

CRITICAL ANALYSIS OF THE PROBLEMATIC SITUATIONS OF SCHOOL MANUALS IN RELATION TO ECOLOGY AND ENVIRONMENTAL EDUCATION IN THE MOROCCAN SCHOOL CURRICULUM

Bouchra Bekhat, Mourad Madrane, Rachid Janati-Idrissi, Rajae Zerhane & Mohamed Laafou

*Research Scholar, Interdisciplinary Laboratory of Research in Pedagogical Engineering (LIRIP), ESuperior Normal
School, Abdelmalek Essaadi University, Tetouan, Morocco*

ABSTRACT

From now on, societies will face development, overpopulation and environmental problems that imply on the part of the citizen competences and predispositions able to allow a critical approach of these problems. School and educational actions would be the only guarantors of an environmental education likely to develop values and skills allowing the development of favourable behaviours to the protection and the preservation of the natural environments. However, the general observation shows an important difference between the objectives and the quality of the educational actions deployed. For the previous actions, the work carried out relates to the nature and the didactic relevance of the introductory texts or problematic situations proposed by different textbooks related to the ecological and the environmental themes. It aims to a critical analysis of these texts, and this to dissect their content and their didactic relevance to the objectives of teaching. Therefore, the methodology adopted is based mainly on content analysis. The results obtained lead to the conclusion that such situations and introductory texts cannot constitute relevant didactic documents to motivate and implement effective educational actions related to the objectives of environmental education.

KEYWORDS: *Environmental Education, Educational Action, Evaluation, Problematic Situations, Didactics*

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INTRODUCTION

In a regional and a global context marked by important issues related to the environment, the future citizen is needed to be aware, to understand and to help the environment by adopting appropriate behaviours. In other words, the citizen needs to participate in decision-making mechanisms and to encourage others to develop appropriate attitudes. Indeed, this will only be possible if it can analyse the phenomena and problems that structure and characterize the environment. The citizen will be able to understand and analyse this environment if he got skills whose acquisition is mainly in the school setting. In addition, actions carried out through the media or associations can have a definite impact on the values and attitudes of citizens in relation to the environment. However, schools and educational activities may be the main guarantors of an environmental education that will be able to develop values, skills and favourable behaviours for the protection and preservation of natural environments. In this sense, the target of an environmental education would be the development of the concept for a sustainable world, through the development of an environmental culture. An effective educational action

aims to achieve the goal of involving the intervention of competent teachers capable of translating educational intentions into concrete and consequent educational actions. Findings about learner behaviour towards the environment indicate a significant gap between the stated teaching objectives and the knowledge and skills actually developed. In fact, for education in general and more for environmental education is where you can find developing values and creating eco-friendly behaviours. While, Actions is where you find the question of impacting the psychology of the learner.

Theoretical Frame

Problematic

Now-a-days, Morocco is confronted generally, by the problem of quality of education, and specifically, the scientific education. National and international studies and assessments converge on the idea of failing the scientific education, with respect to the competencies targeted. Moreover, according to Melhaoui et al. (2004), failure rates in Moroccan universities had increased. For instance, only 10% of students in a class obtain their degree in four years.

With the goal of an environmental education, there is significant gap between the objectives pursued and the quality of the educational actions actually deployed. The failure in question is explained by the very limited scope of educational actions in terms of stabilized knowledge, skills and developed behaviours. With regard to environmental education, the actions developed would have little impact on the knowledge and behaviour targeted. In addition, the knowledge conveyed would not be integrated into visible and palpable eco-friendly behaviours.

To evaluate the impact of this environmental education consists first and foremost in appreciating the quality of the educational actions undertaken. It should be noted that these educational activities are part of a wider education system which includes curricula, textbooks, teacher training, pedagogical supervision, evaluation, the institutional framework, etc. Therefore, the quality of deployed actions depends on the overall functioning of this system. And wanting to approach this quality problem requires an analysis of the entire educational system from which these actions emanate.

The problematic, in this case, relates to the nature and didactic relevance of introductory situations proposed by different textbooks in relation to ecological and environmental issues in the Moroccan education system. It must be known that these situation models are widely shared and used by teachers. For the reasons given, the problem under consideration refers to the scope and possible didactic implications of these introductory texts. As a result, it is a question of analysing these texts in order to dissect the contents and the didactic relevance relative to the objectives of problematization and teaching.

Environmental Education Concept

Since the 1960s, environmental education has become an essential education for the acquisition of values for the awareness, protection and respect of the natural heritage. Since then, the environmental education has evolved considerably, from the problem of "nature" to the problem of "the environment". It is no longer aimed at simply raising awareness, protecting and respecting the environment, but it is also becoming essential for educational programs and transversal skills. It is called, environmental education, the environment, the environment, education, education, environmental awareness, fragility and the complexity of our environment.

Ultimately, to wish through this education is the incentive for local or regional action favorable to the sustainability of life and the global environment. In 1977, the importance of knowledge, values, behaviours, practical skills and possible eco-friendly actions were emphasized. Agenda 21 completed the summit of the Rio Earth

Summit in 1992 eco-citizenship. The Bonn conference in 2009 stated that it was a sustainable development strategy (UNESCO, 2009).

Scientific Knowledge, Definition and Concepts

To the question “what is the scientific knowledge?”, several answers are possible according to the authors and the interviewees (teachers or trainers). This is especially true if they have not received training in history and the epistemology of science. This is the case for the majority of teachers. A teacher who is supposed to develop a scientific culture should first be aware that scientific knowledge is not only knowledge that can solve problems or describe realities or phenomena; it is also a knowledge that allows you to formulate new questions that revive the process of knowledge development. This characteristic can be compared to Bachelard's idea of questioning and questioning (1972: 27). This dynamic leads Popper to a representation of science as a process whose starting point and term is the formulation of ever more fundamental problems, the fertility of which is constantly increasing, giving birth to other problems still unpublished. (1985, pp. 329–330).

For his part, Bachelard notes that "for a scientific mind, all knowledge is an answer to a question" (1938); Popper argues that science begins with problems (1991, pp. 287, 1985, pp. 230, 329). However, a problem is not only present at the beginning and end of a knowledge-building process; a problem is a difficulty, and to understand a problem is to discover that there is a difficulty and where the difficulty lies. This can only be done by discovering why some solutions at first glance do not work (Popper 1991, 282).

According to Orange (2002, 2005, 2007), the nature of basic scientific knowledge would be marked by the following epistemological features:

- Basic scientific knowledge relates to problems of explanation and characterization of phenomena and facts.
- This scientific knowledge articulates at least two registers which are the empirical register (facts and phenomena to be explained) and the register of models (where explanations are developed).
- Scientific knowledge is apodictic, that is to say that this knowledge is not limited to descriptions (facts, phenomena) or descriptions of functioning, but rather relates to conditions that require the adoption of certain explanations (conditions of possibility) and which are in fact necessities on models (delimitation of the field of possibilities by critical arguments) which impose the construction and selection of certain explanations and the rejection of certain explanations considered impossible.

METHODOLOGY

Problematic Situation

The problem here is a situation from which data can be released. A problem situation would represent a real enigma to solve Astolfi (1993). It should enable students to formulate hypotheses and for which learners feel deprived to invest their prior knowledge and ideas and representations. The culmination of this mental journey leads to a questioning that leads to the proposition of new ideas. Fabre (2003) nevertheless seems to suggest that it is impossible to build a problem before having solved it. In this study, problem situations are considered according to the characterization proposed by Sternberg (1999). The student is confronted with situations for which he has no immediate solution in a predefined repertoire. It must then recognize the problem, define it, appropriate it, propose reasoning, formulate resolution strategies, use its cognitive resources and establish mechanisms for verifying and evaluating the solution (or solutions). According to the model

developed by Christian Orange (2002) and the Fabre model (2009), there is a six-dimensional grid that has been chosen according to the objectives of analysis and evaluation of these introductory or problematic situations.

Six dimensions constitute the major features of the problematisation process. The first dimension is according to where the problematisation can be described as a possible relation between a problem and a solution. The second dimension is according to which a work of scientific problematisation is activated if the text proposes questions and remarks making it possible to select and to model the facts relevant to the conditions of the problem. The third dimension refers to the criterion of the existence of questions and remarks proposed by the text and allowing the reformulation and the appropriation of the problem during the problematisation. The fourth dimension is related to the existence in the text of questions and remarks allowing on the questioning developed by the learner during the problematisation. The fifth dimension relative to the remarks and questions proposed by the text allowing to perceive the relation between problems and knowledge, on the one hand, to facilitate the articulation between register of empirical facts (or established scientific facts) and the register of the models and the hypothesis production through reasoning or debate. Finally, the sixth dimension is related to the content of the text in terms of questions and remarks allowing the verbalization and putting in text allowing the formalization and the conceptualization.

According to this author, a scientific activity is aimed mainly at the elaboration of explanatory models proposing cause-effect relations which in fact refer to necessities which are not based simply on empirical observations but mainly on a critical construction activity of explanatory models.

The dimensions below give these models their scientific and conceptual characteristics:

Table 1: Grid Inspired by the Theoretical Framework Exploited by Christian Orange (2005, 2007)

Dimension or Line 1 (Element1)	<ul style="list-style-type: none"> • A problematisation is a way of thinking about the relationship between the problem and the solution.
Dimension or Line 1 (Element2)	<ul style="list-style-type: none"> • Text with questions and remarks allows you to select and model facts according to the conditions of the problem.
Dimension or Line 1 (Element3)	<ul style="list-style-type: none"> • questions and remarks are used to encourage the reformulation of the problem during the problematisation
Dimension or Line 1 (Element4)	<ul style="list-style-type: none"> • Questions and remarks make it possible to focus on the learner's questions during the problematisation;
Dimension or Line 1 (Element5)	<ul style="list-style-type: none"> • Scientific work characterized by a dynamic relationship between knowledge and problems; • it mainly aims at the elaboration of explanatory models proposing relations between cause and effect which refer in fact to necessities which are not based simply on empirical observations but mainly on a critical construction activity of explanatory models. • A problematisation articulates two registers: an empirical register (observation or common experience) and a register of models (which refers to explanations that do not result from a simple observation or common experiences but rather refer to necessities). • (Phases of hypotheses and class debates)
Dimension or Line 6 (Element6)	<ul style="list-style-type: none"> • The sixth element of this model refers to the important language of work in any scientific activity or conceptualization work (verbalization or elaboration of a written text or production of an oral or written text).

This table is inspired by the theoretical framework of problem-based learning of life and earth sciences developed by Orange (2007) and which specifies that this framework refers to epistemological positions Orange (2002, 2005). It should be emphasized in this sense that according to Fabre (1993, 1999). The theoretical framework is part of a broader

reflection on problematization and its links with scientific knowledge and learning.

It is the work of scientific thought (always in the broad sense) that confers specific characteristics on the problematization developed. It is not a matter of simply constructing a problem to produce a solution, but of exploring and "mapping" the problem field of possibilities. This exploration results in an essential character of scientific knowledge: their "necessity".

The theoretical framework in general and the model of Christian Orange in particular served as a basis for developing a grid for a critical analysis of some problematic situations proposed by textbooks in force in the Moroccan education system. The textbooks in question are programmed in the so-called International Baccalaureate and Common Core courses. It should be emphasized that this analysis will still make it possible to evaluate the reform of the education system, in particular that relating to program changes and the teaching language of life sciences and the earth.

Methodology and Workflow

This research work is limited to the analysis of textbooks, more specifically the parts of the textbooks dedicated to the presentation of introductory texts which in fact constitute problematic situations. In fact, the choice fell on some introductory texts of chapters of some textbooks of the sciences of the life and the earth International section of the Moroccan Baccalaureate (French option) in relation with the ecology and the education relative to the environment for fine analysis with regard to the theoretical framework and the analysis grids.

The choice of these textbooks is dictated by the fact that they are recent and supposed to be used by the elite of Moroccan learners (from the international baccalaureate). It should be emphasized that these manuals are part of the perspective of a reform in relation to the language of education of the sciences of life and the earth and the ways of teaching them. Learners in these streams are selected on the basis of grades and language level in French. The choice of these textbooks is further justified by the recommendations of the national charter of education. It is a question of providing quality language teaching, of diversifying the languages of instruction and of ensuring an offer in terms of choice of languages

For all the reasons given and in relation to the research objectives, the methodological tool required in this study is the technique of content analysis as theorized and operationalized by Laurence Bardin (1977).

Content analysis is a set of methodological tools for extremely diverse "discourses" based on inference and inference. It is, in fact, a work of interpretation that balances between two positions, on the one hand, the rigor of objectivity, and, on the other hand, the fertility of subjectivity (Bardin, 1977). Content analysis is organized around three chronological phases; pre-analysis, exploitation of material (body of data and facts) as well as processing of results, inference and interpretation. The choice of objects and corpus as well as the work of analysis were based on the theoretical framework and the framework of Christian Orange. In fact, the analysis was conducted through a grid of analysis and the ideas developed by Orange. This framework of interpretation served as a reference to be able to make inferences and interpretations of the ideas and the corpus in general contained in the various introductory or problematic situations proposed in chapters of some textbooks of the sciences of the life and the earth, Section International Baccalaureate Moroccan (French option) that refer to ecology and/or environmental education. It should be noted that despite the use of a grid and a frame of reference, inspired by Bachelard and Canguilhem, a part of subjectivity would be inherent to any work of inference and interpretation.

Results Analysis

The analysis work carried out focused on problematic situations of different textbooks, relative to the environmental and ecological themes in the Moroccan program.

Situation: (book: SVT + More, Chapter 2: Sequence 8, Impact of man on the ground, p: 40, Editions Maârif)

Text of the situation

If human activities can degrade soils, sustainable soil management is possible by adapting uses and practices.

- What are the human activities that threaten our soil ecosystem?
- How can man preserve and improve the soil (natural resource)?

The Critical Analysis of the Solution

A critical reading of this situation makes it possible to make the following remarks:

- Degradation and natural resource words should not be included in the text or questions as they must be developed by the learners as hypotheses as a result of the construction and problem-solving activity. In this way, the text proposes ideas-hypotheses whose research by the learner would serve to develop the scientific spirit by the exercise of scientific reasoning.
- The text includes a summary of lessons with conclusions that must be deduced as the lesson progresses. The text divulges the conclusions reached throughout the course, which avoids providing a motivation or designing an investigation procedure in accordance with the official guidelines relating to the introduction to the scientific spirit and scientific reasoning.
- The content and structure of the text do not respect the logic of the problematization that encourages propositions of facts and a request for the formulation of hypotheses. Indeed, such a formulation as well as ideas and proposals may create confusion and misunderstanding and in no way allow scientific and logical reasoning to be attempted to construct hypotheses based on empirical facts.
- The text must propose a set of empirical or scientifically established facts while the present text evokes a global consequence on the ground and which does not allow, under any circumstances, the learner to identify empirical facts or established scientifically to elaborate hypotheses on the factors and practices involved in land degradation.
- The use of the term ecosystem would not be adequate from the beginning and it would be better to propose a progression that can deduce the fact that the soil constitutes an ecosystem to reinforce learning, on the one hand, to see to what extent the learner would be able to mobilize a teaching knowledge to question a new situation, on the other hand.
- In the section on soil preservation, the text of the problem scenario does not provide enough empirical facts, relevant progression, and appropriate questions that can engage the learner in a mental activity aimed at generating hypotheses is needed in any problematic work or didactical use of it. The facts, the empirical facts and

the questions formulated in relation to the introductory text are insufficient to enable the learners to engage in a reasoning that may lead to assumptions and ideas regarding the preservation and improvement of the soil;

- Regarding the language work required in any problematization work, the text does not include any questions that relate to the language work of oral or written production necessary to claim to have carried out a problematization activity. In conclusion, this text cannot, under any circumstances, allow the implementation of problematic work necessary to motivate and engage the learner in a scientific reasoning signifier and generator of learning in terms of knowledge and skills targeted through environmental education.

Major features of an activity of problematization of a phenomenon, a concept or a scientific fact (according to our theoretical framework) of Introductory Text 1 or problematic situation proposed by the textbook

Table 2: Some Problematic Work Dimensions

Contribution to the problematisation and questioning to encourage the construction of a problem area	Empirical facts or scientifically established facts	Explicit request for hypothesis production	Modelisation (Explicit modelingrequest)	Language dimension in the text or proposed questions	Link evoked or by the text or the questions between problem and school knowledge
0	0	+	0	0	0

DISCUSSIONS

After an analysis of the proposed texts, it turned out that they have the same characteristics in terms of structuring or content in terms of ideas, facts or wording. This makes possible the development of a global, common interpretation that would be valid for all the introductory texts proposed by the various textbooks selected in this work.

The introductory texts or the problematic situations of the different textbooks would be formulated in the form of text-syntheses, summaries that put forward scholarly scientific truths. These texts could not, under any circumstances, constitute content that would help problematize phenomena, themes or concepts under study. Indeed, they do not include the empirical or scientific facts necessary for any problematisation work. It seems that the authors of the textbooks do not possess an epistemological culture necessary for the elaboration of a relevant introductory text in relation to the objective of problematisation. An ignorance of the epistemological aspects would be at the origin of the incapacity to grasp what is a problematic situation and how to formulate a situation which would have possible didactic implications. The analysis of these situations reveals a total confusion on the meaning and the major features of a problematic situation. Textbook authors seem to be more concerned with the formulation of questions that are not always articulated to content; these formulations present a mixture of ideas, data and facts that would not always identify the problem. Thus, any problematisation activity would be difficult or impossible to implement. In addition, the proposed text generally refers to several problems related to a multitude of ideas and notions that prevent the learners from focusing on a particular problem.

With regard to the didactic implications of these situations, it would seem that the focus has been on the use of problematic situations as didactic moments used to create motivation. They would not be used for lesson development and conceptualization. The authors of these textbooks do not seem to be aware of the close and important link between problematisation and conceptualization, on the one hand, between problems and scientific knowledge, on the other. These authors would thus have a very narrow conception of the problematisation idea. A design that does not allow to design, develop and implement a problematisation activity aimed at conceptualizing the theme or concept under study.

In relation to the singular relationship between problem and solution, the proposed texts would not make it possible to emphasize this relation. The proposed texts do not make it possible to deduce and perceive this particular relationship between problem and solution. It should be emphasized that this relationship actually refers to the possible hypotheses and the need for an explanation that corresponds in fact to the plausible hypothesis.

Regarding the language dimension of the problematisation activity, the proposed texts do not include any questions or ideas that explicitly encourage language work or texting necessary in any problematisation activity. It seems that the authors of these situations do not know the linguistic nature of any problematisation work. Indeed, the proposed situations do not include questions or invitations to the setting in text or the setting in narrative of a process of problematisation aimed at a fact, a phenomenon or a problematic. It turns out that the authors' epistemological culture is atrophied or even absent. On the other hand, this culture is necessary to develop competences that would make it possible to conceive, to elaborate and to implement problematic situations aiming at the motivation and the didactic treatment of a phenomenon or a thematic aiming to realize the conditions of possibility.

CONCLUSIONS

At the end of this research, we must put on some results relating to the critical analyses of the introductory texts which constitute in fact problematic situations proposed by textbooks related to ecological and environmental themes. The analyses were carried out through analysis grids and a theoretical framework that was sufficiently well-founded to serve as a theoretical background from which a new analytical approach must be put in place. All the analyses carried out were intended to evaluate the potential of the proposed texts in terms of problematisation and this in relation to the place and the importance of this process of problematisation in any approach aiming at the access to scientific knowledge and its appropriation. This work presents a theoretical issue, insofar as it participates in research on problematisation processes. The methodology adopted was inspired by the theoretical framework developed by CREN. If we must retain a specificity of scientific problematisation, it is its operation in two opposite paths; towards the solution and the reconstruction of the problem.

The texts analysed suggest a thin didactic potential with regard to any problematisation activity that would be a prerequisite for initiating a lesson in science teaching. The proposed texts cannot constitute as didactic materials to put forward empirical data and necessities accessible to the learners and which lend themselves to a possible didactic exploitation. Similarly, these texts do provide neither the data nor the structure, nor the questions that would incite to engage a linguistic work or putting in text necessary in any problematisation activity in sciences.

As a result, it is clear that the development of a text, which can serve as a problematic starting point, is neither simple nor obvious and requires many academic, epistemological and didactic skills. It appears that textbook authors do not hold these skills; this might explain the very limited didactic interest of this text.

The design of an introductory text would involve a reflection and an in-depth work by a team of specialists likely to design texts that can serve as an introductory document and support for a didactic activity conducted by the learner and in which the latter is engaged mentally in a process of investigation and scientific approach.

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