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ABSTRACT

This document is intended to provide Minnesota educators a means of systematically viewing Environmental Education (EE) programs within their schools or districts, and provide a tool for integrating EE into all courses and programs in accordance with the State Board Curriculum Rule 3500.1075. The material is divided into four chapters, followed by four appendixes and a glossary of EE terminology. Chapter 1 conveys education values, learner values, philosophy, mission, and goals as expressed by the Minnesota State Board of Education. In chapter 2 the roles and purposes of EE are presented. This includes a description of EE, its organizing principles or contexts, and its program goals. In chapter 3 the concept learner outcomes for EE are enumerated. In this section, the associated state learner goals, development and concept emphasis, and EE learner outcomes are stipulated for each program goal. Chapter 4 presents a model for transposing model learner outcomes into curriculum. Ten steps are identified to guide the integration process and samples of an integrated unit and lesson plan format are provided. Also included in this chapter is a section discussing EE approaches to teaching and learning, and a scope and sequence planning guide. Appendixes include the following: (1) expanding and applying EE key concepts; (2) EE supplemental materials and opportunities; (3) discussion, research, and discovery topics for each program goal; and (4) resources. (MCO)

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Model Learner Outcomes for Environmental Education



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MODEL LEARNER OUTCOMES

FOR

ENVIRONMENTAL EDUCATION

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Commissioner of Education

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Chapter 1

**Environmental
Education**

**Minnesota State Board of Education
Education Values, Learner Values
Philosophy, Mission, and Goals**

Chapter 1

Minnesota State Board of Education

Values, Philosophy, Mission, and Goals

School districts nationwide, and certainly in Minnesota, are constantly striving to improve the learning experiences they provide students. The last two or three decades have seen heightened interest in improving all parts of the education process, including appropriate involvement of students, parents, and the community at large.

The documents that constitute the Minnesota Department of Education's *Coordinated Model for Educational Improvement* incorporate many of the concerns expressed and issues addressed by the public, Legislature, and in reports on the state of public education. One of these documents, titled *Goal and Outcome Specification Process*, suggests a set of procedures for appropriate involvement of the public. These procedures include public participation on the development of statements of values, philosophy, mission, and learner goals. These sets of statements are a hierarchy of increasingly specific concepts ranging from values, the most general, to learner goals, the most specific, that give form and direction to public education. Given this hierarchy, staff skilled in subject matter and the profession of teaching can develop very specific learner outcomes for each subject area.

The following sets of statements were adopted by either the Minnesota State Board of Education or the Minnesota State Legislature for two purposes. First, they provide a model for use by communities and school staff as they strive to improve the learning experiences they provide for residents. Second, they are the hierarchy used by Department staff and teams of educators as they develop model learner outcomes for each subject area. The *Mission Statement for Public Education* adopted by the Legislature gives explicit direction to public schools. The State Board Curriculum Rule 3500.1060 adopted February 1990 lists the learner goals which must be incorporated into each district's goal statements. All other parts of this document are models, suggestions for the consideration of residents and professionals in each district.

Education System Values

We believe the following values are preeminent for the education system. These attributes are to be reflected in all educational programs and operations.

Accountability - A condition in every school whereby each is able to justify its use of public resources by effectively fulfilling its mission of learning.

Effectiveness - A condition in every school whereby each accomplishes its mission at a performance level defined by learners, parents, citizens of the community and state, and their representatives.

Efficiency - A condition in every school whereby each accomplishes the highest possible level of excellence with available resources.

Excellence - A condition in every school whereby the highest possible standards for performance are expected of all students and staff.

Flexibility - A condition in every school which results in meeting the needs of learners through sensitive and creative responses to changing circumstances.

Human Equity - A condition in every school which offers equal opportunity and appropriate individualized support to each staff member in employment and professional growth and to each learner in the educational process. Also, a condition which fully, fairly, and accurately portrays various cultures, races, and genders in the instructional program.

Responsibility - A condition in which the school recognizes that the parent has primary responsibility to assure the child is educated, and in which a partnership exists between the school, community, parent, and the learner to identify the learning goals and needs of the child or adult learner and provide appropriate learning opportunities through which those goals can be met.

Responsiveness - A condition in every school whereby diversity of personal and group needs and aspirations are expected, accepted, encouraged, and routinely addressed.

System Equity - A condition in the education system whereby each school is provided with the resources necessary to assist all learners in achieving excellence.

Wholeness - A condition in every school whereby each gives necessary and appropriate consideration to the potential career needs, spiritual, social, emotional, and physical growth of each learner and staff member as it designs and implements educational programs.

Visionary - A condition in the education system whereby emerging trends which will affect the knowledge and skills required to be a successful adult are examined and the knowledge gained is used to produce appropriate changes in the system's course content, procedures, and goals for learners.

Learner Values

We believe helping students develop the following values is a primary purpose of education.

Accountability - A quality in individuals whereby each knows, understands, and accepts the impact and consequences of personal actions and decisions.

Citizenship - A quality in individuals whereby each has an understanding, appreciation, and support of the institutions of American government and society, and a willingness and ability to participate in the democratic process and in socially beneficial service activities.

Compassion - A quality in individuals whereby each is sensitive to the conditions affecting the lives of others and each has the commitment to assist others when appropriate and possible.

Competence - A quality in individuals whereby each attains maximum levels of knowledge, skill, and affect commensurate with his or her potential.

Cooperativeness - A quality in individuals whereby each interacts with others in a manner that mutually benefits all participants in the interaction.

Creativity/Flexibility - A quality in individuals whereby each acts or expresses self in new, improved, or unique ways.

Ethics - A quality in individuals whereby each displays consistent personal and professional integrity and an acceptance of the responsibility to act for the benefit of all learners.

Honesty - A quality in individuals whereby each is fair and straightforward in the conduct of human interaction.

Learning - A condition in individuals whereby each continually strives throughout life to learn more and to increase personal levels of fulfillment and competence in human endeavors.

Problem Solving - A condition in individuals whereby each has the ability to identify, frame, and propose new, improved, or unique solutions to existing and emerging problems.

Responsibility - A quality in individuals whereby each strives to fulfill the obligations of economic self-sufficiency and active commitment to the common good of society.

Self-Acceptance - A quality in individuals whereby each has a positive self-image, through assertion of rights, holding personal, physical, and emotional well-being as an ideal, accepting personal talents with humility, and personal limitations with the resolve to improve where possible and accept where necessary.

Spirituality - A quality in individuals whereby each recognizes and accepts the importance of nurturing one's inner spirit, that creative force that transcends the human and the material.

Thinking - A condition in individuals whereby each continually strives to improve personal skills for mental manipulation of sensory perceptions to form knowledge, thoughts, reason, and judgments.

Minnesota State Board of Education Philosophy of Education

We Believe . . .

- . . . Every person can learn.
- . . . Learning is a lifelong process.
- . . . Every person must understand and accept self before he or she can become a contributing member of society.
- . . . Each person has gifts which the education program must seek, identify, and help to maximize.
- . . . Advancement of the human race requires individuals who are honest, responsible, compassionate, cooperative, creative, and competent.
- . . . The state and local communities have a shared responsibility to assist each person in learning.
- . . . Each community has a shared responsibility with parents for meeting the needs of each child.
- . . . The community and its school system must continually look to and strive to meet the future education needs of society.
- . . . The education system must assist each person to become functional in an increasingly global and interdependent world.
- . . . The education system must lead people to value and accept a wide diversity in human behaviors, sophistication, and values.
- . . . The education system must maintain high standards for responsiveness, human equity, and system equity in the provision of educational opportunities.
- . . . Decisions regarding planning, implementing, and maintaining learning opportunities must be vested as close to the individual learner as efficient use of public resources allow.
- . . . School systems must implement programs that stress the intellectual development of each learner in concert with the spiritual, social, emotional, and physical development of the learner.
- . . . School systems must model and nurture creativity in learners.
- . . . School systems must maintain opportunities for all learners to develop competence in personally selected areas of human development.
- . . . Professional educators have a responsibility to remain current with evolving knowledge about human growth and development, learning theory, and knowledge of subject matter.

- . . . Professional educators and elected or appointed education policymakers have a responsibility to account to the public for the excellence of their efforts.
- . . . Professional educators and elected or appointed education policymakers have a responsibility to use public resources prudently and efficiently.
- . . . Staff employed in schools must model the behaviors they are assisting learners to develop.

Mission for Public Education

*As adopted by the Minnesota Legislative Commission on Public Education
and enacted into law, Chapter 240, Laws of 1985*

The purpose of public education is to help individuals acquire knowledge, skills, and positive attitudes toward self and others that will enable them to solve problems, think creatively, continue learning, and develop maximum potential for leading productive, fulfilling lives in a complex and changing society.

Mission of the Minnesota State Board of Education

The Minnesota State Board of Education will provide the vision, advocacy, and leadership to improve significantly the quality of education throughout the state.

Mission of the Minnesota Department of Education

The Minnesota Department of Education provides leadership, service, and regulation to maintain and improve an equitable, uniform, and quality system of public education for all learners.

The Department provides leadership as an advocate for education by defining quality education and by seeking the resources necessary to meet the needs of all learners.

The Department provides service through informational and technical assistance that will improve the productivity and performance of students and staff, and provide opportunities for the development of the potential of all learners.

The Department regulates education by maintaining, interpreting, and enforcing Minnesota State Board of Education rules, and state and federal laws.

Minnesota State Board of Education

Learner Goals

Learner goals are a series of statements that describe the knowledge, skill, processes, values, and attitudes that a learner can expect to achieve as a result of active participation in K-12 public education. They are based on the presumed current and future intellectual, social, emotional, physical, and career/vocational needs of students and adults in contemporary society.

Each district shall use the learner goals contained below as the basis for defining program-level learner outcomes that are directly reflected in the district's course and program offerings.

- A. To effectively participate in learning activities, each learner will:
1. master reading literacy to gather information and data, gain perspective and understanding, and as a leisure activity;
 2. master writing to explain, describe, and express a point of view and feelings;
 3. master listening to gather information and data and gain perspective and understanding;
 4. master speaking to explain, describe, express a point of view and feelings, and to discuss an issue;
 5. master numerical literacy to apply mathematical functions to life situations;
 6. master the use of a variety of tools, including electronic technology, to enhance learning;
 7. master viewing and observing to gather information and data, and gain perspective and understanding; and
 8. apply skills in self-expression through visual and performing arts.
- B. To provide a foundation for meaning in life, each learner will accumulate and apply knowledge and develop the understanding to:
1. participate in lifelong learning;
 2. live within local, state, national, and world political and social structures;
 3. examine personal beliefs and values and their relationship to behavior;
 4. make ethical and moral decisions;
 5. be a responsible citizen of the community, nation, and the world;

6. practice stewardship of the land, natural resources, and environment;
7. know the impact of human life on nature and the impact of natural phenomena on human life;
8. express self through artistic creation;
9. know career options and the general education requirements for each;
10. know world and national economic conditions to make informed decisions on consumer products, occupations and career needs, and use of resources;
11. select or prepare for a series of occupations that will personally satisfy and suit one's skills and interests;
12. manage personal affairs;
13. understand the physical world using systematic problemsolving strategies;
14. communicate and relate effectively in a language and about a culture other than one's own; and
15. know the importance of geographic location in the functioning of contemporary society.

C. To think, decide, resolve issues, and meet needs creatively, each learner will be able to:

1. compare, differentiate, and relate information and facts and apply knowledge;
2. combine various facts, situations, and theories to formulate new and original hypotheses or to develop new solutions;
3. critique and make judgments about materials, conditions, theories, and solutions;
4. generate and value creative alternatives; and
5. apply the concepts and processes of science.

D. To value, understand, and accept human interdependence, each learner will be able to:

1. seek interactions and feel comfortable with persons who are different in race, religion, social level, or personal attributes;
2. understand the basic interdependence of the biological and physical resources of the environment;
3. understand the interrelationships among complex organizations and agencies in modern society;
4. understand how the citizens of the United States are geographically and socially connected to people and places in other parts of the world.

E. To value, understand, and accept the diversity of humankind, each learner will be able to:

1. base actions and decisions on the knowledge that individuals differ in many ways;
2. base actions and decisions on the knowledge that values and behaviors differ from one social group to another;
3. base actions and decisions on the understanding that lifestyles and behaviors reflect the value system of the societies in which they were learned;
4. judge other's actions with an understanding of the personal and social context of that action;
5. accept that there is more than one way of being human;
6. base actions and decisions on the understanding that as individuals move from one society to another they can learn lifestyles and can learn to behave appropriately in different social contexts; and
7. act on the belief that human behavior is influenced by many factors and is best understood in terms of the context in which it occurred.

F. To address human problems through group effort, each learner will develop the knowledge, skills, values, and attitudes essential to:

1. act in accordance with a basic ethical framework incorporating the values that contribute to successful community life such as honesty, fairness, compassion, and integrity;
2. understand the importance of working in groups to achieve mutual goals; and
3. be able to provide leadership in resolving personal and societal issues.

G. Each learner will be able to effectively resolve conflicts with and among others by:

1. assuming responsibility to form productive and satisfying relationships with others based on respect, trust, cooperation, consideration, and caring for other persons;
2. acting on the belief that each individual has value as a human being and should be respected as a worthwhile person; and
3. resolving conflict in the manner most beneficial to society.

- H. Each learner will be able to act on contemporary events and issues with a perspective of their historical origins:
1. understanding the origins, interrelationships, and effect of beliefs, values, and behavior patterns in world cultures;
 2. understanding one's own culture and historical heritage through the literary, aesthetic, and scientific traditions of the past;
 3. being familiar with the ideas that have inspired and influenced humankind; and
 4. understanding the manner in which heritages and traditions of the past influence the direction and values of society.
- I. Each learner will develop a positive attitude toward self, demonstrated through:
1. a feeling of positive self-worth, security, and self-assurance;
 2. a willingness to live with one's strengths and weaknesses;
 3. a basic understanding of one's own body, its systems and physiology, and a positive attitude toward one's own physical appearance;
 4. understanding that efforts to develop a better self contribute to the development of a better society;
 5. understanding that self-concept is acquired by interaction with other people; and
 6. appropriate control or release of emotions.
- J. To set and achieve personal goals, each learner will develop the ability to:
1. select appropriate personal learning goals;
 2. make decisions about one's life;
 3. plan, act, and organize to realize one's goals;
 4. accept responsibility for personal decisions and actions;
 5. work now for goals to be realized in the future; and
 6. select viable alternatives for actions in changing circumstances.
- K. To cope with change, each learner will develop the ability to:
1. initiate appropriate change while respecting existing structures and concepts;
 2. tolerate ambiguity;
 3. understand that coping with change is a lifelong process;

4. understand and accept the changing nature of work and the potential need to change careers several times;
5. use career information and counseling services to make informed and satisfying vocational choices; and
6. understand that all knowledge is tentative and that as new discoveries are made the knowledge base grows.

L. To lead a healthy and fulfilling life, each learner will:

1. assume responsibility for one's own physical and mental health and safety by establishing a daily regime of health behaviors that will maintain mental and physical health and motor fitness;
2. make informed decisions about health products and services;
3. make a lifestyle that promotes healthful family living;
4. understand public health measures and their effect on the individual, family, community, and environment; and
5. be able to enjoy play-skill activities that include understanding, cooperation, accepting rules, controlling emotions, following group process, and acquiring self-satisfaction.

M. To lead a productive life and actively contribute to the economic wellbeing of our society, each learner will develop the work readiness skills of:

1. applying the basic skills of communications, computation, and scientific principles to real-life situations in a technological society;
2. defining and interpreting the nature of the work force in terms of one's own challenges and opportunities;
3. leadership and citizenship necessary to succeed as an active agent in a changing work force;
4. understanding employment opportunities, job seeking and keeping, and specific work as they relate to transition from school to economic productivity;
5. developing pride in good work and expecting quality in products and services; and
6. adopting a positive attitude toward work, including the acceptance of the necessity of making a living and an appreciation of the value and dignity of work.

Chapter 2

Environmental Education

Introduction to
Environmental Education

Chapter 2

Introduction to Environmental Education

Ours is a technical age. Change comes quickly and unceasingly. It has brought economic growth and lifestyle comforts that people entering the twentieth century would have found unbelievable.

These economic growths and technological changes have often meant a high price in environmental consequences. That's why we need environmental education. It's impossible to document all the environmental challenges citizens of tomorrow will face, but even today we have many reminders. Polluted waters flow in our rivers and oceans. Acid rain falls from our skies. Contaminated soil poses safety hazards. Many resources are becoming scarce. World population continues to increase, putting extra strain on an already stressed planet.

Today's environmental problems are global concerns. Wind and water do not recognize national boundaries. Polluted air blows from one country to the next. We need to develop a global ethic, one that will help individuals and societies develop attitudes and behaviors that promote a sustainable earth for people and for all other organisms, now and for those who follow.

Developing such an ethic won't be easy. Educators must make students aware, provide them with skills, and encourage them to participate in the resolution of environmental problems. Such a program will involve all educational disciplines at all grade levels. It requires students' involvement in investigating real environmental issues in their local communities as well as their thoughtful reflection and action on universal concerns. When we provide balanced, up-to-date, multifaceted environmental education, we develop citizens who are prepared to defend and improve the environment. They approach the future not with a "doom and gloom" attitude, but armed with knowledge, skills, and the confidence that they can make a difference. In being prepared, they protect and create their own legacy and that of generations to come.

The purpose of this document is to provide educators with:

- a means of taking a systematic view of the environmental education program within their school buildings or districts, and
- a tool for integrating environmental education into all courses and programs as cited in the State Board curriculum offering Rule 3500.1075.

It will help evaluate present environmental education programs and provide a basis for selecting and/or developing instructional materials.

The Elementary Rule, adopted by the Minnesota State Board of Education in 1986, mandated: "Environmental education is a required curriculum offering and shall be taught in the context of other required curriculum offerings." In 1990, the Secondary Rule was revised and adopted to include environmental issues with implementation to begin in the 1990-91 school year. The 1990 Legislature enacted a law requiring the establishment of environmental education programs, implementation, and inservice in all public elementary and secondary schools. The 1990 law and the Planning, Evaluating, and Reporting (PER) law also require curriculum program planning. Integration models for a learner outcome-based program and research and development sites will be developed to demonstrate how environmental education outcomes can be integrated into a comprehensive education curriculum.

The following model learner outcomes are intended to help develop strong programs in environmental education in the State of Minnesota. The learner outcomes selected for each Minnesota student have been outlined in the text. All of these outcomes are recommended to deepen the learner's understanding of the natural world, and to help students become active participants in ensuring the health and well-being of the planet we all share.

Environmental education has historical roots in many disciplines. Some of these are nature study, conservation education, outdoor education, ecology, natural resource management education, population education, philosophy, and religion. Modern environmental education is a mixture of these disciplines as well as more recent entries into the field of education, such as systems analysis, energy education, futures, and global education.

Because there are so many approaches to environmental education, it is necessary to adopt a multifaceted method of teaching - one that filters through all areas of the curriculum. The term that has come into use is infusion. Project Learning Tree, a non-profit group that designs curriculum, provides this definition: "An infused approach is one where concepts, skills, attitudes, and experiences to prepare students for responsible decision making related to the environment are integrated within all major school subjects."

This is the kind of education that lasts a lifetime and refuses to be bound to the classroom. It freely crosses subject areas and calls on students and teachers to be creative and ingenious in sorting through the issues.

Many descriptions of environmental education have evolved in recent years. This one, borrowed from the New Mexico Department of Education, provides the basis for our Minnesota environmental model learner outcomes:

"Environmental education is a holistic and interdisciplinary process by which the learner does five things:

1. Develops an awareness of the natural and humanmade environments.
2. Develops knowledge about how the environment works.
3. Acquires knowledge about the technological, social, cultural, political, and economic relationships occurring today in environmental issues.
4. Develops active inquiry and problem-solving skills along with appropriate values to guide behavior in dealing with environmental issues.
5. Becomes motivated to apply action strategies to maintain a balance between quality of life and quality of environment."

This document is the combined work of many Minnesota K-12 educators, Minnesota Department of Education and other subject specialists, nature center professionals, science and ecology-related organizations, and individuals. The program and learner outcome goals were developed in keeping with recent research in the field of environmental education. Of particular influence were two assessment surveys conducted by the Minnesota Department of Education to determine effectiveness and future needs of environmental education in Minnesota. One survey included responses from 107 educators from all parts of the state. In addition to effectiveness and future needs, the survey elicited specific responses to the four contexts used in Minnesota's environmental education programming. A second survey was directed to nature center staffs. In addition, the document was developed in keeping with national standards for environmental education being considered by ASTM (American Society for Testing and Materials). Educational and recreational standards from the U.S. Department of the Interior and research information from the University of Minnesota (Developing a Model Program and Guidelines for Resident-Based Environmental Education Centers in the State of Minnesota, September, 1989) were also reference sources.

A test item bank will be developed that correlates with each of the learner outcomes. Test information will be added to this document in future printings.

This model learner outcome guide should be viewed as a beginning, or as a starting point, for a planning team. As you use, modify, or reject these goals, outcomes and concepts, you are encouraged to share your findings. Please direct your comments to: Environmental Education Specialist, Minnesota Department of Education, 644 Capitol Square Building, 550 Cedar Street, St. Paul, Minnesota 55101.

The Environmental Education Program

Historically, Minnesotans have agreed that environmental education includes, but is not necessarily limited to, four organizing principles or contexts. The four contexts are:

Natural Context

The learning that is most related to nonhuman-dominated communities. These include: plants and animals, decomposers and decomposition processes, nutrient and mineral cycles, energy systems, soils, atmospheric, and hydrologic systems.

Social Context

The learning that is most related to the human relationship to the environment, including: social, economic, political, cultural, ethical, and psychological systems.

Valuing Context

The learning that is most related to choosing freely from a thoughtful consideration of alternatives, becoming aware of what we cherish, and affirming those choices by connecting them to our own overt behavior.

Action Context

The learning that is most related to decision making, problem solving, and the implementing of alternatives. This is the **application** of the natural, social, and valuing contexts in everyday life.

The Contexts of Environmental Education

The contexts are useful for determining diverse environmental education experiences. An effective program should provide experiences in all contexts over a period of time. Which context is emphasized at a particular time or age level is discretionary. Take the contexts in any order that meets student needs. The goal is to develop a progression of learning experiences through the contexts from natural to action. Many different entry points for learning experiences are also possible. Programming decisions will depend upon local variables, including the complexity of the learning experience and the age and sophistication of the students.

The **natural** and **social** contexts relate directly to understanding, or **cognitive learning**. Perhaps it can be described as **the total of one's experiences related to the acquisition of information, skills, and processes**.

The **valuing** and **action** contexts relate to **affective learning**, which greatly **influences what we do with our understanding**. Believing something is true is not enough to motivate an individual to action. For us to act, the belief must have worth or value to us. Behavior associated with the action context results when we acquire values that have high intrinsic worth to us.

Environmental Education Program Goals:

1. Learners should understand ecological systems.
2. Learners should be provided with experiences that will assist in the development of personal appreciation, sensitivity, and stewardship for the environment.
3. Learners should understand the cause-and-effect relationship between human behaviors and attitudes and the environment.
4. Learners should analyze, develop, and use problem-solving skills to understand the decision-making processes of individuals, institutions, and nations regarding environmental issues.
5. Learners should evaluate alternative responses to environmental concerns or issues before deciding on a course of action or no action.
6. Learners should understand the potential complementary nature of multiple uses of the environment.
7. Learners should be provided the information needed to make informed decisions about actions to take on environmental issues.

These program goals were enacted by the legislature of the State of Minnesota, 1990, and goals A through E are a component of the State Board curriculum rule also adopted in February 1990. This rule requires that environmental education be integrated into all courses and programs K-12. The intent is to broaden the base of environmental understanding and decision making for all citizens.

Model Environmental Learner Outcomes:

An open list of learner outcomes representing a range of skills and aptitudes is provided in Chapter 3.

Environmental Concepts:

An open list of topics addressed within each program goal is included in the Appendix, along with a host of supplementary data to help teachers integrate environmental education into other curriculum areas.

Chapter 3

Environmental Education

Model Learner Outcomes

Chapter 3

Model Learner Outcomes for Environmental Education

"Environmental education encourages development of life values and a style of living that minimizes destruction and maximizes those relationships that enhance life. It is learning how to contribute to the quality of life, and it fosters the constructive use, rather than exploitation, of the environment."

Ed Hessler
Minnesota Environmental Science Foundation

Integrated Model Learner Outcomes into Environmental Education

This chapter provides a listing of Model Learner Outcomes for Environmental Education in Minnesota schools. Model learner outcomes represent a set of possible and valuable end results of instruction. Districts can and should develop their own learner outcomes to reflect local needs and beliefs. Each outcome in this chapter is cross-referenced to a State Board of Education goal and eventually to the state test item bank. The outcomes are also referenced to the cognitive (knowing, applying, and integrating), psychomotor, and affective domains. Outcomes that focus on multicultural, disability awareness, international, and gender fair concept development are also noted.

As model learner outcomes are developed, educators will find two publications of invaluable aid in curriculum planning: Program Planning Guide to Environmental Education and Catalog of Energy and Environmental Education Resources. Both are available by special request from the Minnesota Department of Education. See page 57 for ordering information.

Model Learner Outcomes for Environmental Education

STATE BOARD LEARNER GOALS	ENVIRONMENTAL EDUCATION LEARNER OUTCOMES	DEVELOPMENT AND CONCEPT EMPHASIS
<p>Program Goal A: Learners should understand ecological systems.</p>		
<p>Contexts: Natural, Social</p>		
<p>The learner will be able to:</p>		
A, B, C.5	1. Demonstrate knowledge of the basic concept of an ecosystem, its components, and physical factors;	Knowing Applying
B.11	2. Trace a flow of energy through an ecosystem and demonstrate knowledge of the roles of producers, consumers, and decomposers in ecosystems;	Applying
A, C.5	3. Demonstrate knowledge of cycles in the biosphere;	Applying
A, C.5	4. Identify a living organism characteristic of a particular ecosystem and describe why it is found there;	Knowing Applying
A, D.2	5. Describe an interdependency that occurs in the environment;	Knowing Applying
A, C.2, C.5	6. Describe an environmental change and give a consequence;	Knowing Applying
B.7	7. Recognize humans as an integral part of the natural world influenced by natural processes;	Knowing Applying
A, B.7, D.3	8. Describe a relationship between an ecological and sociological or political system.	Applying

STATE BOARD LEARNER GOALS	ENVIRONMENTAL EDUCATION LEARNER OUTCOMES	DEVELOPMENT AND CONCEPT EMPHASIS
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Program Goal B: Learners should be provided with experiences that will assist in the development of personal appreciation, sensitivity, and stewardship for the environment.

Contexts: Social, Valuing, Action

The learner will be able to:

A, C.5	1. Appraise and give examples of diversity in nature;	Applying
B.3, B.4, B.6	2. Differentiate appetite (I like), knowledge (I know), influence ethics (I judge), morals (I act), desire (I want), and necessities (I need), relative to environmental issues;	Applying Integrating Affective
C	3. Differentiate between waste and resource;	Knowing Applying
A, B.6	4. Demonstrate an understanding of precycling, reducing, reusing, and recycling of resources;	Applying Integrating
D.2	5. Understand the bonding process between humans and other living things;	Knowing Applying
D.3, E	6. Understand the relationships between beliefs, political structures, and environmental values of various cultures;	Applying Multicultural Gender Fair
E	7. Describe some cultural differences and their influence on the environment;	Integrating Multicultural
E	8. Evaluate an argument where economic and cultural interests either contradict or enhance aesthetic or environmental concerns;	Integrating Multicultural
E, F.1, F.2, G	9. Work cooperatively in groups toward the accomplishment of a goal;	Applying Affective
A, C.3, C.5 C.8	10. Identify and evaluate the multiple uses of a resource or site;	Knowing Applying Integrating
C.3	11. Analyze the influence of the mass media on shaping perceptions of the environment;	Integrating

STATE BOARD LEARNER GOALS	ENVIRONMENTAL EDUCATION LEARNER OUTCOMES	DEVELOPMENT AND CONCEPT EMPHASIS
B.6	12. Develop a sense of place—recognize the inherent value of a location—without comparison to other environments;	Applying Integrating Affective
B.6	13. Express personal perceptions of a place or event that demonstrate an appreciation of the environment;	Applying Integrating Affective
H	14. Investigate the environmental history of a site;	Applying
C.3, J.2	15. Assess his or her personal commitment to the environment;	Integrating
I.3, L.1, L.5	16. Develop outdoor recreational skills and ethics.	Applying Psychomotor Disability Awareness

Program Goal C: Learners should understand the cause-and-effect relationship between human behavior, attitudes, and the environment.

Context: Natural, Social, Valuing, Action

The learner should be able to:

B.14, C	1. Describe the concept of human population growth and infer future population fluctuations;	Knowing Applying
B.14, H.1	2. Identify and analyze the way in which the environment affected the distribution of humans historically;	Integrating
A, C.5	3. Describe how modern agriculture and technology affect the land and water;	Knowing Applying
D.2	4. Describe how manipulating habitat affects plant/animal populations;	Knowing Applying
D.2	5. Analyze and relate ways in which environmental problems are caused by unforeseen consequences of human actions;	Integrating
B.6	6. Demonstrate knowledge of the renewability of natural cycles and the need for establishing sound resource use policies;	Knowing Applying
C, D.2, K.3	7. Identify the resources subject to overuse, misuse, or change, resulting from human intervention in the natural environment;	Applying

STATE BOARD LEARNER GOALS	ENVIRONMENTAL EDUCATION LEARNER OUTCOMES	DEVELOPMENT AND CONCEPT EMPHASIS
A, C	8. Describe and analyze environmental threats and hazards after considering all the available information;	Applying Integrating
A, C.5	9. Define pollutants and describe the effects of varying levels of pollutants on the environment;	Knowing Applying
A, C.5	10. Understand the concept of exported/imported pollution, e.g., smokestacks, watersheds, and weather systems;	Applying International
D.2, D.3	11. Explain a short-term and long-term effect of an environmental action on human social systems;	Applying Integrating
C	12. Describe and evaluate management alternatives that help preserve the earth's finite natural resources;	Integrating
B.4, B.6	13. Describe how his or her own values influence personal use of resources;	Integrating Affective
B.6, D.2	14. Propose a human social system in harmony with the environment;	Integrating
A, B.9, M	15. Explore the career/life paths that directly or indirectly imply involvement in making decisions about the environment;	Knowing Applying
B.1	16. Demonstrate an environmental service to the community and understand that this is a lifelong process.	Knowing Applying Integrating Multicultural Disability Awareness

Program Goal D: Learners should analyze, develop, and use problem-solving skills to understand the decision-making processes of individuals, institutions, and nations.

Contexts: Natural, Social, Valuing, Action

The learner will be able to:

A, D, F.2	1. Describe the roles of citizens in policy formation.	Knowing
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STATE BOARD LEARNER GOALS	ENVIRONMENTAL EDUCATION LEARNER OUTCOMES	DEVELOPMENT AND CONCEPT EMPHASIS
C.1, C.2 C.3	2. Identify and evaluate the central issue and policies in an environmental dispute;	Knowing Integrating
E, F	3. Describe how a decision made at a local level can affect distant communities nationally and internationally;	Multicultural International Gender Fair Disability Awareness
B.3	4. Identify and analyze examples of the influence of beliefs and values on environmental decisions (e.g., family, peer, school, community, national, and international);	Knowing Integrating Multicultural International
D.3	5. Identify the relationship between political and economic power and environmental decisions;	Applying
B.2, D.3	6. Demonstrate knowledge of an environmental issue influenced by political, educational, economic, and governmental institutions;	Applying
A, E	7. Recognize the inequity of resource distribution and how it affects diplomacy;	Knowing Integrating
A, B.8	8. Demonstrate knowledge of some effects of technology on the environment;	Applying
A.4, A.6 C.1, C.2 C.3	9. Describe the influence of science, technology, and communications on individual and institutional decision making;	Knowing Applying Integrating
C	10. Identify a trend and infer the environmental consequences;	Knowing Integrating
C, E	11. Contrast the advantages and disadvantages of short-term and long-term solutions to an environmental dilemma;	Integrating
D.3	12. Identify agencies/interest groups/local, national, international concerns that would need to cooperate to ensure the success of a specified environmental plan;	Multicultural International
F	13. Suggest some constructive ways of resolving an environmental conflict;	Applying
B.4, B.6	14. Give examples of his or her own positive and negative personal impacts on the environment;	Affective

STATE BOARD LEARNER GOALS	ENVIRONMENTAL EDUCATION LEARNER OUTCOMES EMPHASIS	DEVELOPMENT AND CONCEPT BANK
B.2	15. Use political processes to gain support for a position.	Applying
<p>Program Goal E: Learners should evaluate alternative responses to environmental concerns or issues before deciding on a course of action or no action.</p>		
<p>Contexts: Valuing, Action</p>		
<p>The learner will be able to:</p>		
C, E, J.6	1. Identify at least two alternatives for dealing with an environmental dilemma. Evaluate the consequences of each alternative, and select and defend a position;	Knowing Integrating Affective
C, K.3, K.6	2. Decide which environmental topics are most important in the world today and predict which will remain important/grow in importance/diminish in importance in his or her lifetime;	Applying Integrating Multicultural International
B.3, C, J	3. Evaluate reasons to participate or not participate in an environmental activity in the home, school, or community;	Integrating Affective
B.4, B.6 C, J.6	4. Analyze and describe personal feelings about an environmental dilemma. Select and defend a position.	Integrating Affective

Chapter 4

Environmental Education

Transposing Model Learner Outcomes
Into The Curriculum

Chapter 4

Transposing Model Learner Outcomes into the Curriculum

The Minnesota (PER) Planning, Evaluating, and Reporting legislation gives the Minnesota Department of Education the responsibility of developing model learner outcomes. The development process included input from administration, environmentalists, educators, and Minnesota Department of Education staff. Curriculum development, including establishing a scope and sequence for each subject area, rests with the local school district. Specific lesson plans are generally developed by individual teachers or teams of teachers.

When local districts begin to plan for the teaching of environmental education, a number of questions naturally arise.

- How do we begin?
- What processes can we use to help transpose learner outcomes into curriculum—and ultimately—lesson plans? How do environmental education concepts relate to the rest of the curriculum? How do they correspond to learner outcomes from other subject areas?

Environmental education is interdisciplinary in nature and must be taught in an interdisciplinary manner. Once the separate discipline approach is eliminated, you can make a strong argument for either an integrated or infusion approach to teaching environmental education.

Integration is to bring together different parts into a functioning whole. **Infusion** means things have been poured together and thoroughly mixed to create one new substance. Either concept will enable school districts to develop curricula where environmental education concepts are not just taught at the same time as art, social studies, science, math, and other classes. Rather, the environmental education concepts will be logically blended in with all subject disciplines. This underscores the fact that we are dealing with concepts that are interwoven into every aspect of life.

As Minnesota teachers, we're comfortable with the word "integration" as the label for incorporating diverse concepts into existing curricula. "Integration" is used frequently throughout this guide, however the purists among us are welcome to substitute the word "infusion" in its place. No matter what we label the process, we should think in terms of an environmental program, not an environmental education curriculum. The curriculum already exists in every school district. We merely want to bring the environmental education program (concepts and topics) into that existing curriculum.

As you launch into the planning process, you'll find handy reference tools in the Appendix. They include Expanding and Applying Environmental Key Concepts; Resources; Environmental Education Supplemental Materials and Opportunities; and Discussion, Research, and Discovery Topics. You will also find a Glossary of Terms.

The Integration/Infusion Process

The following steps have been adapted from the Wisconsin manual, *A Guide to Curriculum Planning in Environmental Education (1985)*. Table 1 shows integration into a unit (several lessons).

Step 1. Decide on the environmental education learner outcome for the district that is expected of students at grade 12.

Step 2. Determine who is going to teach what and when it will be taught. (See page 47 for scope and sequence recommendations)

Step 3. Select the specific environmental education learner outcome to be incorporated into an existing instructional unit or lesson.

Ask yourself:

- a. Is the educational experience appropriate for the ages and abilities of the students?
- b. Is it relevant to their lives?
- c. How does it fit with your knowledge, interest, and motivation? (If not a good fit, what can be done to still make it a strong learning experience for the students?)
- d. Into what subject area is the learner goal to be integrated? How does it relate to the existing curriculum content of that subject?
- e. What appropriate student-suggested learning experiences can you bring into the lesson?

Note: Table 1 on pages 40 and 41 illustrates the steps for integrating Model Learner Outcome C4 into an already existing unit on Minnesota mammals being taught at the fifth-grade level. The concepts of habitats, environmental factors, adaptations, and land uses all relate to animal adaptations and needs for different habitats. It is not a complete plan, but rather illustrates some things that could be considered as school districts develop their environmental education programs.

Step 4. Identify the subject area unit(s) and/or lesson(s) that relate to the selected environmental education learner outcome. Normally, you'll have many possibilities. Choosing is the challenge. In many cases, environmental education concepts already are a part of your existing social studies, science, language arts, and other units and lessons.

Step 5. Write objectives for the unit or lessons. Look at Step 3 in Table 1 for an example of compatible existing and new objectives. More new objectives are needed. Two suggested additional objectives are offered.

Step 6. Specify the environmental education content for the unit or lesson. Table 1 shows how the concept of habitat manipulation and management can be added to the basic concept that different mammals require different habitats.

Step 7. Develop instructional procedures. Modification may not always be necessary, but you'll sometimes want to add additional procedures. Table 1 shows the addition of a field trip and the discussion of a new topic.

Step 8. Identify new process skills that might be used to achieve the new environmental education objectives.

Table 1 lists two additional skills to be added to three existing ones. The following list gives you some ideas of K-3 and 4-6 process skills that you can include as you plan your environmental education program. There is obviously some overlap between the K-3 and 4-6 groups.

K-3

- | | |
|---|---------------------|
| a. Observing (all senses) | e. Inferring |
| b. Measuring | f. Predicting |
| c. Classifying | g. Asking questions |
| d. Communicating (listening, speaking, writing) | |

4-6

- | | |
|---|---------------------------------|
| a. Hypothesizing | f. Separating fact from opinion |
| b. Collecting data | g. Interpreting data |
| c. Establishing cause and effect relationships | h. Setting priorities |
| d. Defining terms | i. Proposing compromises |
| e. Comparing (organisms, relationships, and viewpoints) | j. Assessing societal needs |
| | k. Drawing conclusions |

Step 9. Identify new resources to be used to achieve the unit objectives.

Resources are normally plentiful; choosing wisely is important. Local resources could include: anything in the school or district resource center, materials from the Department of Natural Resources (DNR), individuals in the community, field trip sites, films and other audiovisual aids, equipment, existing materials (Ag-Stravaganza, The CLASS Project, Living Lightly in the City, Living Lightly on the Planet, Outdoor Biological Instructional Strategies (OBIS), Project Learning Tree, and Project WILD). See Appendix B.

Step 10. Identify new activities and topics for investigation.

Some will be planned in advance; others will arise spontaneously as lessons are being taught. Everyone benefits if you are open to new ideas and change.

TABLE 1: INTEGRATED UNIT SAMPLE

Learner Outcome C4
Describe how manipulating habitat affects plant/animal populations.

Subject: Science Unit: Minnesota Mammals

Step Characteristics	Current Unit Education Elements	Additional Environmental
1. Select learner outcome to be infused. (C4 above)	"Minnesota Mammals" is taught in grade five using DNR materials and student reports.	1. Habitats 2. Environmental factors: living and non-living 3. Adaptations 4. Land uses
2. Identify subject area unit(s) targeted for integration.	Grade five "Minnesota Mammals" (science) and "People Adapt to Life in Minnesota" (social studies).	Art (sketching, drawing, painting could be a discipline for teaching the topic).
3. Develop environmental objectives for the subject matter unit.	1. To be able to identify a minimum of eight of ten Minnesota mammals shown as slides or pictures. 2. To learn that different mammals eat different foods.	1. To recognize that all organisms have adaptations which help them survive in their environment. 2. To learn that herbivores, carnivores, and omnivores have different needs.
4. Specify the environmental content of the unit.	Different mammals require different habitats.	1. The concept that manipulating habitats affects plant/animal populations. 2. The need for wise habitat management.

TABLE 1: INTEGRATED UNIT SAMPLE (CONTINUED)

Step Characteristics	Current Unit Education Elements	Additional Environmental
5. Develop instructional procedures.	Students read about mammals, see slides, and write reports.	<ol style="list-style-type: none"> 1. Field trip (possibly to a nature center) to study different habitats. 2. Discuss the value of preserving wildlife habitats.
6 Identify new process skills to achieve new objectives.	<ol style="list-style-type: none"> 1. Observing 2. Classifying 3. Writing reports 	<ol style="list-style-type: none"> 1. Inferring: What will happen if we drain a marsh? 2. Interpreting data: Why might there be a continuous deer population decline in a given area as the forest matures? As people move into previously forested areas?
7. Identify new resources.	<ol style="list-style-type: none"> 1. DNR materials 2. Slides 3. Reference materials 	<ol style="list-style-type: none"> 1. Naturalists at a nature center 2. Field trip sites 3. Other community resources 4. New books
8. Identify new activities and topics for investigation.	Those suggested by teacher and DNR materials.	<ol style="list-style-type: none"> 1. Study mammal skulls for teeth differences. 2. Debate: Should our community drain and fill the local marsh for a shopping center? 3. How do humans adapt to the environment? 4. How do animals adapt to the environment? 5. If animals cannot adapt to a habitat change, what happens?

Table 2 offers a sample lesson plan format for integrating an environmental education concept into an existing lesson. When writing out such a lesson plan, be specific enough so another teacher in the school district, teaching the same grade level, would be able to use the form to prepare to teach the suggested environmental education concept. Pages 45 through 46 are handy idea starters for creating dynamic and varied lessons.

As teachers prepare to integrate environmental education concepts into their district's existing curriculum, they should remember that there are several different starting points for writing environmental education lessons. Four of these points are:

1. Some currently taught lessons are already environmental education lessons, or would be with slight modifications.
2. Some currently taught lessons could have an environmental education concept integrated into them to make them environmental education lessons. (This is probably the least disruptive way to write an environmental education program.)
3. Some lessons found in existing materials, but not in the school district curriculum, can be modified to teach desired concepts.
4. New environmental education objectives and lessons can be written.

TABLE 2: SAMPLE LESSON PLAN FORMAT

1. Learner Outcome To Be Integrated:

2. Subject Area:

Grade:

3. Environmental Objectives:

4. Environmental Education Concepts:

5. New Process Skills:

6. Instructional Procedures/Lesson Sequence:

7. Resources/Materials Needed:

Environmental Education Methods: Approaches To Teaching And Learning

As teachers, we use many different approaches to learning. Our guiding philosophy is that we owe it to our students to carefully select those learning experiences that reaffirm how humans best learn. In his book, *Freedom to Learn*, Carl Rogers reminds us that, in general, humans have a natural desire and potential to learn. They tend to learn best when:

- the object or subject matter is seen as contributing to their own needs and objectives;
- self-esteem is not threatened;
- they are actively doing;
- their feelings and intellect are involved in the learning process;
- they contribute to their own self-evaluation;
- they have learned how to learn on their own initiative.

Think about the many types of educational experiences you can select from to help your students learn about the environment. They range from direct and concrete to abstract and symbolic, from greatest use of the senses and learner activity, to least use of the senses and minimal learner activity. The chart below sums it up. The nine educational approaches were modified from *A Guide to Curriculum Planning in Environmental Education*. They represent a range of ideas to appeal to students who learn in different styles and at different paces.

1. Direct, purposeful experiences

- Learners use all senses—seeing, hearing, smelling, touching, and tasting when appropriate—to gather information.
- "Hands-on" experiences (field trips, outdoor lessons, experiments, etc.).
- Maximum opportunity to feel, react emotionally, develop awareness, and sensitivity.

2. Contrived experiences

- Condensed or edited versions of the real thing (models, aquaria, terraria, etc.). Sometimes the best available experience.
- Provide good substitutions for real-life situations.

3. Dramatized experiences

- Drama, role playing, simulations, etc.
- Allow student participation, actively and/or passively.
- Help students develop an understanding of people, positions, and other living organisms.

4. **Demonstrations**

- Visual explanations or illustrations of concepts, ideas, etc. Usually done by one person before a group.
- Learner is passively involved.
- Save time; reduce safety risks.

5. **Displays, exhibits, and models**

- Self-teaching presentations (models, charts, posters, computers, pictures, audiovisual equipment, etc.).
- Best are actual objects with learner involvement through personal manipulation.
- Active is much more meaningful than passive viewing.

6. **Motion pictures, television, and videos**

- "Take" students to places they might otherwise never experience firsthand.
- Time and space can be compressed.
- Controversial issues can be observed and later discussed.
- Students can be asked to watch programs outside of school time for later discussion and/or oral or written reports.

7. **Recordings, radio, charts, and pictures**

- Helpful for young children and other non-readers.
- Can be very effective in conveying a concept.

8. **Visual symbols**

- Little physical activity is involved.
- Abstract way to learn.
- Important for map-reading skills (black line represents a road, etc.).

9. **Verbal symbols (spoken words)**

- Represents ideas, concepts, principles, and formulas.
- Abstract, but helps learners develop abstract thinking.

Outcome Scope and Sequence

School districts are free to decide the scope and sequence of learner outcomes in their own districts. The following shows one step-by-step plan that may serve as a planning guide if districts so choose.

MODEL LEARNER OUTCOMES	I=Introduce E = Extend M = Master			
	Primary K-3	Intermediate 4-6	Junior High 7-9	Senior High 10-12
Program Goal A Outcomes - Learners should understand ecological systems.				
1 Demonstrate knowledge of the basic concept of an ecosystem, including its components and physical factors.	I	E	E	M
2 Trace a flow of energy through an ecosystem and demonstrate knowledge of the roles of producers, consumers, and decomposers.		I	E	M
3 Demonstrate knowledge of cycles in the biosphere.	I	E	E	M
4 Identify a living organism characteristic of a particular ecosystem and describe why it is found there.	I	M	E	E
5 Describe an interdependency that occurs in the environment.	I	I	E	E
6 Describe an environmental change and give a consequence.	I	I	E	E
7 Recognize humans as an integral part of the natural world and influenced by natural processes.	I	E	E	M
8 Describe a relationship between an ecological and sociological or political system.		I	E	E

MODEL LEARNER OUTCOMES		I = Introduce E = Extend M = Master			
		Primary K-3	Intermediate 4-6	Junior High 7-9	Senior High 10-12
Program Goal B Outcomes - Learners should be provided with experiences that will assist in the development of personal appreciation, sensitivity, and stewardship for the environment.					
1	Appraise and give examples of diversity in nature.	I	E	E	M
2	Differentiate appetite (I like), knowledge (I know), ethics (I judge), morals (I act), desire (I want), and necessities (I need), relative to environmental issues.	I	E	E	M
3	Differentiate between waste and resource.	I	E	M	E
4	Demonstrate an understanding of precycling, reducing, reusing, and recycling of resources, and rejecting (whenever possible) materials that are not environmentally sound.	I	E	E	M
5	Understand the bonding process between humans and other living things.		I	E	E
6	Understand the relationships between beliefs, political structures, and environmental values of various cultures.		I	E	E
7	Describe some cultural differences and their influence on the environment.	I	E	E	E
8	Evaluate an argument where economic and cultural interests either contradict or enhance aesthetic or environmental concerns.			I	E
9	Work cooperatively in groups toward the accomplishment of a goal.	I	E	E	E
10	Identify and evaluate the multiple uses of a resource or site.		I	E	E
11	Analyze the influence of the mass media on shaping perceptions of the environment.		I	E	E
12	Develop a sense of place - recognize the inherent value of a location - without comparison to other environments.	I	E	E	E
13	Express personal perceptions of a place or event that demonstrate an appreciation of the environment.	I	I	E	E
14	Investigate the environmental history of a site.		I	E	E
15	Assess his or her personal commitment to the environment.	I	E	E	E
16	Develop outdoor recreational skills and ethics.	I	E	E	E

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MODEL LEARNER OUTCOMES	I = Introduce E = Extend M = Master			
	Primary K-3	Intermediate 4-6	Junior High 7-9	Senior High 10-12
Program Goal C Outcomes - Learners should understand the cause-and-effect relationship between human behavior and attitudes and the environment.				
1 Describe the concept of human population growth and infer future population fluctuations.		I	E	M
2 Identify and analyze the way in which the environment affected the distribution of humans historically.	I	E	E	E
3 Describe how modern agriculture and technology affect the land and water.		I	E	M
4 Describe how manipulating habitat affects animal/plant populations.		I	E	M
5 Analyze and relate ways in which environmental problems are caused by unforeseen consequences of human actions.		I	E	E
6 Demonstrate knowledge of the renewability of natural cycles and the necessity for establishing sound resource use policies.			I	E
7 Identify those resources subject to overuse, misuse, or change resulting from human intervention in the natural environment.		I	E	E
8 Describe and analyze environmental threats and hazards after considering the available information.			I	E
9 Define pollutants and describe the effects of varying levels of pollutants on the environment.	I	E	E	M
10 Understand the concept of exported/imported pollution, e.g., smokestacks, watersheds, and weather systems.		I	E	M
11 Explain a short-term and long-term effect of an environmental action on human social systems.			I	E
12 Describe and evaluate management alternatives that help preserve the earth's finite natural resources.			I	E
13 Describe how his or her own values influence personal use of resources.	I	E	E	E
14 Propose a human social system in harmony with the environment.		I	E	M
15 Explore the career/life paths that directly or indirectly imply involvement in making decisions about the environment.	I	E	E	E
16 Demonstrate an environmental service to the community and understand that this is a lifelong process.	I	E	E	E

MODEL LEARNER OUTCOMES	I = Introduce E - Extend M = Master			
	Primary K-3	Intermediate 4-6	Junior High 7-9	Senior High 10-12
Program Goal D Outcomes - Learners should analyze, develop, and use problem-solving skills to understand the decision-making processes of individuals, institutions, and nations.				
1 Describe the roles of citizens in policy formation.		I	E	M
2 Identify and evaluate the central issue and policies in an environmental dispute.	I	E	E	M
3 Describe how a decision made at a local level can affect distant communities nationally and internationally.		I	E	M
4 Identify and analyze examples of the influence of beliefs and values on environmental decisions (e.g., family, peer, school, community, national, and international).	I	E	E	E
5 Identify the relationship between political and economic power and environmental decisions.			I	E
6 Demonstrate knowledge of an environmental issue influenced by political, educational, economic, and governmental institutions.			I	E
7 Recognize the inequity of resource distribution and evaluate how it affects diplomacy.		I	E	E
8 Demonstrate knowledge of some effects of technology on the environment.	I	E	E	E
9 Describe the influence of science, technology, and communications on individual and institutional decision making.			I	E
10 Identify a trend and infer the environmental consequences.	I	E	E	E
11 Contrast the advantages and disadvantages of short-term and long-term solutions to an environmental dilemma.			I	E
12 Identify agencies/interest groups/local, national, international concerns that would need to cooperate to ensure the success of a specified environmental plan.			I	E
13 Suggest some constructive ways of resolving an environmental conflict.	I	E	E	E
14 Give examples of his or her own positive and negative personal impacts on the environment.	I	E	E	E
15 Use political processes to gain support for a position.		I	E	E

MODEL LEARNER OUTCOMES	I = Introduce E = Extend M = Master			
	Primary K-3	Intermediate 4-6	Junior High 7-9	Senior High 10-12
Program Goal E Outcomes - Learners should evaluate alternative responses to environmental concerns or issues before deciding on a course of action or no action.				
1 Identify at least two alternatives for dealing with an environmental dilemma. Evaluate the consequences of each alternative, and select and defend a position.		I	E	M
2 Decide what environmental topics are most important in the world today and predict which will remain important/grow in importance/diminish in importance in his or her lifetime.	I	E	E	E
3 Evaluate reasons to participate or not participate in an environmental activity in the home, school, or community.	I	E	E	E
4 Analyze and describe personal feelings about an environmental dilemma. Select and defend a position.	I	E	E	E

Appendices

Environmental Education

- A. Expanding and Applying
Environmental Key Concepts
- B. Environmental Education
Supplemental Materials and
Opportunities
- C. Discussion, Research, and
Discovery Topics
- D. Resources

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APPENDIX A

Expanding and Applying Environmental Key Concepts

As teachers and curriculum planners begin to work with the model learner outcomes in Chapter 3, an important step will be to develop a clear understanding of what each learner outcome means. This listing represents a selection of key concepts from each of the program-level outcomes along with some tools for reinforcing these concepts.

The first questions educators will usually ask are:

- a. What is this concept?
- b. How does it function or fit into the whole of environmental education?

For environmental education term **definitions** see the **Glossary**. Beyond term definitions, here are some expanded thoughts about key concepts. In each case, educators will need to adapt the concept to the age and development levels of the students.

Program Outcome 1

- A. Ecosystem: What are the components of a particular ecosystem?
How does an ecosystem function?
- B. Energy Flow: Where does it come from in any particular ecosystem?
Where does it go?
- C. Cycles: What do cycles do in the biosphere?
How do they work?
- D. Interdependency: How does it work in the natural environment?

Program Outcome 2

- A. Diversity: What are examples of diversity?
Why is diversity important?
- B. Stewardship: Who is responsible?
Why is it important?
- C. Multiple Use: What are examples of multiple use?
Why is it important?
What or who besides humans must be considered in multiple use situations?
Who or what determines priorities when making choices for multiple use?
- D. Issue Evaluation: What is the central problem?
What are the different points of view?
What are some balanced solutions?

- E. Sense of Place: What is a place?
What are the components of a place?
Why is it important to recognize the value of places without comparison to other places?

Program Outcome 3

- A. Population: What are the current growth rates globally? In specific regions of the world? In the United States?
What are the predictions for future growth?
Why is it important to know about population when studying environmental issues?
- B. Habitat: Why is habitat of all living things critical information when studying environmental issues?
- C. Renewability: Why is it essential?
- D. Pollution: Where does it come from? What does it do to the environment? Why is it a global issue?
- E. Harmony: What is environmental harmony?
Why is it important?
- F. Community Service: What is it?
Why is it important?
Whose responsibility is it?

Program Outcome 4

- A. Problem Solving: What is it?
How does it work?
Who should be involved?
What information is needed?
- B. Short- and Long-Term Decisions: What is the difference?
How do values influence decisions?
- C. Political Process: What is it?
Who is involved?
What is its importance?
How can it be used to benefit us and the environment?

Program Outcome 5

1. Dilemma: What is it in environmental contexts?
When dealing with a specific dilemma:
What are the consequences?
What appropriate roles do citizens play in solutions?
How might individual or cultural values affect decision making?

APPENDIX B

Environmental Education Supplemental Materials and Opportunities

(This is a sampling. See the *Catalog of Energy and Environmental Education Resources* for a complete list.)

The following are not complete environmental education programs. They do, however, contain lesson ideas that could be used as part of an environmental education program. While many of the activities in these materials are not environmental education activities because they do not make "connections," they can easily be transformed into environmental education activities. After you write your program objectives, examine these materials. Which could support the objectives of your environmental education program?

Ag-Stravaganza

- Developed for grades K-9.
- Designed to inspire appreciation for soil and water as the source of life's basics--food, clothing, and shelter.
- Promotes awareness of the need for soil conservation.
- Looseleaf notebook serves as a teacher's manual.
- Notebook available for \$15 and only to participants in a two-hour workshop. Workshops coordinated through:
Ag-Stravaganza Office
Department of Natural Resources Building
Box S
500 Lafayette Road
St. Paul, MN 55106
(612) 297-2214

A Teacher's Guide to Arbor Month

- Developed for grades K-9.
- Extensive tree-related information and activities.
- Includes bulletin board ideas, stickers, and ready-to-reproduce student activity sheets.
- Available from:
Minnesota Arbor Month Committee
90 West Plato Boulevard
St. Paul, MN 55107
(612) 296-8410

The CLASS Project (Conservation Learning Activities for Science and Social Studies.)

- Developed for grades 6-9, but can be adapted for 10-12.
- Mainly for science and social studies with language arts skills required for many activities.

- Most activities provide concrete experiences for students and some require an outdoor setting.
- Available from:
National Wildlife Federation
1412 Sixteenth Street, Northwest
Washington, D.C. 20036.
(202) 797-6800

50 Simple Things Kids Can Do To Save The Earth and 50 Simple Things You Can Do To Save The Earth (paperback books)

- No specific grade levels.
- Basic environmental information, discussion prompts, and fascinating facts.
- Collections of everyday things people can do to conserve, preserve, reuse, recycle, reject . . . and be kinder to the planet.
- Available from: Retail booksellers or
Earthworks Press
Box 25
1400 Shattuck Avenue
Berkeley, CA 94709
(415) 841-5866

Living Lightly in the City

- Two volumes: K-3 and 4-6.
- Interdisciplinary units designed to be integrated into an existing curriculum.
- Designed to help children examine lifestyles.
- Designed to examine the urban and suburban communities.
- Available from:
Schlitz Audubon Center
1111 East Brown Deer Road
Milwaukee, WI 53217
(414) 352-2880

Living Lightly on the Planet

- Two volumes: 7-9 and 10-12.
- Interdisciplinary units.
- Designed to get students involved in applying their knowledge and skills to solve local environmental problems.
- Brings a global perspective to environmental education.
- Available from:
Schlitz Audubon Center
1111 East Brown Deer Road
Milwaukee, WI 53217
(414) 352-2880

Minnesota Agriculture Magazine

- Targeted to grade 6, but may be used for grade 4 and up.
- Colorful eight-page AgMag and Teacher's Guide produced four times each school year.

- Extensive range of topics. Issue three each year is geared to protecting the environment.
- Available from:
 Minnesota Agriculture in the Classroom
 90 West Plato Blvd.
 St. Paul, MN 55109
 (612) 296-6688.

Outdoor Biology Instructional Strategies (OBIS)

- Developed primarily for grades 5-10, but can be used a little lower or higher.
- Designed as outdoor education activities that provide challenging opportunities to investigate ecological relationships and increase environmental awareness.
- Investigates the role of humans in the environment.
- Available from:
 Lawrence Hall of Science
 University of California
 Berkeley, CA 94720
 (415) 642-1838

Project Learning Tree (PLT)

- Two manuals: K-6 and 7-12.
- Designed to help students develop an awareness and appreciation of the environment.
- Activities provide concrete experiences, many to be conducted in an outdoor setting.
- Activities are related to almost all subject areas.
- Manuals available free to those who attend a workshop.
- Workshops are sponsored by:
 colleges and universities
 Minnesota Department of Natural Resources; (612) 297-2214
 Minnesota Department of Education; (612) 296-4069

Project WILD/Aquatic WILD

- Separate elementary and secondary manuals.
- Designed to help students develop an awareness and appreciation of wildlife.
- Most activities provide concrete experiences, about one-fourth require an outdoor setting.
- Activities are related to almost all subject areas.
- Manuals are available for a nominal fee to those who attend a workshop.
- Separate Aquatic WILD manual available.
- Workshops are sponsored by:
 colleges and universities
 Minnesota Department of Natural Resources; (612) 297-2423
 Minnesota Department of Education; (612) 296-4069

APPENDIX C

Discussion, Research, and Discovery Topics

Each program goal suggests a range of discussion topics and specific learning experiences. Choose from the topics listed here, and add others that meet the abilities, needs, and interests of your students.

Program Goal A:

Learners will demonstrate understanding of ecological systems.

Discussion, Research, and Discovery Topics:

- | | |
|---------------------|--|
| a. population | k. consumer |
| b. environment | l. decomposer |
| c. ecosystem | m. chemical cycling |
| d. community | n. cycles |
| e. life cycle | o. limiting factor |
| f. individual | p. interaction, e.g., competition, predation, parasitism, etc. |
| g. habitat | q. carrying capacity |
| h. food chains/webs | r. succession |
| i. interdependency | s. resources/conservation |
| j. producer | t. adaptation |

Program Goal B:

Learners should be provided with experiences that will assist in the development of personal appreciation, sensitivity, and stewardship for the environment.

Discussion, Research, and Discovery Topics:

- | | |
|----------------------------|--------------------------|
| a. belief systems | n. symbolism |
| b. cooperation/competition | o. design |
| c. aesthetics | p. appetite |
| d. reverence | q. beauty |
| e. love | r. conflict |
| f. morals | s. contentment |
| g. stewardship | t. human welfare |
| h. benevolence | u. lifestyle |
| i. recreation | v. consumerism |
| j. ethics | w. wilderness |
| k. culture | x. action/apathy |
| l. values | y. multiple use |
| m. landscape patterns | z. sustainability |
| | zz. biological diversity |

Program Goal C:

Learners should understand the cause-and-effect relationship between human behavior, attitudes, and the environment.

Discussion, Research, and Discovery Topics:

- | | |
|--|------------------------------------|
| a. energy production and utilization | l. appropriate technology |
| b. food production | m. steady state |
| c. waste | n. technology fix |
| d. building construction | o. recreation |
| e. eugenics | p. cause-and-effect |
| f. weather manipulation | q. multiple use |
| g. resource use | r. renewable |
| h. pollutants | s. nonrenewable |
| i. pesticides, herbicides, and fertilizers | t. human population growth |
| j. habitat management | u. species extinction/endangerment |
| k. threats and hazards | v. biotechnology |

Program Goal D:

Learners should analyze, develop, and use problem - solving skills to understand the decision-making processes of individuals, institutions, and nations.

Discussion, Research, and Discovery Topics:

- | | |
|-------------------|--|
| a. economics | j. laws |
| b. politics | k. power, e.g., institutional/individual |
| c. belief systems | l. compromise/no compromise |
| d. peer pressure | m. health |
| e. customs | n. rights |
| f. education | o. extrapolation |
| g. technology | p. forecasting |
| h. communication | q. assessment |
| i. organizations | r. divergent thinking |
| | s. paradigm, e.g., theoretical mode |

Program Goal E:

Learners should evaluate alternative responses to environmental concerns or issues before deciding on a course of action or no action.

Discussion, Research, and Discovery Topics:

- | | |
|--|---------------------------------------|
| a. facts | i. indicators |
| b. opinions | j. family planning |
| c. inferences | k. alternative futures (see Appendix) |
| d. assumptions | l. commitment |
| e. decision-making processes
(objective/subjective) | m. confrontation |
| f. values/attitudes | n. compromise |
| g. problem-solving approaches | o. dumping |
| h. beliefs | p. embargo/sanctions/harbor mining |
| | q. national environmental program |

APPENDIX D

Resources

As district curriculum committees and individual teachers plan environmental education learning experiences for students, they have strong support from the community. A host of helpful organizations and materials are available with services ranging from planning assistance and teacher workshops to ready-to-use student materials. Educators are encouraged to identify resources in their own school districts as well as choosing from a variety of outside sources. Some of the resources currently available are:

Minnesota Resources

The Minnesota Department of Education

The Minnesota Department of Education has an Environmental Education Specialist. You may contact the specialist for planning assistance and also for the following publications:

Catalog of Energy and Environmental Education Resources
(specify elementary or secondary version)

Program Planning Guide to Environmental Education

Contact: Environmental Education Specialist, Department of Education, 644 Capitol Square Building, St. Paul, MN 55101; (612) 296-4069.

The Acid Rain Foundation, Inc., 1630 Blackhawk Hills, St. Paul, MN 55122; (612) 455-7719.

Minnesota Agriculture in the Classroom, 90 West Plato Boulevard, St. Paul, MN 55107; (612) 296-6688.

Minnesota Arbor Month Committee, 90 West Plato Boulevard, St. Paul, MN 55107; (612) 296-8410.

Minnesota Conservation Federation, 1036B Cleveland Ave. S., St. Paul, MN 55116; (612) 690-3077.

Minnesota Department of Natural Resources, 500 Lafayette Road, St. Paul, MN 55155.

The Nature Center and Environmental Learning Centers of Minnesota. For Metro area see: Singer, Alan. *Discover Nature in the Twin Cities*. Minneapolis: Nodin Press, 1985. Complete list: Catalog of Energy and Environmental Resources (available from Minnesota Department of Education).

Minnesota Pollution Control Agency, Public Information Office, 520 Lafayette Rd., St. Paul, MN 55155; (612) 296-6300 or 1-800-652-9747.

Minnesota Department of Public Service, Energy Division, 900 American Center Building, 150 E. Kellogg Blvd., St. Paul, MN 55101; (612) 297-1771.

Minnesota Zoo, 13000 Zoo Boulevard, Apple Valley, MN 55124; (612) 431-9200 (612) 431-9319 (zoo store).

Science Museum of Minnesota, Education Department, 30 E. 10th St., St. Paul, MN 55101;
1-800-221-9444.

Waste Education Coalition Clearinghouse, Minnesota Waste Management Board,
1350 Energy Lane, St. Paul, MN 55108; (612) 649-5483.

U.S. Fish and Wildlife Service, Federal Building, Fort Snelling, Twin Cities, MN 55111;
(612) 725-3582.

Community Resources

Colleges and Universities

A variety of environmental education consultants are available from institutions of higher education. Many conduct environmental education program planning workshops.

Environmental Conservation Library of Minnesota (ECOL)

Do you need information on environmental issues? Do some of the committee members need an update on environmental education topics? ECOL, which is part of the Minneapolis Library, has a large collection of materials.

Funding Sources

If any teachers and/or administrators are to receive release time for environmental education program planning, funding must be secured. Will funding be needed for anything else? Apart from your school administration, are other potential sources of funding available?

Outdoor Environmental Education Sites

Begin to identify outdoor sites for environmental education activities. Possibilities include the school grounds, parks, nature centers, residential environmental education centers, school forests, marshes, open fields, ponds, streams, lakes, and private land on which owners will allow educational activities.

Other Field Trip Sites

In your community you might find a sewage disposal plant, landfills, water treatment plant, museum, zoo, or power plant.

Other School Districts

You will want to develop an environmental education program designed to meet the needs of and make use of the resources of your particular district; it's possible to get good ideas from others, too.

Computer Resources

Cambridge Development Laboratory, Inc., P.O. Box 605, Newton Lower Falls, MA 02162.

Minnesota Educational Computing Consortium (MECC), 3490 Lexington Avenue,
Shoreview, MN 55126.

Yaker Environmental Systems, Inc., P.O. Box 18, Stanton, NJ 08885.

Film Resources

Source for Rental Films:

- **University Film and Video**
University of Minnesota
313 - 5th Street Southeast
Suite 108
Minneapolis, MN 55414
(612) 627-4270

Free Loan:

- **Minnesota Department of Natural Resources Film Library**
500 Lafayette Road
St. Paul, MN 55155-4046
(612) 296-0899

Catalog available of films, filmstrips, and slide/tape programs. Return postage only.

Any Minnesota organization may borrow DNR films. Films are sent out by the DNR parcel post and must be returned prepaid. Order films by number and title at least three weeks in advance of the date on which the film will be shown.

Glossary

Environmental Education

Glossary

Note: Many of these words have multiple meanings. The definitions in this listing are how the terms relate to environmental education.

Affective learning Learning that affects, or contributes to the development of attitudes, beliefs, and values, and leads the individual to act in certain ways based on personal convictions.

Biodegradable Capable of being broken down into simple substances or basic elements by microorganisms.

Biosphere 1) The part of the world in which life can exist. 2) Living things together with their environment.

Cognitive learning Learning of factual knowledge.

Conservation education Education that is concerned about natural resources and the preservation management of those resources.

Cycle An event or series of events that is regularly repeated. Natural cycles include the water cycle and the soil nutrient cycle.

Diversity in nature The wide range of different types of life or substances in nature.

Ecosystem The make-up and life of a community and its environmental functioning as an ecological unit in nature.

Ecology The study of the interrelationships between organisms and their environment and other organisms.

Energy Flow In the environment, energy is the capacity to change the state of something else. Energy flow is the movement of energy through a system. For example, energy from the sun starts the process of photosynthesis in plants which in turn produces nutrients (energy) for plants.

Environment All living and non-living factors that affect all organisms. Non-living factors include water, nutrients, temperature, light, and soil.

Gender fair Equally representative, fair, and unbiased to both females and males.

Habitat The place or type of place that a plant or animal normally lives and grows.

Harmony with the environment The ability to live in ways that preserve the elements of the environment and disrupt natural ecosystems as little as possible.

Infusion The mixing of a number of factors to create a new entity.

Integration The bringing together of different parts into a functional or unified whole.

Interdependency The relationships by which all things in the environment are connected to (and dependent upon) each other.

International/Multicultural Having to do with global or multicultural knowledge.

Multiple use Using the same resource in a number of different ways for different purposes. For example, a fresh area may be used for recreation, wild life habitat, and forest products.

Nature study A study that is primarily concerned with the identification of organisms and their structures and functions within a particular habitat.

Non-renewable resources or energy Natural materials whose consumption exceeds the replacement capabilities by natural processes because their formation takes a great length of time. Examples: oil, iron ore, silver.

Outdoor education The use of outdoor settings to teach a wide variety of activities and concepts. Advocates of this approach say anything best taught in an outdoor setting should be so taught.

Precycle Decisions made at the time of purchase or use, with choices based on whether or not an item or its components are consistent with environmentally sound disposal. Examples: Choosing recyclable food or beverage packaging as opposed to non-recyclable; choosing products that are not excessively packaged.

Renewable resources Natural materials that can be regrown or reproduced by natural processes to replace materials that are being consumed. Example: wood.

Resource distribution The ways in which natural resources are distributed throughout a region or the world. Examples: The U.S. is rich in timber, agricultural land. South Africa is rich in many metals and gemstones.

Sense of place The ability to recognize each place in the environment as having its own unique values aside from comparisons to other places in the environment.

Sociosphere All society living on one planet.

Stewardship The responsibility to manage resources in a way that regards the rights of others. In environmental education, a stewardship ethic embraces the needs of all elements of the environment for now and the future.

References

A Guide to Curriculum Planning in Environmental Education. Wisconsin Department of Public Instruction, 1985.

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Rogers, Carl. Freedom to Learn. Columbus, Ohio: Charles E. Merrill Publishing Company, 1969.