

---

The Eurasia Proceedings of Educational & Social Sciences (EPESS), 2016

Volume 4, Pages 144-148

**ICEMST 2016: International Conference on Education in Mathematics, Science & Technology**

## **BIODIVERSITY IN MOROCCANS TEXTBOOKS: IMPLICATIONS FOR ACTION-ORIENTED ENVIRONMENTAL EDUCATION**

ARFAOUI Mustapha

EREF, Cadi Ayyad University, Ecole Normale Supérieure, Marrakech, Morocco

AGORRAM Boujemaa

EREF, Cadi Ayyad University, Ecole Normale Supérieure, Marrakech  
LIRDIST, Faculté des Sciences Dhar ElMahraz, University of Sidi Mohamed Ben Abdellah

SELMAOUI Sabah

EREF, Cadi Ayyad University, Ecole Normale Supérieure, Marrakech

KHZAMI Salah-Eddine

EREF, Ecole Normale Supérieure, Cadi Ayyad University, Marrakech

RAZOUKI Abdelaaziz

EREF, Cadi Ayyad University, Ecole Normale Supérieure, Marrakech

MASKOUR Lhoussaine

LIRDIST, Faculté des Sciences Dhar ElMahraz, University of Sidi Mohamed Ben Abdellah

**ABSTRACT:** The world environmental situation is likely to be further aggravated by the increasingly rapid extinction of species. This is likely to destabilize various ecosystems. This phenomenon has stimulated citizenship's awareness to the extent that it is acknowledged that its study involves great educational value and should be present at school. Biodiversity teaching quality depends on how it is dealt with in the classroom. Given that textbooks constitute a widely used material, its content should increase the pupils' knowledge about Biodiversity and the consequences of its loss. The present research explores the contents of school textbooks of Morocco in relation to Biodiversity topic. The research method is content analysis. The findings revealed that the majority of textbooks have integrated a number of issues that could enhance understanding about the significance of biodiversity but only one textbook dealt with consequences of its loss. The textbook analysis revealed a multiplicity of biodiversity definitions, with a strong predominance of the number of species, suggesting that many textbooks were outdated. Majority of analysed textbooks cannot expect concrete action planned and executed against loss of biodiversity. The paper calls for redressing some of the observed limitations through revision of existing content.

**Key words:** Biodiversity, content analysis, textbooks, environmental education.

### **INTRODUCTION**

Following the earth summit in rio in 1992 and the alarming report on the state of global biodiversity and the speed of its erosion, concern for preservation and conservation of biological resources has become a global issue (anup shah 2015 ; barbault 2004 ; barroca-paccard and al 2015) . This is particularly reflected in the adoption and signature by the states involved in the convention on biological diversity (cbd 1992). It has long been feared that human activity is causing massive extinctions. Despite increased efforts at conservation, it has not been enough and biodiversity losses continue (un [www.millenniumassessment.org](http://www.millenniumassessment.org) 03/2005).

Now, the term biodiversity is part of the vocabulary of our educational system in the Life and Earth sciences programs in secondary education. As many researchers have pointed out, this term is not easy to define. However the concept of biodiversity also represents an evolution of representations, more or less implicit,

---

- This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 Unported License, permitting all non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

- Selection and peer-review under responsibility of the Organizing Committee of the conference

\*Corresponding author: ARFAOUI Mustapha - icemstoffice@gmail.com

linking the term unless the issue of biodiversity itself to the question of the preservation of nature or to the Register of disaster.

This complexity associated with Biodiversity concept seems to be an opportunity in the context of a disciplinary education which aims to build knowledge and build the students' capacity of discernment. In this sense, the problematization of biodiversity can help to develop a pedagogy of judgment, able to overcome the difficulties related to a fixed view of school knowledge (Fleury & Fabre, 2006).

Some studies have tried to guideposts for how to teach Biodiversity (Barroca-Paccard & col 2015; Lhoste & Voisin, 2013).

Textbooks have a positive role to play and should provide the core elements of learning in the subjects. Textbooks should also be designed to develop students' critical and creative thinking and other generic skills through the information and activities that they provide. Quality textbooks can also assist teachers by providing a source for materials that will help them to plan the scope and sequence of their teaching.

The present research aims to analyze the contents of secondary textbooks of Morocco in relation to Biodiversity topic. Our research question is : In what ways and to what extent have issues related to biodiversity been integrated into secondary Biology textbooks?

## **METHODS**

### **Corpus**

We have analyzed textbooks of scientific Common Core (level 10) and those of first year and second year of baccalaureat (level 11 and 12) . These levels correspond to different times where biodiversity is treated to all students of science subjects in secondary education (Table 1). The analyzed textbooks are some of the commonly used textbooks and all correspond to Life and Earth sciences' programs currently applied in Morocco.

### **Grids**

For textbooks' analysis, we have used grids developed as part of the European Biohead-Citizen project (Caravita et al 2008). The textbook analysis allow to determine if the dimensions of the New Environmental Paradigm were or were not taken into account. This is to identify whether the cases cited:

- Are only a linear and analytically or are presented in their systemic complexity;
- Are local cases contextualized or general cases leading an overview of the situation, even world;
- Have as a goal to introduce the idea of respect for nature, conservation or rational management;
- Allow an awareness of individual responsibility or social vis-à-vis the environment on the part of each student influencing its current citizens and future behavior.

The textbook analysis had dealt on text and images

## **RESULTS AND ANALYSIS**

In textbooks analyzed, Biodiversity topic was dealt at ecosystem, species and the genetic level, in this order from one grade level to the upper one.

### **Ecosystemic diversity**

A large party of the scientific Common Core's textbook is devoted to the study of ecosystems and their diversity with examples of different environments (forest, sea, desert, soil ...) (13 pages). There are more illustrations than text.

The descriptive approach is more used than explanatory one. There is description of ecosystem's components and of various types of environmental factors that modulate ecosystems (Temperature, rainfall, physical and chemical composition ...). The environment includes a variety of species, numerous trophic relationships occur in diverse ecosystems. No reference to the capacity of ecosystems to resist to changes induced by human activities.

Ecosystems are described in sufficient detail but the various relationships between ecosystem's components are described in a linear way failing to take account the complexity of these interactions.

The impact of Human on the ecosystems is dealt with numerous exemples: tree cutting and deforestation, excessive pasture, forests fires, excessive use of pesticides, but very few management actions on ecosystems are described (shrub planting to combat the movement of sand in the desert areas).

## Diversity of Species

Throughout the scientific Common Core's textbook, a multitude of species are described whether animal and plants. Species diversity is related with habitat diversity modulated by environmental factors and trophic relationships.

Species extinction is mentioned several times and only related to the negative impact of human activities. A paragraph is devoted to man's efforts in the protection of nature (tree planting, using biological pesticides, genetic improvement of forests' trees, protected areas, reintroduction of some species in their natural habitat, regulation of hunting and fishing, pasture management in consultation with the local population). The textbook gives as an example the reintroduction of Ostrich in its habitat in southern Morocco.

Species diversity is also studied at the level of reproduction. The manual gives many examples of reproduction modes (sexual and asexual) only in plants. The specific diversity is also shown in the study of plant classification (morphological diversity, life cycle ...).

Economic, social dimensions are discussed but in rare cases :

*« Faced with the alarming indicators of the deterioration of ecosystems, and in accordance with international recommendations, and in the context of sustainable development, man has taken action to protect the flora and fauna of an integrated way taking into account the economic and social needs of man without to urefois harm the natural balance ».*

## Genetic Diversity

This part is treated in the textbook of 2<sup>nd</sup> year of Baccalaureat in the chapter of population genetics. Several photos show diversity within populations of the same species at morphological and biochemical level. The immunological and nucleotide levels are not mentioned.

The manual also deals with the diversity in the human species without mentioning races but by mentioning human groups. This underlies that what differentiates us as human populations is more important than what assembles us. This reductionist approach suggests that these differences have genetic basis and that we constitute different "races". These assumptions are dangerous because they were used as pretexts by various dictatorships (nazism ...) to commit crimes and massacres against several people. Hereditarian conceptions have been shown in other research and in various contexts (Agorram 2010).

Ethnic, social dimensions in the Biodiversity topic are not mentioned.

## Values in textbooks

The textbooks analysis allow to identify numerous values that can be categorised as follow :

- Ecological: the textbooks dealt with : maintenance of natural systems that require biodiversity; the perceived quality of the environment (local and global); acceptance of constraints for human action, awareness of the planet as a limited pool of resources.
- Aesthetic: Referring to an appreciation of beauty and harmony through our senses; to the pleasure gained by this perception; to the value assigned to beauty relative to other environmental affordances.
- Economic: Referring to the value of resources, to the costs and benefits of human plans of actions.
- Ethical: Referring to taking responsibility as users of resources, to right of future generations to benefit from these resources

So, the most mentioned dimensions in textbooks are related to knowledge there is a lack of several dimensions such as

- Existential: Referring to the value assigned to the quality of life, to the person ; to the role assigned to the spiritual dimension (religious, artistic, ideological) in one's own life.
- Cultural: Referring to the maintenance of the attitudes and the practices of social and cultural units (traditions, habits, knowledge); to the image of science.
- Social: Referring to the maintenance of the cohesiveness of the social environment; to attitudes about diversities (gender, sex, age, culture).
- Political: Referring to the ways of managing, ruling and controlling the interactions between individuals and society, humans and environment; the participation of citizens.

These values are pertaining to different dimensions of human practical and intellectual activity that are relevant to Environmental Education (Caravita 2008 ; Agorram & Caravita 2009).

## **Teaching styles**

The Informative style is the dominant one, it is present in all analyzed textbooks. The injunctive and persuasive styles are underdeveloped in these textbooks.

The participative style, which should be used in any content that have an educational dimension is totally absent in all studied textbooks. Authors should emphasize this style that allows persuade, convince more than one ; that encourages students to question, reflect and propose action from their own thinking.

The Environmental Education suppose out of forms of classical education. It should focus on the teaching styles that encourage a more participatory student learning.

But the dominance of informative style in all studied manuals, would not allow learners or participate in the development and construction of their knowledge or to adopt responsible behavior towards themselves and towards the environment. Education that does not allow the adoption of attitudes is doomed to failure (Agorram & Caravita 2009 ; Caravita 2008).

## **Conception relation of humans respect to nature**

The human-nature relationship is presented as conflictual. This conflictual conception is present in textbooks in other topics (Ecosystems, pollution, use of resources).

Textbooks consider that Human activities are largely affect the nature and cause loss of biodiversity. The difficulty of finding a compromise between the protection/preservation of environmental “integrity” and the demands of the development of human economy is stated in terms of a stereotyped complaint about the destructive presence of humans on the Earth.

The textbooks analysis show that the attitudes conveyed by these textbooks might be classified into the following types: fatalistic, blaming (“Man is guilty!”), responsabilizing, objectivizing (“interest of environment are also the interest of the human species”),

In previous research, we have found the same attitudes when we had analyzed textbooks for other topics (ecosystems, pollution, use of resources) (Agorram & caravita 2009).

Thus, the appeal to a generic responsibility of humans substitutes the identification of real cases, the pointing out of specific responsibilities of agents, the highlighting of concrete policies that might be explored at different levels in the organization of a society : economic, social and political.

## **CONCLUSION**

Analyzed Textbooks devote much to the biodiversity topic, but teaching approaches used are often inadequate and should be reviewed. The textbook analysis from these globally highlights a conservative and disciplinary posture. The perception of the action of man is through examples of collections that focus on discourse in practice, action and develops a very functionalist vision where man is presented as manager (Barroca-Paccard & col 2015). This is particularly true for Scientific Core textbooks. Textbooks neatly not show a link between traditional disciplinary issues and socioscientific dimension to the detriment of the latter. In general, it is clear the coexistence of two approaches: on one hand, a very disciplinary vision leading to a progressive vision for biodiversity and the other an anthropized vision largely centered on the concept of ecosystem. This juxtaposition can give the impression of a dichotomy between disciplinary knowledge and applied examples. This approach is however not sustainable, we must "bring biodiversity in social, moral, ethical and thus changing the relationship to nature among the citizens of tomorrow". This proposal remains to be built at the textbooks analyzed in this work.

In higher secondary school textbooks, the role that individuals can take in the preservation of biodiversity is almost disregarded or it is treated in a way, that is ignoring that the students are in a more adult age, have hopefully developed higher competences, have more autonomy of decision and action as consumers, as customers of services, as people who are planning their life as adults. Providing information about the environment and environmental choices remains an important role of environmental education, but it is not the only role.

## REFERENCES

- Agorram B.; Caravita S.; Valente A.; Luzi D.; Margnelli N.( 2009). Knowledge and Values in Science Textbooks Concerning Complexity in Ecological Systems and Environmental Problems: A Cross-cultural Study on Secondary School Manuals.*US-China Education Review* v6 ; n°2 ;p25-37.
- Agorram B., Clement P., Selmaoui S., Khzami S.E.,Chafik J., Chiadli A.(2010). University students' conceptions about the concept of gene: Interest of historical approach. *US-China Education Review, Volume 7, No.2* (Serial No.63).
- Anup Shah (2015). Environmental Issues; <http://www.globalissues.org/issue/168/environmental-issues> Last Updated Monday, February 02, 2015
- Barroca-Paccard M., Orange-Ravachol D. & Gouyon P.-H. (2015). Biodiversité et recomposition disciplinaire en SVT; *Spiral-E - Revue de Recherches en Éducation – 2015 Supplément électronique au N° 55* (165-176).
- Caravita, S., Valente, A., Luzi, D., Pace, P., Khalil, I., Valanides, N., Nisiforou, O., Berthou, G., Kozan-Naumescu, A. & Clément, P. (2008). Construction and validation of textbook analysis grids for ecology and environmental education. *Science Education International, 19*(2).
- Fleury B. & Fabre M. (2006). « La pédagogie sociale : inculcation ou problématisation ? L'exemple du développement durable dans l'enseignement agricole français ». *Recherches en Éducation*, p. 67-78. (Disponible sur :<http://www.recherches-en-education.net/spip.php?article111>)
- Lhoste, Y., & Voisin, C. (2013). Repères pour l'enseignement de la biodiversité en classe de sciences. *Recherches en didactique des sciences et des technologies, (7)*, 107-134.