Environmental Education Materials: Guidelines for Excellence Workbook

Bridging Theory & Practice

North American Association for Environmental Education

Environmental Education Materials:
Guidelines for Excellence Workbook
Bridging Theory & Practice

Environmental Education Materials: Guidelines for Excellence Workbook represents another in a series ~~of~~ documents published by the North American Association for Environmental Education (NAAEE) as part of the National Project for Excellence in Environmental Education.

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The first page of each section is divided into three distinct parts. One part includes a brief statement of the key characteristic followed by a list of the related guidelines, from the *Materials Guidelines*. The second part lists the objectives and contents for the section, and are denoted by the following graphics:

The third part, entitled "Things to Think About...," is a general discussion of the concepts and considerations included under the key characteristic.

Fairness and Accuracy

EE materials should be fair and accurate in describing environmental problems, issues, and conditions, and in reflecting the diversity of perspectives on them.

1.1 Factual accuracy

Going to the Source's Mouth

BACKGROUND:
The topic being addressed dictates how current information
must be. For example, data regarding the boiling point of water
does not change over time, and a very old source is accept-
able. However, information about private use of government
lands or global climate change may no longer be accurate or
relevant in just a few years' time.

Just as the age of the information is important, so is the
source. How well a given set of materials is **referenced**, e.g.,
how thoroughly the sources of information are cited, tells you
how readily the data can be verified or further explored.
Generally, **primary sources** are preferred over **secondary**
or **tertiary sources** because they reflect an original, firsthand
rendering of the event or situation. It should be noted, however,
that any source of information (primary, secondary, or tertiary)
can be biased or unbiased.

Even curriculum materials with accurate information may not
be **objective** in their presentation. They can be both biased
and accurate. For example, the language used to express facts
may be **propagandistic**, that is, the author may choose to
present only the facts that favor one perspective over another.
Language that is very emotional, that relies heavily on superla-
tives and extremes, or that belittles or minimizes certain ideas
or points of view may be present in a work that is otherwise
factually accurate and well researched. Comments or state-
ments such as "always a problem," "everyone believes," and
"absolutely no evidence," are examples of such types of
writing.

Even a flawed set of materials may have educational value. An
instructor may choose two conflicting pieces to give students
exposure to different viewpoints. Opinionated but accurate
information may be used as a reference, with attention given
to the author's perspective and slant. Information that is dated
may be used for historical purposes and supplemented with
more current data.

INSTRUCTIONS:

Review the selections and indicate if you would use the information in teaching about air pollution. In the space provided, explain your reasoning. Be attentive to whether the information is accurate, well referenced, current, and objective or propagandistic. Answers can be found on page 12.

Information	Would you use this information as is? (Yes/No)	Observations and/or Concerns
EXAMPLE: **"A study funded by the National Indoor Plant Association showed that house plants improve indoor air quality."**	**Yes**	
"Steps to curb air pollution were incorporated in a law called the Clean Air Act in the 1970s."		
"Science has confirmed that Mr. Ford's new internal combustion horseless carriage produces gases which may be unpleasant to some gentlemen, and distasteful to cultured ladies." **—Car and Chauffeur, 1914**		
"A double-blind study ('Residual Toxicity of Nicotine Exposure in Dieffenbachia amoena', Botanica Domestica,		

EXAMPLE:
 The death of <u>excess</u>

- World population continues to increase at unacceptably high rates. In many developing areas of the world, birth rates have remained constant. Yet population increases because of advances in medicine that minimize infant mortality. Despite the high costs of maintaining large families in these increasingly urbanized societies, many cultures stubbornly cling to ancient notions that value large numbers of offspring.

- America is incapable of absorbing unlimited numbers of illegal immigrants. While Americans value growth and welcome diversity, our cherished way of life is threatened by invaders from beyond our borders. Even today, our social, health, educational, and legal systems are creaking under the weight of hordes of trespassers who cross our borders in violation of the law, breed large families, and expect the hard-working taxpayers of our country to support them.

- Experts are divided on the consequences of the recent decline in the population of the lesser tribble. Although this obnoxious and invasive animal has been the bane of farmers

BRINGING IT HOME:
Children are well aware that names and words can be hurtful.
Even adults need to remember the power that words can
have to change our minds, fire our emotions, summon strong
sensitivities, or simply leave a bad taste in our mouths.

Environmental Education Materials: Guidelines for Excellence Workbook
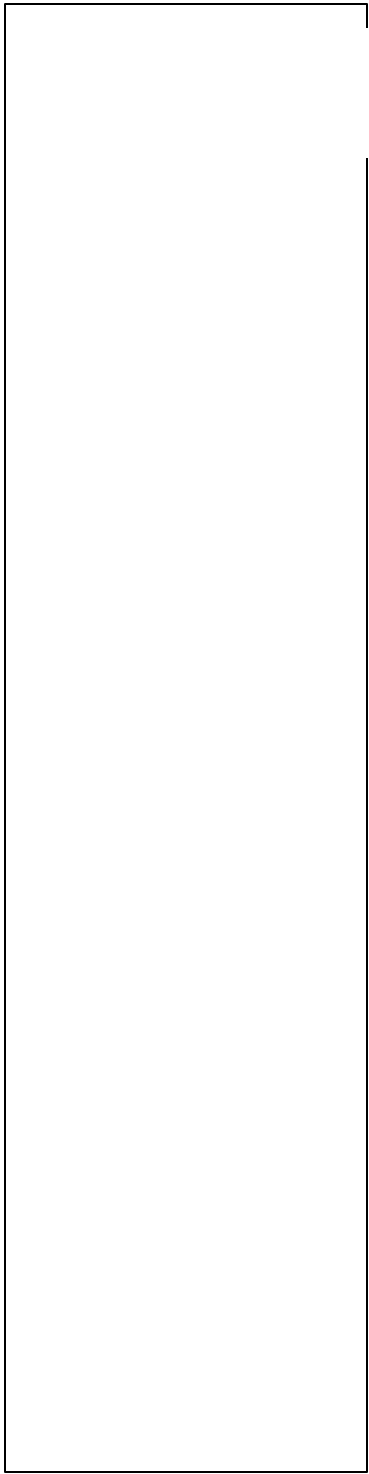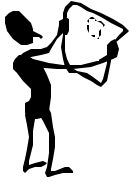
At the Ivory Park Nature Center, the interpretive guides discuss ways different civilizations have thought about elephants. First, they share the natural history of elephants with visitors (what elephants look like, where they live, and how they survive). While discussing elephants' strength and intelligence, the interpreters highlight use of elephants in historical military efforts, such as Hannibal's crossing of the Alps, and in agriculture and logging in Asia today.

The discussion then turns to elephants as a source of ivory. The guides employ photographs and artifacts (such as piano keys) illustrating ways in which ivory has been used. The advantages of using ivory are also discussed. The guides then explain the population decline of wild African elephants in the twentieth century and the role that poaching has played in this decline. Maps and charts show where elephants live and where populations have decreased; they also show areas such as Botswana, Zimbabwe, and Namibia, where populations are currently increasing.

In discussing conservation efforts, the guides point out that many of the countries where elephants live are poor and do not have the resources to commit to protecting them. They add that elephants can damage crops and that farmers often have a financial incentive to help poachers. To illustrate this, the guides explain that a farmer could make three times their typical yearly wage by poaching a single elephant.

Having given this background, the interpreters discuss the importance of making elephant conservation a viable economic activity. Among the strategies they discuss is ecotourism, where visitors from foreign countries pay for excursions to see elephants and other animals in the wild. The guides point out that this industry provides local people with an economic incentive to maintain wild elephant populations and to discourage or end poaching.

Going to the Source's Mouth   page 7

Any one of these passages could be used in a lesson on air pollution. The following are not necessarily "right" answers, but indicate aspects an educator should consider.

Information	Observations and/or Concerns
1. "Steps to curb air pollution were incorporated in a law called the Clean Air Act in the 1970s."	**Objective, but lacks source.** The statement does not pass judgement on the Clean Air Act but the source of the information is not identified.
2. "Science has confirmed that Mr. Ford's new internal combustion horseless carriage produces gases which may be unpleasant to some gentlemen, and distasteful to cultured ladies." —Car and Chauffeur, 1914	**Data dated, but objective.** Here the source is identified but the information is quite old. It would still be useful in teaching about the history of the issue.
3. "A double-blind study ('Residual Toxicity of Nicotine Exposure in Dieffenbachia amoena', Botanica Domestica, volume 4) has shown that second-hand smoke is actually good for house plants. From this we can conclude, it must be OK for humans."	**Propagandistic but well referenced.** Again the source is cited but the intent is clearly to support a particular point of view.
4. "Electric cars are preferable to all other modes of transportation. They are inexpensive and don't pollute the air in any way, shape, or form."	**Propagandistic, not well referenced.** This is a statement of personal opinion without supporting evidence or references. The author uses language that directs the reader to a particular perspective.
5. "Electric cars are expensive playthings for wealthy celebrities that want to be known for their pro-environmental stance. They will never be of any value to average working-class Americans."	**Propagandistic, not well referenced.** Another statement of personal opinion without supporting evidence or references.
6. "Technological innovations in the last thirty years have reduced but not eliminated sulfur emissions from coal burning power plants." —Journal of Amps & Volts, 1996	**Accurate, well referenced.** Source of the information is cited. Information is presented in a balanced, unemotional manner.

To Skew or Not to Skew   pages 8-9

Words and phrases that skew the information are underlined.

- World population continues to increase at <u>unacceptably</u> high rates. In many developing areas of the world, birth rates have remained constant. Yet population increases because of advances in medicine that minimize infant mortality. Despite the high costs of maintaining large families in these increasingly urbanized societies, many cultures <u>stubbornly cling</u> to <u>ancient notions</u> that value large numbers of offspring.

- America is <u>incapable of absorbing</u> unlimited numbers of illegal immigrants. While Americans value growth and welcome diversity, our <u>cherished</u> way of life is threatened by <u>invaders from beyond our borders</u>. Even today, our social, health, educational, and legal systems are creaking under the weight of hordes of <u>trespassers</u> who cross our borders in violation of the law, <u>breed</u> large families, and expect the <u>hard-working</u> taxpayers of our country to support them.

- Experts are divided on the consequences of the recent decline in the population of the lesser tribbleuntry milEn936347 67

BACKGROUND:

EXAMPLE & ACTIVITY

Building the Framework

BACKGROUND:
A framework, in its literal sense, is an organized series of beams used to support and guide construction. Likewise, a **conceptual framework** is an organized set of ideas, concepts, or principles that an educator uses to give structure and shape to educational experiences. Frameworks allow educators to pursue both **breadth** and **depth** by clearly organizing ideas. They ensure that students are given the skills needed to under-stand relationships and connections between pieces of informa-tion, and not just a laundry list of environmental facts or opin-ions. By focusing on **concepts**, educators provide learners with the opportunity to generalize, to draw connections among different disciplines, and to consider differing opinions and perspectives. Teaching without a conceptual framework is like putting together a model airplane without glue: initially it may hold, but eventually it falls apart. Additionally, if concepts are taught out of **context**, they can be misunderstood or quickly forgotten because they are without relevance to the learner.
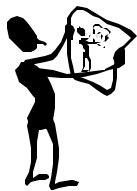
ABOUT THE EXAMPLE:
In the following situation pay attention to the concepts being taught and the order and context in which they are delivered. You will be asked to put them into a framework in the following activity.

Ms. Fong's social studies class was preparing to do a unit on food and agriculture. She approached the subject by asking the students to consider the origin of their own food. As this was a part of the country where hunting and fishing were common, she pointed out a distinction between foods that are deliberately grown or raised for human consumption and those that are taken from the wild. With this distinction in mind, the students broke into two groups. The first group looked at features of wild harvest, while the second considered the features of agriculture. Special attention was paid to the risks, advantages, economic factors, and environmental impacts of each. The two groups shared and compared their findings at the end of the class.

CONCEPTS / TOPI...

1) Cultivated produc...
2) Dependent on humans fo...
   reproduction
3) Self-seeding
4) Maintain ...ic diversi...
5) Crop...ly harvested
6) ...
7) ... harv...ing
8) ...
   ...etic...
9) ...ces

BRINGING IT HOME:
In the activity and example above, the students ... ... been
given a se... of facts about agricultural practices. This would have
been an example of teaching toward **breadth**. By arranging the
information in a ... ... the conne... ... ...
... ... clear, the instructor has given the students a tool to ...
... ... sense of the information ... ... knowledge base...
... which to ... in future lessons, thereby teaching toward **depth** as
... s bread...

INSTRUCTIONS

KEY CHARACTERISTIC #2
Depth

GUIDELINE: 2.4

OBJECTIVE 6:
Recognize the relevancies and relationships of various scales.

GLOSSARY TERMS:
• geographical scale
• temporal scale

BACKGROUND:
The world's economy is becoming increasingly globalized. Products and services bought in one country may be manufactured half a planet away. Changes in the rate of inflation, unemployment levels, or interest rates in a single country can send ripples of uncertainty throughout the world. These impacts are not limited to economics. An increase in lumber prices or higher demand in one region might promote overlogging in another. A change in government in one nation could spur a relaxation of environmental protection policies there and elsewhere. Because of the movement of air and water across borders, the contamination of the air or water in one country or region can have lasting impacts in another area. These are examples of issues that span regions, nations, and continents. Understanding these issues requires attention to the **geographical scales** of the issues.

Another type of scale is **temporal**, which refers to the persistence of an environmental concern over time. For example, the use of the pesticide DDT in North America was abandoned in the early 1970s; however, the effects of this chemical remain with us today and will continue to affect ecosystems for years. When considering environmental issues, the long-term impacts on ecosystems, economics, and human societies are just as important to consider, as are the other circumstances which inform those issues.
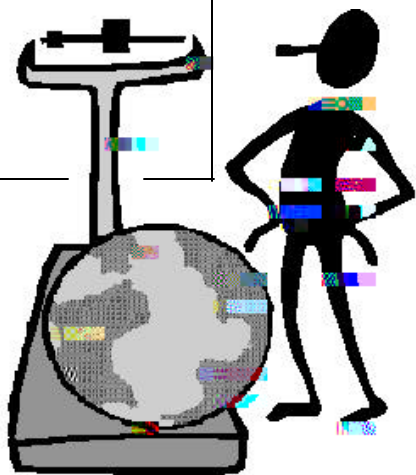
During the autumn months, Ms. Garcia's students observed and recorded the types of birds that came to the feeder located outside the window of her middle-school science classroom. As the year progressed and winter approached, some of the students noticed different birds appearing, and previously common ones not appearing. They raised the question of what birds do in the winter. Ms. Garcia entered into a discussion of the different ways that animals deal with weather changes, noting that some hibernate, some become dormant, some die off, and some migrate to other climates.

The students became interested in knowing where their favorite feeder birds went during the winter and researched the birds' migration routes and wintering territories. As a way of building on the data they already collected, Ms. Garcia arranged for the class to have Internet contact with two other middle school classes: one in south Florida and one in Panama City, Panama. The students compared notes and arranged to compile data in similar ways regarding what birds they observed, how many, and when. By the end of the spring, the students put together a map showing approximate travel routes of most of the

Building the Framework   page 19

Frameworks are organized from the most general to the most specific subheadings. In this case

FRAMEWORK

I. Food resources (9)
    A. Cultivated products (1)
        1. Dependant on humans for reproduction (2)
        2. Predominantly hybrids or controlled genetically (8)
        3. Crop is completely harvested (5)
    B. Wild harvest (6)
        1. Self-seeding (3)
        2. Maintains genetic diversity (4)
        3. Potential for overharvesting (7)

Environmental Education Materials: Guidelines for Excellence Workbook

3

EE materials should build lifelong skills that enable learners to prevent and address environmental issues.

"Tax"ing Your Brain

BACKGROUND:

There are a variety of models for classifying levels or types of learning. These models, or taxonomies, categorize types of learning in a hierarchy ranging from simple to complex. For example, analysis is a different level of learning than is application. Use of these levels is helpful in determining the potential for development of **critical thinking skills**. One of the best known models is the *Taxonomy of Educational Objectives* developed in 1956 by Benjamin Bloom and his colleagues. Bloom identified six levels of learning that range in difficulty from the simple (such as recall of facts) to the complex (such as **abstraction**). Certain verbs describing learning processes are associated with each level. For example, "categorize," "distinguish," and "recognize" are more readily associated with analysis than with any other learning level. These verbs can be used by educators when developing **educational objectives** for their lesson plans. Educators can also look for these verbs in the objectives of existing curricula to determine the level of learning that is expected of the student. For instance, this activity calls on the user to "classify" (see objective in box at left), and is therefore a synthesis-level activity in Bloom's Taxonomy.

INSTRUCTIONS:
For each objective, fill in the relevant verb (from the beginning of each chapter, the beginning of each activity or example, or the summary on page 2) and the corresponding learning level (from the table on page 24). Objective 7 is filled in as an example. Answers can be found on page 28.

Water You Know?

KEY CHARACTERISTIC #3
Emphasis on Skills Building

GUIDELINES: 3.2, 3.3

OBJECTIVE 8:
Distinguish the skills necessary for issue analysis and action.

GLOSSARY TERMS:
• action skills
• cost/benefit analysis

BACKGROUND:
One of the purposes of environmental education is the development of a citizenry that is capable of making decisions regarding the environment, and of taking appropriate action on environmental issues. Simply learning a particular **action skill** is different from being told when or how to use it, or what action to take. One can teach public speaking, for example, without dictating what students are to say about any given topic. Similarly, the teaching of skills such as comparing different policies or actions, investigating current issues, and developing **cost/benefit analyses** does not commit the teacher or student to a particular course of action, but provides learners with the tools needed to make an independent and educated decision about the responses to environmental issues they can support.
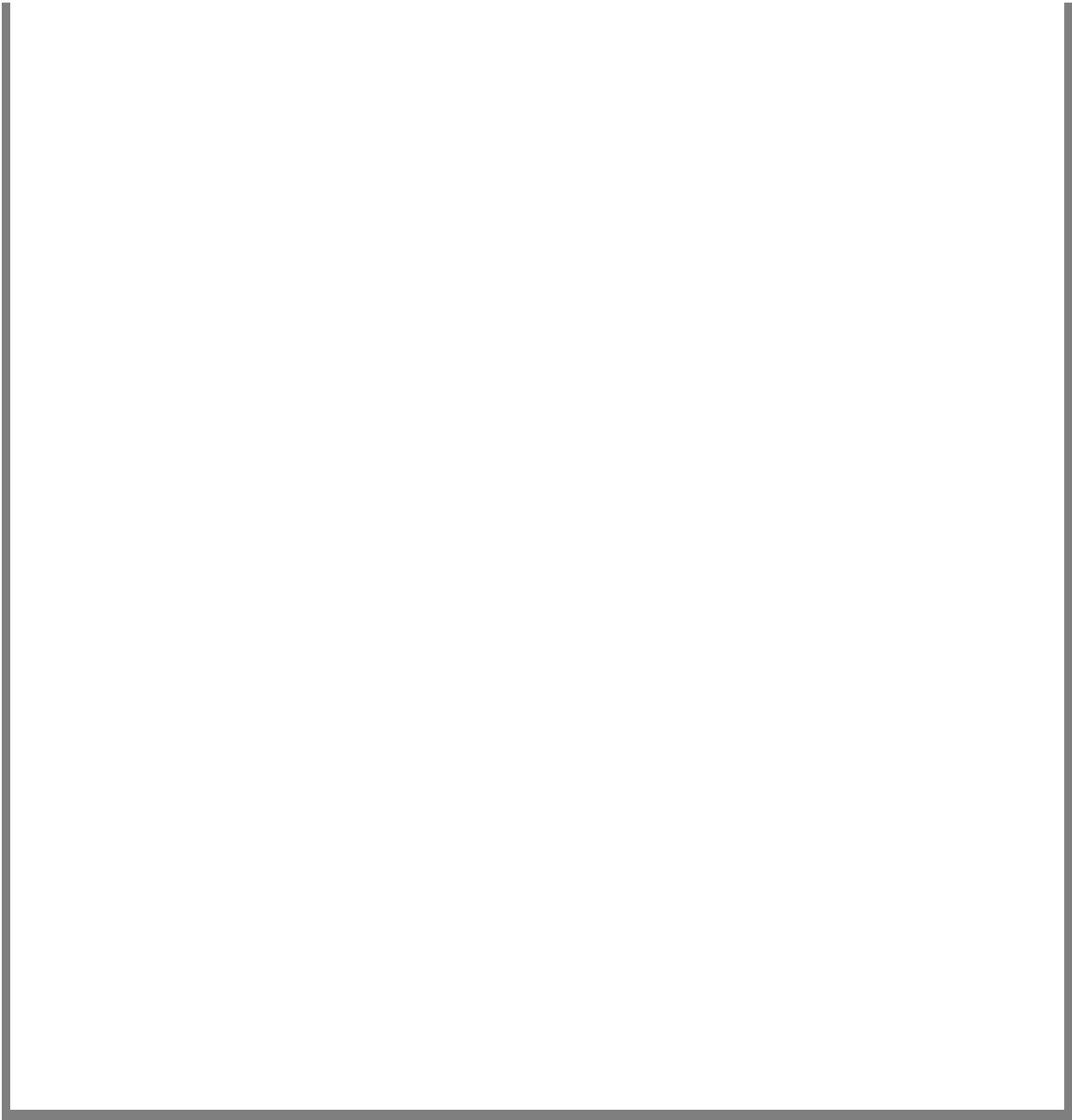
"Tax"ing Your Brain   page 25

Objective Classification Worksheet

OBJECTIVES	OBJECTIVE VERB	LEARNING LEVEL
Key Characteristic #1		
Fairness & Accuracy		
Objective 1		
Objective 2		
Objective 3		
Key Characteristic #2		
Depth		
Objective 4		
Objective 5		
Objective 6		
Key Characteristic #3		
Emphasis On Skills Building		
Objective 7		
Objective 8		
Key Characteristic #4		
Action Orientation		
Objective 9		
Objective 10		
Key Characteristic #5		
Instructional Soundness		
Objective 11		
Objective 12		
Objective 13		
Key Characteristic #6		
Usability		
Objective 14		
Objective 15		
Objective 16		

Action Orientation

EE materials should promote civic responsibility, encouraging learners to use their knowledge, personal skills, and assessments of environmental issues as a basis for environmental problem solving and action.

GUIDELINES
4.1 Sense of personal stake and responsibility
4.2 Self-efficacy

9) Choose strategies that encourage learners to reflect on the consequences of their action(s).
(Guideline 4.1)

10) Distinguish patterns that contribute to learner empowerment.
(Guideline 4.2)

Things to Think About...

One of the overarching goals of education is to prepare students to become effective decision makers. As consumers, citizens, voters, and family members, students will spend their lives making choices among possible actions. Part of an educator's responsibility is teaching students to identify and clarify their *own* opinions. Educa-

BACKGROUND:

Reflecting is more than thinking about something; it involves a careful consideration of one's values, goals, interests, and behaviors. The final purpose of reflection is to ensure that one's actions are consistent with one's intent and, if not, to determine what changes one needs to make. Reflection is crucial to making an **action project** a meaningful experience. If students do not consider the ramifications of the action on their lives and/or the lives of others, or consider the lessons learned from it in terms of future behavior, then their participation has been an exercise, but not necessarily a learn TD ltUeas beET 1 1 1 0 053j 0 41

1) When first planning the recycling program, which of these questions will promote reflection?
    a) How many cans do you want to recycle?
    b) What do we want to accomplish here?
    c) Where can we find room to store the recyclables?

2) Which of these might the students consider when reflecting on their choice of what objects to collect?
    a) From whom do we have to get permission to store the objects?
    b) For which materials can we get the most money?
    c) Are there some recyclables that do not have an established market?

3) Midway through the project, you find that the recycling bins are always empty. Which of

Ms. Wilson's science class completed a unit on electricity, energy, and the mechanics of energy distribution. Once she felt the class had mastered the information, she challenged them to explain to her how this information could be useful or practical to them. As a class, the students decided that it could help them and their families to conserve electricity, thus saving the families money and conserving resources.

To put this into practice, the students decided to do a thorough energy audit of their homes. Ms. Wilson helped the class divide into teams, each of which took responsibility for examining

. 1 0 0 8   T .   W i l s K E Y 1 2 . 7 5   T D   0 . 0 8 7 6

BRINGING IT HOME:
In this example, learner empowerment is demonstrated in a number
of ways. The outcome of the study is a list of suggested ways that the
families of students can save energy. Hence, the lesson develops
students' sense of self-efficacy. The exploration of these methods is
made by the students themselves, which strengthens their sense of
discovery and decision making. The publication of the information is
accomplished using media that the students control or manage and to
which they have easy and frequent access.

ANSWERS Key Characteristic #4—Action Orientation

Answers for: Recycling Reflections   page 30

**** Indicates the more appropriate answer(s) given the definition of reflection used in
this exercise. Other questions could be reflective depending on context and follow-up.**

1) When first planning the recycling program, which of these questions will promote
reflection?

A—*How many cans do you want to recycle?*
**Assumes a course of action has already been set. It presupposes that cans are
the only thing that can be recycled and proceeds to set an arbitrary target
rather than exploring the reasons for recycling in the first place.**

* * B—*What do we want to accomplish here?*
**Encourages students to think about and set goals for their project. If this isn't discussed,
students will have difficulty knowing if they addressed what they set out to accomplish.**

C—*Where can we find room to store the recyclables?*
**Deals with logistics. It is, however, an important step in determining if they have the resources
to conduct the project.**

2) Which of these might the students consider when reflecting on their choice of what objects to collect?

A—*From whom do we have to get permission to store the objects?*
**Deals with logistics. It is a planning step, and would only be a matter of reflection if they find
out too late that the person who gave permission was not authorized to do so. Additionally,
space is at a premium at most schools.**

B—*For which materials can we get the most money?*
**Unless fundraising is the main purpose of the activity, the monitary value is a secondary
consideration.**

* * C—*Are there some recyclables that do not have an established market?*
Addresses the choices they've made and the further implication of the choices.

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Answers for: Recycling Reflections Continued

3) Midway through the project, you find that the recycling bins are always empty. Which of the following best encourages the students to reflect on their previous decisions?

    A—*Should we move these to another room?*
        Recommends an action without assessing the situation. Moving to another location might be pursued as an experiment to determine if the location is the problem.

    ** B—*What are some reasons the bins might be empty?*
        Reflects on different aspects of the problem.

    C—*Nobody's recycling—should we move on to another action project?*
        Gives up without looking at a different course of action. Students would become more empowered if they could identify and overcome the obstacle to their program.

4) The instructor wishes the students to consider a number of consequences of their recycling project. Which questions should students think about early on to be able to consider at the project's completion?

    ** A—

Instructional Soundness

EE materials should rely on instructional techniques that create an effective learning environment.

GUIDELINES

5.1 Learner-centered instruction
5.2 Different ways of learning
5.3 Connection to learners' everyday lives
5.4 Expanded learning environment
5.5 Interdisciplinary
5.6 Goals and objectives
5.7 Appropriateness for specific learning settings
5.8 Assessment

11) Classify instructional methods and ways of learning.
(Guidelines 5.1, 5.2, 5.3)

12) Evaluate the use of various instructional environments.
(Guidelines 5.4, 5.5, 5.7)

Gardening, Naturally

BACKGROUND:
This activity addresses **learner-centered instruction**, **learning styles**, **multiple intelligences**, and the connections that should be made between EE materials and learners' everyday lives. Learner-centered instruction focuses on the needs and interests of the students and emphasizes students having an active role in their education. Akin to this model is **constructivism**, in which learners construct new knowledge from what they already know in an experiential, building-block process.

Whether one is designing or evaluating EE materials, a variety of learning styles should be considered. Planning to teach for more than one learning style not only accommodates the needs of a larger audience, it also adds variety to the presentation of the materials. Often, there is confusion between the terms "learning style" and "intelligence." Learning styles describe the ways in which learners receive and process the information. Whether someone learns best by working alone or within a group is just as important a consideration as whether they learn best by reading, listening, watching, or touching. Intelligence, particularly the multiple intelligences (MI) theory of Howard Gardner, has often been mistaken as a learning style. But intelligence, whether MI theory or not, describes a learner's ability to acquire new knowledge, not the way in which they do it. MI theory in particular identifies learners' aptitudes in certain areas such as language, dance, science and math. It is a premise of MI theory that individuals can strengthen any of their multiple intelligences through practice.

INSTRUCTIONS:

This activity asks you to determine the degree to which the instructional methods are learner-centered, support different ways of learning, and/or connect learners to their everyday lives. Review this outline for a unit on gardening with native plants. Following each section are brief descriptions of the three different educational approaches. In the boxes provided, rank the approaches from 1 to 3 to indicate the most relevant (1) to least relevant (3) for that part of the lesson. Answers can be found on pages 44 & 45.

In this activity students will have the opportunity to research, plan, plant, tend, and monitor a garden featuring plants native to their region of North America. The garden may contain food plants as well as decorative species—that decision lies with teachers and/or students. The research, planning, and evaluation of the project can be left, to a certain degree, in the hands of the students, depending on their developmental level. Resources, glossary, and further background information are available at the end of the unit.

I. Preparing
   A. Students look up examples of all types of gardens in magazines, books, and newspapers, and bring garden catalogs and pictures of gardens to class.
   B. Students visit a local garden center to learn what types of native plants are available in their area, if any.
   C. Local garden club members or native plant restoration groups visit the class.
   D. Using the pictures they brought in, students give a presentation. Presentations are followed by guided discussion on what the students consider to be a garden and the benefits people gain from gardens and gardening.
   E. Students contrast and compare formal, informal, and natural gardens.
   F. Students determine if there are local sources for native plants. If not, students research distant sources.

   Educational Approaches (rank relevance from 1 to 3)

   > ☐ • **Learner centered instruction: Activities and projects use learner questions and concerns as a starting point.**
   >
   > ☐ • **Different ways of learning: Important concepts are conveyed in several ways.**
   >
   > ☐ • **Connection to learners' everyday lives: Examples are relevant to the learner.**

II. Planning
   A. Students determine (through guided discussion, if necessary) the considerations that need to be addressed before planting a garden.
   B. Students inspect and discuss potential garden sites.
   C. Working from information and materials collected in Section I of this activity, students select native plants suitable for a school garden.
   D. Students working in teams plan different gardens and represent the plans in more than one way: e.g., written plant lists, overhead or profile view drawings, murals.
   E. Students choose the garden design which they will use.
   F. Students determine how they are going to evaluate their performance and the degree of success of the project.

   Educational Approaches (rank relevance from 1 to 3)

   > ☐ • **Learner-centered instruction: Materials encourage learner participation in planning and assessing learning.**
   >
   > ☐ • **Different ways of learning: Opportunities are provided for students to learn from self-expression and experience.**
   >
   > ☐ • **Connection to learners' everyday lives: Concepts to be taught are related directly to students' experiences.**

III. Planting
  A. Students consult with each other to assign initial tasks for the planting, maintenance, and monitoring of the garden.
  B. Students devise a rotating schedule of assignments so all participants can contribute to the project in a variety of ways.

IV. Pay-off
  A. Students track the progress of the plants and tend the garden.
  B. At the end of the season and/or year, students report the status of the garden and their project, and devise methods for sharing the information with others through media they determine to be appropriate.
  C. Students evaluate the degree of success of the garden and determine:
    1. Which plants succeeded, which did not and why?
    2. What actions were successful in designing, planting, or tending the garden.
    3. What actions were unnecessary or not successful.
    4. What things could have been done differently.
  D. Students reflect on:
    1.

Studying Habitats with Trees

- Set a time frame for the teams to do general library research on forests, forest types, and other habitats with trees (including tree plantations or farms, corporate campuses, park settings, and so on). They should then <u>share what they learned</u>. (Guideline 5.4—Expanded learning environment: learners are encouraged to share their knowledge and work with others.)

- Once the teams finish their initial research <u>they can begin field work on their wooded site</u>. Within each team, individuals or pairs (depending on number of students) can record information and observations. Student teams should record:
    - Type and location of site: forest, park, school grounds.
    - Size of the site and number of trees of various size ranges. Depending on the preparation of the students, some tree identification to genus or species could be appropriate.
    - Number and types of other plant species (shrubs, flowers, grasses). Easily identified species can be listed by name.
    - Analysis of soil type and condition.
    - Animals observed or heard, signs of animals (tracks, nests, signs of feeding).
    - Estimates of the apparent condition of trees and other plants—do there appear to be any stresses to the plants or trees (diseases, pests, human impacts)?
    (Guideline 5.4—Expanded Learning Environment: Students learn in a diverse environment which includes the school yard, field settings, community, and other settings beyond the classroom.)

Reporting ForesTree Findings

Each team prepares a report on their own observations and evaluations of the site. Students should have a clear understanding of the report evaluation process and know that their grade is based on four distinct elements; 1) the degree to which the main idea is clear and maintained, 2) the degree to which elements are elaborated, 3) the logical flow of ideas and 4) how effectively the product addresses the assignment as a whole. Suggested items for the final report might include, but should not be limited to:

- <u>Language Arts</u>: reports on the library and field research, expository writing emphasizing some aspect of the study site, poetry describing the site or the experience.
- <u>Life Science</u>: evaluations of the health of the study site, plant inventories, etc.
- <u>Mathematics</u>: possible computations include: number of trees or other plants per unit area of the site, percentage of various plant types present, ratio of trees to other species.
- <u>Art</u>: maps of the site, drawings of specific trees or other interesting features of the site.
- <u>Social Science</u>: human uses of the site, regulations involving the site, past and future of the site. (Guideline 5.5—Interdisciplinary: The material helps develop skills useful in subject areas such as reading comprehension, math, writing, and map reading and analysis.)

BRINGING IT HOME:

This example illustrates how simple it is to expand the quality of students' learning experience. Here, students were exposed to a multidisciplinary exploration in a new learning environment that did not overwhelm them or stress the resources of the school.
Experiences such as these do not require expensive technology or complicated field trips, but they do require planning, organization, and attention to basic educational principles and methods.

Rubrics Cubed

KEY CHARACTERISTIC #5
Instructional Soundness

GUIDELINES: 5.6, 5.8

OBJECTIVE 13:
Differentiate the role of goals, objectives, and assessments.

GLOSSARY TERMS:
• alternative assessment
• assessments

SHPATR RUBRIC		Proper Head Patting Tempo (PHP)	Circular Tummy Rubbing Motion (CTR)	PHP & CTR Coordination
3	Fully Developed	Maintains coordination while changing tempo	Maintains coordination while reversing motion	Maintains coordination while changing tempo & reversing motion
2	Developed	Maintains constant tempo	Maintains circular motion	Maintains coordination
1	Absent	Tempo inconsistent or irregular	Motion inconsistent or irregular	Coordination inconsistent or irregular

Evaluating a SHPATR performance is a straightforward process. In the sample rubric each column (down) has a scoring range of 1 through 3 (bottom to top). Inconsistent or irregular motion in any of the actions listed in the column headings results in a score of one for that column (the bottom row). An adequate performance in any of the three skill areas results in a mark of two for that column, and an exemplary performance results in a mark of three. The potential scoring range in the complete rubric is from 3 to 9.

This rubric is based on the goal of attaining SHPATR competency, that is, to successfully pat one's head and rub one's tummy simultaneously. Objectives leading to the goal are: to develop rhythm in head patting, to develop speed and proficiency in tummy rubbing, and to develop coordination between the two motions.

The ForesTree Rubric was adapted from materials in Effective Scoring Rubrics: A Guide to Their Development and Use, Illinois State Board of Education, 1995.

The rubric on the following page is designed to evaluate the performance of students on the ForesTree unit on page 39. The goal of that unit is for learners to develop a basic understanding of forest or woodlot ecology. Objectives of the unit are to learn to identify plant and animal species, to differentiate between various plant and animal communities, and to evaluate and report on the observable relationships between human and other biotic communities.

INSTRUCTIONS:

The following rubric has been formatted for four elements of the ForesTree final assignment: Reporting ForesTree Findings (column headings) and four score levels (row headings). Beneath the rubric are 16 scoring criteria which must be placed in the appropriate squares of the rubric. Place the appropriate letter or complete phrase in each square. Read each heading and criterion

(columoBacolalBacol34signment: Rn6adings). Beneath

BRINGING IT HOME:
The need for assessments that go beyond traditional multiple choice, true-false, and matching instruments gives special power to rubrics. Many types of authentic assessment can be conducted using a well-constructed rubric as the gauge.
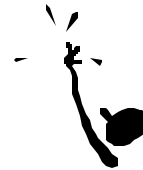
I. Preparing

II. Planning

III. Planting

1 • **Learner-centered instruction: Activities and projects use learner questions and concerns as a starting point.**
Most Appropriate Answer: Instruction encourages learners to undertake their own inquiry.

• **Different ways of learning: Learners are challenged to learn different skills that reflect their multiple intelligences.**
Least Appropriate Answer: While different multiple intelligences may be put into play they are really only incidental to this portion of the activity.

• **Connection to learners' everyday lives: Materials (activities) provide for continuing involvement throughout the year by the learner.**
Acceptable Answer: This stage of the activity encourages student ownership of the project and sets the stage for continued involvement throughout the school year.

IV. Payoff

2 • **Learner centered instruction: Activities allow learners to build from previous knowledge.**
Acceptable Answer: This step of the activity encourages the learners to construct new knowledge through reflection and evaluation.

3 • **Different ways of learning: Materials and activities are developmentally appropriate for the grade level, yet sensitive to individual differences.**
Least Appropriate Answer: It is not directly addressed here, although the entire lesson itself is adaptable to a variety of levels.

1 • **Connection to learners' everyday lives: Materials provide for continuing involvement throughout the year by the learner, both at home and at school.**
Most Appropriate Answer: While there is no home component specifically addressed in this section the primary intent is to encourage involvement throughout the year.

FORESTREE RUBRIC

4   Fully Developed

3   Developed

2   Developing

1   Absent

L) All main points maintained: Effective closing	K)	
B) Bare Bones: Position clear		
G) Attempted: Main point shifts		
N) Main idea absent or unclear		

Usability

EE materials should be well designed and easy to use.

6.1 Clarity and logic
6.2 Easy to use
6.3 Long-lived
6.4 Adaptable
6.5 Accompanied by instruction and support
6.6 Make substantiated claims
6.7 Fit with national, state, or local requirements

Things to Think About...

Compared to the previous five characteristics, it might be supposed that the concept of usability is straightforward and simple. Straightforward it is, but far from simple. The fact that usability is a complex and far too often ignored issue is amply demonstrated by a sample of the comments often heard regarding EE materials. Materials that must be copied for distribution to students but are physically difficult to copy, because of binding or color problems, is one example. Activities that require expensive consumable materials also present problems. Lack of documentation or background information for teachers who are not sufficiently familiar with the subject matter or procedures can prevent EE materials from being used at all. Unfortunately, the list of complaints is probably as long as the list of materials.

"User friendly" is a term that has become well known with the growth of personal computer use. However, the term applies to many other fields as well, including environmental education. There is one overarching question to be answered when judging the usability, or user friendliness, of EE materials. Will it be easy for the educator to include this material or lesson in the curriculum? To answer this not-so-simple question, you must consider many things, from the mechanical (reproducibility of student pages, for example) to the more technical (such as **correlation** to educational **standards** or issues of copyright protection).

Attention to detail goes a long way toward the creation of materials that gather users rather than dust. The following examples will help clarify the range of considerations that evaluators or authors face in determining whether environmental education materials possess usability.

KEY CHARACTERISTIC #6
Usability

GUIDELINES: 6.1, 6.2

OBJECTIVE 14:
Recognize the necessary structural elements for quality environmental education materials.

BACKGROUND:
Environmental education materials must be accessible to the people who are to use them. Without such qualities as clarity, logic, and ease of use, it matters little how well EE materials meet the other Key Characteristics. If usability is greatly compromised the materials will sit on a shelf. However apparently simple and straightforward, concepts such as "clarity and logic" and "easy to use" turn out to be rather complex when examined in detail. While authors of EE materials concentrate on more obvious characteristics such as Instructional Soundness or Fairness and Accuracy, the characteristic of Usability can become lost in the shuffle.

Ensuring this does not happen may mean something as simple as using a checklist approach to evaluating or creating EE materials, since incorporating these elements is simply a matter of attention to detail. The following example looks more closely at some of those details.
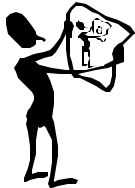
ABOUT THE EXAMPLE:
In the following example of a water quality assessment lesson, we look at some of the indicators of quality environmental education materials according to Guidelines 6.1 and 6.2. All lines in the example on page 49 have been assigned numbers. The checklist below lists some of the indicators from Guidelines 6.1 and 6.2. Next to each indicator is a number corresponding to the line in the example which demonstrates that indicator. Note, indicators that have physical attributes are difficult to represent in a workbook and have been intentionally left out of this example and the activity on page 51.

Testing the Waters - Usability Checklist

Location	**Usability Indicators**
Line 2 in Sidebar	**•Intended grade level.**
Line 19 in Sidebar	**•Materials needed.**
Line 37 in Sidebar	**•Safety precautions.**
Line 27 in Preparation	**•Instructions for conducting the activity.**
Line 0 in Background	**•Adequate and accurate background information for educators.**
Line 48 in Student Sheets	**•Copyright spelled out or permission to copy.**

BACKGROUND

Teaching most subjects requires the use of physical objects, from worksheets to chemicals to owl pellets. Some items, such as text books or CD-ROMs, can be used over and over again by successive learners. Others, such as owl pellets, need to be replaced after each use. Some high quality educational materials require consumable supplies. Materials that can be used more than once are generally preferred.

Additionally, materials should be adaptable to the needs of different situations and learners. Other things being equal, activities that can be used on rainy, sunny, and overcast days is preferable to those that requires consistent, direct sunlight. An activity adaptable to large or small groups is preferable to an activity for specific group sizes.

INSTRUCTIONS:

The checklist on the following page lists indicators that contribute to the longevity and adaptability of educational materials. Carefully read through the statements below. For each line of text write the line number next to the criterion to which it applies. *Clearing the Waters* on page 48 serves as the example for this activity. Correct answers can be found on page 53.

0 **Student Sheets and Teaching Aids:**
Loose leaf, black line master copies of sample instructions, student data sheets, invertebrate identification guides, and teacher aids are included with this activity guide in a supplementary folder. All materials may be freely copied for classroom and field use. Updates and replacements for the materials in this activity guide may be purchased on

5 CD-ROM or downloaded free at our website by registered users. All materials in this packet may also be downloaded from the website by registered users or for a nominal fee. Supplementary materials are available from a variety of suppliers listed in the Appendix. Spanish and German versions are available.

10 **Getting the Most Out of It:**
If it is not possible for a class to conduct the field work which begins this activity, the chemical and biotic testing can still be completed. Advance preparation for the teacher, in this case, includes collecting water and biotic invertebrate samples from a suitable location and bringing the materials to the classroom. For classes that can spend suffi-

15 cient time in the field, collecting from at least two widely differing sites (woodland stream, urban stream) should yield interesting results. The goal of this unit is the correlation of biotic and chemical testing with quantitative measurements of water chemistry. For younger students not ready for the details and demands of quantitative testing, qualitative testing is an alternative.

BRINGING IT HOME:

BACKGROUND:
Environmental education materials generally contain claims about their effectiveness and the expertise of their authors.

Testing

T

...ons for
...r, formal and
...xed level classes, or

...pting to different grade levels.

...cal support for educators is provided.

...s include lists of essential resource and supporting
...aterials, such as agency contacts, references to videos,
information on computer databases, etc.

Environmental Education Materials: Guidelines for Excellence Workbook

Cost/Benefit Analysis: An examination of a program that seeks to evaluate the resources expended in relation to the outcome, often noted in financial terms.

Creative Thinking: Thinking which results in connections or possibilities previously unrecognized or unknown to the learner.

Critical Thinking: Analysis or consideration based on careful examination of information or evidence. Critical thinking relies on thoughtful questioning and logical thinking skills such as inductive and deductive reasoning.

Cultural Perspective: A "world view" or belief system based on the mores and values embraced by one's culture.

Depth: Focusing on one part or a narrow range while probing into details. (See Breadth)

Education: The imparting or creation of knowledge through any of several means including training, instruction, and facilitation.

Educational Objective: A statement of a specific measurable or observable result desired from an activity.

Environmental Awareness[2]: Awareness of and concern about economic, social, political and ecological interdependence in urban and rural areas.

Environmental Literacy: Possessing knowledge about the environment and issues related to it; capable of, and inclined to, further self-directed environmental learning and/or action.

Experiential Education: Education based on personal experience or observation by the learner, direct experience rather than second hand information delivered through an intermediary such as a teacher or textbook.

Field Test: Trial of educational materials under the conditions and in the locations for which they were developed in order to determine their quality.

Geographical Scale: Representation of some part of, or area of, the earth's surface.

Goal: A desired result from an activity, lesson, or course of study.

Higher-Order Thinking Skills: Skills reflective of more complex thought processes, such as the synthesis of new knowledge or analysis of data vs. less complex processes such as rote recall or simple recognition.

Interdisciplinary: Linking of two or more academic disciplines.

Primary Source: The originating point of

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For Further References See:
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