 Span," The
American Biology Teacher, (April, 1971) pp. 220-225.

Bennett, Dean B; and MacGown, Richard H. "The Community Environmental
Inventory," Maine Environmental Education Project, Yarmouth,
Maine: 1972, (Mimeographed) (Cited by: Paz, 1974).

Bennett, Dean. "In-service Teacher Education," in Noel Melnnis and Don
Albrecht (eds.), What Makes Education Environmental? Louisville,
Ky., Data Courier Inc. and Environmental Educators Inc., 1975.

Biological Science Curriculum Study (BSCS) Special Publication No. 7,
Life Science in the Middle School, by Clark, George M., (Boulder,
Colorado: University of Colorado, 1969).

Blough, Glen O. "Science and Outdoor Education or Nobody Can Really
Know How I Feel," Outdoor Education. By: Donald R. Hammerman and
William M. Hammerman. Minneapolis, Minnesota: Burgess Publishing
Comp., 1973.

Brandwein, Paul F. "Conservation," The Science Teacher, XXXIV, April,
1967.

Brehm, Shirley A. A Teacher's Handbook for Study Outside the
Classroom, Columbus, Ohio: Charles E. Merrill Publishing Comp.,
1969.

Brennan, Matthew J. People and Their Environment: Teachers Curriculum
Guides to Conservation Education 8 Volumes. (Chicago, Ill.:
Ferguson Publishing Company, 1969).

- Carlson, J.E., and Baumgartner, D. "The Effects of Natural Resource Camps on Youths." The Journal of Environmental Education, Vol. 5, No. 3, Spring, 1974.
- Ceropsky, Jan. "Instructional Resources for Environmental Education," Trends in Environmental Education (UNESCO: Paris, 1977).
- Chauze, Simon J. "Outdoor Education, Dayton Style." Environmental Education, Vol. 2, No. " (Winter, 1970).
- Childress, R.B. "Public School Environmental Education Curricula: A National Profile." Journal of Environmental Education, Vol. 9, No. 3, Spring, 1976.
- Cohen, Michael R. "Problem Solving as a Goal of Energy and Environmental Education." The Journal of Environmental Education, Vol. 13, No. 1, Fall, 1981.
- Cummings, Stanley I., "Methodology for Environmental Education," The Journal of Environmental Education, Vol. 6, No. 2, (Winter, 1974).
- DeRose, James J., David Lockard, and Lester Paldy. "The Teacher is the Key: A Report on Three NSF Studies," The Science Teacher, Vol. 46, No. 4, (April, 1979) pp. 31-37.
- Dictionary of Education, New York: McGraw-Hill Book Co., Inc., 1973.
- Eichler, Arturo. "Environmental Education at the Secondary School Level." Trends in Environmental Education, (UNESCO: Paris, 1977).
- European Working Conference on Environmental Conservation Education, Morges, International Union for Conservation of Nature and Natural Resources. (Supplement to the IUCN Bulletin, Vol. 3, No. 3, March, 1972).
- Falk, John H., and Balling, John D. Setting a Neglected Variable in Science Education: Investigation into Outdoor Field Trips. Final Report. Edgewater, MD: Chesapeake Bay Center for Environmental Studies, 1979. ERIC Document (ED) 195-441.
- Fennessey, Livingston, Edwards, Kidder and Nafziger. "Simulation, Gaming and Conventional Instruction in the Teaching of Ecology." The Journal of Environmental Education, Vol. 5, No. 4, Summer, 1974.
- Forselius, Sten. "Environmental Education in the School Curricula: the Swedish Example." Prospects, (UNESCO: Paris) Vol. II, No. 4, Winter 1972, pp. 447-484.
- Foster, Philips W. Introduction to Environmental Science. (Homewood, Ill., Learning Systems Co., 1972.

- Fouda, Sohier Z. "Effectiveness of Two Instructional Designs Based on Gagne's Learning Hierachy and Ausubel's Subsumption Theory and Two Modes of Presentation in Teching the Concept of 'Mutualism in Nature' to Tenth Grade Girls in the Egyptian High Schools." Unpublished Ed.D. dissertation, Temple University. Dissertation Abstracts International 1980 No. 8:3488-A.
- Gallagher, J.J. "A Renewed Emphasis for Environmental Education." Journal of Enviornmental Education. (Washington, D.C.) Vol. 9, No. 1, Fall 1977, pp. 2-3.
- Gary, Charles E. "Development of Moral Judgment (or Reasoning)" (Mimeograph. Normal, Ill.: Dept. of History, Illinois State University, 1976), (Cited by: Harshman, 1978-79).
- Glass, Gene V. and Stanley, Jullian C. Statistical Methods in Education and Psychology. (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1970).
- Glenn, Allen D, Gennaro, Eugene D., "An Interdisciplinary Approach for Exploring Values and Values Questions for Social Studies and Science Teachers," The High School Journal, Vol. 58, No. 5, (Feb., 1975), pp. 208-223.
- Goudswaard, Johanner and Teitelbarm, Mirta de. "Learning Environments for Environmental Education," Trends in Environmntal Education, UNESCO, (Belgium, 1977).
- Grass, Phyllis and Railton, Easther P. Teaching Science in an Outdoor Environment. Berkeley, Calif.: University of California Press, 1972.
- Hall, Garry L. "The Teaching of Ecology in a Noval and Relevant Wilderness Setting and its Effects on Ecological Thinking, Feeling and Perceiving of Elementary School Youth." Unpublished Ph.D. Dissertation, University of Mantana. Dissertation Abstracts International 41 (1980) No. 8:3524-A.
- Harman, Willis. "Alternative Futures and Education Policy," Stanford Research Institute, Educational Policy Research Center, (Palo Alto, California, 1970).
- Harshman, Ronald. "Value Education Processes for an Environmental Education Program," Journal of Environmental Education. Vol. 9, No. 2 (Winter, 1979), pp. 30-34.
- Hefferman, Helen. "They Grow Nine Feet Tall," Journal of Outdoor Education, Vol. 1, No. 2 (Winter, 1967).

- Hepburn, Mary A. "Environmental Knowledge and Attitude Changes in High School Program of Interdisciplinary Social Studies and Science Education." In Craig B. Davis and Arthur Sacks (eds.), Current Issues in Environmental Education IV. Columbus, OH: Eric Clearinghouse for Science, Mathematics, and Environmental Education, 1978, 175-185. Eric Document (ED) 167-407.
- Herron, M.D. "The Nature of Scientific Inquiry." School Review, Vol. 79, No. 2, (Feb., 1971) pp. 171-212.
- Holabinko, Paul; Rasmussen, F.A.; and Showalter, V. "Synopsis of Games and Simulations in the Commerical Edition of the ERC Life Science", (Cited by Troost, and Altman, 1972).
- Hounshell, Paul B., and Liggett, Larry "Environmental Education One Year Later." The Journal of Environmental Education, Vol. 8, No. 1, Fall, 1976.
- Howie, T.R. "Indoor or Outdoor Environmental Education," The Journal of Environmental Education, Vol. 6, No. 2, Winter, 1974.
- Hundt, Professor. Education and Training in the Field of Environmental Protection in the German Democratic Republic. Halls, German Democratic Republic. Martin Luther University, 1977, pp. 1-27 (cited by: Stapp, W.B. "An Analysis. . ." The J.E.E., . . .1980-81).
- Hungerford, H.R., and Peyton, R.B. Teaching Environmental Education. Portland, Maine: J. Weston Walch, Pub., 1978.
- Hungerford, Harold; Peyton, Ben R.; and Wilke, Richard J. "Goals for Curriculum Development in Environmental Education." The Journal of Environmental Education, Vol. II, No. 3, Spring, 1980.
- Hungerford, Harold R. and Peyton, Robert Ben. Strategies for Developing an Environmental Education Curriculum: A Discussion Guide for Training Workshops in Environmental Education. (Prepared for the UNESCO), Michigan State University, E. Lansing, MI, 1980.
- "International Environmental Education Since Stockholm and Tbilisi," Connect, Paris: UNESCO, Vol. VII, No. 1, March, 1982.
- Jackman, W.S., Nature Study, 3rd Yearbook. National Society of Scientific Study of Education. (Chicago: University of Chicago Press, 1904).

- Jinapala, Alles and Chiba, A. "Environmental Education at the Pre-school and Primary Level." Trends in Environmental Education, (UNESCO: Paris, 1977).
- Kanapp, Clifford, "Teaching Environmental Education with Focus on Values," Cited by: (Miles, 1978).
- Kohlberg, Lawrence. "The Child as a Moral Philosopher," in Chazan, Barry I; Soltis, Jonas F. (eds.), Moral Education, Teachers College Press, 1973.
- Larson, Mark A.; Forrest, Mary, and Bastian, Lloyd. "Participation in Pro-Environmental Behavior." The Journal of Environmental Education, Vol. 12, No. 3, Spring, 1981.
- Lewis, Gerald E. "A Review of Classroom Methodologies for Environmental Education." The Journal of Environmental Education, Vol. 13, No. 2, Winter, 1981-82.
- Lucko, Bernard J., Disinger, John F., and Roth, Robert E., "Evaluation of Environmental Education Programs at the Elementary and Secondary School Level." The Journal of Environmental Education. Vol. 13, No. 4, Summer, 1982.
- McCow, Steven C. "Teacher Attitudes Toward Environmental Education." The Journal of Environmental Education, Vol. II, No. 2, Winter, 1979-80.
- Mehrens, William A. Measurement and Evaluation in Education and Psychology. (New York: Holt, Rinehart and Winston, Inc., 2nd. ed., 1978).
- Miles, John C. "The Study of Values in Environmental Education," Journal of Environmental Education. Vol. 9, No. 2, (Winter, 1978), pp. 5-17.
- Miller, John D., and Bachman, Jerald G. Ecological Concern Among High School Seniors, 1976-1979. Ann Arbor, MI.: University of Michigan, Institute for Social Research, Monitoring the Future Occasional Paper Series, Paper 7, 1980. ERIC Document (ED) 201-484. (Cited by Lucko, Bernard J., et al., 1982).
- Ministry of the Environment. Environmental Education in Norway: Post Secondary Level. Oslo, Norway: 1976, pp. 1-95. (Cited by: Stapp, W.B., et al. ". . .An Analysis. . .", 1980-81).
- Moroni, Antonio. "Interdisciplinary and Environmental Education." Prospects, (UNESCO: Paris). Vol. VIII, No. 4, Winter, 1972.
- Nagalski, Jan L. "What is Basic About Biology?" The American Biology Teacher, Vol. 42, No. 2, (Feb., 1980), pp. 113-115.

- Nash, R. The American Environment: Readings in the History of Conservation. (Reading, Mass., Addison-Wesley, 1968).
- National Swedish Board of Education. Curriculum for the Comprehensive School. Stockholm, Sweden: 1971, pp. 1-122. (Cited by: Stapp, et al., An Analysis of Pre-service. . . , 1980-81).
- Naylon, Michael J., "Needed: A Real World Program of Environmental Education" The American Biology Teacher. Vol. 32, No. 7, Oct., 1970, pp. 404-409.
- Nie, Norman; Hull, H.; et al. Statistical Package for the Social Science. (New York: McGraw-Hill Book Co., 1975).
- Paz, Concepcion Medel. A Conceptual Framework for Environmental Education Adapted to the Philippine Environment. (Unpublished Ph.D. dissertation: Michigan State University, E. Lansing, Michigan, 1974).
- Pettus, Alvin and Schwaab, Karl. "A Survey of Virginia Public School Principals on the State of Environmental Education." The Journal of Environmental Education, Vol. 10, No. 2, Winter, 1978-1979.
- Project Learning Tree, Supplementary Activity Guide for Grades 7 Through 12, The American Forest Institute, Inc., Washington, D.C., 1977.
- Putting Research into Educational Practice (PREP) Report No. 33, Environmental Education Programs and Materials. (Washington, D.C.: Government Printing Office, 1972).
- Ramsey, John; Hungerford, H.R.; Tomera, Audrey N. "The Effects of Environmental Action and Environmental Case Study Instruction on the Overt Environmental Behavior of Eighth Grade Students," The Journal of Environmental Education, Vol. 13, No. 1, Fall 1981.
- Rasmussen, Fred A. "Science Teaching and Academic Gaming," The American Biology Teacher, Vol. 31, No. 9, (Dec., 1969), pp. 559-562.
- Raths, Louis, Merrill Harman, and Sidney B. Simon, Values and Teaching. (Columbus, Ohio: Charles E. Merrill Publishing Co., 1966).
- Richard, Paul W. "Enrichment in Biology: The American Biology Teacher, Vol. 31, No. 7, (Oct., 1969), pp. 444-47.
- Roth, Charles. "A Massachusetts Audubon Society Program." Processes for Quality Environment. By: Robert S. Cook and Georg T. O'Hearn, Green Bay, Wis.: University of Wisconsin, 1971.

- Roth, Robert E. "Fundamental Concepts for Environmental Management Education K-16." The Journal of Environmental Education. Vol. 1, No. 3, (Spring, 1970), pp. 65-74.
- Roth, R.E. A Review of Research Related to Environmental Education 1973-1976: Columbus, Ohio: ERIC/SMEAC Center for Science, Mathematics and Environmental Education, 1976. (Cited by: Hungerford et al., 1980).
- Rowe, Mary Budd and Hurd, de Hart, "The Use of Inservice Programs to Diagnose Sources of Resistance to Innovation," Journal of Research in Science Teaching, Vol. IV, No. 1, 1966, pp. 3-13.
- Sale, Larry L. and Lee, Ernest W. Environmental Education in the Elementary School. (New York: Holt, Rinehart and Winston, Inc., 1972).
- Samples, Robert E. "Environmental Studies" The Science Teacher, Vol. 38, No. 7, (Oct., 1971) pp. 36-37.
- Sarhan, El-Demerdash, and Mounseer Kamel. Curriculum, 3rd ed., (Cairo: Dar Al-Hana, 1972).
- Schmieder, Allen A. "The Nature and Philosophy of Environmental Education: Goals and Objectives." Trends in Environmental Education, UNESCO, (Belgium, 1977).
- Selim, M. Saber. "Environmental Education at the Tertiary Level for Teachers," Trends in Environmental Education, (UNESCO: Paris, 1977).
- Sklair, Leslie, The Sociology of Progress, London: Routledge and Kegan Paul, 1970.
- Slesnick, Irwin L. "Population Education: A Response to a Social Problem," The Science Teacher, XXXVIII, Feb., 1971 p. 22-23.
- Smith, Julian W. and others. Outdoor Education. (Englewood Cliffs, N.J.: Prentice Hall, Inc., 1963).
- Smith, Julian W. "A Decade of Progress in Outdoor Education." Outdoor Education: A Book of Readings. Edited by Donald R. Hammerman and William M. Hammerman. Minneapolis, Minn: Burgess Publishing Comp., 1973.
- Stapp, W. B. et al. "The Concept of Environmental Education," The Journal of Environmental Education. Vol. 1, No. 1, Fall 1969, pp. 30-31.

- Stapp, William B. Development, Implementation and Evaluation of Environmental Education Programs (K-12). University of Michigan, 1973.
- Stapp, William B. "Community Profile and Lifestyle Survey," A Handout in a Seminar-Workshop on Problems of Human Environment at Higgins Lake, Michigan, Teachers' Environmental School, July 15-19, 1973 (Mimeographed), cited by: (Paz, 1974).
- Stapp, William B. "Preservice Teachers Education," in Noel Melnnis and Don Albrecht (eds.), What Makes Education Environmental? Louisville, Ky., Data Courier Inc., and Environmental Educators Inc., 1975.
- Stapp, W. B. et al., "Environmental Education Needs and Priorities: A Preliminary World Survey, E.E. Unit, Paris, UNESCO, Sept., 1975 (first draft).
- Stapp, William B. "An Instructional Model for Environmental Education." Prospects. (Paris, UNESCO) Vol. VIII, No. 4, 1978, pp. 495-507.
- Stapp, William B., and Cox, Dorothy A. Environmental Education Activities Manual. (Farmington Hills: Michigan, 1979).
- Stapp, W.B., et al. "An Analysis of Preservice Environmental Education of Teachers in Europe and an Instructional Model for Furthering this Education." The Journal of Environmental Education, Vol. 12, No. 2, Winter, 1980-81, pp. 3-10.
- State of Michigan Legislature, Senate Concurrent Resolution No. 69, April, 1971.
- Swan, James A. "Environmental Education: A New Religion?" The Journal of Environmental Education, Vol. 10, No. 1, Fall, 1978, pp. 44-48.
- Swinerton, E. Nelson, "Environmental Gaming Simulations," The Journal of Environmental Education, Vol. 3, No. 4, (Summer, 1972), pp. 49-52.
- Tewksbury, Susan and Harris, Glen. "The Status of Environmental Education in Northern New York," The Journal of Environmental Education, Vol. 13, No. 3, Spring, 1982, pp. 30-38.
- Towler, John O. "A Survey of Canadian Preservice Training in Environmental Education." The Journal of Environmental Education. Vol. 12, No. 2, Winter 1980-81, pp. 11-16.
- Traverso, Adriano Buzzati, "Some Thoughts on the Philosophy of Environmental Education," Trends in Environmental Education,

- UNESCO, (Belgium, 1977).
- Troost, Cornelius J.; and Altman, Harold. Environmental Education: A Source Book, New York: John Wiley and Sons, 1972.
- UNESCO. "Defines Environmental Education," Environmental Education News for School People, VII (March, 1973).
- UNESCO. "The Belgrade Charter: A Global Frame-work for Environmental Education," Connect, Vol. 1, No. 1, Jan. 1976.
- UNESCO. "Regional Needs and Priorities in Environmental Education," Connect, Vol. 1, No. 3, Sept. 1976.
- UNESCO. "The Intergovernmental Conference on Environmental Education." Connect, Vol. II, No. 2 (Paris, July, 1977).
- UNESCO. Needs and Priorities in Environmental Education: An International Survey. Paris, Aug., 1977, (Cited by Hungerford and Peyton, 1980, p. 5).
- UNESCO. "The Tbilisi Declaration," Connect, Paris: Vol. III, No. 1, Jan., 1978.
- UNESCO. "African Regional Workshop in Environmental Education," Connect, Vol. IV, No. 1, (Paris, March, 1979).
- UNESCO. "National Training Activities in Environmental Education," Connect, Vol. IV, No. 2, June, 1979.
- UNESCO. Environmental Education in the Light of Tbilisi Conference. Paris: 1980.
- U.S. Department of Health, Education and Welfare, Environmental Education, Education that Cannot Wait. Washington, D.C. Office of Education, 1971.
- USSR. Environmental Education in the USSR. The State Committee of the Council of Ministries of the USSR for Science and Technology. Moscow: 1977, pp. 1-56. (cited by: Stapp, et al., An Analysis of Preservice. . . , 1980-81).
- Vande Visse, E. and Stapp, W.B. "Developing a K-12 Environmental Education Program." (Cited by: Hungerford, H.; Peyton, Ben, R.; and Wilke, R.J. Journal of Environmental Education, Vol. II, No. 3, 1980).
- Victor, E. and Lerner, M.S. Reading in Science Education for the Elementary School. Toronto: The McMillan Company, 1969. (Cited by: McCaw, Steven C., The J. E.E. Vol. II, No. 2, Winter, 1979-80).

Wentworth, D.F.; Couchman, J.K. and others, Examining Your Environment. 12 Units (Minneapolis, Minn: Winston Press, 1972).

White, Roy C. "A Study Associating Selected Conservation Understandings with Available Community Resources from Grades Four Through Twelve." A Review of Research Related to Environmental Education (Columbus, Ohio: The Ohio State University, 1972).

Wisconsin Environmental Education Plan. A brochure distributed at the National Conference of the Conservation Education Association, Murray, Kentucky, Aug. 12-16, 1973.

Wolsk, David. "Methodologies of Environmental Education," Trends in Environmental Education, (UNESCO: Paris, 1977).

APPENDICES

Appendix A

Panel

Appendix A

Panel

1. Dr. Gallagher, James J.
Professor, Teacher Education, Michigan State University.
2. Dr. Peyton, R. Benny
Associate Professor, Fisheries and Wildlife, Michigan
State University.
3. Dr. Racle, Fred A.
Professor, Natural Science, Michigan State University.
4. Dr. Abou-Elseoud, Mohamed O.
Professor, Natural Science, Michigan State University.
5. Dr. Smith, Edward L.
Associate Professor, Teacher Education, Michigan State
University.
6. Dr. Mehrens, William
Professor, Counseling, Educational Psychology, Michigan State
University.

Appendix B

**Translation Letter from The
Islamic Society of
Greater Lansing**

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

In the name of Allah the most merciful and the most beneficent

The Islamic Society of Greater Lansing
THE ISLAMIC CENTER

920 South Harrison Road • East Lansing, Michigan 48823

Telephone: (517) 351-4309 or (517) 337-9089

February, 20, 1982

I hereby certify that the translation of all of the documents of this dissertation of Mr. Arafa Ahmed Hassan from English into Arabic is accurate in the meaning and the style. This includes the covering letter, the questionnaire entitled "Teachers' Questionnaire Concerning Teaching of Environmental Education in the Secondary Schools in Egypt" as well as the "Interview Card" for Ministry of Education Personnel and School Principals.

The Islamic Society of Greater Lansing
THE ISLAMIC CENTER
 920 SOUTH HARRISON ROAD
 EAST LANSING, MI 48823

M. Abou-El-Seoud

M. Abou-El-Seoud

Professor, Chairman of
 the Board of Trustees.

Appendix C

**The Arabic Version of Teachers' Questionnaire
Concerning Teaching of Environmental
Education in the Secondary
Schools in Egypt**

استطلاع آراء مدرسي
العلم والمواد الاجتماعية
نحو تدريس التربية البيئية
في المدارس الثانوية بمصر

إعداد

مروة أحمد حسن

جامعة ولاية ميشيغان
بالولايات المتحدة الأمريكية
١٩٨٢م - ١٤٠٢ هـ

" بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ "

الأخوة والأخوات مدرسي المعلم والمواد الاجتماعية
السلام عليكم ورحمة الله وبركاته
أما بعد

هناك جهود عالمية كبيرة تهذل الآن لتحسين متطلبات الحياة الانسانية ، وكذلك لتحسين متطلبات البيئة التي نعيش فيها وحفظها من الدمار . فلقد شهد المقدين الأخمين من الزمان صرخات الانذار من الخطر التي عمت المؤسسات العلمية والتعليمية في بقاع العالم المختلفة بخصوص المشاكل البيئية التي تهدد استمرارية الحياة الانسانية مثل نضوب المصادر الطبيعية ، الانفجار السكاني ، نقص الغذاء ، سوء استخدام الأراضي الزراعية ، الزحف الصحراوي ، أزمة الطاقة ، وصور التلوث المختلفة .

وهذه الدراسة التي بين أيديكم انما تمثل محاولة لاستقصاء واقع تدريس التربية البيئية في المدارس الثانوية المصرية ، وذلك لمعرفة ماتم عمله أو ما يمكن عمله لتطوير تدريس التربية البيئية في مدارسنا . ولهذا فاني اذ أعتر كثيرا بمشاركتم وتعاونكم معي ، فاني أدعوكم للاستجابة لعبارات هذا الاستفتاء بصراحة ووضوح لنساهم سويا في تطوير التربية البيئية في بلادنا .

والاستفتاء يتكون من سبعة أجزاء رئيسية كالآتي :

- أولا : معلومات عامة .
- ثانيا : أهداف التربية البيئية .
- ثالث : كيفية ادخال التربية البيئية في المناهج المدرسية .
- رابعا : محتوى منهج التربية البيئية .
- خامسا : طرق تدريس التربية البيئية .
- سادسا : تدريب مدرس التربية البيئية .
- سابعا : الصعوبات والاقتراحات .

■ يرجى التأكيد من قراءة وفهم كل عبارة من عبارات الاستفتاء ، وكذلك التعليقات الخاصة بكل جزء .
واني اذ أقدر مشاغلكم الكثيرة . . . كذلك فاني أشكركم مقدما على مشاركتكم وتعاونكم الصادق معي في هذه الدراسة .

والله الموفق له

الباحث

عرفه احمد حسن

أولا : معلومات عامة :

- ١- الاسم : (اختياري) :
- ٢- الجنس : ذكر ☐ أنثى ☐
- ٣- المادة التي تقوم بتدريسها :
- ٤- اسم المدرسة :
- ٥- المحافظة التابعة لها المدرسة :
- ٦- عدد سنوات التدريس بالمرحلة الثانوية :
- ٧- المؤهلات العلمية الحاصل عليها : (يحدد المؤهل : تاريخ الحصول عليه / التخصص)

المؤهل	التاريخ	التخصص
بكالوريوس / ليسانس دبلوم خاص ماجستير دكتوراه مؤهلات أخرى		

- ٤ -

■ مستوى الاتجاهات البيئية :

ماهى درجة فعالية المادة التى تقوم بتدريسها فى الفضل
فى تزويد التلاميذ بالفرص المناسبة التى تساعدهم

درجة الفعالية				
كثيرة جدا	كبيرة	متوسطة	لنفيفة	قليلة

- ١٩- تنمية وتغيير اتجاهاتهم نحو مشاكل البيئة
- ٢٠- تنمية ميولهم نحو حماية وتحسين البيئة
- ٢١- تنمية روح الفريق والمشاركة الجماعية فى حل مشاكل البيئة
- ٢٢- تنمية الاتجاه نحو تبادل المعلومات البيئية مع زملاء الدراسة
الآباء ه وأفراد المجتمع الذى يعيشون فيه
- ٢٣- تنمية الاتجاهات الموجهة (النافعة) فى المحافظة على البيئة
- ٢٤- تنمية القيم الاخلاقية والجمالية لتحقيق التوازن بين متطلبات
الحياة الانسانية ه ومتطلبات البيئة
- ٢٥- تنمية الاتجاه نحو ادراك أن العلم والتكنولوجيا بدون القسم
الاخلاقية غير كافيين لحل مشاكل البيئة المختلفة
- ٢٦- تنمية الاتجاه نحو الاحساس بالسنولية الفردية والجماعية فسى
حماية وتحسين البيئة

رجاء وضع دائرة حول الاجابة المناسبة لرأيك نحو العبارة الآتية (٢٧) :

٢٧- اعتقد أن تنمية مستوى اتجاهات تلاميذ المرحلة الثانوية نحو الموضوعات والمشاكل البيئية

يجب أن :

- أ - يزداد بدرجة كبيرة ب - يزداد بدرجة متوسطة ج - يبقى كما هو الآن .
د - يتناقص بدرجة متوسطة هـ - يتناقص بدرجة كبيرة .

ثالث : كيفية ادخال التربية البيئية فى المناهج المدرسية :

رجاء وضع علامة (✓) فى الخانة التى تناسب اجابتك امام كل عبارة من العبارات الآتية :

درجة الموافقة				
تامة	كثيرة	متوسطة	قليلة	لا توجد

٤٣- اعتقد ان مناهج التربية البيئية فى المدرسة الثانوية المصرية يجب أن يشترك فى وضعها وتخطيطها المدرسون ، التلاميذ ، الآباء ، وخبراء فى العلم البيئية

٤٤- اعتقد ان التربية البيئية فى المرحلة الثانوية يجب أن تدرس من خلال مواد العلم الطبيعية فقط (احياء ، كيمياء ، طبعة ، ...)

٤٥- اعتقد أن التربية البيئية فى المرحلة الثانوية يجب ان تدرس من خلال مواد العلم الطبيعية ، والعلوم الاجتماعية (جغرافيا ، تاريخ ، اقتصاد ...)

٤٦- اعتقد أن التربية البيئية هامة لمجتمعنا ويجب ادخالها فى المناهج المدرسية .

٤٧- رجاء وضع دائرة حول رقم المدخل الذى تراه اكثر فعالية فى تحقيق اهداف التربية البيئية فى المدرسة الثانوية المصرية :

أ- وضع منهج واحد او عدة مناهج متكاملة للتربية البيئية وتطبيقها كمقررات جديدة على صف دراسى معين .
ب- وضع مجموعة من الوحدات او الانشطة البيئية وادخالها ضمن بعض المقررات التى تدرس فعلا

اقلب الصفحة من فضلك

- ٨ -

رابعاً : محتوى منهج التربية البيئية :

رجاء وضع علامة (✓) في الخانة التي تناسب اجابتك امام كل عبارة من العبارات الآتية
ما مدى اهمية المظاهر الآتية عند وضع مناهج التربية البيئية في المرحلة الثانوية في مصر ؟

درجة الاهمية				
لا تهمني	تهمني قليلا	تهمني كثيرا	تهمني كثيرا	تهمني كثيرا

- ٤٨- مفهوم النظام البيئي (الكائنات الحية وغير الحية الموجودة في مكان معين)
- ٤٩- مفهوم الجماعات الحيوية (نبات ، حيوان ، انسان)
- ٥٠- مفهوم الاقتصاد وعلاقته بالتكنولوجيا
- ٥١- مفهوم اتخاذ القرارات البيئية
- ٥٢- مفهوم القيم الاخلاقية المتعلقة بالبيئة
- ٥٣- مفهوم المحافظة على البيئة عبر الاجيال
- ٥٤- مفهوم التلوث البيئي
- ٥٥- مفهوم الصحة وعلاقتها بمتطلبات البيئة
- ٥٦- مفهوم الزراعة الحديثة وانتاج الغذاء
- ٥٧- مفاهيم أخرى ترى اضافتها ولم ترد في هذه القائمة (٤٨-٥٦)

—
—
—
—

اقلب الصفحة من فضلك

رجاء وضع علامة (✓) في الخانة التي تناسب اجابتك امام كل عبارة من العبارات الآتية :

اعتقد ان اهم السمعات التي تواجه تطبيق التربية البيئية في المدارس الثانوية المصرية هي :

[illegible]

٧٣- عدم وجود أهداف محددة للتربية البيئية

٧٤- اهداف التربية البيئية غير واقعية ولا يمكن تحقيقها

٧٥- أهداف التربية البيئية واقعية ولكن لا يمكن تحقيقها بالوسائل المطاحة

٧٦- عدم وجود مناهج او برامج خاصة بالتربية البيئية

٧٧- الموضوعات والمشاكل المتضمنة فى مناهج ابراج التربية البيئية لا تلبي حاجات التلاميذ فى البيئات المصرية المختلفة

٧٨- التربية البيئية موضوع معقد ، وغير واضح ولم يحسم النقاش حول اهميتها ما يجعلها غير قابلة للتدريس بطريقة ذات مغزى .

٧٩- عدم وجود الوقت اللازم لادخال التربية البيئية فى المناهج المدرسية المزدحمة اصلا

٨٠- النقص فى عدد المدرسين المدربين لادخال التربية البيئية فى البرامج الدراسية

٨١- نقص الاجهزة والمواد اللازمة لتدريس التربية البيئية

٨٢- عدم وجود البرامج اللازمة لتدريب المدرسين اثناء الخدمة والتي تتناول الاتجاهات الحديثة فى تدريس التربية البيئية

٨٣- نقص الاموال اللازمة لوضع وتطوير برامج التربية البيئية الفعالة

٨٤- مقاومة افراد المجتمع وعدم اقبالهم بالشئون والقضايا البيئية

٨٥- مقاومة الجهاز المدرسى وعدم الاكتراس بالشئون والقضايا البيئية

٨٦- آراء او مقترحات اخرى ترى اضافتها ولم ترد فى هذا الاستفتاء

الباحث
عرفه احمد حسن

مع وافر شکری و تقدیری ۱

Appendix D

The English Version of Teachers' Questionnaire Concerning Teaching of Environmental Education in the Secondary Schools in Egypt

Appendix D

**Michigan State University
College of Education
Department of Instruction
and Curriculum**

**Teachers' Questionnaire Concerning Teaching
of Environmental Education in the
Secondary Schools in Egypt**

by

Arafa A. Hassan

**Michigan State University
U.S.A.
1402 - 1982**

Dear Science and Social Science Teachers:

Worldwide efforts are being made to improve the quality of human life and the quality of the environment. The past two decades have witnessed a hue and cry all over the world in scientific and educational establishments concerning such environmental problems as over-exploitation of natural resources, over-population, food shortages, land mis-use, desertification, the energy crisis, and the many different forms of pollution.

This study is an attempt to investigate the real world of teaching environmental education in the secondary schools in Egypt in order to know what is being done and what can be done to improve environmental education. Therefore, your participation, cooperation, and honest responses to this questionnaire will be greatly appreciated.

The questionnaire consist of seven parts:

- I. General Information
- II. Goals and Objectives of Environmental Education
- III. Incorporating Environmental Education into School Curricula
- IV. Environmental Education Curriculum Content
- V. Teaching Methods
- VI. Teacher Training
- VII. Constraints and Suggestions

Please make sure you read and understand each statement and the instructions provided for each part.

Thank you in advance for your participation and your cooperation in this study.

Sincerely yours,



Arafa A. Hassan
Michigan State University

Please turn to the following page and begin.

**Teachers Questionnaire Concerning
Environmental Education in the
Secondary School in Egypt**

I. General Information

1. Name (optional) _____
2. Gender: Male _____ Female _____
3. Subject matter you teach _____
4. Name of school _____
5. Governorator in which the school is located _____
6. Years of teaching at secondary level _____
7. Educational background _____

Degree	Date	Major
BS/ BA		
Special diploma		
MS/ MA		
Ph.D.		
Others		

II. Goals and Objectives of Environmental Education

Instructions: Place a checkmark (✓) in the column which best describes your response to each statement.

Please turn to the following page and continue

*Attitudes towards environmental issues and problems

To what extent does the subject matter you teach in the classroom provide students with opportunities to:

19. ...develop attitudinal changes toward environmental problems.
20. ...develop much more interest in the protection and improvement of the environment.
21. ...develop the spirit of team work in solving the environmental problems.
22. ...develop the attitude of sharing environmental information with schoolmates, parents and community.
23. ...develop positive attitudes toward environmental conservation.
24. ...develop moral and aesthetic values concerning the maintenance of a balance between the quality of human life and the quality of the environment.
25. ...realize that science and technology without moral values are not enough to solve environmental problems.
26. ...develop individual and collective responsibility for environmental protection and improvement.

Circle the answer which best describes your response to the following statement (27):

27. In the future, the emphasis placed on developing students' attitudes towards environmental issues and problems should:

- a. increase substantially
b. ~~increase somewhat~~
c. remain the same
d. decrease somewhat
e. decrease substantially

EXTENT OF EFFECTIVENESS	
COMPLETELY	
CONSIDERABLY	
MODERATELY	
VERY LITTLE	
NOT AT ALL	

***Participation in environmental planning and activities**

To what extent does the subject matter you teach in classroom provide students with opportunities:

37. To participate in environmental investigation in order to solve environmental problems.

38. To examine critically the ecological implications of technological advances before endorsing them (e.g. proposed atomic power plants, the use of agricultural chemical, etc.).

39. To participate effectively in an individual or group action to protect the environment (i.e. persuasion, consumerism, political or legal action...).

40. To evaluate actions taken by decision makers with respect to their influence on achieving a dynamic balance between the quality of life and the quality of the environment.

Circle the answer which best describes your response to the following statement (41).

41. In the future, the emphasis placed on developing students' participation in environmental activities should:

- a. increase substantially
- b. increase somewhat
- c. remain the same
- d. decrease somewhat
- e. decrease substantially

42. In the space below, please list other goals and objectives for environmental education not listed here (1-41).

EXTENT OF EFFECTIVENESS				
COMPLETELY	CONSIDERABLY	MODERATELY	VERY LITTLE	NOT AT ALL

III. Incorporating Environmental Education into School Curricula

Place a checkmark (✓) in the column which best describes your response to each statement.

43. I believe that environmental education curricula in the Egyptian secondary schools should be designed by teachers, students, parents, and environmental science experts.

44. I believe that environmental education at the secondary level should be taught only through natural science courses.

45. I believe that environmental education at the secondary level should be taught through natural science and social science courses.

46. I believe that environmental education is important and should be incorporated into the school curriculum.

47. Circle the approach you believe will most effectively achieve the environmental education goals and objectives at the Egyptian secondary schools:

- a. Developing a discrete course or a series of courses for environmental education to be implemented at specific grade levels.
- b. Developing environmental education units (activities) and incorporate them into existing school curricula.

STRONGLY AGREE	AGREE	UNCERTAIN	DISAGREE	STRONGLY DISAGREE

VI. Teacher Training of Environmental Education

Place a checkmark (✓) in the column which best describes your response to each statement.

67. Preservice teacher training programs in my own major area have provided me with sufficient information to educate students about environmental concerns.
68. Inservice teacher training programs in my own major area have provided me with sufficient information to educate students about environmental concerns.
69. As an educator, I beleive that all techers should have some preservice and inservice training in the areas of environmental concerns.
70. I believe that the best way to provide environmental education teachers with inservice training should be through workshops.
71. I believe that the best way to provid environmental education teachers with inservice training should be through mass-media (i.e. T.V., Radio. . .).
72. Other suggestions not listed here.

	STRONGLY AGREE
	AGREE
	UNCERTAIN
	DISAGREE
	STRONGLY DISAGREE

84. A resistance and apathy on the part of the community toward environmental concerns.

85. A resistance and apathy on the part of schools toward environmental concerns.

86. Other suggestions not listed in the questionnaire.

STRONGLY AGREE	AGREE	UNCERTAIN	DISAGREE	STRONGLY DISAGREE

THANK YOU FOR COMPLETING THE QUESTIONNAIRE

ARAFA A. HASSAN

Appendix E

**The Arabic Version of Interview Card Used
for Ministry of Education Personnel
and School Principals**

بسم الله الرحمن الرحيم
بطاقة مقابلة

السيد /

السلام عليكم ورحمة الله وبركاته .. وبعد :-

لقد تم تصميم هذه البطاقة للتعرف على رأيكم بخصوص واقع تدريس التربية البيئية في المدارس الثانوية المصرية ، واننى اذ أعتر برأيكم بهذا الخصوص فأنه فى نفس الوقت سيكون عوناً لنا فى هذه الدراسة لنعرف ماتم انجازه ، ومايجب انجازه فى هذا المجال فى مدارسنا من أجل أجيالنا الحاضرة والقادمة .

أولاً: معلومات عامة :

١ - الاسم (اختيارى) :

٢ - الجنس : ذكر ☐ أنثى ☐

٣ - الوظيفة :

٤ - المؤهلات العلمية :

تعريف :

التربية البيئية هى " عملية تهدف الى تنمية الوعى لدى سكان العالم وإشارة اهتمامهم نحو البيئة بمعناها الشامل والمشاكل المتعلقة بها ، وذلك بتنمية المعارف ، والاتجاهات ، والدوافع ، والمهارات اللازمة للعمل أفراداً وجماعات لحل المشاكل البيئية الحاضرة وتجنب حدوث مشاكل بيئية جديدة " .

ثانياً: الأهداف المقترحة فى هذه الدراسة للتربية البيئية فى المدارس الثانوية

المصرية :

- ١ - تنمية الوعى لدى التلاميذ فيما يتعلق بالموضوعات والمشاكل البيئية فى المناطق الصناعية والزراعية والمصراوية وغيرها .
- ٢ - تزويد التلاميذ بالمعرفة اللازمة لفهم ، وحماية ، وتحسين البيئة المحيطة بهم .
- ٣ - مساعدة التلاميذ على اكتساب الاتجاهات ، والقيم المناسبة اللازمة لتحقيق التوازن بين متطلبات الحياة الانسانية ، ومتطلبات البيئة ؛
- ٤ - مساعدة التلاميذ على اكتساب المهارات اللازمة لحل المشاكل البيئية الحالية ، ومنع حدوث مثل هذه المشكلات مستقبلاً .
- ٥ - مساعدة التلاميذ فى المشاركة الفعالة أفراداً وجماعات فى الأفعال والاجراءات المناسبة لحل المشاكل البيئية .

" المناقشة "

١ - هل ترى اضافة أهداف أخرى للتربية البيئية فى المرحلة الثانوية المصرية غير التى وردت فى بند ثانيا (١ - ٥) ؟

—
—
—

٢ - الى أى مدى تتحقق هذه الأهداف (٥-١) فى المدارس الثانوية المصرية؟ وفى أى المناهج المقررة فى هذه المرحلة؟

—
—
—

٣ - رتب هذه الأهداف (٥-١) حسب أهميتها فى المرحلة الثانوية . مع اضافة ماتشاء اليها من أهداف أخرى ترى أنها أكثر أهمية منها .

—
—
—

٤ - كيف يمكن تحقيق الأهداف السابقة فى المدارس الثانوية المصرية؟

—
—
—

٥ - أين يجب أن تدرس التربية البيئية فى المرحلة الثانوية (فى مناهج العلوم الطبيعية ، المواد الاجتماعية ، أو غيرها) ؟

—
—
—

٦ - تعليقات واقتراحات أخرى لم ترد فى هذه البطاقة .

—
—
—
—
—

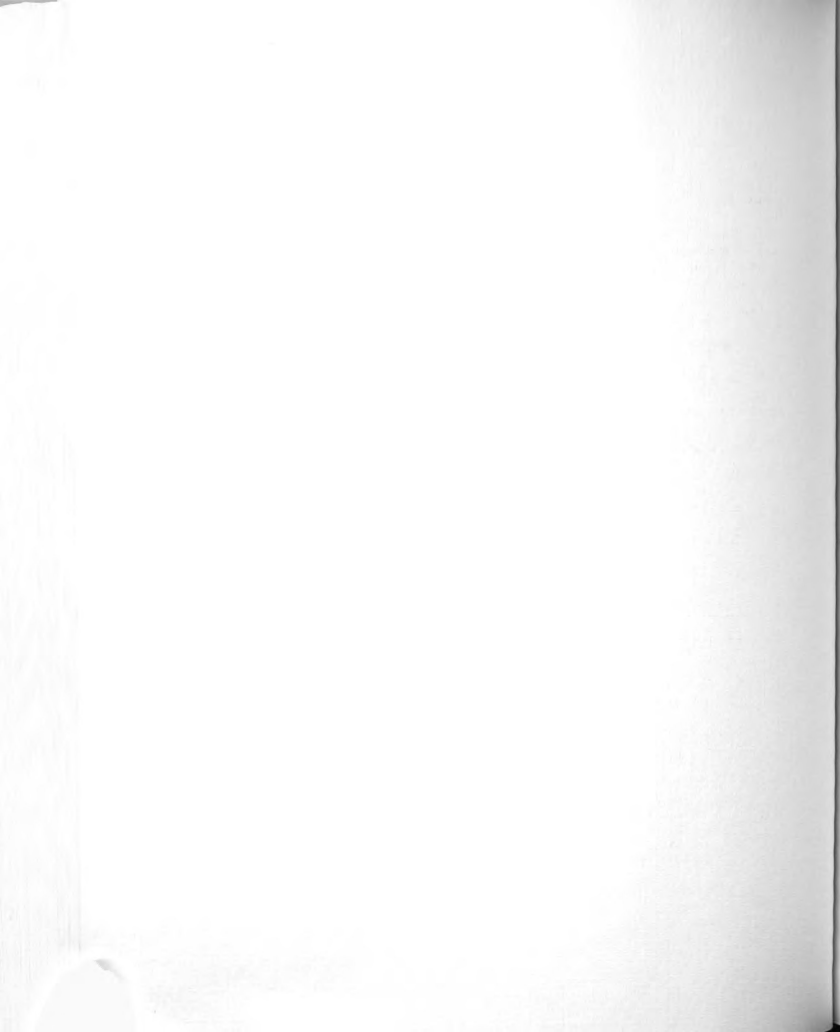
مع وافر شكرى وتقديرى ،

الباحث

عرفه أحمد حسن

Appendix F

**The English Version of Interview Card Used
for Ministry of Education Personnel
and School Principals**



Appendix F

Interview Card

Dear Sir:

This interview card was designed to get your point of view concerning the state of environmental education in the Egyptian secondary schools. Your opinion will be of great help to this study to know where we are? and where we should go?

Definition of Environmental Education

Environmental education is "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, attitudes, motivations, commitments and skills to work individually and collectively toward solutions of current problems and prevention of new ones."

A. General Information

1. Name:
2. Sex: Male ☐ Female ☐
3. Position:
4. Educational Background:

B. Suggested Goals of Environmental Education in Egyptian Secondary School.

1. To develop in students a clear awareness of, and concern about, environmental issues and problems in urban and rural areas.
2. To provide students with knowledge to understand, protect, and improve their environment.
3. To help students acquire positive attitudes and values needed to maintain balance between the quality of human life and quality of the environment.
4. To help students acquire skills required to solve environmental problems and preventing new ones.
5. To help students participate effectively in individual or group actions to work toward resolutions of environmental problems.

Appendix F

Interview Card

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A. General Information

1. Name:
2. Sex: Male ☐ Female ☐
3. Position:
4. Educational Background:

B. Suggested Goals of Environmental Education in Egyptian Secondary School.

1. To develop in students a clear awareness of, and concern about, environmental issues and problems in urban and rural areas.
2. To provide students with knowledge to understand, protect, and improve their environment.
3. To help students acquire positive attitudes and values needed to maintain balance between the quality of human life and quality of the environment.
4. To help students acquire skills required to solve environmental problems and preventing new ones.
5. To help students participate effectively in individual or group actions to work toward resolutions of environmental problems.

C. Discussion:

1. Other goals and objectives of environmental education not listed here (1-5).
2. To what extent are these goals (1-5) achieved in Egyptian secondary schools? and where? (in which curriculum?)
3. Please, re-order the five goals mentioned under Part B.
4. How can we achieve these goals in Egyptian secondary schools?
5. Where should we teach environmental education (science, social sciences,...)?
6. Other comments or suggestions

Thank you
Arafa A. Hassan

Appendix G

Frequency Tables

Appendix (G)

Table 24. Perceived Effectiveness of Science and Social Science Curricula in Developing Students' Awareness of Environmental Issues and Problems.

Item #	Identification	Completely		Considerably		Moderately		Very Little		Not at All	
		FREQ	%	FREQ	%	FREQ	%	FREQ	%	FREQ	%
#1	S.T.	68	<u>34.0</u>	61	<u>30.5</u>	44	22.0	19	09.5	08	04.0
	S.S.T.	46	<u>38.3</u>	40	<u>33.3</u>	26	21.7	06	5.0	02	1.7
	E.S.	114	<u>35.6</u>	101	<u>31.6</u>	70	21.9	25	7.8	10	3.1
#2	S.T.	49	<u>24.5</u>	56	<u>28.0</u>	60	30.0	29	14.5	06	03.0
	S.S.T.	34	<u>28.3</u>	43	<u>35.0</u>	31	25.5	08	6.7	04	3.3
	E.S.	83	<u>25.9</u>	99	<u>30.9</u>	91	28.4	37	11.6	10	3.1
#3	S.T.	66	<u>33.0</u>	59	<u>29.5</u>	54	27.0	14	07.0	07	03.5
	S.S.T.	41	<u>34.2</u>	40	<u>33.3</u>	19	15.8	17	14.2	03	2.5
	E.S.	107	<u>33.4</u>	99	<u>30.9</u>	73	22.8	31	9.7	10	3.1
#4	S.T.	40	<u>20.0</u>	67	<u>33.5</u>	58	29.0	24	12.0	11	05.5
	S.S.T.	17	<u>14.2</u>	46	<u>38.3</u>	43	<u>35.8</u>	09	7.5	05	4.2
	E.S.	57	<u>17.8</u>	113	<u>35.3</u>	101	31.6	33	10.3	16	5.0

Science Teachers (S.T.) = 200

Social Science Teachers = 120

Entire Sample = 320

Table 24 (Continued)

Item #	Identification	Completely		Considerably		Moderately		Very Little		Not at All	
		FREQ	%	FREQ	%	FREQ	%	FREQ	%	FREQ	%
#5	S.T.	45	22.5	48	24.0	58	<u>29.0</u>	41	20.5	08	04.0
	S.S.T.	30	25.0	41	<u>34.2</u>	35	29.2	10	8.3	04	3.3
	E.S.	75	23.4	89	27.8	93	<u>29.1</u>	51	15.9	12	3.7
#6	S.T.	55	27.5	58	29.0	59	<u>29.5</u>	23	11.5	05	2.5
	S.S.T.	43	<u>35.8</u>	35	29.2	29	24.2	09	7.5	04	3.3
	E.S.	98	<u>30.6</u>	93	29.1	88	27.5	32	10.0	09	2.8
#7	S.T.	39	19.5	55	27.5	63	<u>31.5</u>	30	15.0	13	6.5
	S.S.T.	33	27.5	43	35.8	33	27.5	07	5.8	04	3.3
	E.S.	72	22.5	98	<u>30.6</u>	96	30.0	37	11.6	17	5.3
#8	S.T.	177	88.5	22	11.0	00	00.0	01	0.5	00	0.0
	S.S.T.	113	<u>94.2</u>	06	5.0	00	0.0	00	0.0	01	0.8
	E.S.	290	<u>90.6</u>	28	8.8	01	0.3	01	0.3	00	0.0

S.T. = 200

S.S.T. = 120

E.S. = 320

Table 25. Perceived Effectiveness of Science and Social Science Curricula in Developing Students' Knowledge of Environmental Issues and Problems.

Item #	Identification	Completely		Considerably		Moderately		Very Little		Not at All	
		FREQ	%	FREQ	%	FREQ	%	FREQ	%	FREQ	%
#9	S.T.	64	32.0	60	30.0	57	28.5	12	06.0	07	03.5
	S.S.T.	33	27.5	35	29.2	32	26.7	12	10.0	08	06.7
	E.S.	97	30.3	95	29.7	89	27.8	24	07.5	15	04.7
#10	S.T.	59	29.5	67	33.5	52	26.0	18	09.0	04	02.0
	S.S.T.	29	24.2	42	35.0	36	30.0	08	06.7	05	04.2
	E.S.	88	27.5	109	34.1	88	27.5	26	08.1	09	02.8
#11	S.T.	45	22.5	58	29.0	65	32.5	23	11.5	09	04.5
	S.S.T.	30	25.0	31	25.8	36	30.0	17	14.2	06	05.0
	E.S.	75	23.4	89	27.8	101	31.6	40	12.5	15	04.7
#12	S.T.	64	32.0	58	29.0	50	25.0	21	10.5	07	03.5
	S.S.T.	15	12.5	50	41.7	32	26.7	13	10.8	10	08.3
	E.S.	79	24.7	108	33.7	82	25.6	34	10.6	17	05.3
#13	S.T.	77	38.5	68	34.0	42	21.0	09	04.5	04	02.0
	S.S.T.	42	35.0	48	40.0	15	12.5	07	05.8	08	06.7
	E.S.	119	37.2	116	36.2	57	17.8	16	05.0	12	03.7

S.T. = 200

S.S.T. = 120

E.S. = 320

Table 25. (Continued)

Item	Identification	Completely		Considerably		Moderately		Very Little		Not at All	
		FREQ	%	FREQ	%	FREQ	%	FREQ	%	FREQ	%
#14	S.T.	54	27.0	74	37.0	50	25.0	21	10.5	01	0.5
	S.S.T.	46	38.3	47	39.2	19	15.8	05	04.2	03	2.5
	E.S.	100	31.3	121	37.8	69	21.6	26	08.1	04	1.2
#15	S.T.	09	04.5	23	11.5	83	41.5	64	32.0	21	10.5
	S.S.T.	14	11.7	22	18.3	65	54.2	15	12.5	04	3.3
	E.S.	23	7.2	45	14.1	148	46.2	79	24.7	25	7.8
#16	S.T.	12	6.0	16	8.0	56	28.0	93	46.5	23	11.5
	S.S.T.	03	2.5	16	13.3	44	36.7	46	38.3	11	9.2
	E.S.	15	4.7	32	10.0	100	31.3	139	43.4	34	10.6
#17	S.T.	22	11.0	24	12.0	98	49.0	45	22.5	11	5.5
	S.S.T.	09	7.5	19	15.8	54	45.0	27	22.5	11	9.2
	E.S.	31	9.7	43	13.4	152	47.5	72	22.5	22	6.9
#18	S.T.	173	86.5	26	13.0	00	0.0	00	0.0	01	0.5
	S.S.T.	100	83.3	19	15.8	00	0.0	00	0.0	01	0.8
	E.S.	273	85.3	45	14.1	00	0.0	00	0.0	02	0.6

S.T. = 200

S.S.T. = 120

E.S. = 320

Table 26. Perceived Effectiveness of Science and Social Science Curricula in Developing Students' Attitudes Towards Environmental Issues and Problems

Item #	Identification	Completely		Considerably		Moderately		Very Little		Not at All	
		FREQ	%	FREQ	%	FREQ	%	FREQ	%	FREQ	%
#19	S.T.	49	24.5	46	28.0	60	30.0	25	12.5	10	5.0
	S.S.T.	29	24.2	39	32.5	38	31.7	11	9.2	03	2.5
	E.S.	78	24.4	95	29.7	98	30.6	36	11.2	13	4.1
#20	S.T.	48	24.0	66	33.0	56	28.0	22	11.0	08	4.0
	S.S.T.	26	21.7	35	29.2	43	35.8	12	10.0	04	3.3
	E.S.	74	23.1	101	31.6	99	30.9	34	10.6	12	3.7
#21	S.T.	31	15.5	56	28.0	73	36.5	29	14.5	11	5.5
	S.S.T.	24	20.0	29	24.2	51	42.5	13	10.8	03	2.5
	E.S.	55	17.2	85	26.6	124	38.7	42	13.1	14	4.4
#22	S.T.	36	18.0	53	26.5	65	32.5	31	15.5	15	7.5
	S.S.T.	16	13.3	25	20.8	49	40.8	14	11.7	16	13.3
	E.S.	52	16.2	78	24.4	114	35.6	45	14.1	31	9.7
#23	S.T.	36	18.0	66	33.0	73	36.5	16	8.0	09	4.5
	S.S.T.	17	14.2	46	38.3	40	33.3	14	11.7	03	2.5
	E.S.	53	16.6	112	35.0	113	35.3	30	9.4	12	3.7

S.T. = 200

S.S.T. = 200

E.S. = 320

Table 26. (Continued)

Item #	Identification	Completely		Considerably		Moderately		Very Little		Not at All	
		FREQ	%	FREQ	%	FREQ	%	FREQ	%	FREQ	%
#24	S.T.	29	14.5	65	32.5	74	36.0	21	10.5	13	6.5
	S.S.T.	17	14.2	41	34.2	44	36.7	16	13.3	02	1.7
	E.S.	46	14.4	106	33.1	116	36.2	37	11.6	15	4.7
#25	S.T.	47	23.5	60	30.0	61	30.5	18	9.0	14	7.0
	S.S.T.	36	30.0	43	35.8	21	17.5	14	11.7	06	5.0
	E.S.	83	25.9	103	32.2	82	25.6	32	10.0	20	6.3
#26	S.T.	34	17.0	55	27.5	73	36.5	26	13.0	12	6.0
	S.S.T.	27	22.5	33	27.5	44	36.7	09	7.5	07	5.8
	E.S.	61	19.1	88	27.5	117	36.6	35	10.9	19	5.9
#27	S.T.	162	81.0	30	15.0	06	3.0	02	1.0	00	0.0
	S.S.T.	109	90.8	10	8.3	01	0.8	00	0.0	00	0.0
	E.S.	271	84.7	40	12.5	07	2.2	02	0.6	00	0.0

S.T. = 200

S.S.T. = 120

E.S. = 320

Experiment 20.10.11

Time	Temp (°C)	Pressure (mm Hg)	Volume (ml)	Mass (g)	Calculation	Result
0	20.0	760	10.0	0.0		
1	20.0	760	10.0	0.0		
2	20.0	760	10.0	0.0		
3	20.0	760	10.0	0.0		
4	20.0	760	10.0	0.0		
5	20.0	760	10.0	0.0		
6	20.0	760	10.0	0.0		
7	20.0	760	10.0	0.0		
8	20.0	760	10.0	0.0		
9	20.0	760	10.0	0.0		
10	20.0	760	10.0	0.0		
11	20.0	760	10.0	0.0		
12	20.0	760	10.0	0.0		
13	20.0	760	10.0	0.0		
14	20.0	760	10.0	0.0		
15	20.0	760	10.0	0.0		
16	20.0	760	10.0	0.0		
17	20.0	760	10.0	0.0		
18	20.0	760	10.0	0.0		
19	20.0	760	10.0	0.0		
20	20.0	760	10.0	0.0		
21	20.0	760	10.0	0.0		
22	20.0	760	10.0	0.0		
23	20.0	760	10.0	0.0		
24	20.0	760	10.0	0.0		
25	20.0	760	10.0	0.0		
26	20.0	760	10.0	0.0		
27	20.0	760	10.0	0.0		
28	20.0	760	10.0	0.0		
29	20.0	760	10.0	0.0		
30	20.0	760	10.0	0.0		
31	20.0	760	10.0	0.0		
32	20.0	760	10.0	0.0		
33	20.0	760	10.0	0.0		
34	20.0	760	10.0	0.0		
35	20.0	760	10.0	0.0		
36	20.0	760	10.0	0.0		
37	20.0	760	10.0	0.0		
38	20.0	760	10.0	0.0		
39	20.0	760	10.0	0.0		
40	20.0	760	10.0	0.0		
41	20.0	760	10.0	0.0		
42	20.0	760	10.0	0.0		
43	20.0	760	10.0	0.0		
44	20.0	760	10.0	0.0		
45	20.0	760	10.0	0.0		
46	20.0	760	10.0	0.0		
47	20.0	760	10.0	0.0		
48	20.0	760	10.0	0.0		
49	20.0	760	10.0	0.0		
50	20.0	760	10.0	0.0		
51	20.0	760	10.0	0.0		
52	20.0	760	10.0	0.0		
53	20.0	760	10.0	0.0		
54	20.0	760	10.0	0.0		
55	20.0	760	10.0	0.0		
56	20.0	760	10.0	0.0		
57	20.0	760	10.0	0.0		
58	20.0	760	10.0	0.0		
59	20.0	760	10.0	0.0		
60	20.0	760	10.0	0.0		
61	20.0	760	10.0	0.0		
62	20.0	760	10.0	0.0		
63	20.0	760	10.0	0.0		
64	20.0	760	10.0	0.0		
65	20.0	760	10.0	0.0		
66	20.0	760	10.0	0.0		
67	20.0	760	10.0	0.0		
68	20.0	760	10.0	0.0		
69	20.0	760	10.0	0.0		
70	20.0	760	10.0	0.0		
71	20.0	760	10.0	0.0		
72	20.0	760	10.0	0.0		
73	20.0	760	10.0	0.0		
74	20.0	760	10.0	0.0		
75	20.0	760	10.0	0.0		
76	20.0	760	10.0	0.0		
77	20.0	760	10.0	0.0		
78	20.0	760	10.0	0.0		
79	20.0	760	10.0	0.0		
80	20.0	760	10.0	0.0		
81	20.0	760	10.0	0.0		
82	20.0	760	10.0	0.0		
83	20.0	760	10.0	0.0		
84	20.0	760	10.0	0.0		
85	20.0	760	10.0	0.0		
86	20.0	760	10.0	0.0		
87	20.0	760	10.0	0.0		
88	20.0	760	10.0	0.0		
89	20.0	760	10.0	0.0		
90	20.0	760	10.0	0.0		
91	20.0	760	10.0	0.0		
92	20.0	760	10.0	0.0		
93	20.0	760	10.0	0.0		
94	20.0	760	10.0	0.0		
95	20.0	760	10.0	0.0		
96	20.0	760	10.0	0.0		
97	20.0	760	10.0	0.0		
98	20.0	760	10.0	0.0		
99	20.0	760	10.0	0.0		
100	20.0	760	10.0	0.0		

Table 27. Perceived Effectiveness of Science and Social Science Curricula in Developing Students' Skills of Environmental Education

Item #	Identification	Completely		Considerably		Moderately		Very Little		Not at All	
		FREQ	%	FREQ	%	FREQ	%	FREQ	%	FREQ	%
#28	S.T.	36	18.0	51	25.5	71	35.5	25	12.5	17	8.5
	S.S.T.	30	25.0	33	27.5	36	30.0	14	11.7	07	5.8
	E.S.	66	20.6	84	26.2	107	33.4	39	12.2	24	7.5
#29	S.T.	22	11.0	50	25.5	83	41.5	34	17.0	11	5.5
	S.S.T.	21	17.5	34	28.3	41	34.2	18	15.0	06	5.0
	E.S.	43	13.4	84	26.2	124	38.7	52	16.2	17	5.3
#30	S.T.	23	11.5	48	24.0	70	35.0	40	20.0	19	9.5
	S.S.T.	25	20.8	34	28.3	40	33.3	13	10.8	08	6.7
	E.S.	48	15.0	82	25.6	110	34.4	53	16.6	27	8.4
#31	S.T.	25	12.5	61	30.5	76	38.0	31	15.5	07	3.5
	S.S.T.	19	15.8	42	35.0	43	35.8	12	10.0	04	3.3
	E.S.	44	13.7	103	32.2	119	37.2	43	13.4	11	3.4
#32	S.T.	16	8.0	58	29.0	77	38.5	39	19.5	10	5.0
	S.S.T.	14	11.7	31	25.8	47	39.2	18	15.0	10	8.3
	E.S.	30	9.4	89	27.8	124	38.7	57	17.8	20	6.3

S.T. = 200

S.S.T. = 120

E.S. = 320

Table 27. (Continued)

Item #	Identification	Completely		Considerably		Moderately		Very Little		Not at All	
		FREQ	%	FREQ	%	FREQ	%	FREQ	%	FREQ	%
#33	S.T.	13	6.5	49	24.5	86	43.0	37	18.5	15	7.5
	S.S.T.	12	10.0	31	25.8	40	33.3	21	17.5	16	13.3
	E.S.	25	7.8	80	25.0	126	39.4	58	18.1	31	9.7
#34	S.T.	11	5.5	53	26.5	81	40.5	37	18.5	18	9.0
	S.S.T.	07	5.8	37	30.8	44	36.7	21	17.5	11	9.2
	E.S.	18	5.6	90	28.1	125	39.1	58	18.1	29	9.1
#35	S.T.	10	5.0	40	20.0	94	47.0	42	21.0	14	7.0
	S.S.T.	10	8.3	27	22.5	48	40.0	20	16.7	15	12.5
	E.S.	20	6.3	67	20.9	142	44.4	62	19.4	29	9.1
#36	S.T.	171	85.5	26	13.0	03	1.5	00	0.0	00	0.0
	S.S.T.	99	82.5	19	15.8	01	0.8	00	0.0	01	0.8
	E.S.	270	84.4	45	14.1	04	1.2	00	0.0	01	0.3

S.T. = 200

S.S.T. = 120

E.S. = 320

Table 28. Perceived Effectiveness of Science and Social Science Curricula in Developing Students' Participation in Environmental Planning and Activities.

Item#	Identification	Completely		Considerably		Moderately		Very Little		Not at All	
		FREQ	%	FREQ	%	FREQ	%	FREQ	%	FREQ	%
#37	S.T.	18	9.0	31	15.5	86	43.0	37	18.5	28	14.0
	S.S.T.	15	12.5	24	20.0	38	31.7	25	20.8	18	15.0
	E.S.	33	10.3	55	17.2	124	38.7	62	19.4	46	14.4
#38	S.T.	18	9.0	36	18.0	81	40.5	47	23.5	18	9.0
	S.S.T.	08	6.7	25	20.8	25	20.8	38	31.7	24	20.0
	E.S.	26	8.1	61	19.1	106	33.1	85	26.6	42	13.1
#39	S.T.	20	10.0	22	11.0	53	26.5	71	35.5	34	17.0
	S.S.T.	16	13.3	20	16.7	40	33.3	24	20.0	20	16.7
	E.S.	36	11.2	42	13.1	93	29.1	95	29.7	54	16.9
#40	S.T.	09	4.5	34	17.0	46	23.0	69	34.5	42	21.0
	S.S.T.	10	8.3	20	16.7	30	25.0	33	27.5	27	22.5
	E.S.	19	5.9	54	16.9	76	23.8	102	31.9	69	21.6
#41	S.T.	166	83.0	32	16.0	00	0.0	00	0.0	02	1.0
	S.S.T.	97	80.8	22	18.3	00	0.0	00	0.0	01	0.8
	E.S.	263	82.2	54	16.9	00	0.0	00	0.0	03	0.9

S.T. = 200

S.S.T. = 120

E.S. = 320

Table 29. Opinions of the Research Sample Towards Incorporating Environmental Education into School Curricula

Item #	Identification	5 Strongly Agree		4 Agree		3 Uncertain		2 Disagree		1 Strongly Disagree	
		FREQ	%	FREQ	%	FREQ	%	FREQ	%	FREQ	%
#43	S.T.	139	69.5	55	27.5	05	2.5	00	0.0	01	0.5
	S.S.T.	88	73.3	20	16.7	07	5.8	02	1.7	03	2.5
	E.S.	227	70.9	75	23.4	12	3.7	02	0.6	04	1.2
#44	S.T.	33	16.5	60	30.0	57	28.5	30	15.0	20	10.0
	S.S.T.	10	8.3	14	11.7	22	18.3	36	30.0	38	31.7
	E.S.	43	13.4	74	23.1	79	24.7	66	20.7	58	18.1
#45	S.T.	109	54.5	59	29.5	26	13.0	06	3.0	00	0.0
	S.S.T.	84	70.0	27	22.5	05	4.2	00	0.0	04	3.3
	E.S.	193	60.3	86	26.9	31	9.7	06	1.9	04	1.2
#46	S.T.	149	74.5	42	21.0	07	3.5	02	1.0	00	0.0
	S.S.T.	97	80.8	19	15.8	04	3.5	00	0.0	00	0.0
	E.S.	246	76.9	61	19.1	11	3.4	02	0.6	00	0.0
S.T. = 200		S.S.T. = 120		E.S. = 320		1		2			
				Appr. A.		Appr. B					
#47	S.T.					FREQ		FREQ			
	S.S.T.					67		133		66.5	
	E.S.					33		87		72.3	
S.T. = 200						100		220		68.8	

S.T. = 200

S.S.T. = 120

E.S. = 320

Table 30. Opinions of the Research Sample Towards the Environmental Education Curriculum Content

Item #	Identification	5		4		3		2		1	
		FREQ	%	FREQ	%	FREQ	%	FREQ	%	FREQ	%
#48	S.T.	94	47.0	85	42.5	20	10.0	01	0.5	00	0.0
	S.S.T.	31	25.8	59	49.2	27	22.5	01	0.8	02	1.7
	E.S.	125	39.1	144	45.1	47	14.7	02	0.6	02	0.6
#49	S.T.	99	49.5	78	39.0	20	10.0	03	1.5	00	0.0
	S.S.T.	39	32.5	58	48.3	21	17.5	01	0.8	01	0.8
	E.S.	138	43.1	136	42.5	41	12.8	04	1.2	01	0.3
#50	S.T.	84	42.0	72	36.0	34	17.0	08	4.0	02	1.0
	S.S.T.	55	45.8	41	34.2	21	17.5	03	2.5	00	0.0
	E.S.	139	43.4	113	35.3	55	17.2	11	3.4	02	0.6
#51	S.T.	81	40.5	63	31.5	44	22.0	08	4.0	04	2.0
	S.S.T.	54	45.0	45	37.5	16	13.3	04	3.3	01	0.8
	E.S.	135	42.2	108	33.7	60	18.8	12	3.7	05	1.6
#52	S.T.	115	57.5	62	31.0	17	8.5	04	2.0	02	1.0
	S.S.T.	65	54.2	40	33.3	10	8.3	05	4.2	00	0.0
	E.S.	180	56.3	102	31.9	27	8.4	09	2.8	02	0.6

S.T. = 200

S.S.T. = 120

E.S. = 320

Table 30. (Continued)

Item #	Identification	5 Very Important		4 Important		3 Moderate		2 Very Little		1 Not at All	
		FREQ	%	FREQ	%	FREQ	%	FREQ	%	FREQ	%
#53	S.T.	118	59.0	63	31.5	15	7.5	04	2.0	00	0.0
	S.S.T.	69	57.5	32	26.7	15	12.5	03	2.5	01	0.8
	E.S.	187	58.4	95	29.7	30	9.4	07	2.2	01	0.3
#54	S.T.	137	68.5	53	26.5	06	3.0	04	2.0	00	0.0
	S.S.T.	72	60.0	35	29.2	08	6.7	04	3.3	01	0.8
	E.S.	209	65.3	88	27.5	14	4.4	08	2.5	01	0.3
#55	S.T.	131	56.5	55	27.5	12	6.0	01	0.5	01	0.5
	S.S.T.	63	52.5	44	36.7	10	8.3	02	1.7	01	0.8
	E.S.	194	60.6	99	30.9	22	6.9	03	0.9	02	0.6
#56	S.T.	118	59.0	51	25.5	20	10.0	08	4.0	03	1.5
	S.S.T.	64	53.3	45	37.5	06	5.0	03	2.5	02	1.7
	E.S.	182	56.9	96	30.0	26	8.1	11	3.4	05	1.6

S.T. = 200

S.S.T. = 120

E.S. = 320

Table 31. Opinions of the Research Sample Towards Teaching Methods of Environmental Education

Item #	Identification	5 Very Often		4 Often		3 Occasionally		2 Seldom		1 Not at All	
		FREQ	%	FREQ	%	FREQ	%	FREQ	%	FREQ	%
#58	S.T.	02	1.5	12	6.0	120	60.0	34	17.0	32	16.0
	S.S.T.	05	4.2	15	12.5	40	33.3	33	27.5	27	22.5
	E.S.	07	2.2	27	8.4	160	50.0	67	20.9	59	18.4
#58	S.T.	08	4.0	18	9.0	115	57.5	36	18.0	23	11.5
	S.S.T.	07	5.8	22	18.3	37	30.8	30	25.0	24	20.0
	E.S.	15	4.7	40	12.5	152	47.5	66	20.6	47	14.7
#60	S.T.	03	1.5	08	4.0	44	22.0	95	47.5	50	25.0
	S.S.T.	09	7.5	18	15.0	24	20.0	34	28.3	35	29.2
	E.S.	12	3.7	26	8.1	68	21.2	129	40.3	85	26.6
#61	S.T.	07	3.5	09	4.5	61	30.5	92	46.0	31	15.5
	S.S.T.	09	7.5	31	25.8	32	26.7	19	15.8	29	24.2
	E.S.	16	5.0	40	12.5	93	29.1	111	34.7	60	18.8
#62	S.T.	04	2.0	29	14.5	120	60.0	29	14.5	18	9.0
	S.S.T.	18	15.0	19	15.8	45	37.5	25	20.8	13	10.8
	E.S.	22	6.9	48	15.0	165	51.6	54	16.9	31	9.7

S.T. = 200

S.S.T. = 120

E.S. = 320

Table 31. (Continued)

Item #	Identification	5 Very Often		4 Often		3 Occasionally		2 Seldom		1 Not at All	
		FREQ	%	FREQ	%	FREQ	%	FREQ	%	FREQ	%
#63	S.T.	02	1.0	04	0.2	65	32.5	86	43.0	43	21.5
	S.S.T.	13	10.8	19	15.8	33	27.5	24	20.0	31	25.8
	E.S.	15	4.7	23	7.2	98	30.6	110	34.4	74	23.1
#64	S.T.	09	4.5	22	11.0	116	58.0	35	17.5	18	9.0
	S.S.T.	21	17.5	43	35.8	39	32.5	13	10.8	04	3.3
	E.S.	30	9.4	65	20.3	155	48.4	48	15.0	22	6.9
#65	S.T.	24	12.0	89	44.5	67	33.5	14	7.0	06	3.0
	S.S.T.	37	30.8	29	24.2	43	35.8	08	6.7	03	2.5
	E.S.	61	19.1	118	36.9	110	34.4	22	6.9	09	2.8
#66	S.T.	02	1.0	06	3.0	27	13.5	99	49.5	66	33.0
	S.S.T.	03	2.5	02	1.7	27	22.5	36	30.0	52	43.3
	E.S.	05	1.6	08	2.5	54	16.9	135	42.2	118	36.9

S.T. = 200

S.S.T. = 120

E.S. = 320

Table 32. Opinions of the Research Sample Towards Teacher Training

Item #	Identification	5 Strongly Agree		4 Agree		3 Uncertain		2 Disagree		1 Strongly Disagree	
		FREQ	%	FREQ	%	FREQ	%	FREQ	%	FREQ	%
#67	S.T.	36	18.0	42	21.0	81	40.5	24	12	17	8.5
	S.S.T.	14	11.7	16	13.3	47	39.2	30	25.0	13	10.8
	E.S.	50	15.6	58	18.1	128	40.1	54	16.9	30	9.4
#68	S.T.	18	9.0	37	18.5	47	23.5	72	36.0	26	13.0
	S.S.T.	12	10.0	27	22.5	34	28.3	32	26.7	15	12.5
	E.S.	30	9.4	64	20.0	81	25.3	104	32.5	41	12.8
#69	S.T.	131	65.5	59	29.5	09	4.5	01	0.5	00	0.0
	S.S.T.	88	73.3	29	24.2	03	2.5	00	0.0	00	0.0
	E.S.	219	68.4	88	27.5	12	3.7	01	0.3	00	0.0
#70	S.T.	94	47.0	77	38.5	24	12.0	03	1.5	02	1.0
	S.S.T.	59	49.2	38	31.7	16	13.3	05	4.2	02	1.7
	E.S.	153	47.8	115	35.9	40	12.5	08	2.5	04	1.2
#71	S.T.	76	38.0	68	34.0	41	20.5	10	5.0	05	2.5
	S.S.T.	47	39.2	39	32.5	21	17.5	11	9.2	02	1.7
	E.S.	123	38.4	107	33.4	62	19.4	21	6.6	07	2.2

S.T. = 200

S.S.T. = 120

E.S. = 320

Table 33. Opinions of the Research Sample Towards the Constraints and Suggestions

Item #	Identification	5 Strongly Agree		4 Agree		3 Uncertain		2 Disagree		1 Strongly Disagree	
		FREQ	%	FREQ	%	FREQ	%	FREQ	%	FREQ	%
#73	S.T.	99	49.5	80	40.0	16	8.0	04	2.5	01	0.5
	S.S.T.	63	52.5	38	31.7	12	10.0	04	3.3	03	2.5
	E.S.	162	50.6	118	36.9	28	8.8	08	2.5	04	1.2
#74	S.T.	01	0.5	16	8.0	24	12.0	80	40.0	79	39.5
	S.S.T.	08	6.7	17	14.2	33	27.5	27	22.5	35	29.2
	E.S.	09	2.8	33	10.3	57	17.8	107	33.4	114	35.6
#75	S.T.	73	36.5	86	43.0	33	16.5	06	3.0	02	1.0
	S.S.T.	53	44.2	45	37.5	17	14.2	04	3.3	01	0.8
	E.S.	126	39.4	131	40.9	50	15.6	10	3.1	03	0.9
#76	S.T.	101	50.5	58	29.0	28	14.0	11	5.5	02	1.0
	S.S.T.	49	40.8	43	35.8	09	7.5	07	5.8	12	10.0
	E.S.	150	46.9	101	31.6	37	11.6	18	5.6	14	4.4
#77	S.T.	71	35.5	63	31.5	43	21.5	16	8.0	07	3.5
	S.S.T.	44	36.7	38	31.7	27	22.5	05	4.2	06	5.0
	E.S.	115	35.9	101	31.6	70	21.9	21	6.6	13	4.1

S.T. = 200

S.S.T. = 120

E.S. = 320

Table 33. (Continued)

Item #	Identification	5 Strongly Agree		4 Agree		3 Uncertain		2 Disagree		1 Strongly Disagree	
		FREQ	%	FREQ	%	FREQ	%	FREQ	%	FREQ	%
#78	S.T.	28	14.0	35	17.5	41	20.5	64	32.0	32	16.0
	S.S.T.	29	24.2	24	20.0	19	15.8	23	19.2	25	20.8
	E.S.	57	17.8	59	18.4	60	18.8	87	27.2	57	17.8
#79	S.T.	77	38.5	50	25.0	28	14.0	31	15.5	14	7.0
	S.S.T.	42	35.0	33	27.5	17	14.2	12	10.0	16	13.3
	E.S.	119	37.2	83	25.9	45	14.1	43	13.4	30	9.4
#80	S.T.	93	46.5	65	32.5	24	12.0	13	6.5	05	2.5
	S.S.T.	62	51.7	33	27.5	12	10.0	03	2.5	10	8.3
	E.S.	155	48.4	98	30.6	36	11.2	16	5.0	15	4.7
#81	S.T.	120	60.0	55	27.5	17	8.5	05	2.5	03	1.5
	S.S.T.	70	58.3	33	27.5	04	3.3	04	3.3	09	7.5
	E.S.	190	59.4	88	27.5	21	6.6	09	2.8	12	3.7
#82	S.T.	119	59.5	58	29.0	18	9.0	03	1.5	02	1.0
	S.S.T.	65	54.2	34	28.3	11	9.2	03	2.5	07	5.8
	E.S.	184	57.5	92	28.8	29	9.1	06	1.9	09	2.8

S.T. = 200

S.S.T. = 120

E.S. = 320

Table 33. (Continued)

Item #	Identification	5 Strongly Agree		4 Agree		3 Uncertain		2 Disagree		1 Strongly Disagree	
		FREQ	%	FREQ	%	FREQ	%	FREQ	%	FREQ	%
#83	S.T.	113	56.5	54	27.0	25	12.5	04	2.0	04	2.0
	S.S.T.	65	54.2	30	25.0	18	15.0	02	1.7	05	4.2
	E.S.	178	55.6	84	26.2	43	13.4	06	1.9	09	2.8
#84	S.T.	54	27.0	47	23.5	47	23.5	41	20.5	11	5.5
	S.S.T.	33	27.5	28	23.3	35	29.2	15	12.5	09	7.5
	E.S.	87	27.2	75	23.4	82	25.6	56	17.5	20	6.3
#85	S.T.	33	16.5	33	16.5	65	32.5	45	22.5	24	12.0
	S.S.T.	20	16.7	21	17.5	27	22.5	29	24.2	23	19.2
	E.S.	53	16.6	54	16.9	92	28.8	74	23.1	47	14.7

S.T. = 200

S.S.T. = 120

E.S. = 320

Appendix H

Items of Teachers' Questionnaire That Have Significant Chi-Square

Appendix (H)

Table 34. Items of Teachers' Questionnaire that have Significant Chi-square

Item #	χ^2	d.f.	SIGN.
5	10.04	4	.0397
7	11.10	4	.0255
12	18.50	4	.0010
14	12.50	4	.0159
15	26.93	4	.0000
30	9.48	4	.0501
38	18.37	4	.0000
39	9.85	4	.0429
43	11.86	4	.0184
44	45.37	4	.0000
45	20.66	4	.0004
48	20.78	4	.0003
49	11.78	4	.0190
58	23.52	4	.0001
59	22.46	4	.0002
60	25.83	4	.0000
61	52.76	4	.0000
62	27.93	4	.0000
63	48.20	4	.0000
64	52.08	4	.0000
65	22.56	4	.0002
66	14.14	4	.0068
67	12.33	4	.0150
74	32.13	4	.0000
76	19.24	4	.0007
78	11.00	4	.0265
81	10.47	4	.0332