Engaging the Environmental Education and Biodiversity Issues in Curriculum in Iran

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Abstract— Many people, after learning the value of natural resources and the environment, work diligently to prevent their destruction. We should spread the culture of environmental conservation by using compelling means to educate about environmental problems. Since many members of society are students, we can promote societal awareness by including environmental conservation subjects in textbooks. The present study tries to identify the preference of biodiversity learning concepts at each grade level and then recommends the means to teach them from professionals' points of view. This study is based on applied goals and quantitative aspects of the descriptive method and is of the survey type. Descriptive statistics were used for statistical analysis, which includes frequency, percentage of frequency, valid percentage, aggregate percentage and mean. In addition, deduction statistics were used including binominal test, Friedman test and sign test. Prioritization of all items is based on the number of votes faculty members gave to value of teaching items in each basic variable.

Index Terms— Biodiversity Issues, Environmental Education, Curriculum, Iran.

1 Introduction

Over several decades, educational programmers' attention has been drawn to the phenomenon of environmental destruction. Many people, after learning the value of natural resources and the environment, work diligently to prevent their destruction. We should spread the culture of environmental conservation by using compelling means to educate about environmental problems. Since many members of society are students, we can promote societal awareness by including environmental conservation subjects in textbooks (Meiboudi, 2012).

The pace of extinction of universal biological resources has increased, and is even increasing more rapidly due to the destruction of forests and other rich biological habitats as well as excessive ploughing of soil, contamination and abuse of non-native animals and plants. It is worth mentioning that since the early 20th century, energy utilization has increased almost 16 times, industrial production up to 40 times, use of water up to 9 times, fishery up to 35 times, carbon dioxide emission nearly17 times, sulfur emission almost 13 times. Deforestation and desertification are also increasing (McMichael, 2008). Already world population has increased from 1.2 billion at late 20th century to just over 7 billion people today. This is a five-fold rise (UNICEF, 2009). A recent review by the UN revealed that if recent production and consumption patterns continue, we may confront an inevitable crisis of climate change, threatening universal ecological systems and human health (UNEP, 2008). Preservation of biological diversity is necessary for survival of human kind. Food, medicine, cloth, furniture and many raw materials are provided by biological resources. These resources are of particular importance to improve the status of agricultural products and livestock as well to provide development of new medicine and products. Animals and plants are also important in preserving soil fertility, as are decomposition and methods of controlling pests, and efforts to counter flooding (Keating, 1993).

A focus on teaching about the environment as a top point of educational efforts began with 1972's United Nations Conference on the Human Environment, held in Stockholm, Sweden. More recently, the Intergovernmental Conference on Environmental Education, organized by UNESCO in cooperation with UNEP, was held in October 1977, in Tbilisi, USSR, now the capital of Georgia. The first step in teaching about the environment is training active and aware people about the environment and their responsibility in conserving it. Consequently, teaching must increase the awareness of people of physical, biological, social, economical, and cultural reactions to the environment, and of the connections and complex relationships of socioeconomic development and improving the environment. Through training, students must obtain a set of values and interests in the environment and become motivated to engage in active partnership in conserving and improving the environment (Palmer, 1998). In fact, in order to train aware and responsible citizens about the environment and its problems, awareness about and eagerness to discover solutions to its problems are extremely important to the teaching environment (Veeravatnanond and Singseewo, 2010).

Preservation of the environment and biodiversity is achieved when environmental learning changes the overall society's behaviors and inclinations (ICCE, 1984). Hangford and Wolk (1980) stated based on their own widespread study

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and the studies of other authors about curriculum, the following components must be considered to influence several variables present in a learner's behavior and provide effective changes to it:

- Training in key ecological concepts and reciprocal environmental relationships present around these concepts and among them;
- Providing deep and well-designed opportunities for learners to reach a level of environmental susceptibility to strengthen the inclination for suitable behavior;
- Providing a curriculum leading to deep understanding of The subjects;
- Providing a curriculum to teach skills related to research and analysis to learners, and giving them sufficient time to use these processes;
- Presenting a curriculum teaching required citizen skills for problem solving and giving them enough time to use these skills;
- Providing a learning situation waiting for authoritative action by learners, i.e., trying to create a personal internal control medium in learners (Hungerford and Volk, 1990).

Table 1. Function of Environmental Learning Objectives on Biodiversity

	Frameworks for objectives, concepts and skills of a biodiversity curriculum	
Level of objective 1	***1. Cognitive principles level***	1) Definition of biodiversity 2) Describing the importance of biodiversity 3) Describing places on the world where there is biodiversity 4) Describing the factors threatening biodiversity 5) Describing the status of biodiversity in local and regional fields
Level of objective 2	***2. Conceptual knowledge level***	1) Biodiversity values range 2) Local, regional and universal affairs in biodiversity management 3) Benefits of supporting biodiversity 4) Political and social organizations involved in biodiversity management 5) Present and future of existing biodiversity 6) Nature of biodiversity issues 7) The role of personal behavior in solving biodiversity issues 8) Relationship between culture and biodiversity 9) Human behavior towards high tension issues 10) Scientific and technical tools for biodiversity management
Level of objective 3	***3. Evaluation and research variables***	1) Clarification of values and personal priorities 2) Effective participation in group processes to solve biodiversity problems 3) Analysis of issues related to biodiversity (stakeholders, scientific status, values beliefs) 4) Inclination to supervise procedures of biodiversity 5) Recognizing the values and priorities of others relative to biodiversity 6) Recognizing and research on biodiversity issues and combination of information 7) Recognizing and evaluating suitable solutions for implementing choices
Level of objective 4	***4. Skill level in actual training and action***	1) Effective participation in group decision making processes 2) Recognizing, evaluation and selection of actions to implement the solutions 3) Effective implementation of selected action

Hangford et al. (1980) developed the objectives explained in the Tbilisi bulletin for environmental learning to provide a series of scientific guidelines complying with a curriculum. Their work suggested 4 objective levels of biodiversity training (Table 1). Based on these levels of objectives in environmental learning, not only must information on ecology and environment must be provided, but learners must also achieve skills for research, evaluation and actual practice on environmental problems and issues (Peyton et al, 1995).

Biodiversity is in fact a component of environmental learning which improves the richness of the environmentaing architecture. Selected items to teach biodiversity not only must reflect the worldwide status of biodiversity, but also must be included in local and regional situation of problems related to this field of study and evaluation of them. In this regard, present study tries to identify the preference of biodiversity learning concepts in each relative level and then achieve the preferences to teach them from professionals' point of view.

4 METHODOLOGY

Present study is based on applied goals and quantitative aspects in descriptive method, and is of the survey type. Since having opinion on all the research parts requires the skill in all of its parts, our study population included experts in environmental learning and related fields from universities' faculties. Thirty experts were selected using a census sampling technique. The inventory of biodiversity concepts for high school level was extracted after studying several resources from Hungerford et al. (1980). Then minor components related to it were adjusted for interviewing based on 5 spectra. Agreement of preferences of responders on a spectrum (left or right) was considered as relevant or irrelevant to these values for training, which were measured based on binominal test. Selected preferences for interviewing were transferred to the second part from the teaching preferences viewpoint. Descriptive statistics were used for statistical analysis, including frequency, percentage of frequency, valid percentage, aggregate percentage and mean. In addition, deduction statistics was used including binominal test, Friedman test and sign test.

Prioritization of all items was based on the number of votes that faculty members gave to the value of teaching items in each basic variable. In this way, we considered a 4-way prioritization table for all quadrupled items, which were our basic variables. They are presented subsequently, and the results of one table placed in another table with a pursuit test. Tables (2), (3), (4) and (5) indicate the value priority for teaching biological diversity.

4 DISCUSSION

According to a chi-square test of 95.501, 10 degrees of freedom and a significance level of 0.000, and based on results of Friedman and Sign tests, priorities of cognitive principles concepts were divided to 2 groups and except for describing the places on the world where there is biodiversity, all priorities were placed in first priority (Table 2). According to a chi-square test equal to 76.059, 8 degrees of freedom degree, a significance level of 0.000, and Friedman and Sign tests, priorities of conceptual knowledge level concepts were placed in 3 groups. The first priority included biodiversity values range, local, regional and universal affairs in biodiversity management, the nature of biodiversity issues and present and future of available biodiversity. The second priority was including the concepts of political and social organizations involved in biodiversity management, benefits of supporting biodiversity and the relationship between culture and biodiversity. The third priority included concepts such as human behavior toward high-tension issues, the role of personal behavior in solving biodiversity problems and scientific and technical tools for biodiversity management (Table 3). According to chi-square equal to 28.639, 7 degrees of freedom, a significance level of 0.003 and the Friedman and Sign tests, priorities of concept participation variable level were placed in 2 groups. All concepts are placed in first priority except for the clarification of values and personal priorities, and recognizing and evaluating suitable solutions to implement choices (Table 4). According to chi-square test equal to 10.562, 6 degrees of freedom, a significance level of 0.926 and the Friedman and Sign tests, all concepts of skill level in actual training and action have the same priority (Table 5).

Table 2. Priorities of Concepts in Cognitive Principles Level

Variables in cognitive principles level	N	Mean	Priorities of variables of cognitive principles level using the results of Friedman and Sign tests
▪ *Definition of biodiversity*	31	4.2581	First
▪ *Describing the importance of biodiversity*	31	4.1935	First
▪ *Describing the status of biodiversity in the local and regional fields*	30	4.1333	First
▪ *Describing places in the world where there is biodiversity*	31	4.1290	Second
▪ *Describing the factors threatening biodiversity*	31	4.0968	First
No. of Valid Observations	30		

Table 3. Priorities of Conceptual Knowledge Level Concepts

Variables on conceptual knowledge level	N	Mean	Priorities of variables of cognitive principles level using the results of Friedman and Sign tests
▪ *Biodiversity values range*	31	4.4194	First
▪ *Local, regional and universal affairs in biodiversity management*	30	4.4000	First
▪ *Nature of biodiversity issues*	30	4.3667	First
▪ *Present and future of existing biodiversity*	29	4.2414	First
▪ *Political and social organizations involved in biodiversity management*	31	4.2257	Second
▪ *Benefits of supporting biodiversity*	31	4.2257	Second
▪ *Relationship between culture and biodiversity*	30	4.1667	Second
▪ *Human behavior towards high tension issues*	30	3.8867	Third
▪ *The role of personal behavior in solving biodiversity issues*	30	3.7221	Third
▪ *Scientific and technical tools for biodiversity managemen*	30	3.6830	Third
No. of Valid Observations	25		

Table 4. Priorities of Evaluation and Research Level Concepts

Variables of evaluation and research variables	N	Mean	Priorities of variables of cognitive principles level using the results of Friedman and Sign tests
▪ *Effective participation in group processes to solve biodiversity problems*	31	4.1735	First
▪ *Inclination to supervise the procedures of biodiversity*	31	4.1735	First
▪ *Analysis of issues related to biodiversity, including stakeholders, scientific status, and values beliefs*	31	4.1735	First
▪ *Clarification of values and personal priorities*	31	4.0553	Second
▪ *Recognizing the values and priorities of others relative to biodiversity*	31	3.9488	First
▪ *Recognizing and researching biodiversity issues and the combination of information*	31	3.8225	First
▪ *Recognizing and evaluating suitable solutions for implementing the choice*	31	3.6122	Second
No. of Valid Observations	31		

Table 5. Priorities of Concept Skill Level in Actual Training and Action

Variables of skill level in actual training and action	N	Mean	Priorities of variables of cognitive principles level using the results of Friedman and Sign tests
▪ *Effective participation in the group decision making processes*	31	3.5161	First
▪ *Recognizing, evaluation and selection of actions to implement the solutions*	29	3.3661	First
▪ *Effective implementation of selected actions*	31	3.2987	First
No. of Valid Observations	25		

3 CONCLUSIONS

As has been demonstrated, major challenges such as environment destruction and the destruction of biodiversity facing societies at the national and international level, as well as a potentially immense population increase have led to widespread efforts in diverse forms of environment and biodiversity preservation. In this regard, educational organization can expand the environment preservation culture through compiling challenging issues on environmental and biodiversity issues and playing an effective role in preserving the environment. The present study, which focuses on prioritization of biodiversity training concepts at each related level, indicated that 4 items of biodiversity training each with several minor subjects and components have been accepted generally by the members of scientific society of responders in a study sample population for teaching in high school grade. These items have 3 priorities in high school teaching. Their importance sequence for teaching is as follows: Definition of biodiversity, Describing the importance of biodiversity, Describing the status of biodiversity in the local and regional fields, Describing places in the world where there is biodiversity, Describing the factors threatening biodiversity, Biodiversity values range, Local, regional and universal affairs in biodiversity management, Nature of biodiversity issues, Present and future of existing biodiversity, Political and social organizations involved in biodiversity management, Benefits of supporting biodiversity, Relationship between culture and biodiversity, Human behavior towards high tension issues, The role of personal behavior in solving biodiversity issues, Scientific and technical tools for biodiversity management, Effective participation in group processes to solve biodiversity problems, Inclination to supervise the procedures of biodiversity, Analysis of issues related to biodiversity, including stakeholders, scientific status, and values beliefs, Clarification of values and personal priorities, Recognizing the values and priorities of others relative to biodiversity, Recognizing and researching biodiversity issues and the combination of information, Recognizing and evaluating suitable solutions for implementing the choice, Effective participation in the group decision making processes, Recognizing, evaluation and selection of actions to implement the solutions, Effective implementation of selected actions.

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