A WWF – KPM PRODUCT

This guide is for science teachers in the use of the EE Kits for science

2011

A SCIENCE TEACHER'S GUIDE TO USING THE EEKIT

Guidance in infusion of environmental elements in science teaching and learning

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WHAT WOULD YOU USE? WHY?

SHARING AND CREATION OF IDEAS – ADD IN TEACHERS IDEAS

WHY IS SCIENCE A GOOD WAY TO INFUSE EE?

IMPORTANT INFO

Latest estimates from 2008 studies show that there are less than 7,000 orangutans left in the wild. While most of Malaysia's orangutan rehabilitation efforts are focused in east Malaysia, such as the Sepilok Orangutan Rehabilitation Center in Sabah, other initiatives are also forming in Peninsular Malaysia toward this goal. One fundamental hub that contributes to these efforts is Orangutan Island located in Semanggol, Perak.

Source: http://www.travelvideo.tv/news/malaysia/10-20-2010/malaysia-working-to-save-endangered-orangutan

INTRODUCTION

The EE Kits for Science Forms 1, 2 and 3 have been produced in the hope that the infusion of environmental elements in science teaching and learning will be enhanced.

You have to realize that when you start using the EE Kit for science you are an environmental educator.

There are three main objectives in this guidebook:

1. You as a teacher need to evaluate the EEKits for Science,
2. You have to write a review of what you would use and why, and
3. You have to explain why you think that infusing EE into science teaching and learning is an effective way in environmental education.

TASK ONE

EVALUATING THE ENVIRONMENTAL EDUCATION (EE) KITS FOR SCIENCE

Please read Appendix 1. Then examine the EE Kits for Science. Work in your respective groups.

Create an evaluation report according to the main dimensions of Accuracy, Depth, Emphasis on Science Process and Thinking Skills, Action Oriented, Instructional Strength and Usability.

The format of the report can be as given in the following pages. You can also create your own format of evaluation.

At the end of the session all groups will have to present their evaluations.

IMPORTANT INFO

As their forests shrink, Malayan tigers lose territory and prey. Their numbers are currently estimated between 600 and 800 tigers. They live scattered and fragmented, struggling to maintain large territories with sustainable food sources. Human development and logging are responsible for habitat reduction. Forest taken for agricultural purposes places farmers and tigers in direct contact; tigers that prey on livestock are often killed. Likewise, poaching is a serious problem. All tiger sub-species have been hunted by humans since ancient times. Per the WWF, "tigers are poisoned, shot, trapped and snared, and the majority of these animals are sought to meet the demands of a continuing illegal wildlife trade - which includes traditional Chinese medicine."

Source: http://www.suite101.com/content/the-malayan-tiger-an-endangered-species-a151642

APPENDIX 2

MORE SERIOUS CONSIDERATIONS

1. EE may not find a separate place in School education since there is a feeling that this slot is already overloaded including the science curricula. Though EE deserves a separate place, there is an apprehension of it becoming another structured and specialised subject which may require trained specialised teachers. It may rather dilute the focus.

2. Integration into already existing curricula is though a soft option, but a difficult proposition due to lack of trained curriculum developers.

3. Preparation of Science teachers is needed to effectively deal with socially sensitive but important issues related to population, environment and They will have to have commitment, dedication and actions for environmental protection. development. They will have to have commitment, dedication and actions for environmental protection.

EVALUATION OF THE EEKit 1

Accuracy

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

Factual accuracy

Balanced presentation of differing viewpoints and theories.

Reflection of diversity

EVALUATION OF THE EEKit 1

Depth of Ideas Presented

Environmental education materials should foster awareness of the natural and built environment, an understanding of environmental concepts, conditions, and issues, and an awareness of the feelings, values, attitudes, and perceptions at the heart of environmental issues, as appropriate for different developmental levels.

Awareness

Concepts in context

Attention to different scales

APPENDIX 2

There is a long list of reasons for integrating EE with Science

1. Science is an integral part of school education.
2. Science is offered to all during first ten years of general education.
4. Science curricula have core concepts running through all stages of schooling.
5. Science courses can accommodate EE enrichment since they are becoming less disciplinary than in the past.
6. Interdisciplinary approach to science is also central to environmental education.
7. Scientific methods can be meaningfully employed to study environmental problems and seek their solutions.
8. Manipulative, experimental skills would be quite relevant for study of environmental problems.
9. Problem solving and decision making abilities expected to be developed through science teaching are core to environmental education.
10. Scientific values are means of promoting environmental ethics/ values.
11. The scope of investigatory projects, case studies and field studies adopted for science teaching can help in studying physical, biological and social aspects of environmental problems/issues.
12. EE could be an interface between science, technology and society.

APPENDIX 1

Usability
Environmental education materials should be well designed and easy to use.

1. **Clarity and logic.**
   The overall structure (purpose, direction, and logic of presentation) should be clear to educators and learners.

2. **Easy to use.**
   Materials should be inviting and easy to use.

3. **Long-lived.**
   Materials should have a life span that extends beyond one use.

4. **Adaptable.** Materials should be adaptable to a range of learning situations.

5. **Accompanied by instruction and Support.**
   Additional support and instruction should be provided to meet educators' needs.

6. **Make substantiated claims.**
   Materials should accomplish what they claim to accomplish.

7. **Fit with national, state, or local requirements.**
   Environmental education materials should fit within national, state, or local standards or curricula

EVALUATION OF THE EEKit 1

Emphasis on Science Process and Thinking Skills

Environmental education materials should build lifelong skills that enable learners to address environmental issues. For science in particular, process and manipulative skills are of utmost importance.

Critical and creative thinking

Science process skills

Manipulative skills

EVALUATION OF THE EEKit 1

Action Oriented

Environmental education materials should promote civic responsibility, encouraging learners to use their knowledge, personal skills, and assessments of environmental problems and issues as a basis for environmental problem solving and action particularly in socio-scientific issues.

Consequences of everyday behavior

A sense of their own ability to influence outcomes

APPENDIX 1

6. Goals and objectives.

Goals and objectives for the materials should be clearly spelled out.

7. Appropriateness for specific learning settings.

Claims about the material's appropriateness for the targeted grade level(s) and the implementation of the activity should be consistent with the experience of educators.

8. Assessment

A variety of means for assessing learner progress should be included in the materials.

APPENDIX 1

Instructional Strength
Environmental education materials should rely on instructional techniques that create an effective learning environment.

1. Learner centred instruction:
When appropriate, learning should be based on learner interest and on the learner's ability to construct knowledge to gain conceptual understanding.

2. Different ways of learning
Materials should offer opportunities for different modes of teaching and learning

3. Connection to Learners' everyday lives
Materials and concepts should present information and ideas in a way that is relevant to learners. and are related directly to students' experiences.

4. Expanded learning environment
Students should learn in environments that extend beyond the boundaries of the classroom.

5. Interdisciplinary
The materials should recognize the interdisciplinary nature of environmental education.

EVALUATION OF THE EEKit 1

Instructional Strength

The synthesis of an effective learning environment through the environmental education materials created.

Learner centred instruction

Offers different modes of learning

Connection to everyday life

Diverse learning environments

Interdisciplinary

EVALUATION OF THE EEKit

Usability

The materials should be well designed and easy to use.

Clarity and logic

Easy to use

Adaptable

APPENDIX 1

Action orientation

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

1. Sense of personal stake and Responsibility
Materials should help learners to examine the possible consequences of their behaviours on the environment and evaluate choices they can make which may help resolve environmental issues.

Materials convey the idea that many individual actions have cumulative effects, both in creating and addressing environmental issues.

2. Self-efficacy
Materials should aim to strengthen learners' perception of their ability to influence the outcome of a situation.

Materials include a variety of individual and community strategies for citizen involvement and provide learners with opportunities to practice these strategies through projects they generate individually in their school or in the larger community.

APPENDIX 1

Making Models: Constructing mental, verbal, or physical representations of ideas, objects, or events to clarify explanations or demonstrate relationships. Constructing models helps clarify ideas.
Defining Operationally: Creating a definition by describing what is done and observed It is in the language of the students. Definitions are in context of students' experiences - not from the glossary, not to be memorized.
Collecting Data: Gathering and recording information about observations and measurements in a systematic way
Interpreting Data: Organizing, analyzing, and synthesizing data using tables, graphs, and diagrams to locate patterns that lead to the construction of inferences, predictions, or hypotheses.
Identifying and Controlling Variables: Manipulating one factor to investigate the outcome of an event while other factors are held constant.

4. Manipulative skills

Select appropriate apparatus for experiments;
Know the limitations of the apparatus regarding their size and accuracy;
Assemble and adjust apparatus systematically;
Handle the apparatus, instruments, chemicals carefully to avoid damage or injury;
Perform the experiment with reasonable efficiency and accuracy;
Separate and remove desired parts of a specimen for detsile study without damaging it;
Locate and rectify errors in apparatus and instruments;
Add chemicals in appropriate quantity and using correct procedures;
Handle sensitive apparatus, chemicals or flame correctly;

TASK TWO

WHAT WOULD YOU DO WITH THE EE KIT FOR SCIENCE? WHY?

Please read Appendix 2. Based upon your evaluation above, select the best 5 activities you would use and state your rationale.

You are also asked to select any activities you think is not effective and explain why.

WHAT WOULD YOU USE? WHY?

The best 5 activities

Your rationale

APPENDIX 1

Emphasis on Science Process and Thinking Skills

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

1. **Critical and creative thinking**

Learners should be challenged to use and improve their critical thinking and creative skills. Students should learn to arrive at their own conclusions about what needs to be done based on thorough research and study, rather than being taught that a certain course of action is best. Learners should gain basic skills needed to participate in resolving environmental issues

2. **Science Process skills**

Observing: Using the 5 senses (see, hear, touch, smell, taste) to find out about objects and events, their characteristics, properties, differences, similarities, and changes. Observations are recorded.
Classifying: Grouping or ordering objects or events according to similarities or differences in properties Lists, tables, or charts are generated.
Measuring: Comparing an unknown quantity with a known (metric units, time, student- generated frames of reference) - Observations are quantified using proper measuring devices and techniques
Inferring: Interpreting or explaining observations More than one inference may be presented to explain an observation.
Predicting: Forming an idea of an expected result - not a guess
Communicating: Using the written and spoken work, graphs, demonstrations, drawings, diagrams, or tables to transmit information and ideas to others
Using Number Relationships Applying numbers and their mathematical relationships to make decisions

APPENDIX 1

Depth:
EE materials should foster awareness of the natural and built environment, an understanding of environmental concepts, conditions, and issues, and an awareness of the feelings, values, attitudes, and perceptions at the heart of environmental issues, as appropriate for different developmental levels.

1. Awareness
Materials should acknowledge that feelings, experiences, and attitudes shape environmental perceptions and issues

2. Focus on concepts
Rather than presenting a series of facts, materials should use unifying themes and important concepts.

3. Concepts in context
Environmental concepts should be set in a context that includes social and economic as well as ecological aspects.

4. Attention to different scales
Environmental issues should be explored using a variety of scales as appropriate, such as short to long time spans, localized to global effects, and local to international community levels.

Ineffective activities

Explanation

TASK THREE

WHY IS SCIENCE A GOOD WAY TO INFUSE EE? HOW?

Science underlies the process of understanding nature and natural phenomena. There exist great opportunities for incorporating and dealing such concepts through science. Both science and environment demand active teaching-learning methodologies. Some of the commonly used terms—learning-by-doing, outdoor teaching, experimental learning, data analysis, etc. are closely associated with the two subjects. Similarly both the disciplines help students develop skills of observation, enquiry, analyzing, experimenting, and collecting and interpreting data, etc. Thus, there emerge several synergies that call for a special effort to infuse and integrate environmental concepts in science education.
(Excerpt from:

Jain, S. & Raghunathan, M. (2001). Towards Incorporating Major Environmental Concepts into Science Education in South Asia. Published in Greening Science Education; Jerath Nellima & Saxena S.K. (Eds); UNESCO and PSCST; Chandigarh, CEE.

Read Appendix 2 and then create a script for a talk show involving science teachers, environmental NGO representatives and scientists to answer the question above.

APPENDIX 1

Source: *Environmental Education Materials – Guidelines for Excellence by the the North American Association for Environmental Education (NAAEE).*

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. Factual accuracy
Environmental education materials should reflect sound theories and well-documented facts about subjects and issues.

2. Balanced presentation of differing viewpoints and theories.
Where there are differences of opinion or competing scientific explanations, the range of perspectives should be presented in a balanced way.

3. Openness to inquiry
Materials should encourage learners to explore different perspectives and form their own opinions.

4. Reflection of diversity
Different cultures, races, genders, social groups, ages, etc., are included with respect and equity.