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ABSTRACT

This generic model is intended to provide a rationale and conceptual basis for thinking about and understanding the institutionalization of environmental education. To achieve this purpose, the document: (1) broadly defines EE: (2) presents a systems view of formalized education: (3) presents a view of EE contextualized in the formal education setting: (4) discusses the process of institutionalized change in education: (5) characterizes a generic model of institutionalized environmental education: and (6) presents basic elements of a system for institutionalizing environmental education. (Author/RE)

A GENERIC MODEL

THE INSTITUTIONALIZATION OF ENVIRONMENTAL EDUCATION IN THE FORMAL EDUCATION SECTOR

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THE INSTITUTIONALIZATION OF ENVIRONMENTAL EDUCATION IN THE FORMAL EDUCATION SECTOR:

A GENERIC MODEL

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PREFACE

Supported by a grant from the Office of Environmental Education (U.S. Office of Education), the Far West Laboratory for Educational Research and Development has developed a set of resources applicable to the institutionalization of environmental education and for the design of environmental education delivery systems.

The development of the environmental education delivery systems design resources in this project responded to a need identified in the Environmental Education Act (Public Law 91-516; Public Law 93-278 as amended) for facilitating changes in user institutions and organizations that lead to the adoption, installation, and use of effective environmental education programs and curricula.

The resources developed by the project include:

- The Institutionalization of Environmental Education in the Formal Education Sector: A Generic Model
- The Design of Environmental Education Delivery Systems: A Procedural Guide
- Case Studies of the Institutionalization of Environmental Education
- A Final Report

An essential aspect of the project was the involvement of educational practitioners in the research and development process. This was accomplished through the cooperation and participation of individuals representing various school districts, state departments of education, universities and colleges, and educational research and development (R&D) and service agencies.

This document presents a description of a Generic Model for the Institutionalization of Environmental Education in the Formal Education Sector. In this

model we: (a) introduce the basic intent and purpose of the document; (b) describe the general nature of environmental education, its content, and its functional components; (c) characterize the educational system in which environmental education is to be delivered; and (d) interface a) and b) and characterize the requirements, structure, and components of an environmental education delivery system.

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INTRODUCTION

The purpose of the Generic Model is to provide a rationale and a conceptual basis for thinking about and understanding the nature of institutionalizing environmental education. To achieve this purpose we will: (1) define environmental education (EE) from a broad perspective; (2) present a systems view of formalized education; (3) present a view of environmental education in the context of a formal educational setting; (4) portray perspectives on the institutionalization of change in education; (5) characterize a generic system for institutionalizing environmental education; (6) describe the general requirements, the major operations, and the basic structure of a system for designing the institutionalization of environmental education.

The ideas and descriptions presented in this document, therefore, constitute a knowledge base for designing a system for institutionalizing change (specifically in environmental education) within formal education settings.

A system for institutionalizing environmental education (EE) refers to various procedures by which EE is planned, developed, implemented, and evaluated in an educational setting. This system represents an organized and coordinated "network" of people, procedures, and arrangements whose primary function is to deliver EE into an educational system so that the EE program or curriculum can become an integral part of the system.

The formulation of a generic model for the institutionalization of EE is facilitated by two major sources of information: (1) relevant literature and research on educational change and innovation (in general) and related to EE (more specifically); and (2) the collective perceptions and experiences of a number of educational practitioners and environmental educators representing state departments of education, universities and colleges, independent

community agencies, and public and private schools.* From these sources, several assumptions have been drawn about the need for comprehensive systems for institutionalizing environmental education. These needs assumptions are summarized as follows:

- There is a need for citizens to develop a greater public awareness and understanding of environmental and energy problems and issues in order to be better prepared to participate in making decisions that affect their daily lives.

- There is a need for educators to be aware of "holistic" and comprehensive models for environmental education in order to design more effective programs and curricula and select better resources for use in their schools and classrooms.

- There is a need for educators to know how to facilitate changes that lead to the design and adoption of effective EE programs and curricula in schools and school systems.

As a useful resource document, the Generic Model is designed to provide answers to the following questions:

- What is environmental education--its mission, goals, and content? (Chapter One)

- How can we characterize the formal education system (into which we will introduce EE)? (Chapter Two)

- How can we characterize environmental education in the context of the formal education system? (Chapter Three)

- What do we know about the institutionalization of change in education? (Chapter Four)

- What are the requirements for a system for institutionalizing environmental education? (Chapter Five)

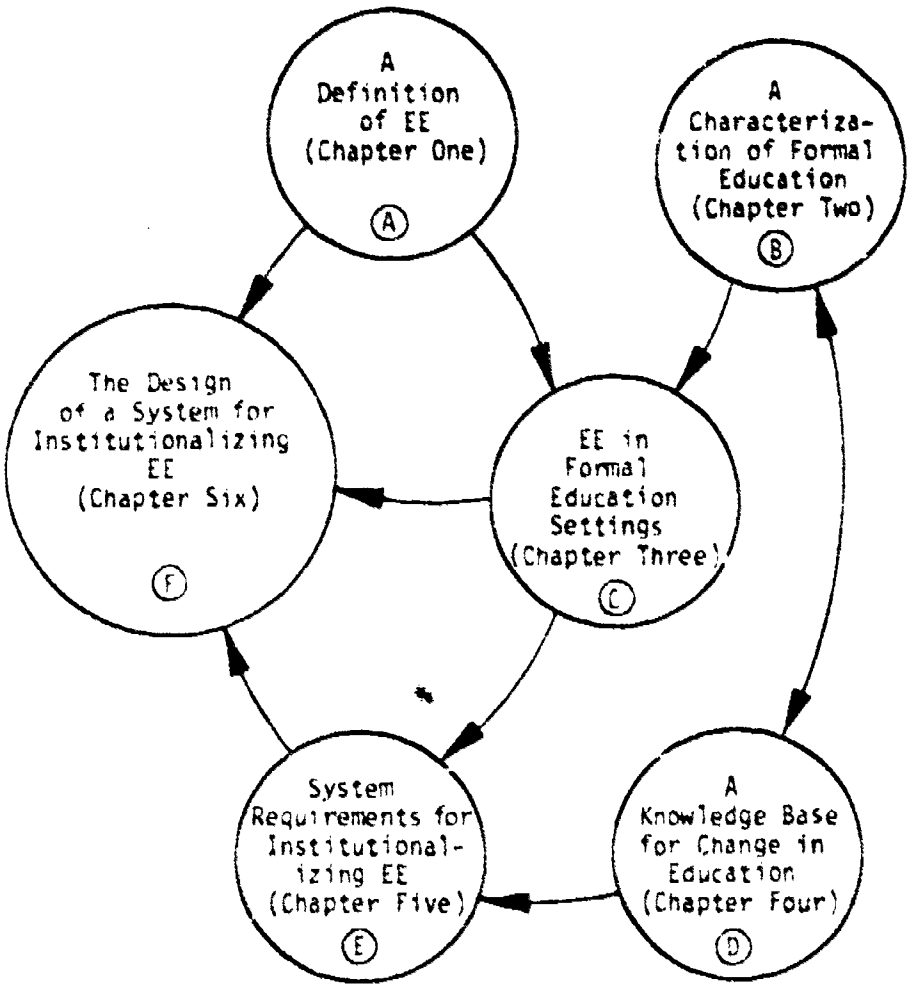
- What are the components and options for designing a system for institutionalizing EE? (Chapter Six)

*A group of educational practitioners and environmental educators representing such agencies were participants in the Far West Laboratory project.

The relationships among the information provided in the six chapters of the Generic Model are as follows:

FIGURE 1

THE CONCEPTUAL RELATIONSHIP OF THE CHAPTERS WITHIN THE GENERIC MODEL



- A Characterization of Environmental Education helps to set forth an (ideal) image of what kind of EE should be institutionalized (A).
- A characterization of the formal education systems complex leads us to understand the context of institutionalization (B).
- Relating (A) and (B) will set the stage for discussing the institutionalizing of EE in the formal education sector (C).
- Institutionalization is a process that indicates change. A review of what is known about the change (improvement) process in education will help to identify certain propositions as to how to go about institutionalizing change in education (D).
- A Generic System Model for institutionalizing change in education is introduced (E) that is based on the propositions explicated in (D) and is related to EE in (C) the formal education.
- A synthesis of all previous considerations provides the major components and options essential to the design of a system for institutionalizing EE in formal educational settings (F).

KEY TERMS

Change Agent (or Change Agency): An individual or agency that instigates or facilitates the inception, design, installation, and implementation of a curriculum delivery system.

Comprehensive Environmental Education: The study of the interrelationships between various aspects and considerations of natural and human systems in the total environment. These aspects and considerations include the study of energy, population, pollution, total resource allocation, resource depletion, conservation, transportation, technology, economics, and urban and rural planning, and the study of specific environmental issues related to these areas. See also Holistic Environmental Education.

Curriculum Delivery System (CDS): A system which provides the organizational and procedural arrangements that facilitate the infusion of educational programs, procedures, practices, and resources into a user system so that they can become an integral part of the system.

Design: A mode of inquiry, analysis, and problem solving that is cyclical or iterative in nature, and that leads to the specification of the product or system to be developed. The Far West Laboratory design approach defines an image of an ideal system and considers barriers and constraints in order to attain a feasible and workable model of the system to be developed.

Holistic Environmental Education: Education that promotes an understanding and clarification of the complex interrelationships between human and natural systems in the environment by the examination of the components and reciprocal functions of both.

Model: An abstract representation of reality, or an organized expression of a mental image. This image can be described, depicted or otherwise displayed. Here, the term "model" is used in the sense of a mental image.

Model of a Curriculum Delivery System (CDS): A descriptive representation of a CDS. The model describes specifications for the components of the delivery system and the relationship among the components. The model presented in this and the accompanying documents is derived from a synthesis of several user-specific delivery systems, and is the basis upon which appropriate curriculum delivery systems can be developed and adapted to fit into a variety of educational settings.

User System: The targeted educational setting (county, district, school) that is the focus for educational planning and design, and involves the primary implementers and recipients of educational programs and products.

CHAPTER ONE

A CHARACTERIZATION OF ENVIRONMENTAL EDUCATION

During the past decade there has been a growing public concern over the rapidly deteriorating state of our environment and the threat this deterioration poses for our survival. Despite this concern, the central problems of our environment--and their possible solutions--have continued to be obscured by many attempts both to exploit and to safeguard the environment. Compounding this situation further have been the frequent failures of investigators to study environmental problems from a sufficiently broad and holistic perspective and to propose solutions to environmental problems that transcend their discipline-bound and specialized perspectives.

Just as the natural environment and the human settlements within it are complex and interrelated, the environmental "crisis" involves a complex and interrelated set of problems that will continue to face the nation and the world throughout this century and beyond. Therefore, the public and their leaders will continually be called upon to decide how they should deal with a variety of complex environmental issues.

Sensitivity to the complexity of these issues was demonstrated in the legislated mandate of the Environmental Education Act of 1970 (Public Law 91-516). According to the EE Act, environmental education should deal with:

> "...man's relationship with his natural and manmade 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."

In a subsequent amendment to the EE Act in 1974 (Public Law 93-278), the areas of economics and energy were added to the list of major factors to be inter-

related in environmental education. A graphic representation of this definition is presented in Figure 2.

A. The Mission of Environmental Education*

Environmental education can not be developed and advanced unless it can be perceived in relation to the whole of education. If it can be seen in relation to this whole, then questions of how to integrate it, how to resolve role assignments or career directions, how to relate subject matter, how to balance the allocation of resources across various objectives, all can be dealt with through modest changes in the prevailing frameworks of education.

Let us, therefore, perceive the whole of education from the standpoint of three great purposes. These may be stated as follows:

- To put the learner in possession of his or her cultural inheritance
- To enable the learner to participate in the contemporary world
- To qualify the learner to contribute to the civilization of the future

We may view each of these three great purposes of education as overarching the whole of educational experience, in the sense that they span the past, the present, and the future. Within this framework, no discipline can claim sole jurisdiction. The routes toward achievement of these purposes are varied. The emphases differ from discipline to discipline. The elaboration of these purposes into the vast realms of human knowledge has produced the educational systems that we have today.

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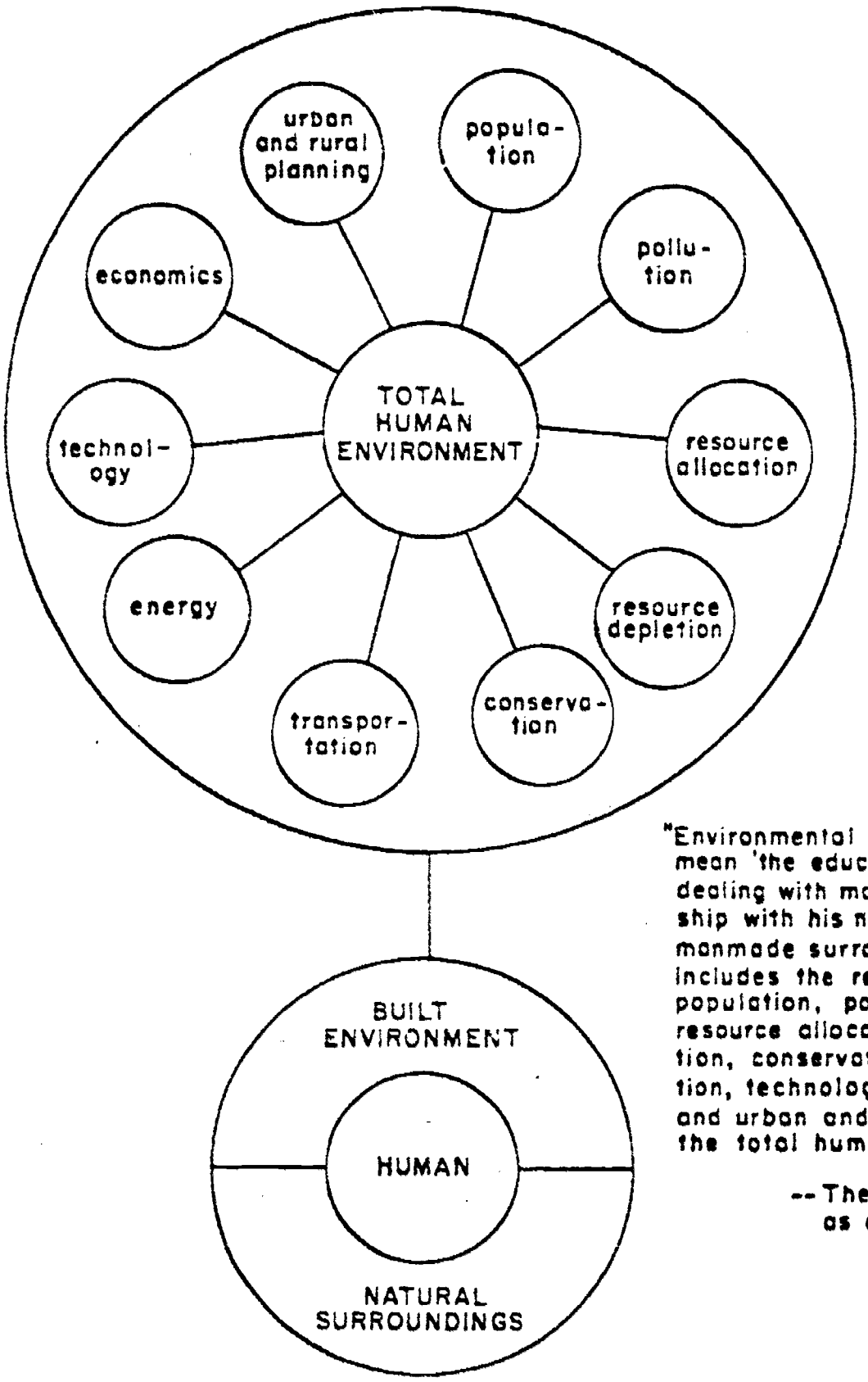
*This section is adapted from Chapter One of John N. Warfield, Development of an Interpretive Structural Model and Strategies for Implementation Based on a Descriptive and Prescriptive Analysis of Resources for Environmental Education/Studies, Vol. II. Draft of a final report submitted to the Office of Environmental Education (Dept. of HEW), Charlottesville: University of Virginia, August 31, 1979.

FIGURE 2

GRAPHIC REPRESENTATION OF THE LEGAL DEFINITION OF ENVIRONMENTAL EDUCATION*



"Environmental education shall mean 'the educational process dealing with man's relationship with his natural and manmade surroundings, and includes the relation of population, pollution, energy, resource allocation and depletion, conservation, transportation, technology, economics, and urban and rural planning to the total human enviroment'."

--The EE Act of 1970, as amended.

*Warfield, op. cit.

Within our present educational system, however, knowledge is carved up into many different disciplines and subject matters. Students face an overwhelming array of courses, topics, and concepts from which they are implicitly expected to construct a whole and satisfactory understanding of our world. In this situation, how are we to accomplish the third great purpose "to qualify the learner to contribute to the civilization of the future"? Are we to subject the person to a study of parts, assuming thereby that at some point in life a miraculous capacity will suddenly appear that enables the person to understand the whole?

We have been advised by the philosopher, Alfred North Whitehead, that we can never fully understand anything. Some part of the knowledge is always denied us because we are finite humans. But this truth was not offered as a reason to avoid the effort to comprehend how the fragments of our world relate to each other. Rather it serves to alert us to the difficulty of such an endeavor, and should suggest to us that studies aimed specifically at understanding interactions should become a part of our qualification to contribute to the civilization of the future.

If we do not doubt the three great purposes of education, we may nonetheless suspect that, lacking the capacity to integrate, to see interrelationships adequately, we will forever lack the balanced emphasis in education that carries these three purposes as far as possible within available resource and human limitations. Thus, there will always be room for improvement, for adjustment of educational goals and of emphases. And if, in education, we can make advances in our understanding of the complexity of things, how these complexities function within or influence the wholes, and how we, as individuals, can "contribute to the civilization of the future" by the decisions we make as participants in the "contemporary world," then we can truly say that we are preparing people to be

responsible citizens.

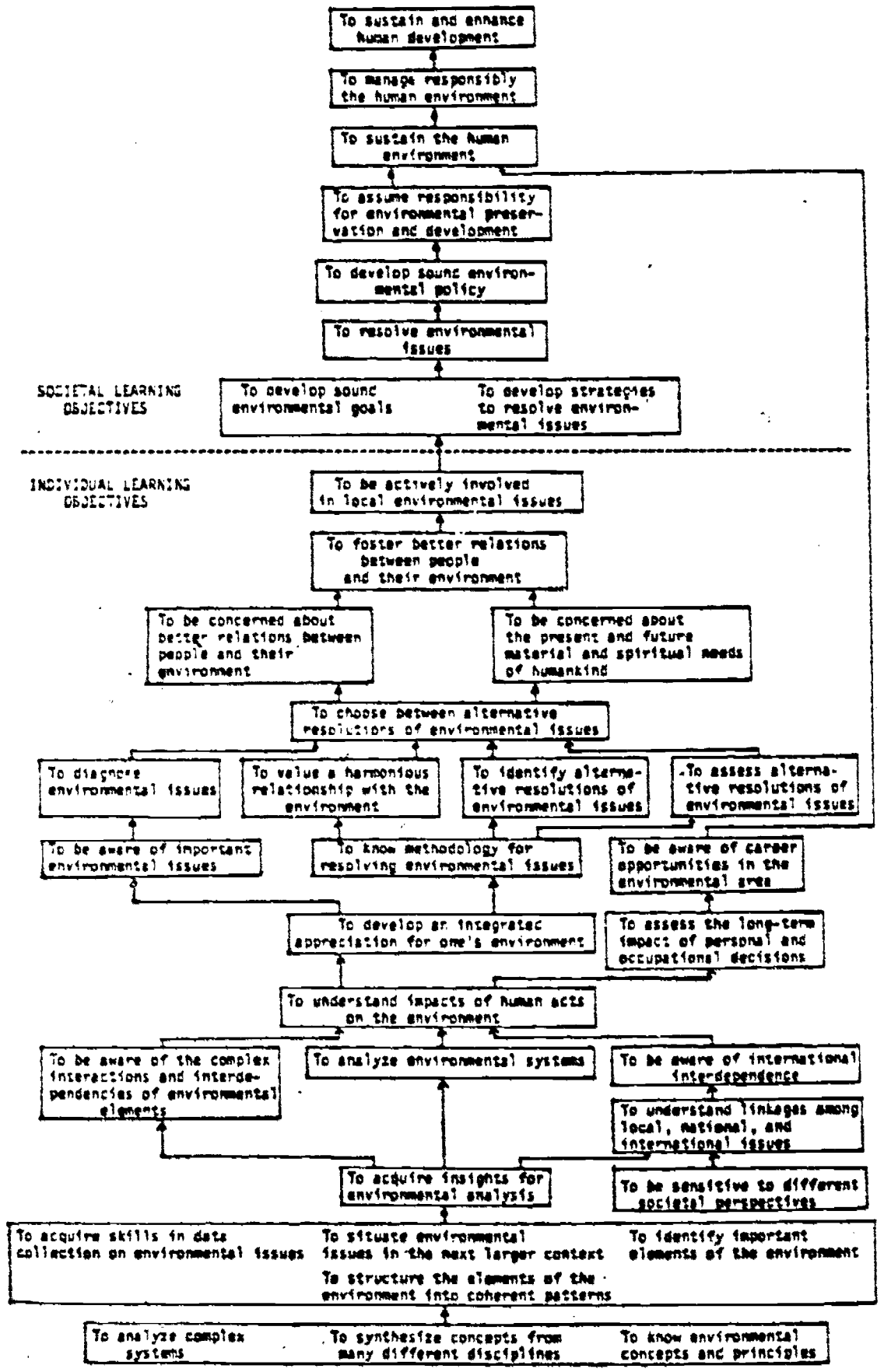
While we cannot go back and explore in detail the reasoning of the U.S. Congress when the Environmental Education Act of 1970 was passed, it is not a great leap from the wording of the Act to the conclusion that the Congress had in mind something similar to the point expressed in the preceding paragraphs. The emphasis on relationships, on a "process dealing with...relationship," on "relation...to the total human environment," all point toward development of a functional grasp of the whole as opposed to a fragmented consideration of the parts.

Environmental education should be perceived as contributing to the three great purposes of education stated previously, with emphasis upon qualifying the learner to contribute to the civilization of the future. Against this perspective, the special mission of environmental education can be stated in capsule form: Environmental education should equip the learner with a knowledge of how to analyze interactions among the major components of the total human environment, to the end that the learner becomes able to contribute to the civilization of the future through informed decision-making relevant to that environment.

This capsule mission statement is elaborated in Figure 3 as a set of broad environmental education learning objectives.

FIGURE 3

MISSION OBJECTIVES FOR ENVIRONMENTAL EDUCATION*



(A ← B means ELEMENT A SHOULD HELP ACHIEVE ELEMENT B)

*Warfield, op. cit.

B. Holistic Environmental Education Goals, Objectives, and Curricula

In order to adequately prepare citizens to meet the long-range planning and decision-making challenges that the previously stated purposes and mission objectives present, environmental education will need to develop citizens' skills in: (1) analyzing environmental problems and issues; (2) examining the environmentally related pro and con arguments of a variety of public and private interest groups, labor, business, and government organizations; (3) exploring possible side effects of various environmental problems solutions; (4) predicting both short-term and long-term implications of (alternative) local, state, and national environmental programs; (5) articulating personal goals, desires, and life-style needs in terms of their aggregate (regional, national, or global) implications for energy use and resource allocation; and (6) making long-term life-style decisions that are compatible with the requirements for maintaining an appropriate balance between natural-system and human-system functions.*

From these requirements, we can re-specify the various mission objectives presented in Figure 3 into more discrete sets of environmental education goals and objectives. These are as follows:

*B.H. Banathy, S. Mills, K. O'Connell, and L. Peterson. Resource Material Development: Development of Teacher Training Materials on Energy/Environmental Education and Design of a Program for Trainers. Final report submitted to the Office of Environmental Education (Department of H.E.W.), San Francisco: Far West Laboratory for Educational Research and Development, December 29, 1978, p. 35.

1. Major goals of environmental education:*

   - To increase awareness and understanding of the fundamental interrelationships and interdependencies between natural and human systems.

   - To foster awareness of and concern about economic, social, political, and ecological interdependence in urban and rural areas.

   - To foster concern and a sense of responsibility for the environment.

   - To provide every person with opportunities to acquire the knowledge, values, attitudes, commitments, and skills needed to protect and improve the environment.

   - To increase skills in synthesizing information from a variety of disciplines and knowledge areas in order to develop a more integrated body of knowledge and a world view.

   - To increase the capability of understanding and making decisions about key issues affecting the individual, society, and the environment.

   - To foster new patterns of behavior of individuals, groups, and society as a whole toward the environment.

2. Types of environmental education objectives compatible with the major goals:**

   - Awareness: To help individuals and groups acquire an awareness of and sensitivity to the total environment and its associated problems.

   - Attitudes: To help individuals and groups acquire a set of values and feelings of concern for the environment, and the motivation for actively participating in environmental improvement and protection.

   - Knowledge: To help individuals and groups gain a variety of experience in and acquire a basic understanding of the environment and its associated problems.

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*In addition to Warfield op. cit., these goals have also been derived from various sources including: The EE Act of 1970 (Public Law 91-516 and Public Law 93-278 as amended); The High School Energy/Environmental Education Teacher Training Model, B.H. Banathy, et al., Far West Laboratory for Educational Research and Development, San Francisco, 1977; "Goals, Objectives, and Guiding Principles for Environmental Education," Conservation Education Association paper of conclusions drawn by Intergovernment Conference on Environmental Education, October 1977; "Approach to Contextual Education," E. Clark, unpublished paper, George Williams College, Downers Grove, Ill., April 1979.

**Ibid.

- Skills: To help individuals and groups acquire the skills for identifying and solving or anticipating and preventing environmental problems.

- Participation: To provide individuals and groups with an opportunity to be actively involved in learning about the environment and in working toward the resolution of environmental problems.

Developing capabilities such as the above in our citizens can only occur through well-conceived and meaningful environmental education that is geared to reach people of different ages and at different levels of society. This type of environmental education has the following primary characteristics:*

- It is holistic. It considers the environment in its totality--natural and human built; focuses on and clarifies the complex relationships, linkages, and interdependencies between all things--natural and human; emphasizes understanding natural and human systems as complex wholes rather than from narrow or simplistic perspectives; emphasizes synthetic, connective thinking as well as analytic, reductive thinking; emphasizes multiple causal effects as well as single, linear cause-effect relationships; emphasizes synergism (the whole being more than the sum of its parts).

- It is interdisciplinary. It utilizes information from a variety of fields and disciplines (including the natural sciences, social sciences, and humanities) in order to deal adequately with the ecological, social, aesthetic, economic, technological, cultural, and ethical dimensions of environmental issues; emphasizes coming to know interrelationships and interdependencies between natural and human systems by applying appropriate knowledge from any and all disciplines (i.e., uses knowledge and information in a "cosmopolitan" manner).

- It is problem and issue focused. It emphasizes problem solving and decision-making by presenting real environmental problems or issues that have local, regional, national, or global significance; engages learners in values clarification, problem solving, planning, and decision-making activities that prepare them for dealing with environmental problems and issues that affect individuals and society; examines major environmental problems and issues from local, national, regional, international, and global points of view, so that learners receive insights into environmental conditions in other geographical areas; emphasizes making cross-cultural comparisons.

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*Banathy, Mills, O'Connell, and Peterson, op. cit., p. 32.

In addition to these primary characteristics, environmental education also has the following secondary characteristics:*

- It is concerned with the understanding of events over time. It focuses on current and potential environmental situations, while taking into account their historical antecedents; focuses on chains of events and cycles; emphasizes the importance of antecedent events and experiences.

- It is policy focused. It emphasizes finding alternative solutions and strategies to resolve environmental problems and issues; emphasizes developing decision-making skills in real or simulated situations.

- It is cooperation oriented. It emphasizes the value and necessity of local, national, and international cooperation in the prevention and solution of environmental problems.

- It is futures oriented. It emphasizes anticipatory thinking (i.e., foreseeing and preventing environmental problems) rather than reactive thinking (i.e., responding to environmental problems after they appear); emphasizes considering environmental aspects in planning for development and growth; emphasizes planning and designing for the future and striving to achieve the "ideal."

- It is ethics and values oriented. It emphasizes world views, principles of parity, equity, stewardship, environmental ethics.

- It is committed to public and private action. It encourages political awareness as well as active involvement and participation in public events.

- It is life skills oriented. It emphasizes the complexity of environmental problems, and thus the need to develop critical-thinking, problem-solving, and decision-making skills that can deal with complexity.

- It is committed to lifelong learning. It emphasizes the necessity for continual, ongoing learning to keep abreast and informed, and for personal growth and development; sees environmental education as a continuous lifelong process, beginning at the pre-school level and extending through all formal and non-formal levels of education. and experience.

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*Derived from the contributions of various state, university, research and development laboratories, and K-12 school environmental education facilitators who participated in the EE curriculum delivery system design meetings held at the Far West Laboratory, San Francisco, December 5-7, 1978.

The development of educational resources that provide environmental education curricula that embody these characteristics should become a major priority in meeting the environmental education needs of all institutions and organizations providing formal and non-formal education for children, youth, and adults on a continuous or recurrent basis.

Holistic, interdisciplinary, problem-focused environmental education curricula would therefore need to engage learners in exploring the following:

- Complex, broad-impact energy and environmental issues of concern to national, state, and local leaders and citizens, e.g., electric power generation and environmental safeguards, long-term utilization and conservation of energy resources, optimal use of finite land resources, impact of energy intensive urban growth on the quality of life, energy resource delivery and use.*

- Interrelated content areas that address natural and human-built or human-managed systems affected by the above issues, e.g., those specified by the Environmental Education Act, such as human settlements, food production, population dynamics, transportation, land use, and environmental pollution.

- Useful processes that are helpful in understanding and resolving complex energy/environmental issues involving the above content areas, e.g., systems analysis, problem solving, decision-making, life-style assessment, world views and values analyses, net energy and energy quality assessment, planning and policy formation, and futures thinking.**

Holistic EE curricula should be so designed that any one or combination of the above content areas or processes may be used as entry points for developing learners' awareness and understanding of broad energy and environmental issues within standard subject matter areas, as well as through special

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*Bela H. Banathy and Stephen Mills, The Environmental Education Teacher Training Models Project. Final report submitted to the Office of Environmental Education (Dept. of HEW), San Francisco: Far West Laboratory for Educational Research and Development, November 15, 1978, p. 64.

**Ibid., pp. 13-14.

courses and activities. In addition, the selection of useful teaching and learning strategies and materials from those currently available, as well as the development of new ones, should be made on the basis of their compatibility with a holistic EE curriculum design and their utility in addressing the needs, interests, and requirements of the user.

To conclude, the mission statement elaborates the desirable outcomes of environmental education as defined in the EE Act. It embodies the three general purposes of education and exemplifies the kind of awareness, attitudes, knowledge, skills, and participation that environmental education entails. Finally, it provides a basis for deriving, planning, or designing environmental education curricula and learning systems.

CHAPTER TWO

A SYSTEMIC VIEW OF FORMALIZED EDUCATION*

Contemplating the design of a model of institutionalizing environmental education in formal educational settings, one of the concerns that must be audressed is the characterization of formal educational settings into which environmental education is to be introduced, integrated, and finally institutionalized. The purpose of this chapter, therefore, is to introduce such a characterization.

In this chapter, schooling--the formalized manifestation of education--is viewed as a complex of systems operating at several levels. These levels will be identified and the systems organized at these levels will be characterized.

The rationale for considering the various levels as primary system levels will be examined and the systemic consequences of giving primacy to the learning experience level will be explored. This exploration will lead us to a new image of schooling.

A. A Characterization of Education as a System Complex Operating at Various Levels

There is a variety of configurations by which systems concepts and principles can be used to view social systems such as education, and by which such systems can be characterized as organized complexities. We have selected a particular configuration that appears to be particularly relevant to portraying the organization of schooling. This configuration is displayed in the form of a set of inquiries. The set includes the following points of inquiry:

1. Clarify the systems levels that constitute the systems hierarchy of education.

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*Adapted from Bela H. Banathy, "Organizing Education Around the Learning Experience Level," in Science and Systems Science, proceedings of the 1980 Annual Meeting of the Society for General Systems Research.

2. Designate the primary system level in the hierarchy.

3. Identify the systems that operate at the various levels.

4. Clarify the key systems entity arour hich the various systems are built.

5. Specify the purposes of these systems.

6. Specify their input.

7. Specify their output.

8. Designate system controls and the decision-making authority at the various system levels.

9. Display the relationships among the various systems.

10. Define the degree to which the systems are closed or open.

Let us see how the line of inquiry might help us to develop a systemic characterization of education.

(1)* The systems hierarchy in education is a structure made up of four (systems) levels. The institutional level, created by the society, interfaces and interacts with the society and the administrative level of schools. The administrative level attends to the function of educating (and other functions defined at the institutional and administrative level). Instructional personnel operating at this level deal with the learners. The learning-experience level - the level at which learners come to focus - has recently come to the fore with a potential to become a full partner in the systems hierarchy of education.

(2) The designation of the primary (systems) level is probably the least understood aspect of schooling, even though its designation is probably the most crucial. Depending upon which one of the levels is selected as

*Circled numbers are used in the four tables in this chapter to refer to the 10 point characterization of education.

the primary level, several distinctively different organization models and educating modes emerge.

(3) At each level of the systems complex of education a system can be identified. The school system operates at the institutional level, the system of (school) administration at the next level, and the instructional system at the instructional level. At the learning-experience level we have begun to recognize recently the notion of "learner systems" as separate and viable entities.

(4) A significant point of inquiring into the systemic characteristic of education is to designate clearly the key system entity around which each of the systems is built and operates. Often we fail to state explicitly who or what the key entity is, or we may view entities as being interchangeable within the various systems. Such lack of specificity has led to confusion and has hindered an understanding of problem structures and their potential solutions.

The four systems are to be further characterized--and understood--by the specification of (5) their purpose, (6) their input, and (7) their output. At this point, systems thinking may help us again to understand the relationship between purpose, input, and output. It has become clear, for example, that we cannot designate "learning attained" as a direct output at the institutional or instructional levels, but only at the learning-experience level. Systems thinking has also legitimized the goals of the individual learner as a viable input of the instructional system.

(8) The matter of who controls and who decides at the various system levels must be made clear.

(9) The nature of relationships among the various systems that comprise the systems complex of schooling is determined by the designation of the

primary (systems) level and by the nature of intersystems relationships (subordinate, centralized, or egalitarian).

(10) The degree of openness or closedness is another critical dimension. The traditional thrust in education has been toward thinking of the school in isolation from its environment. This tendency has become a major source of discontent, inefficiency, dissatisfaction, and loss of support. It is unfortunate that the early "systematic approaches" neglected to consider: (1) the uniqueness of the various environments in which education is organized and, most importantly, (2) the uniqueness of learners.

The points of inquiry described above will be used next to characterize systemic constructs of various organizational models of education.

B. Considering the Various Levels as Primary System Levels

Depending upon which level is selected as the primary system level, four distinctively different organizational models of education can be constructed. A display and discussion of these models and understanding their supporting and underlying rationale and their contrasting features will help us to see the learner system in proper perspective and will lead us to recognize the necessity of establishing an additional level at which education should be defined.

The four models are introduced next and displayed in Tables 1, 2, 3, and 4. They have been constructed in view of the line of inquiry presented in Section A of this chapter.

The Institutional Level as the Primary Level

Organizing the educational system complex around the institutional level as the primary level is usually evidenced:

- in societal contexts where the educational authority is highly centralized;

- in cases where education is defined as part of a larger organization, such as a church; and
- in traditional societies where the only or primary purpose of education is enculturation.

Model A (Table 1) portrays the systems characterization of education where the institutional level is the primary level.

TABLE 1

MODEL A: THE INSTITUTIONAL LEVEL AS THE PRIMARY LEVEL (2)
[The numbers encircled refer to the ten point (1) - (10) system characterization introduced earlier]

Levels in the hierarchy (1)	The System operating at that level (3)	Purpose of the system(s) (4)	Key entity around which the system is built (7)	Primary decision maker in the system (8)	System input (5)	System output (6)
Institutional level (National or local)	The School System as an institution	To enculturate, indoctrinate children and youth	National, societal (cultural), or organizational goals	The educational authority, minister of education, church or societal authority	Societal, organizational definitions, needs, values, financial resources available to education, and constraints that limit education	Educational goals, organizational schemes, budgets, specifications of educational programs, set policies, standards, and methods
Administrative level	System-wide administration. Building-level administrative system.	To establish operational guides to (1) implement input and (2) account for resources	Information received as input and resources allocated to the system	Educational managers and administrators	The output of the institutional level and facilities	Guidelines, directives, curriculum specifications, monitoring and evaluation programs that regulate behavior at the instructional level
Instructional level	Grade programs, departments, etc.	To provide instruction in line with the defined institutional purpose	The prescribed curriculum	Department chairman, principal, etc.	System output from the administrative level	Specification of instructional experiences; organization of teachers, staff, students: instructional arrangements, scheduling, etc.
Educational experience level	Class(es) of students	To respond to instruction	Instruction	Teacher	The output of the instructional level and the instructional materials, aids, lesson plans, tests, etc.	Student passing courses, earning grades, diplomas, etc.

Relationships (9). If the primary level is the institutional level then the system operating at that level governs education. Systems operating at other levels will respond to it and are subordinated to the institution as indicated by the arrows (■).

(10) The model displayed above implies a rather closed educational system in which decisions are being made far removed from the learner and the system is a complex regulated by the top decision-maker(s). An educational institution represented by this model would operationalize a uniform curriculum and educational experience.

The Administrative Level as the Primary Level

Organizing the educational systems complex around the administrative as the primary system level is best evidenced by the way public education systems are currently organized in the United States. This way of organizing education is displayed in Model B (Table 2).

TABLE 2

MODEL B: THE ADMINISTRATION AS THE PRIMARY LEVEL (2)
[The numbers encircled refer to the ten point (①-⑩) system characterization introduced earlier]

Levels in the hierarchy (1)	The System operating at that level (3)	Purpose of the system(s) (4)	Key entity around which the system is built (7)	Primary decision maker in the system (8)	System input (5)	System output (6)
Institutional level	The School System as an institution	To enculturate and educate children and youth	Societal goals, community expectations	Board of Education or other similar authority	Information on societal needs, values, financial resources available to education and constraints that limit education	Stated educational goals, policies, organizational schemes, budgets, facilities, etc.
Administrative level	System-wide administration Building-level administrational systems	The management of the operational systems of education	Information on system goal requirements and resources available to the system	Superintendent of schools and other administrative leaders	The output of the institutional level and information on the needs of the instructional level	Specifications of educational programs, standards, methods, materials, regulations for the use of resources, etc.
Instructional level	Instructional systems	To provide instruction in line with the defined institutional purpose	The (prescribed) curriculum	Department chairman, principal, etc.	The output of the administrative level, resources, facilities, and students	Specification of instructional experiences; organization of teachers, staff, students; instructional arrangements, scheduling, etc.
Educational experience level	Class(es) of students	To respond to instruction	Instruction	Teacher	The output of the instructional level and the instructional materials, aids, lesson plans, tests, etc.	Student passing courses, earning grades, diplomas, etc.

Relationships (9). If the primary level is the administrative level then the system operating at that level governs education. Systems operating at other levels will respond to it and are subordinated to the institution as indicated by the arrows ( ).

The model described above indicates a system that is more open (10) than the one described under Model A. Decision-making is quite removed from the learning-experience level.

The Instructional Level as the Primary Level

Organizing the educational systems complex around the instructional level as the primary level can be found:

- in the context of education where high technology and instructional-systems approaches are used during the last 10 to 15 years and
- in highly departmentalized, traditional, and discipline-based higher education programs.

This approach is represented by Model C (Table 3).

TABLE 3

MODEL C: THE INSTRUCTIONAL LEVEL AS THE PRIMARY LEVEL (2)
[The numbers encircled refer to the ten point (1) - (10) system characterization introduced earlier]

Levels in the hierarchy (1)	The System operating at that level (3)	Purpose of the system(s) (4)	Key entity around which the system is built (7)	Primary decision maker in the system (8)	System input (5)	System output (6)
Institutional level	School system	To provide facilities and resources in support of the operating systems	Needs, requirements of the environment and the operational systems	Managers, policy makers boards, etc.	Societal needs and values, resource requirements of the instructional system, financial resources available, etc.	Overall educational goals, allocation of resources in support of operating systems, and policies regulating the use of resources
Administrative level	System-wide administration Building level administrational system, etc.		Formalized information relevant to societal expectations, institutional policies, and instructional system needs	System-wide administrators, building principals, etc.	The output of the institutional level and requirements of the instructional systems level	Policies regulating the use of resources and specifying educational requirements
Instructional level	Instructional systems	To provide instruction to students	Instructional objectives	Instructional systems manager and teacher	The output of the administrative level, aims/instructional design, staff, facilities, students	Instructional objectives, instructional arrangements
Educational experience level	Classes (groups) of students	To optimize instructional arrangements	Instruction	Teacher	The output of the instructional level and implementation plans geared to specific instructional environments	Students who can perform on instructional objectives

Relationships (9). The instructional system governs the systems complex. There is an interacting relationship between the administrative and instructional levels, and the learning-experience level is subordinated to the instructional level.

The model displayed above implies a system which is more open (10) than that described in Tables 1 and 2. The system is somewhat open to external influences. Primary educational decisions are made at the middle level, closer to the learner. Consequently, within a specific educational institution, a variety of instructional systems and educational experiences may be operationalized. Any given instructional system, however, is rather closed.*

*The so-called self-pacing, individualized, programmed instruction movement is considered a step toward considering the learning experience level as the primary level.

The Learning-Experience Level as the Primary Level

We have had only limited experience with organizing an educational systems complex around the learning-experience level. The ancient tutorial approach of "sitting on the log," and more recent innovative and alternative educational programs manifest this organizational approach.

Model D (Table 4) displays a systemic characterization of this way of organizing education.

TABLE 4

MODEL D: THE EDUCATIONAL EXPERIENCE LEVEL AS THE PRIMARY LEVEL (2)

[The numbers encircled refer to the ten point ((1) - (10)) system characterization introduced earlier.]

Levels in the hierarchy (1)	The System operating at that level (3)	Purpose of the system(s) (4)	Key entity around which the system is built (7)	Primary decision makers in the system (8)	System input (5)	System output (6)
Institutional level	Various educational sectors in the community	To facilitate the availability of resources in support of the instructional/learning systems	Societal expectations and the requirements of the instructional/learning system	Educational policy makers and resource systems representatives	Society's educational needs and values, and requirements of the instructional/learning systems. Financial resources (constraints), etc.	Overall educational goals, allocations of resources available to the instructional/learning systems, etc.
Administrative level Building-level systems	System-wide administration	To formalize information about resource requirements that facilitate learning, and negotiate the use of those resources	Instructional/Learning resources, educational facilities requirements	Managers/administrators for resource acquisition and utilization systems	The outputs of the institutional level and the instructional/learner levels	Policies regulating the use of society's educational resources and setting of overall educational requirements
Instructional level	Instructional learning resources system	To provide resources and arrangements which facilitate learning	Learner(s) needs, objectives	Manager(s) of the instructional/learning resources system	The output of the administrative level, information about learners' systems, learners' requirements etc.	Information about the overall curriculum framework; instructional/learning resources and arrangements; and organized, readily available resources
Educational experience level	The learners' systems	To become, educated, to master learning tasks	Information about desired learning outcomes	Learner(s) and resource managers (above)	The output of the instructional level, learners' needs/objectives, and specific plans for making use of instructional/learning resources	Learning tasks mastered, progress toward becoming a fully functioning person

Relationship (9). If the educational experience level is primary, then the systems complex is built around and responds to the learner's system(s). The systems are interactive. The governing direction, however, flows from the learning experience level.

The model displayed above projects a rather open educational system (10). Decisions relevant to the educational experience are made jointly by the instructional/learning resource systems personnel and learners. Within an educational setting there may be as many organized learner systems as learners. Furthermore, the boundaries of the learner systems may be extended into the various societal sectors.

Implications of the Models

We would probably seldom find a perfect match between any of the models and a specific education operation. Most of what exists in the real world is probably some mix of what the four models represent.

Whichever model is operationalized in a given situation depends upon several factors. We can speculate that some of those factors are:

- The socio-political configuration of the particular society. More open and progressive societies will tend to move toward the learning-experience-level-focused Model D. More closed, autocratic, and traditional societies have schools that are uniform and prescriptive, more like Model A.

- The unitary versus pluralistic nature of the society. A pluralistic society--one that defines itself as such--will not be likely to support a uniform system of schooling such as the one represented by Model A.

- The prevailing conception of learning and the learner. If individual differences are recognized and the learner is judged to be capable of making his or her own decisions in learning, Model D will be the direction in which the organization of education will tend.

Models A, B, and C are the most familiar to us. The learning-experience-level-focused model, however, is less known, if in sharp contrast to the others, but at this point of the development it does not offer a clear image as to what such an educational complex might be like.

In the closing section we shall use the systems perspective developed above and speculate about a learning-experience-level-focused education that is supported by a societal level organization of learning resources.

C. The Systemic Consequences of Organizing Education Around the Learning-Experience Level

Speculating about an educational systems complex built around the learning-experience level, our thinking is guided by a set of organizing perspectives that include the following:

- The learner is the key entity and occupies the nucleus of the systems space of education.
- The primary systems function is the facilitation of learning.
- The primary systems level is the learning-experience level.
- The learner system is organized at this level.
- It is the learner system around which the systems complex is built.
- There is a large reservoir of learning resources in the society that can be defined/developed and made available that are not now used in the planned and institutionalized mode.
- Left to his or her own devices, the learner cannot attain easy access to these resources.
- Learning resources need to be identified and developed; their availability must be communicated to, and their use arranged for, the learner.
- The community in which the learner lives, and the society of which he or she is a member, establish laws and policies that regulate the educational enterprise and provide for its financial support.

A detailed elaboration on the perspectives introduced above provides the rationale for organizing the systems complex of education around the learning-experience level. The systems perspective, the organizational models derived from that perspective, and the assumptions highlighted above lead us to:

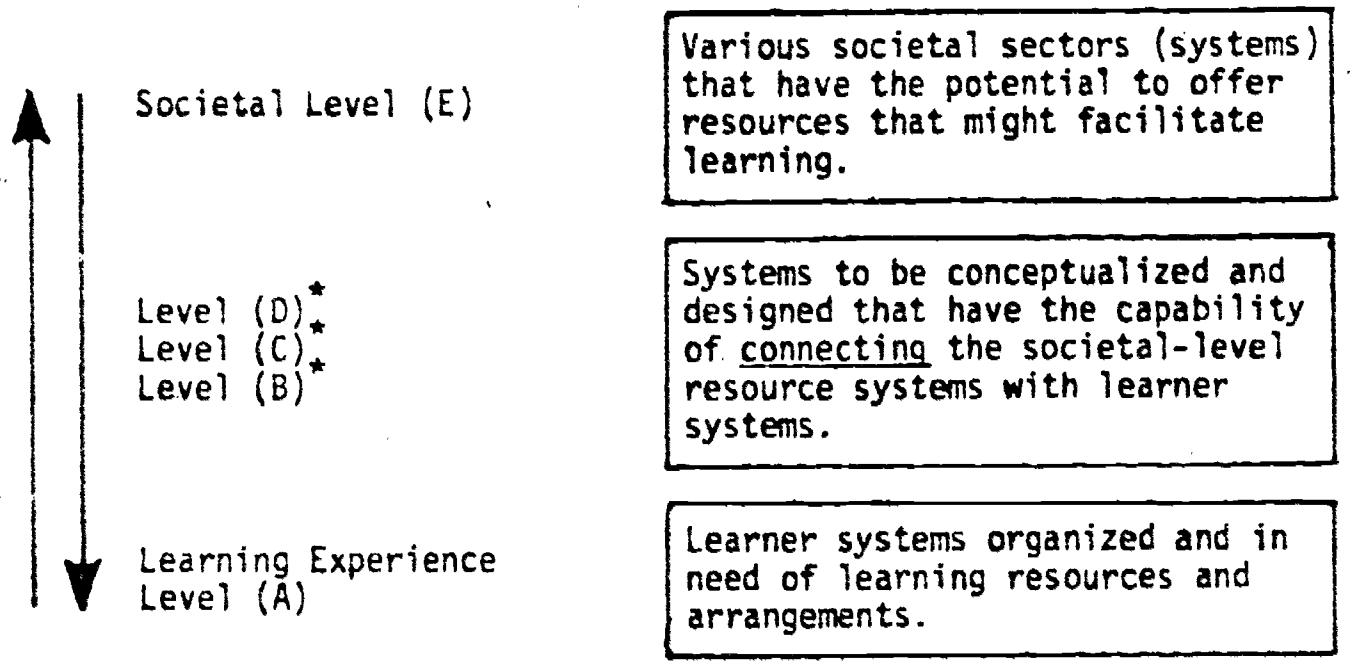
- Recognize the learning-experience level as the primary level in the systems complex of education.

- Identify a new level--the societal level--that should be included in the set of levels at which education is organized.
- Define as a major R&D task the design of system(s) that connect the learning-experience level with societal sectors (systems) that have the potential to offer learning resources.

The following figure displays the relationship of these three considerations:

FIGURE 4

AN IMAGE OF A NEW LEVELS STRUCTURE

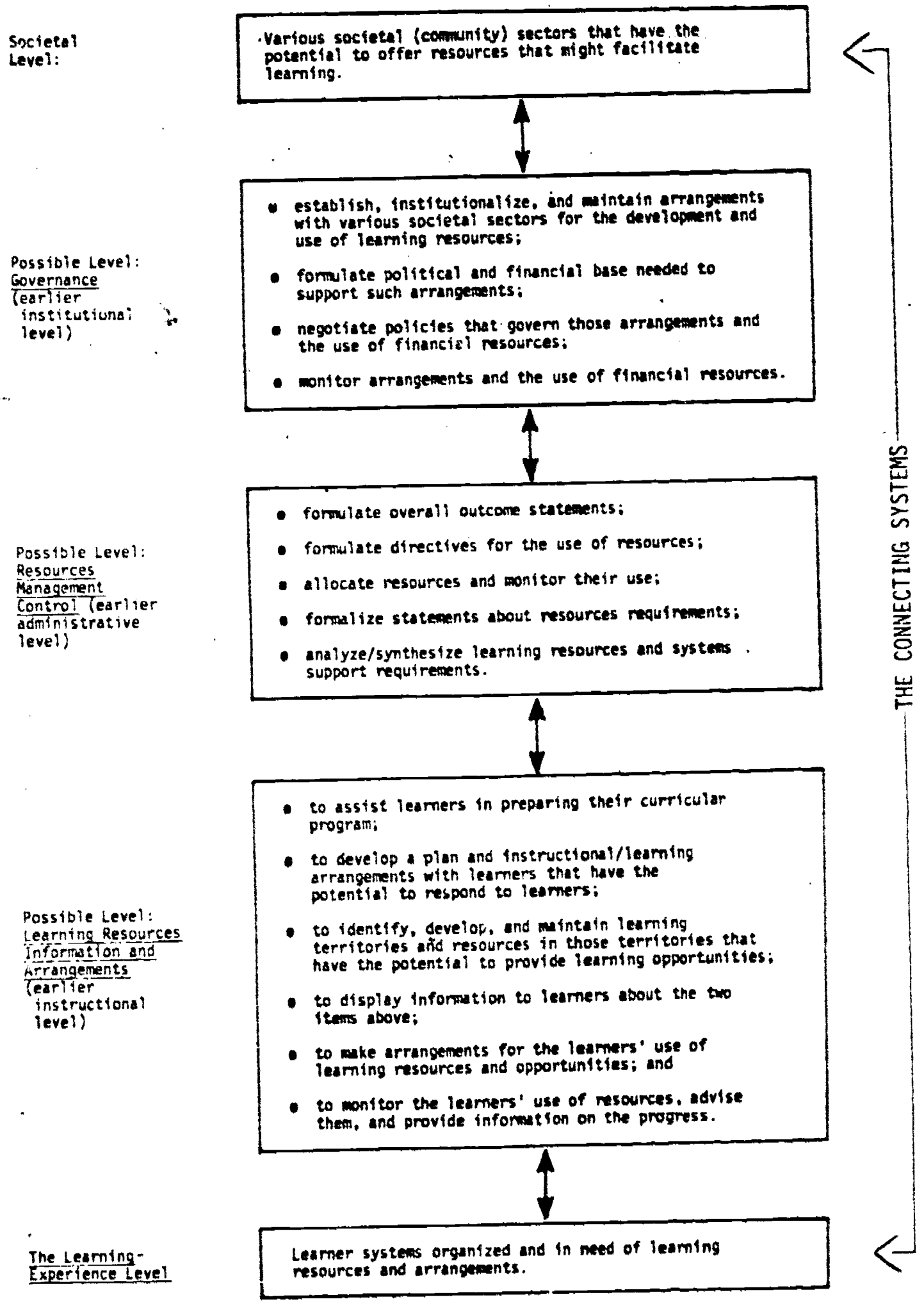


We shall now briefly speculate--in an unconstrained way--about major functions that the "connecting" systems might address. Figure 5 displays sets of possible functions.

*Earlier called institutional (D), administrational (C), and instructional (B) levels.

FIGURE 5

PARTIAL SETS OF FUNCTIONS OF THE CONNECTING SYSTEMS



The functions introduced above do not indicate linear sequence.

In moving toward the creation of a new image of a systems complex of education within which we can integrate the various systems and educational resources that are or might be available for the facilitation of learning, we shall have to examine some of the dynamics of creating and operating such a system. Such an examination should pursue the following inquiries:

- What resources are or might be available in the various systems of the society that can facilitate learning?
- What arrangements could be made to discover and map out these resources and make them accessible to the learner?
- How can the application of these resources be optimized for the use of the learner?
- What are ways by which we can interrelate the various resource systems?
- What are the specific functions that the various resource systems can perform in offering resources for learning?
- What are possible organizational/structural arrangements that could integrate and institutionalize the use of various resource systems?
- How can we facilitate the development of cooperative relationships among the various systems?
- What would a system be like that could assume management of an integrated use of resources?
- How could a system be created, maintained, and supported?

D. Summary and Implications for Institutionalizing Change

A new image of a systems complex of education was created above based on (1) the examination of a variety of ways of organizing formalized education and (2) a set of organizing perspectives that set forth the notion of organizing education around the learning-experience level.

The systemic view of formalized education elaborated in this chapter has several major implications for thinking about institutionalizing environmental education.

First, in attempting to institutionalize environmental education, one needs to understand the nature of the formalized educational system hierarchy that is manifested in a particular situation. Such understanding can be attained by portraying the particular system in terms of use of one of the four models characterized in Section B.

Second, an attempt to institutionalize environmental education should deal with all system levels, all systems operating at those levels, and all the interactions between and among these systems.

Third, if we adhere to the overall purpose of environmental education --as articulated by the Environmental Education Act--the development of personal and social environmental literacy and problem-solving capability will lead us to designate the learning experience level at the primary level around which to organize the environmental educational enterprise. This will lead us to contemplate a societal-based organization of personal and social learning.

CHAPTER THREE

ENVIRONMENTAL EDUCATION IN THE CONTEXT OF SOCIETY AND FORMAL EDUCATION

We will now examine EE in the larger societal context of formalized education. Specifically, we will attempt to integrate the considerations presented in the first two chapters into a system that portrays environmental education in the context of formal education.

A. The Components of Environmental Education Relevant to Society and to Formal Education

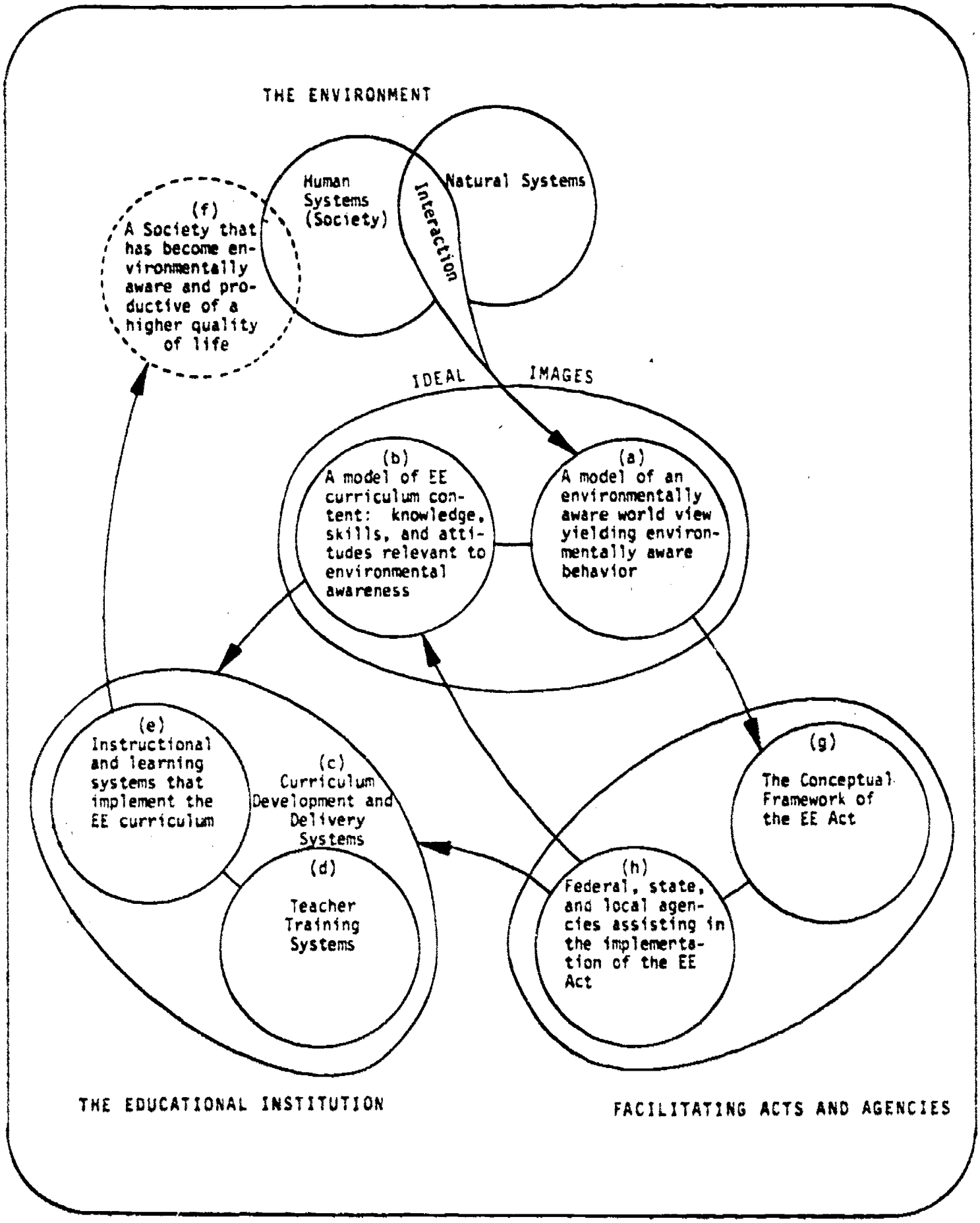
To understand the nature of environmental education as a system existing within a larger societal context, it is helpful to adopt a rather broad view of the situation. At this level of consideration, human society, its interactions with and its dependencies and impacts on natural systems, constitutes a useful starting point for understanding environmental education as a conceptual system. This conceptual system can be looked at as consisting of a number of interacting components of subsystems which are described below and graphically depicted in Figure 6.

1. A model of an environmentally aware world view (a)

An environmentally aware world view embraces the notion of the finiteness of nature's resources and uses the criterion of environmental acceptability (i.e., promotes the mutual long-term stability and survival of natural and human systems) as a primary basis for decision making. With this view, the world is seen as being made up of a delicate balance of interacting systems or parts, none of which can be exploited or manipulated without affecting the other parts. This view has evolved from a realization that, in addressing global, national, regional, or local environmental problems, there are several systems that need to be considered, such as natural ecosystems

FIGURE 6

THE CONCEPTUAL SYSTEM OF ENVIRONMENTAL EDUCATION



and human economic, production, political, technological, and social systems. Therefore, an understanding of the complex interaction and interdependence of these systems, their points of instability, and their resistance to short-term, "linear" or topical problem solutions are necessary prerequisites to our finding a balanced approach to environmental management that results in our maintaining and, hopefully, increasing the quality of life.

From an environmentally aware world view can be derived a model of behavior that comprises knowledge, skills, and attitudes characteristic of environmental awareness and environmentally competent decision making. And from this behavioral model, a model of the curriculum content of EE can be derived.

2. The EE curriculum content model (b)

As shown in Figure 6, a generic EE curriculum content can be derived from a model of environmentally aware behavior which is, in turn, derived from a corresponding world view (a). If the overall educational goal is to develop such a world view in learners, then the purpose of an EE curriculum (and its delivery through supporting materials and resources) must be to develop competence consistent with that world view. A curriculum content model will, therefore, display and elaborate those behaviors that constitute the knowledge, skills, and attitudes consistent with an environmentally aware world view (a) and a problem-solving/decision-making capability compatible with such a view.

3. Curriculum development and delivery systems (c)

These systems operate wherever environmental education takes place. Being consistent with a generic curriculum content model (b), systems for the development and delivery of EE curriculum provide resources, plans, and procedures for designing, implementing, and evaluating EE programs that are

compatible with the characteristics of educational organizations into which EE is to be introduced. Thus, curriculum development and delivery systems take into account such diverse phenomena as institutional goals, organizational structure, methods of operation, community involvement, budgetary policies and procedures, and other aspects constituting potential sources of support or constraints to designing and implementing EE curricula.

4. EE teacher-training systems (d)

Teacher-training systems provide curriculum content models, educational resources, implementation plans, and procedures that help to prepare people to conduct EE. Teacher-training systems both derive from and address: (1) the EE curriculum content model (b); (2) knowledge and information about curriculum development and delivery systems (c); and (3) the skill requirements for planning, designing, implementing, and evaluating instructional and learning systems.

5. Instructional and learning systems (e)

Instructional and learning systems consist of procedures and arrangements that transmit a holistic, environmentally aware world view. This world view is achieved through the development in learners of appropriate knowledge, skills, and attitudes that are compatible with the behavioral (a) and curriculum content (b) models. Thus, effective instructional and learning systems utilize appropriate resources and methods that are adapted to specific curriculum delivery needs (c).

6. Educational outcomes (f)

The educational outcomes generated as a result of the implementation of effective EE instructional and learning systems (e) is the eventual attainment of a society that has become both environmentally aware and competent in producing and maintaining a higher quality of life.

Two more systems that are important to the domain of environmental education at the societal level and that support the other EE systems described above are:

7. The conceptual framework of the EE Act (g)

The definitions, criteria, and requirements for environmental education presented in the EE Act (Public Law 91-516) provide useful parameters for developing an environmentally aware world view (a). The Act provides a conceptual framework within which models for the curriculum content of EE (b) can be defined and elaborated.

8. Federal, state, and local agencies assisting in the implementation of the EE Act (h)

At the heart of the national EE effort are the various federal, state, and local agencies and organizations that assist in the implementation of the EE Act. These agencies and organizations seek to foster the development and implementation of EE through a variety of means, including financial aid, material resources, and technical assistance.

The aspects described above constitute a systems way of thinking about and exploring EE from a societal perspective. It should be clear from the above discussion, as well as from the direction of systems flow depicted in Figure 6, that the most direct means of achieving an environmentally aware and competent society is through the development of effective EE curriculum delivery systems--and in particular, the development of competent instructional leadership and instructional/learning systems.

B. The Primary Focus for EE in Formal Education

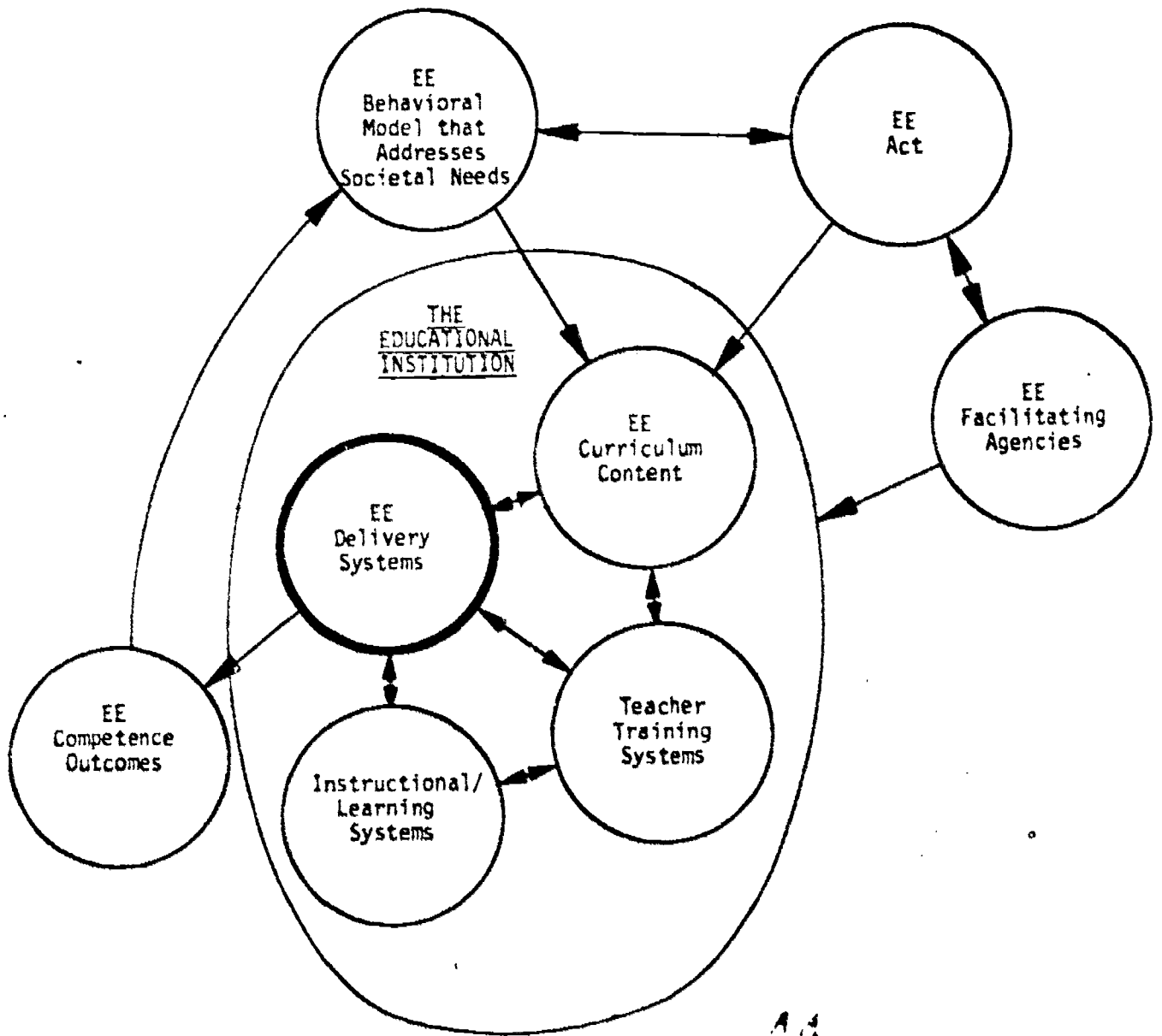
The key entity in our consideration of EE in the context of formal education is the educational institution. The educational institution consists of four important subsystems described previously. These are:

- the EE curriculum content development subsystem;
- the EE instructional and learning subsystem;
- the EE teacher-training subsystem; and
- the EE curriculum or program delivery subsystem.

These subsystems and their relationships (depicted in Figure 7) comprise the primary foci for designing EE programs and their institutionalization within an educational institution. Furthermore, we believe that it is imperative that designers understand these subsystems and their relationships as a prerequisite to formulating the requirments for an EE program that responds to the larger educational and societal systems in which EE is embedded.

FIGURE 7

THE EDUCATIONAL INSTITUTION AS A FOCUS FOR EE DESIGN

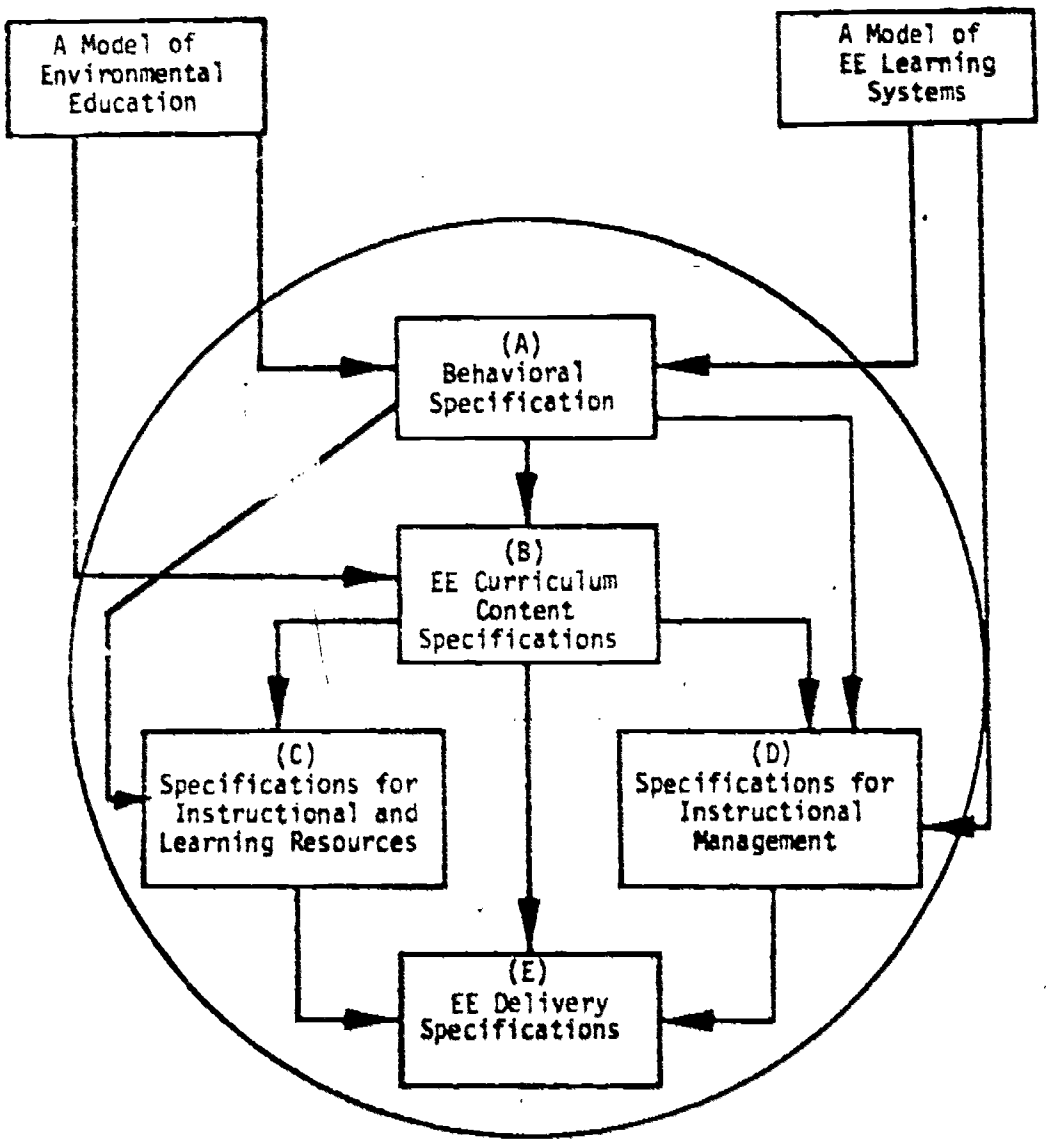


C. A General Model of EE in Formal Education

In designing a model for the institutionalization of EE in the formal education sector, we will need to consider further the relationships between the subsystems of teacher training, curriculum content development, instruction and learning, and curriculum or program delivery. The image displayed in Figure 7 will now be reinterpreted in light of these critical relationships and displayed in Figure 8 as a general model.

FIGURE 8

A GENERAL MODEL OF EE IN FORMAL EDUCATION



An explanation of the model is as follows:

- Behavioral specifications (A)--describing knowledge, skills, and attitudes relevant to environmental competence--are bases for specifying the EE curriculum content. These specifications are derivedd from mission and goal statements (models) for EE and EE learning systems.*

- The development of the EE curriculum content specifications (B), based on behavioral goals and objectives (A), go through several transformations as they are placed in a specific educational context or setting.

- Instructional and learning resource specifications (C) describe materials, people, and other resources that address the EE curriculum content (B) and can be used by teachers to develop students' knowledge and understanding of the environment (A).

- Specifications for instructional management (D) describe arrangements by which the teacher confronts the learner with the EE curriculum content (B) through instruction and through the use of learning resources (C), and thereby assists the learner in acquiring the desired competence (A).

- EE delivery specifications (E) describe strategies, arrangements, and procedures by which an EE program--its competencies, curriculum content, learning resources, and instructional arrangements--can be designed, developed, and institutionalized within a specific educational setting.

The main purpose of a general EE model is to provide perspectives that help educators to design and institutionalize EE. The design requirements and components for developing and institutionalizing an EE program are described in the next three chapters.

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*Such mission and goal statements have been described in Chapter One.

CHAPTER FOUR

SOME PERSPECTIVES ON THE INSTITUTIONALIZATION OF CHANGE RELEVANT TO ENVIRONMENTAL EDUCATION

In this chapter we will attempt to characterize some critical aspects of educational change and innovation -- as addressed in the literature*-- that are particularly relevant to the institutionalization of environmental education and to the design of EE delivery systems. Because this literature is rather extensive, the various facets of educational change will be summarized and presented as a set of propositions covering the following: the general nature and phases of change, organizational influences, planning and implementing considerations, and a general implementation framework.

A. The General Nature of Educational Change and Innovation

- A planned educational change or innovation is a decision to make a deliberate effort to improve or provide new or additional services to a school system. To facilitate this aim, an educational delivery system provides the means (support, materials, practices) by which the planned change or innovation can be achieved.

- An educational delivery system can be defined as a set of organizational and procedural arrangements that allow educational programs, practices, and resources to be introduced and infused into a school system in such a way that they become an integral and permanent part of that system.

- While pressure or support for the educational program can derive from outside the school system through the demands and influences of external agencies or the community (e.g., federal and state departments of education, universities/colleges, R&D laboratories, educational service centers, parents, environmental organizations), the institutionalization of the program as a planned change comes about mainly from within the school system and affects many aspects of its structure and functions.

- The institutionalization of an educational change occurs in three successive stages or phases:

  (1) mobilization, involving program planning, support and resource preparation activities;

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*The literature sources we reviewed are listed in the Bibliography Section at the end of this document.

(2) implementation, involving program development and installation activities; and

(3) continuation, involving program refinement and expansion activities.

1. Change mobilization phase

- Most educational change projects (including EE) come into being because of the efforts of a small number of persons who are operating independently of (or in opposition to) the wishes of district superordinates and teachers. Rarely is an educational change initiated in response to a significantly felt need to change among school staff.

- "Most school districts (...tend to...) store their needs in a bottomless pit. When outside money appears (e.g., from federal or state governments), the district fishes around the pit until it finds a need that matches the announced purposes of the soft money. That need is then elevated to the status of a priority in order to demonstrate the district's commitment, and not incidentally in order to capture b[illegible]s. (This tendency...) invalidates the central tenet of a district-based goal-seeking model of change."*

- Typical school planning for change does not follow a rationalistic model where the different options or alternatives available in some universe of potential solutions are searched out prior to initiating a project. Rather, only those alternatives are considered that tend to be imminent in the experience or education of the small group of project initiators.

- The positive relationship found between extensive planning and the success of educational change projects cannot be explained by any intrinsic value attributed to the planning activity, but by the fact that the most successful projects tend also to be the most ambitious, complicated, and thus demanding of good planning.

- A "vicious circle" may occur in planning an educational change where the difficulty of adequately specifying outcomes of a behaviorally complex system such as education can lead to prematurely deprecating the possibility of good planning. Once this happens, the resulting cynicism causes people to fall far short of the achievements they might otherwise realize.

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*Dale Mann, "The Politics of Training Teachers in Schools," Making Change Happen?, ed., D. Mann. (Columbia University: Teachers College Press, 1978), p. 4.

- In educational-change projects designed to improve purportedly deficient behavior, target groups are rarely involved in the planning process (such involvement is seen as embarrassing) and are often unaware of what is to happen to them. Paradoxically, when awareness increases and specific change goals are understood, opposition increases. It would seem that "precise purposes, although good from a planning standpoint, tend to increase conflict."*

- When a project's operational goals are at odds with that of the larger district (usually the case in a change-oriented activity), there is a strong need for protective coloration. For example, "to survive, it (...is...) necessary for teachers to believe that the project (...represents...) only a relatively small change in their existing practices."**

- "The most successful change projects are those that set out to make a big difference, to help people to depart substantially and radically from their previous patterns. Less successful projects (...contribute...) more to organizational maintenance than to organizational change. Big change aspirations (...seem...) to be functional because they (...provide...) their participants with early motivation and commitment and because when the inevitable compromises (...come...), ambitious projects (...can...) still salvage a significant portion of their purpose."***

- Since educational change is frequently perceived as an indictment of existing practice and practitioners, resistance by teachers and school administrators can often be expected. For this reason, it is important to involve a sufficient number of a school building's staff in the planned change to provide a potentially self-contained unit that can accommodate defections, backsliding, and partial implementation.

2. Change implementation phase

- Although counter to one's intuition, the most successful educational change projects are those that are the most complicated, i.e., "rely on various inputs, the availability of different sorts of actor attitudes, long chains of changes and events, and so on."****

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*Ibid., p. 5.

**Ibid., p. 6.

***Ibid., p. 6.

****Ibid., p. 7.

- The most successful projects tailor-make and prepackage their own materials. This locally developed curriculum tends to counteract the resistance of teachers who believe that no one else could possibly understand or know anything of their situations. Thus, when trainers and teachers write their own guides and curricula, they know them better, believe in them more, and have more confidence in using them than if they would simply have adopted preexisting materials.

- The most powerful and effective educational-change programs focusing on teacher training or involving a teacher-training component have the following characteristics:*

  -- "The simple availability, over time, of the training staff as a source of help on the trainees' demands and on the trainees' problems. This (...reduces...) the teachers' apprehension that change projects mean more unrealistic work for them."

  -- "The provision of a demonstration lesson done by the trainer with the trainees' classes, but with no participation or responsibility on the part of the trainee. This (...helps...) establish the trainer's credibility and the treatment's feasibility."

  -- "Provision of multimedia, multioptic, self-paced, autoinstructional teaching packages for the trainees' independent use."

  -- "The credible, non-invidious, independent evaluation of individual progress at relatively frequent intervals by people outside the teacher's school-based chain of command and unrelated to the teacher's 'official,' permanent-record performance evaluation."

- With regard to the criticality of trainee characteristics in educational-change programs, in general, the higher the grade level of students, the more resistant to training are teachers; and while volunteers are a more receptive and cooperative initial audience for training, gearing program premises and resources to this group will tend to create "transferability" problems later on when dealing with non-volunteers in program-expansion efforts.

- With regard to effective trainer characteristics, in general, the most successful trainers are those who understand (have experience with) the client system, but can maintain some emotional, professional, and tactical distance from it. Further, the most effective trainers are those who seem naively enthusiastic and can maintain that enthusiasm in the face of reality.

- The most successful change programs require the cooperation (or at least non-antagonism) of school principals, since principals are the key authority and support figures at the building level.

*Ibid., pp. 7-8.

- All educational-change projects (or programs) display similar adaptation patterns over time. That is, projects tend to transmogrify their goals and activities by: (a) becoming less ambitious about system-wide effects they seek, (b) simplifying their treatments, (c) slowing the pace of their activities, (d) decreasing the amount of changed behavior expected from any individual, and (e) decreasing their expectations about how many people within a site can be changed.

3. Change continuation phase

- The continuation of an educational-change project's efforts is most assured where the materials and procedures produced remain intact after the project's dissolution and are well infiltrated into all parts of the curriculum and bureaucracy.

- The most successful change projects are those whose staff anticipated the inevitable emergence of "conservative" forces and prepared for that contingency by, for example, inserting their project's desired teacher outcomes into the district's set of performance competencies for recertification of their faculties; lobbying to have completing parts of the project's training materials accepted as qualification for a higher step on the district's pay scale; building second-round (refresher) training cycles into their program to prevent backsliding.

- In general, efforts to disseminate project materials and procedures tend to be ignored or least effective within the (home) school district of the project. Such efforts are much more acceptable and effective when they are directed to neighboring or more distant school districts. It appears that greater distance in transporting project outcomes means that (a) asking for help can be a more anonymous and "safe" experience, (b) it won't be necessary to acknowledge the superiority of someone with whom you are in competition, (c) the ideas can be changed with impunity, and (d) they can be credited to one's self.

- Those projects or programs whose participants plan delivery efforts for each of the mobilization, implementation, and continuation stages will tend to develop more effective delivery systems that have a greater chance for successful implementation and continuation. This characteristic of long-range planning tends to distinguish successful programs that eventually get institutionalized from unsuccessful programs that do not.

- In order to plan and design an educational program and its delivery system, one must consider:

  -- the quality of the present educational organization and the services it provides (as well as how the services are provided);

  -- the type(s) of changes or improvements that are desired in the school system and that can be achieved through the educational program;

-- the basic incentives or mechanisms for change already present within the educational organization;

-- the general resources available and coordination required for successful implementation of the desired educational program.

- Constraints or barriers to the delivery of an educational change manifest themselves as certain institutional dispositions, policies, practices, and resource limitations that tend to inhibit or prevent the development, implementation, and continuation of an educational program. Therefore, major delivery objectives for implementing the program are to develop strategies, tactics, procedures, and arrangements that overcome or adjust to institutional barriers and constraints. For example, a common environmental education curriculum requirement is the need for an interdisciplinary approach to teaching and learning about environmental issues. An effective delivery strategy would therefore need to overcome the barrier of teachers' inflixible orientations to standardized subject matters and encourage and facilitate their use of interdisciplinary-oriented instructional materials and activities.

Table 5 summarizes the features of the most and least successful educational change programs or projects.

B. Educational Organization Factors that Influence Innovation and Change

- Even in the best of circumstances, the notion of a comprehensive system-wide educational change is a questionable one since school organizations "legitimately seek a state of equilibrium in order to sustain themselves, and broad, sweeping change in the system militates against the achievement of that steady state. Schools can only tolerate so much change and still attend to the business of 'keeping' school, and planned change programs should be sensitive to that need."*

- There are limits to what can be changed and how quickly change can occur since it is highly unlikely that dissatisfaction with an ongoing school system will pervade top and middle management, and all community clienteles at the same time. Furthermore, "people are reluctant to change those things with which they are satisfied even if new roles, relationships, and statuses (...engendered by planned change...) are not directly threatening to them."** Thus, gradual, incremental change seems to be possible in most schools, while grandiose change does not.

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*Wayne J. Doyle, "A Solution in Search of a Problem: Comprehensive Change and the Jefferson Experimental Schools," in D. Mann, ed., op. cit., p. 97.

**Ibid.

TABLE 5

SUMMARIZED PROJECT CHARACTERISTICS RELATED TO AMOUNT OF SUCCESS*

The Most Successful Cases

Case #1	*Case #2*
• An integral, highly committed management group that stayed with the project from its initiation on. The group provided itself with social and material support against opposition.	• Same as #1 plus overtones of true-believer, messianic and revolutionary spirit.
• A goal of substantial transformation in the most important areas of the district's teaching practices.	• A goal of revolutionary change in all parts of the system.
• Change initiated from the central office middle management level down.	• Change initiated from the higher reaches of the central office down.
• A relatively complicated project treatment with several components and sequences.	• An extremely complicated and comprehensive statement.
• Strong emphasis on on-site development of materials and written curriculum. Material to allow multiple entry points, teacher pacing, and independent but non-invidious evaluation. Highly role-relevant training.	• Same as #1.
	• Strong theoretical base.
• Availability of some staff assistance on site.	• Limited on-site staff assistance. Some demonstration lessons.
• Some material rewards as reinforcement for continuation, not as incentive to begin.	• Same as #1.
• Very high-felt need among an innocent and trusting training population.	• High felt need among an innocent but xenophobic training population. Some teacher motion in a direction the project could reinforce.
• No opposition; some principal support.	• Opposition and very limited support from principals.
• Peer group support in the schools and several critical masses.	• More limited support and fewer critical masses.

The Least Successful Cases

Case #3	*Case #4*
• Interrupted leadership. Some commitment but also uncertainty about content of techniques.	• Changing leadership. No confidence in techniques. Status quo orientation.
• No real goals. Search for problems which might be helped.	• Goals of organizational maintenance.
• Change from bottom up.	• No change intended.
• Simple project treatment.	• Laissez-faire, situationally determined project treatments.
• Consultant provision of materials with little on-site development. No trainee progress evaluation. Relevance only to one part of the teacher's role (participation in management).	• No materials. High role relevance.
• Strong theoretical base but among consulting group, not project staff.	• No theoretical base.
• Limited availability of staff to project treatment.	• High availability of staff to project treatment.
• No rewards, only risks.	• No rewards.
• Low felt need among a knowledgeable but complacent and suspicious population.	• No felt need among a veteran and extremely resistant population.
• Superordinate opposition; opposition from principals.	• Superordinate support; subversion by principals.
• No peer group support. No critical mass.	• Same as #3.

*Dale Mann, op. cit., pp. 15-16 (as summarized from Berman, McLaughlin, et al. Rand Study findings).

- Given their complex, unspecific, and inherently difficult nature, most educational change projects are rarely initiated without sufficient institutional support (i.e., active support and commitment of district officials and participants).

- Within a school district, there is rarely an impelling incentive to implement new practices; instead there are some persuasive reasons not to, insofar as the outcomes of innovation are uncertain and changing bureaucratic patterns, curricula, instruction, etc., require risk and additional (but unrewarded) effort.

- Unless participants (teachers) perceive the change project as representing a school or district priority, or are motivated by professional concerns (rather than for pay or credit incentives), they are often unwilling to put in the extra time and emotional commitment necessary for successful implementation.

- Initiating educational innovations requires changes in traditional roles, behavior, and organizational structures that exist within the school or classroom, as well as changes in classroom practices.

- "The means through which new programs are operationalized create new relationships and change the roles and statuses of individuals. These changes in role and status of individuals are the true innovation (...in educational change projects...), not the mere 'introduction' of new materials (...or practices)."*

- Clarity and agreement on the parts of "implementers" regarding their roles and what is expected of them in carrying out a planned educational change is critical to avoid confusion and aggravation of problems (e.g., conflicts between project staff, the central office, or school building staff over curriculum and instruction priorities and practices).

C. Planning an Educational Change

- Just because a planned change is to occur in a small setting or on a small scale does not mean that it has to be "piecemeal." Emphasizing comprehensiveness in planning a change project should be taken to mean intensiveness, rather than extensiveness.

- Many of the problems which decrease the likelihood that a planned change will occur can be predicted in advance. However, the knowledge educators have about barriers to change and about facilitators of change is usually ignored by participants. Successful change can only be launched after careful planning.

- Adequate "wiggle room" must be allowed for participants to work out details. Solutions cannot be laid on school or classroom "implementers" without their agreement that the solutions are related to the problem(s) to be solved.

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*Wayne Doyle, op. cit., p. 95.

- Educational change projects are often initiated or funded (e.g., by federal and state governments) without adequate data about local school conditions. Without such information, responsible decisions about whether planned change can occur at all or what specific changes should be made are impossible.

- In planning an educational change, it is important that participating school personnel with various areas of responsibilities, such as administration, evaluation, testing, and instruction, be provided with information on student needs compatible with the planned change. This information will enable them to help project staff define conditions to be fulfilled and actions to be taken to achieve project/program goals and objectives.

- In educational change projects or programs, the primary focus of the delivery system must be on the deliverer. Thus, "unless the developmental needs of the users are addressed, and unless project methods are modified to suit the needs of the user and the institutional setting, the promises of new technologies (materials and practices) are likely to be unfulfilled."*

- Project proposals that contain little more than broad guidelines for action without specifying ways to make decisions about policy or methods for resolving conflict are inadequate for planning the implementation of change.

- Before project or program funding is sought, the problem(s) to be solved by the change should have been clearly conceptualized, the ends to be gained agreed to by all participants, and specific strategies for implementing the overall program design spelled out in detail.

- Educational change projects that are generated primarily to take advantage of an opportunity to get outside funds (e.g., state or federal) never win the support of teachers and principals, and are never seriously attempted. Thus, adequate need and incentive or desire for change must be present.

- In general, whenever the cost of achieving a particular change objective rises in terms of time, money, and amount of effort required, project staff and participants will work to attain less of that goal. Thus, educational change planners should focus on developing strategies for mustering the incentives, people, energy, and resources needed to achieve specific program goals. For example, it may be necessary to develop ways to provide additional incentives to encourage school personnel to develop and implement new practices.

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*Milbrey W. McLaughlin, "Implementation as Mutual Adaptation: Change in Classroom Organization," in D. Mann, ed., op. cit., p. 31.

- To the extent that school systems tend to be loosely coupled, a goal-free* approach to planning an educational change or innovation may be more appropriate. The characteristics of this approach are presented in Table 6.

- Because of the lack or difficulty of comprehensive prior planning, almost all effective school and classroom change projects engage in ongoing, adaptive planning. This continuous planning process provides a forum for reassessing project goals, monitoring project activities, and modifying practices in the light of evolving institutional and project demands, and "unanticipated events."

- A continuous planning approach seems to be particularly appropriate since the highly complex nature of school and classroom change projects tends to require an adaptive implementation strategy that allows reassessments and refinements, as well as "learning-by-doing."

*Goal-free planning makes assumptions exactly opposite to those typically assumed in goal-based educational planning. Assumptions for goal-based planning require: (1) consensus in and understanding of desired program end states, (2) empirical data on the resources and potential productivity of participating individuals and schools, (3) evaluative data on competitive plans and strategies, (4) requisite technical and instrumental knowledge about program implementation, and (5) predictive certainty about internal and external impact factors that might affect the program. It should be obvious that these goal-based planning assumptions rarely apply in typical school situations.

TABLE 6

CHARACTERISTICS OF A GOAL-FREE APPROACH TO PLANNING EDUCATIONAL CHANGE*

Likely educational system condition	Goal-free approach
1. Multiple perspectives on end states and means.	1.a) Objective: To design a plan to fit the commitments and operating strengths of the participating individuals and schools. To maximize their effective participation in the educational change or innovation. b) Strategies/tactics: 1) inventory institutional commitments to the change; 2) examine their current involvement; 3) assess their potential for increased involvement; 4) negotiate whatever realistic and sustaining consensus is possible within and between individuals and schools; 5) reduce, insofar as possible, disagreements over means to achieve ends.
2. Incomplete data on resources and productivity.	2.a) Objective: To reduce the impact of *a priori* school census data on the effectiveness of school participation in the plan. b) Strategies/tactics: 1) shorten the planning time frame; 2) gather assessment/judgment information on school participation in the plan, i.e., evaluation of the plan's effect on the capacity of the school to change or adapt.

*Adapted from David Clark, "A New Perspective on National Planning for School Improvement Programs: The Configurational Perspective and Goal-Free Planning," in P. Hood, ed., New Perspectives on Planning, Management, and Evaluation in School Improvement: A Report on the 1979 Far West Laboratory Summer Workshops on Educational Dissemination and School Improvement. San Francisco Far West Laboratory for Educational Research and Development, August 1979, pp. 42-43.

Table 6 (continued)

Likely educational system condition	Goal-free approach
3. Incomplete data on competitive plans.	3.a) Objective: To avoid premature closure on change implementation plans that exclude alternatives. b) Strategies/tactics: 1) initiate planned variations of implementation strategies and tactics; 2) examine possible current and future implementation strategies employing goal-free evaluation tactics; 3) encourage divergent, competitive, novel approaches to program implementation.
4. Emerging technology; unpredictable outcomes.	4.a) Objective: To avoid stifling of experimental efforts in educational innovation by imposing-short range product evaluation requirements, rigid process definitions, and specified outcomes. b) Strategies/tactics: 1) allow talented participants to "...operate on the basis of trial and error procedure...pragmatic inventions of necessity;"* 2) emphasize formative rather than summative evaluation; 3) assume that support of practitioners in emerging areas of techniques/practices is appropriately judged as an investment in inquiry.
5. Predictive uncertainty regarding external and internal impact factors.	5.a) Objective: To achieve predictive realism in planning. b) Strategies/tactics: 1) shorten the planning time frame; 2) design iterative cycles of replanning that assume that documentation of practice will yield data appropriate for continuing short time-frame plans of increasing sophistication.

*M.D. Cohen, J.G. March, and J.P. Olsen, "A Garbage Can Model of Organizational Choice," Administrative Science Quarterly, 17 (1972): 1-25.

D. Implementing an Educational Change

- Implementation of change policies and change strategies is a highly variable process involving three possible interactions between project goals and methods, and the institutional setting. These are:

  -- mutual adaptations, where successfully implemented projects involve modifications in the project design, as well as changes in the institutional setting and individual participants;

  -- Cooptation, where adaptations of the project design do not lead to desired changes in the participants or the institutional setting; or

  -- nonimplementation, where projects break down during implementation or are ignored by project participants.

- School and classroom changes require a mutually adapative process between the user and the institutional setting where, for example, teachers can "work out their own styles and classroom techniques within a broad philosophical framework."*

- "The mere adoption of a 'better' practice does not automatically or invariably lead to 'better' student outcomes. Initially, similar technologies undergo unique alterations during the process of implementation and thus their outcomes cannot be predicted on the basis of treatment alone."**

- A change project's particular implementation strategy is the result of many local choices about how best to implement project goals and methods. "What seems to be the most effective thing to do? What is possible given project constraints? What process fits best with local needs and conditions? Decisions about the type and amount of training, the planning necessary, and project participants are examples of such choices."***

- At least three specific strategies are critical to "successful" classroom implementation projects: local materials development, ongoing and concrete staff training, interactive planning combined with regular and frequent staff meetings.

  -- Local materials development, where project staff working together to develop needed materials can give the staff a sense of pride and "ownership" in the project, break down the traditional isolation of classroom teachers, and provide a sense of "professionalism" and cooperation not usually available in the school setting.

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*Milbrey W. McLaughlin, "Implementation as Mutual Adaptation: Change in Classroom Organization," in D. Mann, ed., op. cit., p. 20.

**Ibid.

***Ibid., p. 23.

-- ongoing staff training tends to be more effective than one-shot training, which attempts to be too comprehensive and to predict and cover all contingencies at the outset of the project.

-- in general, training involving outside consultants (which emphasizes more abstract advice, truth, and knowledge) is considered less useful than regular and frequent meetings of project staff and local resource personnel (which emphasizes concrete, how-to-do-it training).

- The design of implementation strategies for educational change programs may involve one of two approaches (or a mixture of the two): "programmed implementation, assumes that implementation problems can be made more tolerable, if not eliminated, by careful and explicit preprogramming of implementation procedures; adaptive implementation, holds that (...implementation...) can be improved by processes that enable initial plans to be adapted to unfolding events and decisions."* Table 7 characterizes these two approaches in more detail.

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*Paul Berman, "A New Perspective on Implementation Design: Adaptive Implementation," in P. Hood, ed., op. cit., p. 30.

TABLE 7

COMPARISON OF PROGRAMMED VERSUS ADAPTIVE IMPLEMENTATION APPROACHES*

PROGRAMMED APPROACH

Situation Diagnosis	Prescription
1. Unclear goals	1. Formulate specific, detailed objectives and guidelines.
2. Unclear authority and too many actors	2. Specify lines of authority (e.g., SOPs), minimize number of decision makers, and match authority and responsibility.
3. Deliverers resist program or are ineffective	3a. Formulate tight SOPs. 3b. Introduce monitoring and accountability procedures. 3c. Change rewards and penalties to go with SOPs. 3d. Develop extensive contigency plans.

ADAPTIVE APPROACH

Situation Diagnosis	Prescription
1. Overspecification of goals and rigidity of goals	1. Settle for a vague, general agreement on goals or even agreement on means. Try for tacit agreement over the rules of the game. Strive for negotiation and clarification of goals and means during implementation.
2. Failure to energize relevant actors	2. Concentrate on mobilizing broad-based support of those who will be involved in the implementation.
3. Excessive control over deliverers	3. Allow for learning-by-doing by deliverers.

*Ibid., pp. 31-32.

- The approach used to best implement a planned change--programmed or adaptive--depends on the nature of the planned change and on conditions/contingencies found in the school organization. Selecting an appropriate approach may be facilitated through the analysis presented in Table 8.

TABLE 8

MATCHING IMPLEMENTATION APPROACHES TO SITUATIONS*

Contingent Characteristic of the Situation	IMPLEMENTATION APPROACH: Programmed	Adaptive
Scope of Planned Change	Minor	Major
Certainty of Technology or Theory	Certain, within risk	Uncertain
Conflict Over Program's Goals or Means	Low conflict	High conflict
Structure of Institutional Setting	Tightly coupled	Loosely coupled**
Stability of Environment	Stable	Unstable

- If all the conditions in Table 8 hold, then a programmed approach seems appropriate since:
  - -- the scope of change, implied by the program, in the behavior of members of the implementing system is marginal;
  - -- the validity of the program's technology (or theory, or presumption) is relatively certain;
  - -- members of the implementing system generally agree on the program's goals and means;
  - -- the coordination structure of the implementing system is tightly coupled; and
  - -- the implementing system's environment is relatively stable.
- If any of these conditions are replaced by those in the right hand column (above), however, elements of adaptive implementation strategies are appropriate.

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*Adapted from Berman, op. cit., p. 16.

**In general, educational organizations tend to be loosely coupled systems. A loosely coupled system is one in which the subparts (...classrooms, schools, administration, etc....) are relatively independent, so that actions taken in one subpart have little effect, or are relatively slow to affect, another part.

E. A Sequential Framework for Institutionalizing a Planned Change*

There are some critical aspects that contribute to a school system's success or failure in implementing any planned educational change. These elements are portrayed as a sequence of planned change processes in Figure 9.

The five phases or stages in this sequential framework are as follows:

- *Establishing an atmosphere of support* is necessary to create conditions within a school system that are favorable to the design and implementation of the planned change. While this support does not necessarily require that there be a "ringing district mandate" for the change, it does require that the school board, district administration, or school principal is at least not consistently opposed to the planned change efforts.

- *Implementing the leadership component* requires a person or a group to assert leadership to initiate and implement the planned change. This "leadership component" does not depend on the emergence of a charismatic or dynamic teacher, principal, or superintendent, nor an outstanding school board, but may be provided by any one or several persons or groups (of teachers, principals, district administrators, school board members). In some instances, the mantle of leadership may be worn by different individuals as the planned change passes through various development stages of mobilization, implementation, and continuation.

- *Building an appropriate planning and delivery system* provides methods that allow the school system to supply the benefits of the change or innovation to its clients (students or teachers). The major aspects of the delivery system must be carefully planned: a curriculum focus must be established, program requirements for implementing the curriculum specified, constraints and barriers to actualizing program requirements identified, and suitable strategies selected for satisfying the program requirements and for overcoming barriers. In addition, each phase of the program's delivery within the target institution must be thought out and problems anticipated. The style or methods of delivering the educational program (or change) may vary considerably (e.g., centralized or decentralized program management, directed or volunteer staff participation), but the delivery system should be consistent with the district's or school's traditions, values, and expectations of an appropriate approach.

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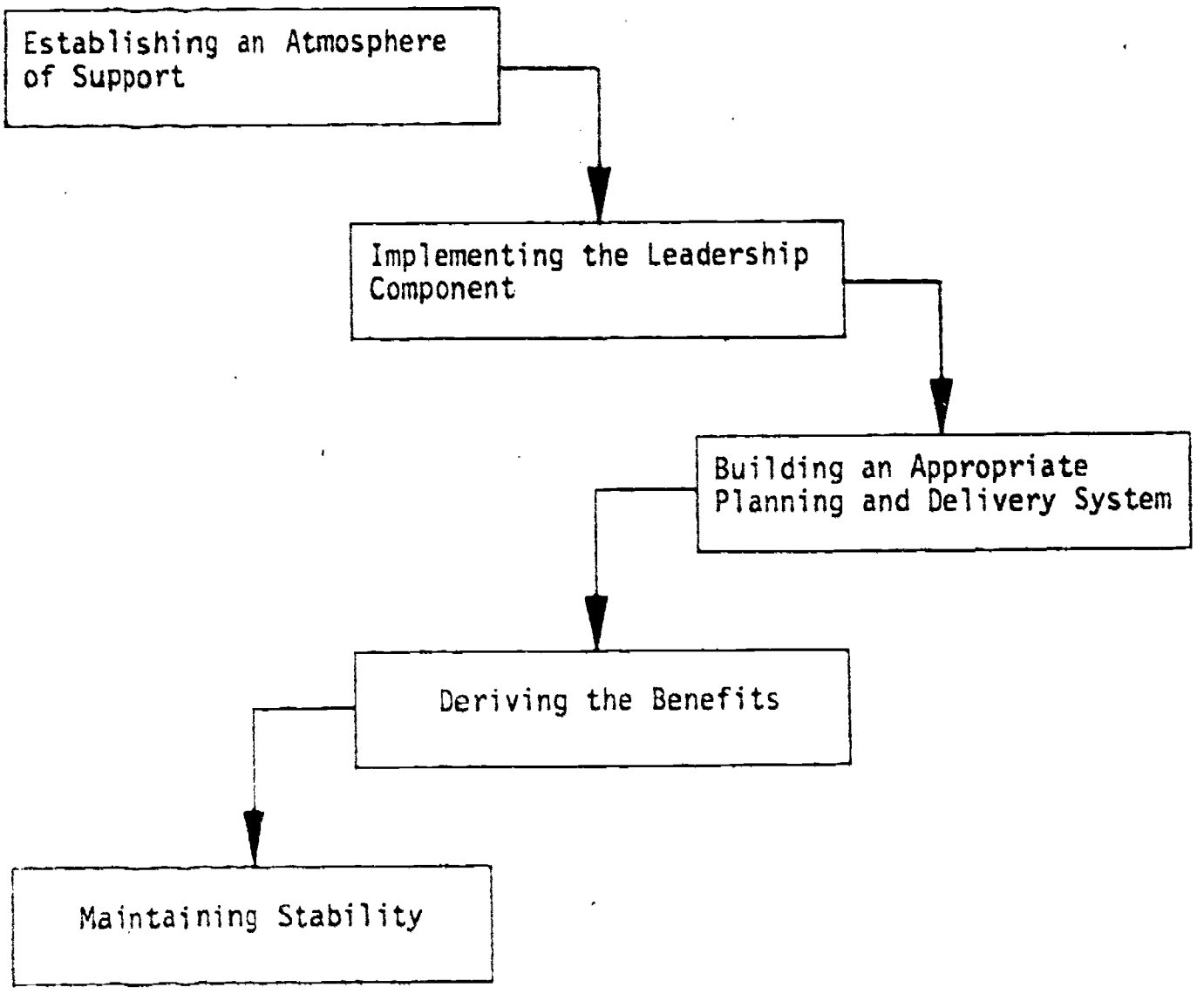
*Adapted from J. Pincus and R.C. Williams, "Planned Change in Urban School Districts," Phi Delta Kappa, June 1979, pp. 729-733.

FIGURE 9

A SEQUENCED FRAMEWORK FOR IMPLEMENTING
PLANNED CHANGE IN SCHOOL SYSTEMS



- *Deriving the benefits* may take many forms, including the attainment of the educational program's change or primary goals (e.g., increased environmental awareness and understanding by students, greater skills in developing EE activities in grades K-12). There may be other benefits as well in the form of increased staff morale, greater enthusiasm and activity, increased student interest and motivation, or "outside" recognition for the district's or school's accomplishments.

- *Maintaining stability* is necessary in view of the fact that the achievement of the planned change does not provide an energy or momentum of its own that ensures its long-term stability. Thus, initial resources and work efforts put into the planned change must be nurtured and maintained in order to ensure the appropriateness, effectiveness, and longevity of the program.

The propositions and sequential framework just presented characterize both the nature of and requirements for educational change and innovation that are relevant to environmental education and to its delivery and institutionalization within the formal education sector.

Many of the considerations in these propositions will be transformed into aspects for planning and design as we present, in the next two chapters, a general model and specific components for designing delivery systems for institutionalizing EE. (The propositions will also be re-explored in the Procedural Guide that accompanies this document.)

CHAPTER FIVE

A SYSTEM FOR THE INSTITUTIONALIZATION OF ENVIRONMENTAL EDUCATION

We will now attempt to integrate in chapters Five and Six the basic views presented in the previous chapters--a systems view of environmental education, a systems view of education as a social system into which EE is to be introduced, and the nature of institutionalizing change in education. The challenge in interrelating these perspectives is to think in a disciplined way about how EE fits into the overall context of the educational system in order to derive a model for the delivery and institutionalization of EE within that system. As we integrate the basic views, the components of an EE change delivery system should begin to emerge.

A. Basic Requirements for an EE Change Delivery System

One can think of the institutionalization of educational change as involving a change delivery system (CDS). The following discussion highlights some basic requirements for an EE change delivery system and constitutes a basis from which further elaboration relevant to the needs and requirements found in specific educational settings can be made.

Requirement 1. The EE change delivery system must be designed to develop and utilize useful EE programs, curricula, training strategies, and materials in specified school settings in order to meet their environmental education needs. To do this, the EE change delivery system must serve the multiple purposes of: (1) addressing user needs, (2) specifying and introducing information and materials, and (3) providing selection, choice, or alternatives, as well as (4) facilitating the adoption, installation, and use of relevant EE programs, curricula and materials. Thus, the delivery system must be user responsive as it provides and facilitates

the use of procedures, strategies, and resources required to implement or install a holistic EE program of curriculum in a specific user site.

Requirement 2. The EE change delivery system must address itself to several levels, including:

- *the societal level,* at which the present and future needs of society must be considered in the light of resource management requirements to ensure the optimal long-term survival of both human and natural systems;
- *the institutional level,* at which current educational goals, policies, and practices must be considered, useful EE resources identified, and a variety of useful support and cooperative arrangements established in order to assess and share these resources;
- *the administration (management) level,* at which a variety of favorable program plans, structures, and arrangements must be established to ensure the development of a suitable EE curriculum, the preparation of staff, and the selection and use of appropriate EE products and resources;
- *the instructional level,* at which appropriate EE instructional strategies, products, resources, and learning arrangements must be implemented that facilitate the development of the learner;
- *the learning-experience level,* around which available resources, institutional policies and structures, administrative practices, and instructional/learning arrangements must be built to enhance learners' mastery of required environmental education knowledge and skills.

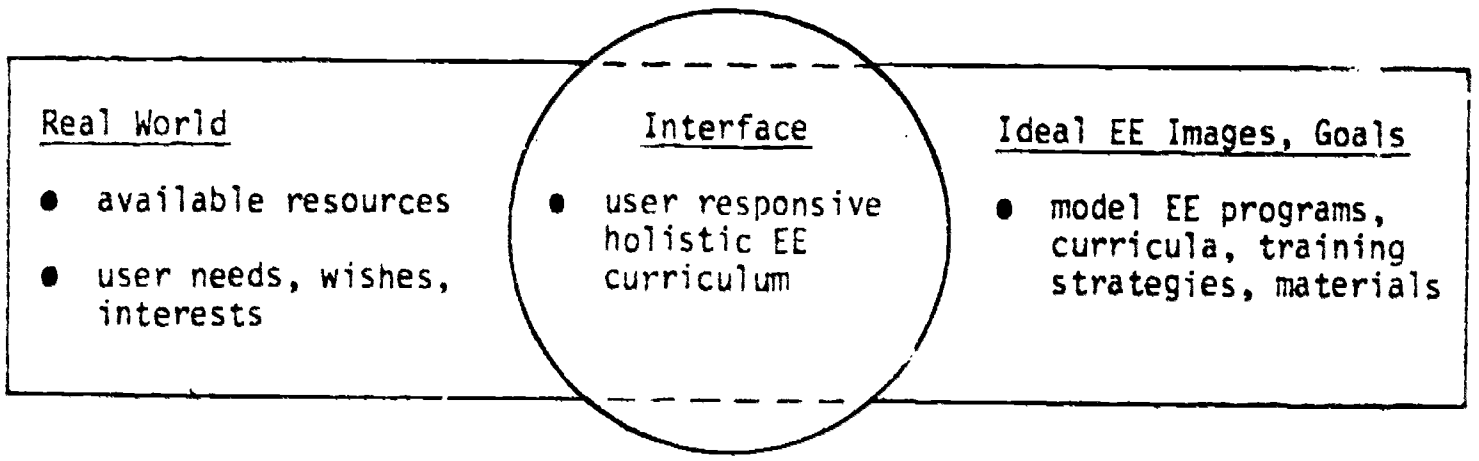
Requirement 3. The designer of an EE change delivery system must consider simultaneously and interactively:

- the environment and the societal/community context in which the user's educational system exists;
- the EE goals that are to be achieved, and the product and learning outcomes that are to be produced;
- the program functions that are to be carried out in order to attain the EE goals and outcomes;
- the program structures and components that carry out those functions, and the interaction of these components; and
- the processes that are to be applied in the operation of the EE programs.

Requirement 4. The EE change delivery system must be able to establish a compatible interface between (a) the constraints of the real world (e.g., available resources, user needs, societal and institutional demands relevant to EE), and (b) ideal images and goals for EE (e.g., model programs, curricula, training strategies, materials). The more compatible the interface between these elements, the better the design of an EE delivery system that responds to societal needs and user needs while attempting to satisfy, as much as possible, ideal goals for a holistic EE curriculum.

FIGURE 10

INTERFACE BETWEEN THE REAL WORLD AND IDEAL IMAGES



Requirement 5. The design of an effective change system for institutionalizing EE must address three basic functions (not necessarily arranged sequentially).

- a definition subsystem that characterizes the existing educational system, the contemplated change (needed or desired) to improve the system, and the resource and support requirements for bringing about the change;
- a design subsystem that specifies the processes, methods, and arrangements for utilizing resources to implement the educational change, and designates a plan for implementing the change; and
- an implementation/management subsystem that executes or carries out the change according to the plan.

Each of these subsystems embodies various concerns that need to be thought about and designed for in order to cause or facilitate the institutionalization of a desired educational change. Each subsystem also involves various functions or areas of activity (i.e., planning, development, implementation, evaluation, revision) important to the institutionalization of change. Therefore, the utility of examining a CDS in terms of these subsystems is two-fold: they provide a basis for designing and planning, and they provide a basis for action.

B. An Image of an EE Change Delivery System*

In developing an image of a change delivery system required to institutionalize EE, two key questions must be answered:

- What specific change functions or activities need to be attended to by each subsystem of the CDS?
- What is the relationship of these subsystems and functions?

We propose the following answers to these questions.

An EE change delivery system involving the three major subsystems described previously attends to several specific change functions. These are:

Subsystem A: Definition of the requirements for institutionalizing EE.

Functions include:

- characterizing relevant aspects (needs, demands) of the user's educational system;
- identifying the need for an EE program that responds to the above aspects;
- characterizing the expected impact of the EE program (results, benefits, products, etc.) on the user's educational system, i.e., its potential benefits for society, the institution, instruction, and the learner; and

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*Adapted from Bela H. Banathy, "Change Systems in Education: A Systems Theory Based View" in the Proceedings of the Annual Meeting of the Society for General Systems Research, Denver, Colorado, 1977.

- specifying the general requirements (resources, support, and practices) for EE program implementation in terms of institutional support, program management, curriculum development, and instruction.

Subsystem B: Design of the institutional adaptation to EE.

Functions include:

- studying the feasibility of various ways to introduce and adapt EE curriculum and instructional practices to the standard educational curriculum;
- projecting the impacts of alternative strategies for introducing and adapting EE;
- selecting the most promising strategies for eliciting support, acquiring resources, and implementing EE practices; and
- developing a plan for the implementation and management of the EE program within the educational institution.

Subsystem C: Implementation and management of the institutionalization of EE.

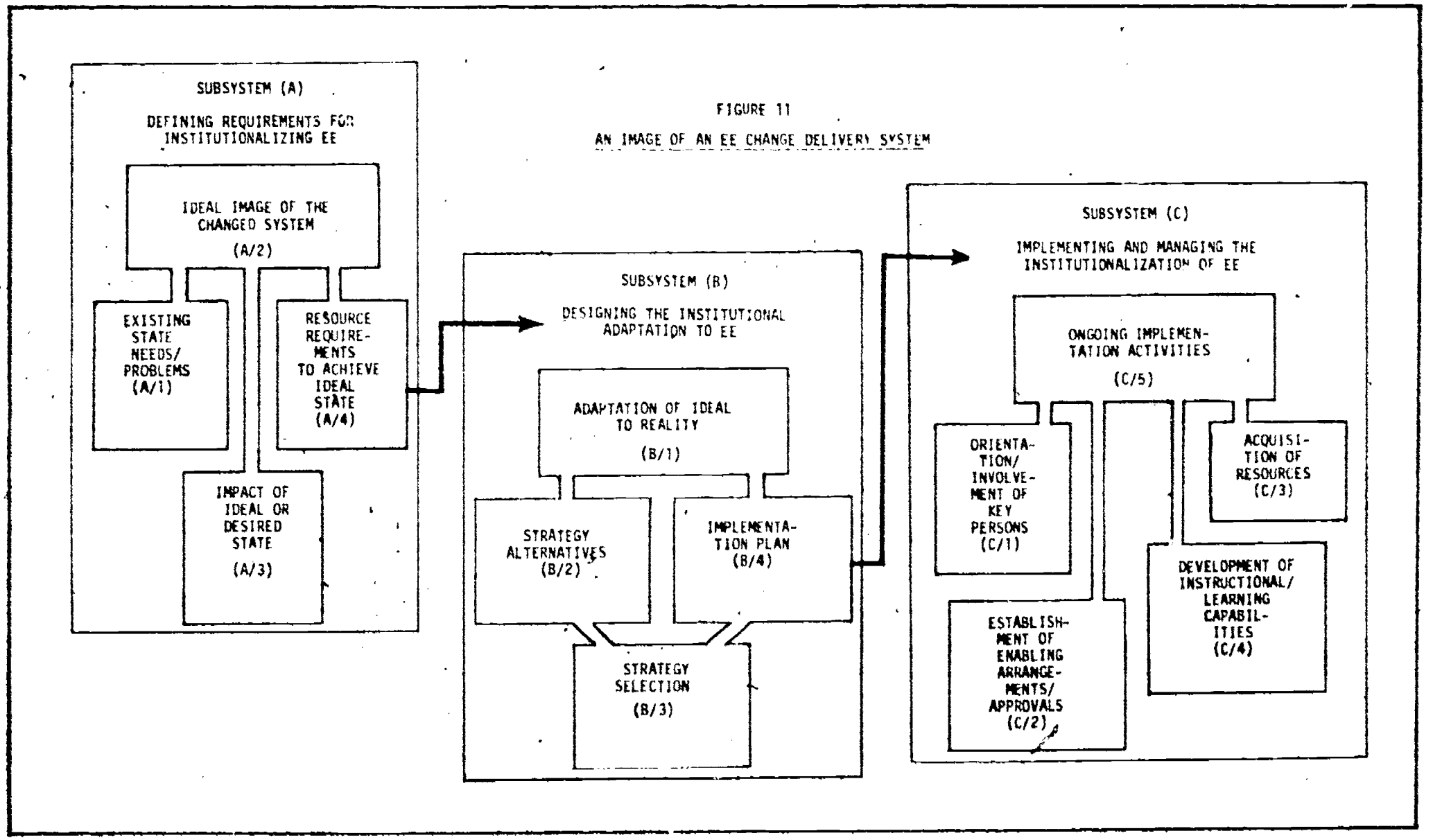
Functions include:

- orienting the key personnel (school board members, district administrators, principals, teachers, parents) who will support and facilitate the EE program within the institution.
- making arrangements to ensure the "vitality" of the EE program, i.e., acquiring specific school board, district administration, and principal approvals and support, establishing cooperative linkages within a district or school to provide resources and to assure the use of EE program materials and practices;
- acquiring resources (finances, facilities, instructional/learning materials) necessary to implement the EE program within specific school settings;
- preparing or training teachers and other key staff to design and develop EE curriculum materials, to carry out EE instructional practices, to facilitate EE learning arrangements, and to evaluate EE instructional and learning outcomes; and
- continuing to develop strategies and alternatives for managing, improving, and expanding the EE program that satisfy changing conditions and constraints over time.

The overall EE change delivery system and its component subsystems are depicted in Figure 11.

FIGURE 11

AN IMAGE OF AN EE CHANGE DELIVERY SYSTEM



Recognizing the need to introduce EE into an educational system, the change agent/educator will:

- Consider or propose an EE program and curriculum to move the educational system toward a more ideal state of affairs (subsystem A).
- Develop a plan for achieving EE by moving the system toward the desired state (subsystem B).
- Provide for the implementation of the plan (subsystem C).

In designing the institutionalization of EE, it is necessary to define the present needs of the educational system (A/1), the desired or ideal state to which the system must be brought to enable or to benefit from the implementation of EE (A/2), the outcomes or benefits to be derived by an EE program or curriculum (A/3), and the general resources and support needed to achieve the program (A/4). These considerations form the basis for designing an EE delivery system and implementation plan (B/4) that takes into account the actual conditions, barriers, and constraints found in the system (B/1), identifies alternative strategies for utilizing resources to implement change (B/2), and selects strategies from these alternatives (B/3).

The implementation plan, in turn, provides the model or "blueprint for change" that guides educators in implementing and managing the desired EE program and curriculum by involving key persons (C/1), establishing support arrangements (C/2), acquiring needed resources (C/3), developing instructional arrangements (C/4), and maintaining ongoing implementation activities (C/5).

To summarize, the systemic perspective of an EE change delivery system thus far developed calls for:

- addressing the intended EE program in the context of the larger educational (school) system in which the program will operate;
- addressing all levels and all components of the target system in contemplating, designing, and introducing the EE program;

- making a projective assessment of both societal and institutional impacts of EE; and
- using systemic thinking and systems models in designing and managing the EE program.

The three major change functions (subsystems A, B, and C) have evolved as a result of considering a systemic design for the delivery of environmental education programs in the context of formal educational settings. These change functions constitute a design image for an EE delivery system. This image may be useful to educational practitioners in designing systems that deliver holistic environmental learning experiences and instructional content to school settings.

CHAPTER SIX

A DISPLAY OF THE COMPONENTS, OPTIONS, AND CONTEXT FOR DESIGNING THE INSTITUTIONALIZATION OF EE

In Chapter Five we introduced the design requirements and an image of a change delivery system that can institutionalize EE. In this chapter we set forth the specifics of EE curriculum delivery by presenting (1) a logical structure for designing curriculum delivery systems that institutionalize EE, (2) options for the design and implementation of EE programs, and (3) a context for designing EE delivery and support systems.

A. A Design Structure for the Institutionalization of EE*

The most salient aspects of EE expressed or implied in the statements of legislators, educators, researchers, and other experts--extracted from various reports and the EE Act and Regulations--can be organized into a logical structure or map for designing the institutionalization of environmental education. This structure is displayed in Figure 12.

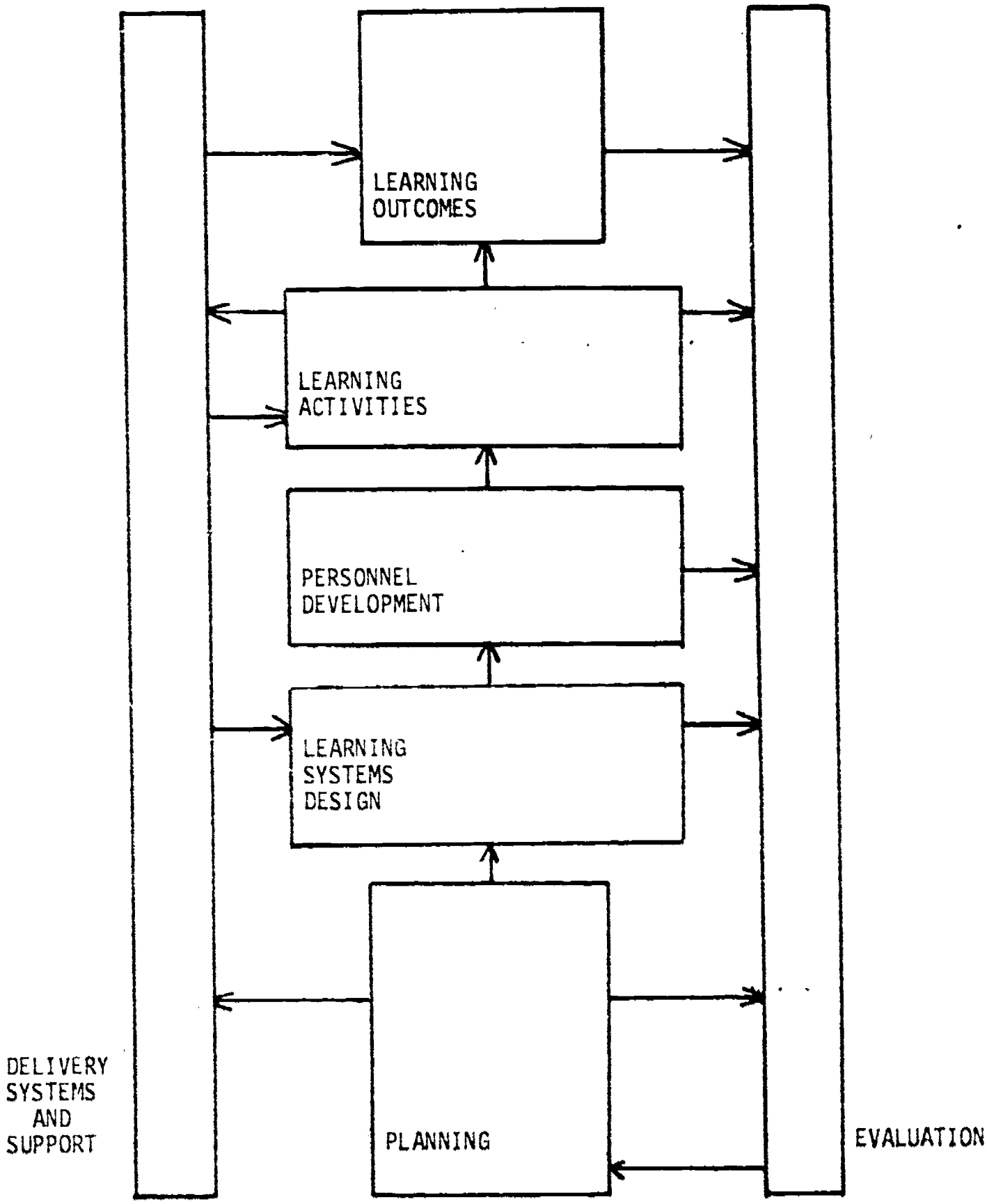
The components of this design structure consist of seven functional areas:

- Planning lies at the base of the structure and sets into motion the development of major EE goals, funding, and institutional support.
- Learning Systems Design is largely concerned with developing and modifying curricula and approaches to meeting EE objectives.
- Personnel Development provides for training of teachers and EE facilitators.
- Learning Activities are concerned with developing and conducting the program and activities laid out in the Learning Systems Design.

*Adapted from John N. Warfield, "Systems Planning for Environmental Education," University of Virginia, Charlottesville, VA, Contract No. 300-700-4028, Office of Environmental Education, Department of Health, Education, and Welfare, July 1979; and in R. Fritz, J. Troha, and L. Wallick, "An Integration of Normative Models for Environmental Education," University of Virginia, Charlottesville, VA, sub-contract No. 5-22033, Office of EE, Department of H.E.W., June 1978.

FIGURE 12

A STRUCTURE FOR THE DESIGN OF AN ENVIRONMENTAL EDUCATION INSTITUTIONALIZATION SYSTEM*



*Ibid.

- Learning Outcomes are the realization of the various EE goals set forth by the educational institution or organization.
- Delivery Systems and Support includes activities that will implement and institutionalize EE and provide for dissemination of newly developed materials and approaches.
- Evaluation, like Delivery Systems and Support, is a continuing set of activities that intermesh with the five central areas.

The components of this structure, as indicated graphically by the arrows, are organized into a set of logical relationships wherein each lower component "should help achieve" each higher one. This relationship translated into prose is: "Component A, if carried out, should help to achieve component B." Therefore, components at the bottom of the structure can be thought of as lending support to all components above them and thus logically precede them. However, the two vertical components represent activities that are carried out at many levels and are thus portrayed as continuous processes.

This structure helps to present different facets of EE and provides an organized framework within which these facets can be addressed in designing a system for institutionalizing EE in a formal education setting.

1. Planning

Planning involves collecting social information and data to ensure that EE is always responsive to present and anticipated environmental issues and problems. Then, with the cooperation of persons in various disciplines, key EE program goals and objectives can be developed. These goals and objectives, in turn, can provide a basis for conceptualizing an EE curriculum content in such a way that it is not restrictive, but lends itself to an interdisciplinary approach. A proper framework for EE, therefore, would relate key goals and objectives to appropriate educational methods that provide for problem solving and interdisciplinary learning at specific age levels.

It then remains for various sources of funding and institutional support to be specified and key persons or groups identified upon whom successful institutionalization of EE depends. These key persons or groups will include students to whom information and awareness is transmitted, teachers who provide for information transfer, and district and school and external agents (representing universities, state agencies, R&D labs) on whom teachers depend for support, materials, training, and technical assistance. Taken collectively, planning will usually address (1) development and implementation of new and desirable EE programs, or (2) continuation and improvement of existing EE efforts.

2. Learning Systems Design

Planning supports the design of learning systems where "the interactions of learners, teachers, and supporting personnel are structured by specific organizational and institutional arrangements. These arrangements are designed to identify learning outcomes, to mobilize needed resources, and to foster the activities needed to realize these learning outcomes."* Example activities would include developing new or modifying old curricula, developing methods, tools, and resources for demonstrating the curricula, and providing for technical assistance that facilitates the above activities.

Once EE curricula have been demonstrated, promising results can be given further support, successful approaches disseminated, and failures reported so that further resources will not be expended on them. These evaluations, then, become critical for the maintenance and continuation of an EE program and to the effectiveness of future planning.

3. Personnel Development

With the development of new EE materials, new training programs may

*Fitz, et al., op. cit., p. 14.

be called for to equip teachers to use them. Training program activities include setting training objectives, disseminating information on training programs, convening workshops and other types of training activities, and, as with the design of learning systems, following up with evaluation activities that will, in turn, influence future program planning.

The major outcomes desired as a result of personnel development activities are (1) increasing educators' competency with new methods and materials, and (2) changing their attitudes and behavior towards EE.

4. Learning Activities

The prior activities of program planning, learning systems design, and personnel development all support the central thrust of education, namely the carrying out of learning activities. Carried out largely by teachers, learning activities would involve a variety of educational arrangements including lecture-demonstrations, field trips, practica, inquiries into local environmental issues, participation in outdoor ecology centers and public meetings, etc.

A particularly important learning activity involves providing all learners with interdisciplinary materials and training in decision making. This is in keeping with a major intention of EE to prepare citizens with the information and skills they need to make sound decisions about their environment.

The end result of these types of learning activities will be the realization of five mutually supportive EE objectives:

- facilitate participation in decision making and inquiry;
- facilitate interdisciplinary perception and understanding of the environment;
- train individuals to work from a holistic frame of reference concerning the environment;

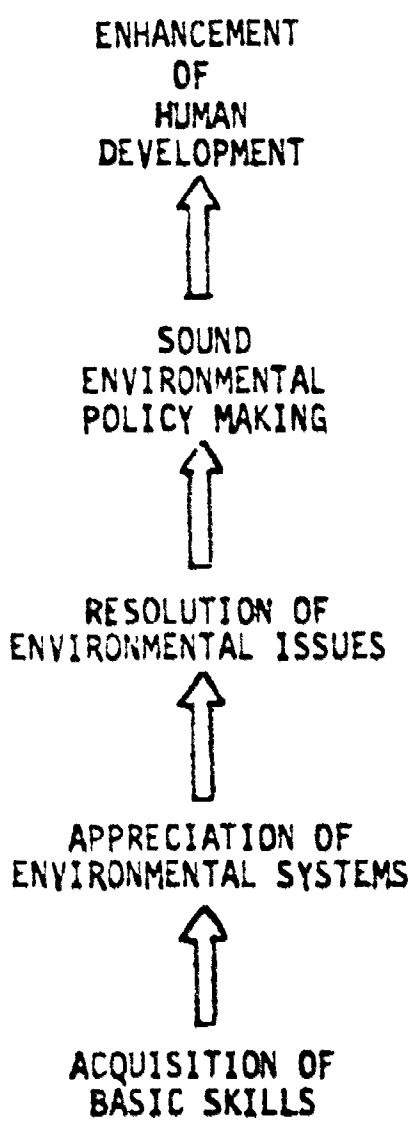
- facilitate development of harmonious relationships between the individual and the environment; and
- facilitate involvement of learners in local environmental issues.*

5. Learning Outcomes

The facilitation and institutionalization activities embodied in the EE design structure support a hierarchy** of desired learning outcomes illustrated in Figure 13:

FIGURE 13

HIERARCHY OF DESIRED EE LEARNING OUTCOMES



*Ibid., p. 29.
**Ibid., p. 33.

The acquisition of basic EE skills involves the learner's ability to analyze complex systems, to synthesize concepts from many different disciplines, and to understand environmental concepts and principles. These skills support the next learning-outcome level of developing an integrated appreciation of the environment and its systems where individuals can analyze environmental systems, are aware of their interactions and interdependencies, and can understand the impacts of human actions on the environment.

Once these two outcome levels have been attained, the ability to resolve environmental issues becomes possible where individuals can identify alternative resolutions of environmental issues, assess those alternatives, diagnose environmental issues, or value a harmonious relationship with the environment. The development of these skills and awarenesses paves the way for individuals to engage in social action by developing sound environmental goals and strategies to resolve environmental issues, which, in turn, supports the development of sound environmental policy. Through responsible action to sustain both the human and natural environment--manifested as responsible management--society, or the collective learners, can sustain and enhance human development.

6. Delivery Systems and Support

Delivery systems and support activities are designed to ensure a smooth coordination of activities between the major components of an EE program and the educational organization (or setting) in which the program is being implemented. These interfacing activities also ensure a smooth flow of information, ideas, and educational methods and materials from one program component to the others. Delivery systems are also designed to disseminate information, materials, and resources made available at the conclusion of learning system design activities. These items may include EE curriculum

design guides, instructional and learning methods and teaching materials, and information about program and learner achievements.

As EE program design and development activities are about to commence, two activities are critical to the delivery of successful, ongoing EE. They are: (1) educate key personnel regarding major EE goals and objectives and (2) develop institutional support for EE in the educational organization. Once critical support is obtained, learning systems can be designed, personnel trained, and learning activities begun.

7. Evaluation

Evaluation should occur as a continuous process throughout the development and institutionalization of an EE program. Thus, formative and summative evaluations of program soundness, effectiveness, and efficiency can occur as each program component is implemented. This ongoing evaluation creates an important source of feedback from each component to the planning stages and enables educators to ever more finely tune the EE program to present and future educational needs.

B. Design Options

In designing an EE program, it will be necessary to consider a number of program options with respect to their varying degrees of compatibility with the standard goals, priorities, and practices of specific educational institutions. A profile displaying some of these options--consistent with the EE design structure and components--is presented in Table 9.

The options presented under column C are most critical, since a choice or decision here will determine the very nature of the EE program to be designed. For this reason, these options are now considered in more detail.

TABLE 9

OPTIONS PROFILE FOR THE DESIGN OF EE PROGRAMS AND THEIR IMPLEMENTATION*

A Basic Student Learning Outcome Sought	B Level of Program Focus	C Curriculum Delivery Approach
___ • Specific knowledge	___ • Post-secondary	___ • Add as new EE course or program to existing curriculum
___ • Specific skills	___ • Secondary	___ • Add as separate "mini-modules" or units into existing curriculum
___ • Specific attitudes	___ • Intermediate	___ • Infuse and integrate EE within various subjects in the curriculum
	___ • Elementary	___ • Treat EE as an integrating context into which standard subject matter is organized

*Adapted from Warfield, op. cit.

TABLE 9 (continued)

D

Source of Support Funding, Resources

- Federal (e.g., Office of EE)
- State (department of education)
- University/college
- R&D laboratory
- Private foundations
- School district
- Community organizations/facilities
- Parents

E

Source of Instruction/ Learning Materials Resources

- External prepackaged materials
- Internally adapted materials (from outside sources)
- Internally developed materials

F

Focus of EE Learning Activities

- Issues or problems
- Topics
- Concepts/principles

TABLE 9 (continued)

G	H	I
Teacher Role	Learner Interaction Resources	Type of Teacher Preparation Required
• Learning process manager/facilitator	• Built environment	• Knowledge/awareness development
• Group discussion leader	• Natural environment	• Motivation/attitude development
• Field guide and interpreter	• Printed materials (books, texts, magazines, journals)	• Skill development
• Classroom lecturer	• A-V materials (films, slides, tapes, filmstrips)	
	• People	

Option 1: Add as new course or program

Advantage: EE as a separate course or program can focus on all aspects of EE instruction and learning: EE content, themes, issues, procedures of problem solving/decision making, and dispositions/attitudes compatible with an environmentally informed world view.

Disadvantages: (1) The presently already heavy curriculum load that would negate an add-on program; (2) in case of a decrease of resources, the EE course would be among the first to go; (3) EE would not have a "real house" and in most cases would require special funding support; (4) EE would be still limited in scope rather than encompassing all levels (grades) of the educational structure.

Option 2: Add as separate "mini-modules" or units

Advantage: EE units can be easily "plugged-in" if a time slot is available.

Disadvantages: All of the above in Option 1 and in addition and most significantly, mini-course arrangements would not adequately address EE goals and objectives.

Option 3: Infuse into standard curriculum areas, such as science, social science, humanities, languages.

Advantages: Such an approval could treat EE comprehensively, articulated through all levels (grades) of the educational structure. It would make the various "host" subject matters more relevant to real life issues and concerns.

Disadvantage: A treatment of EE will be required in the context of the various subject matter, necessitating teacher training and the development of exemplary "fusion" programs by subject matter domain.

Option 4: Organize standard subject matter into an EE curriculum that would freely address the specifications of the EE Act.

Advantage: Subject-matter requirements would be satisfied by carrying out instruction/learning in the functional context of EE issues/problems with the use of basic skills and the skills of problem analysis, problem sharing, and decision making.

Disadvantage: This approach would require a major reorientation of the instructional staff.

The most conducive place to begin the design and development of this option could be the middle-school or junior-high program structure.

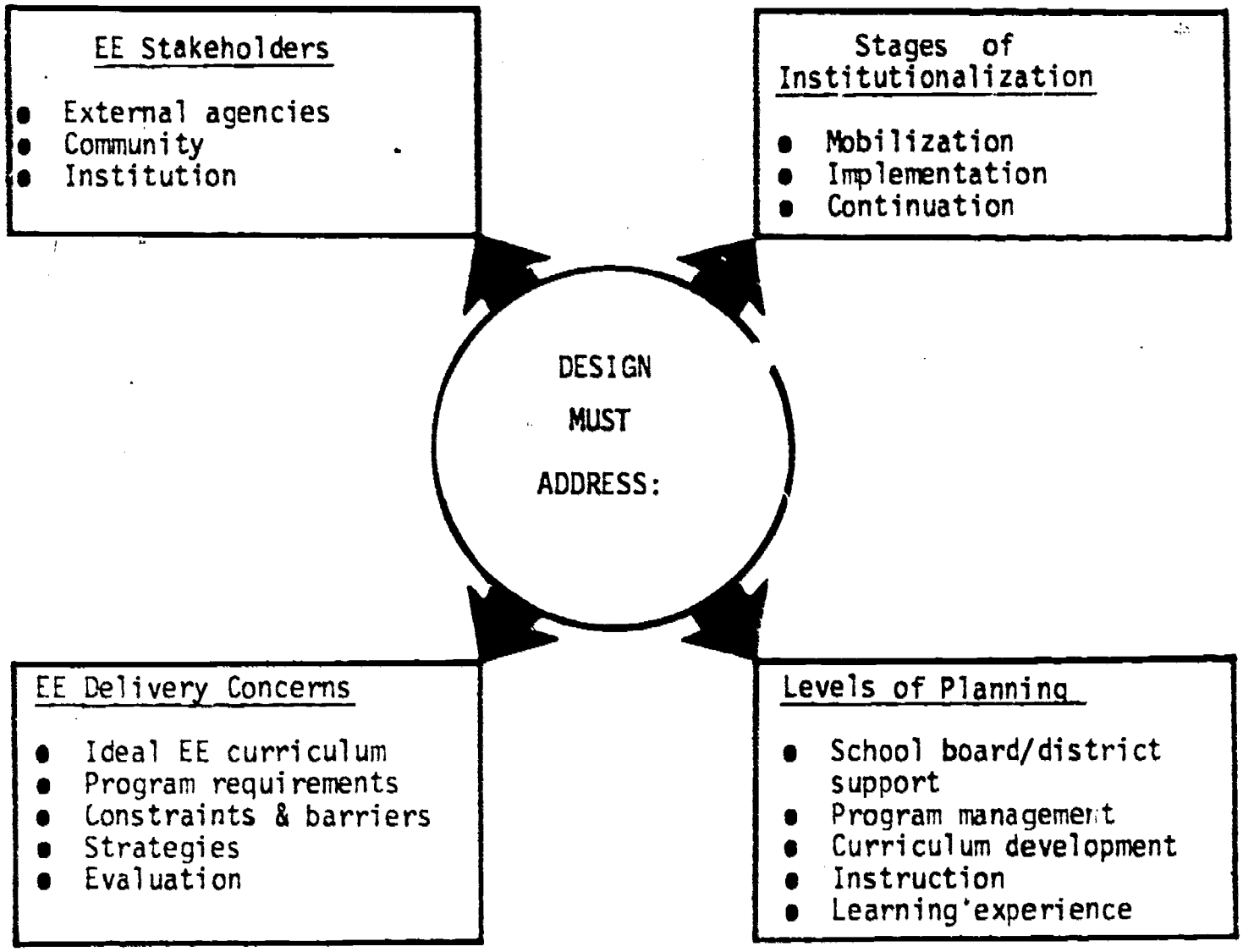
To conclude, both the EE design structure and design options present an orderly flow of activities for modifying current educational systems to accommodate EE. The structure and options, therefore, can be regarded as a general framework for the design of EE programs and their implementation within formal educational settings.

C. A Context for Designing an EE Delivery and Support System

In Section A of this chapter we indicated the importance of curriculum delivery and support systems in ensuring the coordination and implementation of the major components of an EE program. We will now examine four important considerations for designing and developing a comprehensive and effective EE delivery and support system: the EE stakeholder, the EE delivery concerns, the levels of planning, and the stages of institutionalization. These four considerations constitute major areas for thinking about and planning EE and its delivery within an educational institution or setting, and for identifying needed delivery resources and strategies compatible with the institution or setting. The major EE delivery design considerations are displayed in Figure 14.

FIGURE 14

CONSIDERATIONS FOR DESIGNING AN EE DELIVERY AND SUPPORT SYSTEM



1. EE Stakeholders

EE stakeholders represent the various organizations, agencies, groups, and individuals that have a "stake" in environmental education in that they constitute sources of educational change and make up the entire system of control, influence, and support in which environmental education and EE programs must exist. The stakeholders represent major sources of EE concern, influence, and resource support. They include:

- External agencies consist of federal government agencies, state departments of education, R&D laboratories and centers, independent service agencies, and universities and colleges. The major influence of these organizations is in providing implementing agencies (schools) with general EE goals, curriculum guidelines, "moral support," and various types of financial and technical assistance for materials development, teacher training, needs assessment, and evaluation.

- Community includes parents, social clubs, civic groups, professional associations, environmentally concerned groups and organizations, business and labor organizations, newspapers, radio and television stations, public facilities (museums, libraries, field sites). The major influence of these groups is in providing the source of many educational needs and demands, in addition to their providing political, moral, and sometimes financial support for EE program development.

- Institution involves all organizational levels within the formal educational system, including county or district, school building, and classroom. The educational institution acts as the primary developer and implementer of EE. Thus, within the educational organization, specific goals, policies, and program requirements are determined, financial and support arrangements that facilitate EE program development are made, and EE delivery in terms of curriculum development, teacher preparation, instruction, and program management are carried out.

2. EE Delivery Concerns

EE delivery concerns indicate the focal activities for planning the institutionalization of an EE program in a given educational (school) setting. The focal activities include: (1) specifying an ideal EE curriculum in terms of overall EE goals, general learning objectives, and broad or general curriculum content; (2) specifying the program requirements necessary to develop, implement, and manage an EE program and thereby achieve the EE goals and learning objectives; (3) identifying the institutional constraints and barriers existing in a specific educational setting that present obstacles to the fulfillment of the program requirements; (4) selecting strategies, procedures, and arrangements that will be utilized to implement the program by accommodating constraints and overcoming or circumventing barriers; and (5) specifying evaluation procedures (including criteria and instruments) for assessing the quality of the EE program design, the delivery plan itself and, once implemented, the success, utility, or efficiency of the delivery strategies and arrangements. Note that, as was illustrated in Figure 12 (Section A), evaluation considerations address all levels or aspects of the EE program delivery system.

3. Levels of Planning

Within a formal educational institution or setting, there are several important levels that should be considered in planning and designing an effective EE delivery system. These important levels of planning address: school board/district support, program management, curriculum development instruction, and the learning experience.

*See The Design of Environmental Education Delivery Systems: A Procedural Guide for a more specific presentation of these concerns.

- School board/district support. This level of planning is concerned with the key decision makers or decision-making bodies that can influence an EE program and its delivery through a variety of district or building level directives, sanctions, policies, practices, and resource allocations. The key agents or decision makers involved include school board members, district superintendents, district administrators, school principals, program coordinators, and department heads. At this level, the EE delivery design focuses on controls and influences largely outside the program or project, for example, identifying potential community or district funding and material resources, identifying district or school policies that may support or block program or project aims, ensuring compatibility of program needs and objectives with overall district needs and priorities, obtaining necessary approvals, obtaining necessary funds and/or support services.

- Program management. This level of planning seeks to identify key people, procedures, and resources, within and outside the school district, that can provide guidance, technical assistance, and material support to the delivery of the EE program. Key people may include federal or state EE agency officials, district superintendents, school principals, project directors or coordinators, and school staff and teachers. At this level, the delivery design focuses on ways to, for example, acquire and allocate resources, schedule project activities, tasks, and events, supervise staff, monitor and evaluate program development and implementation, maintain program or project visibility, provide "costs" accounting and budgeting, provide guidance training and assistance to teachers.

- Curriculum development. This level of planning is concerned with the EE curriculum content that is to be implemented and what teacher preparation, materials, and other resources are needed to develop the content. At this level, the delivery design focuses on specifying curriculum that addresses:

  --key environmental knowledge to be acquired by the learner, i.e., environmental issues, topics, principles, concepts;

  --important skills to be developed, e.g., critical thinking, problem solving, decision making; and

  --important sensitivities, awarenesses, and appreciations to be developed.

- Instruction. This level of planning is concerned with how curriculum content is to be transmitted to learners and what specific resources, materials, and activities are required to enable or facilitate this transmission. At this level, the delivery design focuses on specifying:

  --how instructional or learning materials are to be utilized;

  --what teaching methodologies are to be employed;

  --what learning activities, arrangements, or settings are to be used; and

  --how the curriculum is to be organized and sequenced.

- Learning experience. This level of planning is usually addressed as an integral part of both the curriculum development and instruction planning levels. At this level, the impact of the planned curriculum and instructional approach(es) on the students' knowledge, skills, and attitudes development are considered and the means to evaluate this development decided upon.

As should be evident from this and previous discussions, evaluation is an overall delivery concern since it is important to assess the effectiveness of an EE delivery and support system at each level of planning. Thus, at the

school board/district support level, the major evaluation concern is whether or not the delivery plan, or more specifically, the delivery strategies are successful in eliciting required approvals, resources, and general support for the EE program. At the program management level, the major evaluation concern is whether or not the planned delivery strategies lead to the development and implementation of the EE curriculum as an accepted part of the standard curriculum of the district or school. At the curriculum development level, evaluation looks at whether or not the EE content implemented in the classroom is faithful to or consistent with the EE goals and learning objectives established for the program. At the instruction level, evaluation focuses on the suitability and effectiveness of instructional procedures, learning arrangements, and activities in achieving desired student learning objectives; or conversely, at the learning-experience level: Do students acquire the environmental knowledge, skills, and attitudes specified in the EE program goals and curriculum objectives?

These evaluation concerns form the basis for a feedback and adjustment component that is, or should be, an integral part of the design of an EE delivery system at each level of planning.

4. Stages of Institutionalization

The stages of institutionalization are characterized by three time-related phases over which the development and delivery of an EE program occurs: mobilization, implementation, and continuation.

- Mobilization includes all system readiness and preparation activities in which the nature of the EE program and how it will be delivered (i.e., introduced and integrated into existing school programs and curricula) are specified, and program activities begun. Typical mobilization or initiation

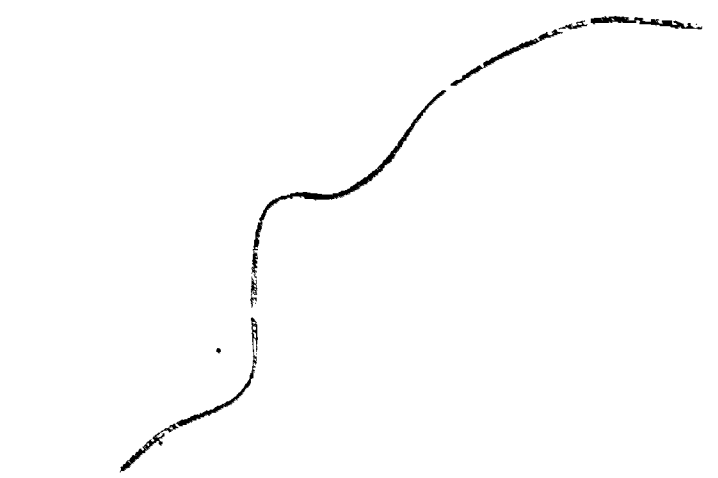
activities include problem definition, needs assessment, goal setting, program planning and design, site and participant selection, eliciting interest, securing approvals and support, and acquiring funds.

- Implementation includes all activities and actions which introduce the EE program and curriculum to schools and in which the program plans (i.e., strategies for delivering the EE program and curriculum) are carried out. Typical activities include acquisition and allocation of learning resources, development or adaptation of instructional materials, staff preparation and training, curriculum development, tryouts, and practice.

- Continuation, the final and ongoing stage of EE program delivery, includes all activities in which the EE program is maintained, improved, and extended or expanded in scope. Typical activities include ongoing monitoring and refinement of program activities, dissemination of program information and materials, evaluation of student progress in achieving EE objectives and learning outcomes, continued curriculum and materials development, ongoing periodic staff training, stabilization or "solidification" of district approval and financial support, and program expansion to other grade levels, schools, or districts.

To conclude, as described above and illustrated in Figure 14, a comprehensive and effective design for an EE delivery and support system should: (1) take into account the concerns, influences, and resources of various EE stakeholders representing external agencies and the community, as well as those within the educational institution itself; (2) address various EE delivery concerns by specifying ideal EE goals and curriculum objectives, program development requirements, institutional constraints and barriers, implementation strategies, and evaluation procedures; (3) specify these

delivery concerns at each level of planning to ensure a coordinated overall effort to institutionalize the EE program; and (4) consider and design for all of the above at each stage of institutionalization in order to anticipate both short- and long-term program needs and problems, ensure smooth transitions between various program phases, and control for desired program outcomes.



SUMMARY

The chapters presented in this document constitute both the knowledge base of and a generic model for the institutionalization of environmental education in the formal education sector. Essentially, the generic model presents those aspects and considerations that are important in understanding and in designing a system that can deliver and institutionalize EE as a planned change.

The development of the generic model proceeded from a very general level, i.e., describing the mission of EE, the formal education system, and the nature of educational change, to a more specific level, i.e., portraying the structure and the components of an EE delivery system. More specifically, the development of the generic model proceeded as follows:

In Chapter One, we characterized EE in terms of its basic mission, goals, and curriculum content. These were portrayed as defined by the Environmental Education Act and by various and typical educational practitioners. Specific awareness, attitude, knowledge, skill, and participation competencies required by EE were also presented.

In Chapter Two, we characterized the formal education system into which EE would be introduced, integrated, and finally institutionalized. This system was described at several different levels, including the overall institution, administration (district, building), instruction, and learning-experience levels. The implications for organizing education around the learning-experience level (rather than the other levels) were also described.

In Chapter Three, we examined EE as it relates to the larger societal and formal educational context. Specifically, we described this context as consisting of: (1) ideal images of an environmentally aware world view and EE curriculum content that can transmit this world view to learners;

(2) facilitating acts and agencies (e.g., the EE Act, federal and state agencies) that provide incentives and support to school systems to develop and utilize EE curricula; (3) the educational institution that develops and implements EE curricula through various delivery, teacher training, and instruction/learning subsystems; and (4) society that gradually becomes more environmentally aware and responsive as a result of the EE curriculum implementation/instruction efforts of educational institutions.

In Chapter Four, we described important aspects of educational change and innovation that we derived from a review of the literature and that we found to be relevant to the institutionalization of EE. Our findings were summarized in the form of a set of propositions that characterized the general nature of change, factors that influence change within the educational organization, and considerations and requirements for planning and implementing change. We also presented a sequential framework for institutionalizing EE as a planned change.

In Chapter Five, we attempted to integrate the previous viewpoints and characterizations by describing the basic requirements for a change delivery system for institutionalizing EE and by presenting a generic image of such a system. The basic components of this change delivery system -- a definition subsystem, a design subsystem, and an implementation/management subsystem -- were also described.

And finally, in Chapter Six, we elaborated on the design components of an EE change delivery system. These included: (1) a design structure involving various aspects of planning, learning-system design, personnel development, learning activities, learning outcomes, delivery systems and support, and evaluation; (2) design options for developing EE programs; and (3) a context for designing an EE delivery and support system by considering

the EE stakeholders, EE delivery concerns, levels of planning, and stages of institutionalization.

It is hoped that the knowledge base/generic model introduced here serves the purposes intended: (1) to orient the user/educator/practitioner to the nature and complexity of institutionalizing EE in the formal education sector, and (2) to provide a conceptual basis for the design of an effective EE delivery system.

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