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PROBLEM-BASED LEARNING AS AN APPROACH TO ECOLOGICAL EDUCATION

Education is very important component of sustainable development, individual development. Education for sustainable development is a dynamic concept that includes all aspects of society awareness, education and training in order to ensure or increase understanding of the relationship between sustainable development and development of knowledges, skills, perspectives and values which will enable people of any age to assume certain responsibilities for creating sustainable future and the possessing of them.

Environmental education is defined as the educational and cultural process through which subjects build knowledge and develop capacities, attitudes, and values that allow them to understand the environmental and socio-cultural reality in order to establish a responsible relationship with the environment and implement actions to address environmental problems.

Environmental education is concerned with complex systemic objects, having countless internal and external connections, and requires complex studies of their structures and functions.

Successful learning in environmental education is closely related to methods used by the teacher and the learners. In an age of incessantly growing information the entire educational paradigm changes continuously due to the unceasing social and technological changes. Many problems connected with successful teaching are under investigation: students working in small groups, debating, peer learning, competition and cooperation, concept construction, meaningful learning, project work, problem solving, presentations, motivation, and grading teachers.

Problem-based learning (PBL) is an instructional approach that enables learners to conduct research, integrate theory and practice, and apply knowledge and skills in order to develop a solution to a defined problem.

PBL is an instructional pedagogy that provides students with the tools to solve problems through the use of real world issues. The PBL process begins with an unstructured problem that the students must solve. After reviewing the problem, students identify information they already know as well as information they need to learn in order to find a solution. The three necessary components are students as the learners, the instructor as the tutor, and the problem as the context. The key learning outcomes are learning and applying new information, structuring information for future use, developing cognitive skills, and becoming lifelong learners.

The main characteristics of PBL are:

- (1) The starting point for learning is a problematic stimulus for which an individual lacks a ready response;
- (2) The problem is one that students are apt to face as future solutions;
- (3) The knowledge that students are expected to acquire during their training is organized around problems rather than disciplines;
- (4) Students, individually and collectively, assume a major responsibility for their own instruction and learning;
- (5) Most of the learning occurs within the context of small groups rather than lectures.

A typical PBL process consisted of the following steps:

Step 1: Identify and clarify unfamiliar terms presented in the scenario, and list those that remain unexplained after discuss;

Step 2: Define the problem or problems to be discussed. Students may have different views on the issues, but all should be considered. A list of agreed problems is reported;

Step 3: “Brainstorming” session to discuss the problem, suggesting possible explanations on basis of prior knowledge. Students draw on each other’s

knowledge;

Step 4: Review steps 2 and 3, and arrange explanations into tentative solutions;

Step 5: Formulate learning objectives. Group reaches consensus on the learning objectives. The tutor ensures that the learning objectives are focused, achievable, comprehensive and appropriate;

Step 6: Private study (all students gather information related to each learning objective);

Step 7: Group shares results of private study (students identify their learning resources and share their results). The tutor checks learning and may assess the group.

One of the global ecological problems is the problem biodiversity loss. Using the problem-based approach, students can discuss these issues in this way. The next questions will be discussed: how biodiversity is distributed across landscapes and how habitat loss affects biodiversity. Prior to class, students will be given a set of background readings, with two observations/problems, and a list of the supplies they will be using. Using this as a guide, teacher should let students know that they will be working in class to design a simple simulation study that can be used to address these two issues.

1. Once in class, students will begin the activity by breaking into small groups and discussing why species' distribution patterns may differ for different species and in different ecosystems. In addition, they should discuss how biodiversity can be effectively sampled for and how habitat loss is likely to affect biodiversity in different ecosystems.

2. Using the discussion above, the list of materials that students have been given ahead of time, students will form the model of ecological factors (anthropogenic factor), climate, landscape changes can influence at different living organisms distribution in ecosystems.

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4. Using the background readings described above, students and instructors can design an effective sampling methodology for determining how species are distributed across their habitat.

5. Students will use the model to determine how many individuals of each species are present in ecosystems under the influence of various environmental factors. Students will discuss the results and form a model that takes into account the influence of different ecological factors.

6. Students must form conclusions about what ecological factors influence at biodiversity in various ecological systems.

After completing this task, students should learn how to solve the problem of loss of biodiversity in different situations and learn to assess the likelihood of loss of biodiversity under the influence of different factors.

The number and variety of environmental problems are increasing day by day. Urgent environmental problems such as global warming, food scarcity, and destruction of biodiversity are very complex problems, and they concern both science and society. In line with the goals of environmental education, students need to work on real-life problems to develop their critical thinking, problem-solving, and decision-making skills. In this context, problem-based learning is appropriate for environmental education since it encourages students to express ideas, develop their cognitive and affective skills, direct their learning through analyzing real-life problems.