TEACHING PRACTICES OF SCIENTIFIC AWAKENING RELATED TO MANAGEMENT OF REPRESENTATIONS OF PRIMARY SCHOOL LEARNERS: INSPECTORS VIEWPOINTS

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Abstract- At the present time, in the field of education, many researches deal with the subject of analysis of teachers' pedagogical practices in order to understand the conditions of learning and teaching that allow students to learn in an optimal way. The objective of this study is to analyze the teaching practices of the teachers of scientific awakening related to the management of the representations of the learners of primary school. To do this, we administered a questionnaire to a sample of 145 primary school inspectors, from all the provincial directorates of Morocco. The main results of the questionnaire showed that the majority of the primary school inspectors affirmed that the teachers of scientific awakening are not aware of the representations of their learners, also this study allowed us to identify the difficulties and the constraints found by the teachers during the teaching of the scientific awakening, according to the points of view of the inspectors, namely: the adoption of the scientific approach, the teaching of the scientific concepts, the didactic transposition of the scientific awakening, the identification and the correction of the false representations, the elaboration of the problem situations. In order to overcome these difficulties, the inspectors propose to: organize continuous training sessions, assign the teaching of scientific awakening to teachers with scientific training, reduce the program of scientific awakening.

Keywords: Teaching Practices, Representation, Scientific Awakening, Primary Cycle.

1. INTRODUCTION

Today, many researchers affirm that current teaching of science is not producing the expected results. Moreover, it is no longer a question of training only scientists but also of allowing a scientific acculturation of citizens living in a world where science and technology have a principal place [1]. To meet these requirements, researchers confirm the need for a renewal of science teaching [2].

This approach is part of a socio-constructivist perspective, promoting exchanges between students in order to build their own knowledge, as is recommended in the official instructions [3, 4].

In the same context, Morocco has made considerable efforts to improve the quality of education and ensure its generalization. Indeed, major reform projects have been initiated since 2000.

However, several research studies in science didactics have shown that learning difficulties are partly responsible for school failures. Other studies have shown that these difficulties are not only related to knowledge itself and to the representations that students and teachers have of science, but also to teachers' pedagogical practices [5, 6]. Indeed, teachers are considered the main vector for student learning [7], it is necessary to look at teaching practices in order to identify avenues of development that can promote effective learning. Development is considered to be a gradual and continuous change in teaching practices influenced by programs and research in didactics, among other things.

According to Legendre [8], teaching practices refer to "a set of activities guided by the teacher's knowledge and skills, as well as by the norms of the profession".

It should be noted that these practices are sometimes unstable and variable in time and space and that they do not fall under methods that are systematically applied in the same way from one context to another [9]. They are contextualized and oriented by the nature of the learning targeted, which more specifically calls into question the orientations proposed in the programs, but also in the research work in didactics.

When put together, the orientations proposed in the programs, as well as in the research in science and technology didactics, make it possible to take stock of the educational priorities and the approaches to be deployed to contribute to the development of teaching practices.

In Morocco, no research has yet been done on teaching practices related to the management of primary school learners' representations.

The objective of this work will be, firstly, to analyze the teaching practices of the teachers of scientific awakening related to the management of the representations of the learners of the primary level, secondly, to identify the difficulties encountered by the teachers during the teaching of scientific awakening.

Our study is based on these main questions:
- How do the teachers manage the learners' representations?
- What are the difficulties and constraints encountered by teachers when teaching scientific awakening?
- What are the solutions proposed by primary school inspectors to overcome the difficulties encountered by scientific awakening teachers?

2. CONCEPTUAL FRAMEWORK

2.1. Teaching Practice

According to Altet [10], teaching practice is a person's singular way of doing things, his real, specific way of executing a professional activity.

The practice is not only the set of observable acts, actions, reactions but it also includes the processes of implementation of the activity in a given situation by a person, the choices, the decision making : "it is the double dimension of the notion of practice that makes it valuable" as Jacky Beillerot [11] says, specifying "on the one hand, the gestures, the conducts, the languages; on the other hand, through the rules, it is the objectives, the strategies and the ideologies that are invoked".

The professional practice thus covers both the way of doing of each singular person, "the doing specific to this person" and "the processes for doing" which correspond to a professional function (for example "know how to teach") as defined by a particular professional group according to goals, objectives and autonomous choices.

In fact, teacher practice refers to a professional activity that is situated, oriented by the ends, goals and norms of a professional group. It translates into the implementation of knowledge, processes and skills in action by a person in a professional situation.

The multiple dimensions-epistemic, pedagogical, didactic, psychological and social, that make up practice interact with each other to enable the teacher to adapt to the professional situation and to manage student learning and classroom conduct in parallel.

2.2. Why Use the Representations at School?

Astolfi [12] pointed out that it is necessary to pass from the model of the "empty head" to "the learner and his cognitive deja-la" also, a change of position leads to understand their relationship to the world. He adds that a differentiated pedagogy would facilitate the positive evolution of representations. This implies that the initial representations should be taken into account and analyzed in order to see the needs they reveal.

Giordan and De Vecchi [13] add that there can be no transmission of knowledge if we do not know the initial conceptions of the learners in the educational situations.

Astolfi [12] proposes six steps in taking account of representations in school:
- Collecting representations.
- Analyze the representations.
- Make the students aware of their own representations, which already contributes to their evolution.
- Compare the different representations to allow the students to observe their diversity and to decentralize themselves.
- Provoke destabilization through socio-cognitive conflicts by organizing discussions among them (important for intellectual development).
- Monitor their evolution.

3. RESEARCH METHODOLOGY

To answer the research questions, we administered an electronic questionnaire to 145 primary school inspectors from all provincial directorates in Morocco.

The questionnaire consists of a total of fifteen questions divided into four parts:
- The first part, entitled general information, aims to identify the characteristics of the respondents.
- The second part entitled: "Pedagogical Practices of Primary School Teachers", composed of eight questions related to the management of their learners' representations.
- The third part entitled: "Difficulties and Constraints Encountered by Primary School Teachers Related to Scientific Awakening", composed of two questions, allowing to determine the difficulties and the solutions proposed by the inspectors.
- The fourth part entitled: "The Category of Teachers Concerned by the Training", is composed of three questions whose objective is to determine the category of teachers who need scientific training and training in the didactics of scientific awakening, as well as to specify the type of training proposed by the inspectors of the primary cycle.

4. RESULTS

4.1. Characteristics of Primary School Inspectors

4.1.1. Gender

The analysis of the results reveals that 78.6% of our sample are male and 21.4% are female.
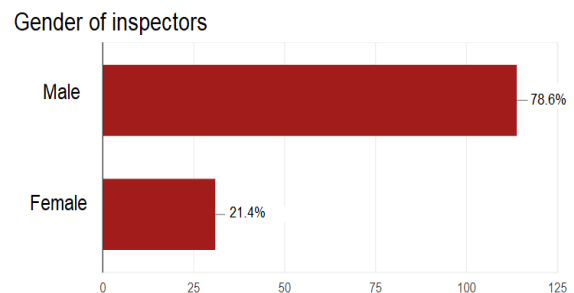

Figure1. Gender of inspectors interviewed

4.1.2. Seniority of Respondents

The results of the questionnaire addressed to the primary school inspectors revealed that our sample appears relatively young, This finding is explained by the majority of inspectors have an experience of less than 10 years represents 80%, followed by a percentage of 9.7% who have accumulated an experience ranging from 10 years to 20 years, this same percentage also represents the respondents who have an experience ranging from 20 years to 30 years, while the old inspectors have an experience of more than 30 years represent a minor percentage.
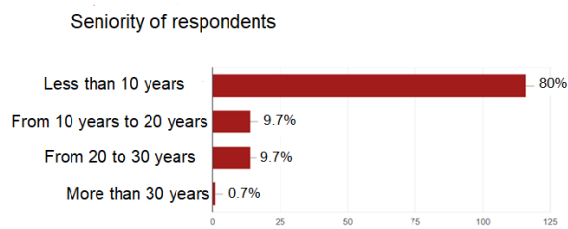

Figure 2. Percentage of primary school inspectors by seniority

4.2. Pedagogical Practices of Primary School Teachers

4.2.1. Taking into account the Learners' Representations

The analysis of the results indicates that 62.1% of inspectors stated that a small percentage of primary school teachers take into consideration the representations of their learners (<25%) and 25.5% stated that the percentage of teachers who take into consideration the representations of their learners vary between 25% and 50%, while a minority of respondents (1.4%) stated that primary school teachers do not take them into consideration.
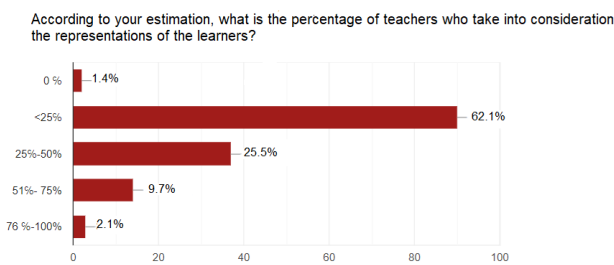

Figure 3. Percentage of inspectors who state that teachers take into account learners' representations

4.2.2 Exploitation of Learners' Representations

The results of the questionnaire addressed to the inspectors reveal that 67.6% state that a small percentage of teachers exploit learners' representations in construction activities (<25%) and 18.6% state that the percentage of teachers who exploit them varies between 25% and 50%, while a minority (3.4%) state that the percentage of teachers who exploit learners' representations in construction activities varies between 76% and 100%.
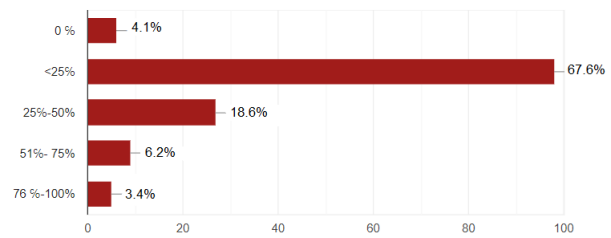

Figure 4. Percentage of primary school inspectors who declare that teachers exploit representations in construction activities

4.2.3. Teachers' Management of Representations

The results of the analysis of the inspectors' responses in relation to the management of learners' representations by the teachers are presented in Table 1.

Table1. Teachers' management of learners' representations

How do teachers deal with learners' representations?	P
Teachers are not aware of their learners' representations	71%
Teachers correct misrepresentations directly	9%
Teachers use a few representations in science activities	8.27%
Teachers take into consideration representations of their learners	6.89%

The results show that the majority of primary school inspectors (71%) reported that teachers do not take into account the representations of their learners and only 9% reported that teachers directly correct the erroneous representations,8.27% reported that teachers exploit some representations, while a minority (6.89%) reported that teachers considering representations of their learners.

4.2.4. Strategy Used by Teachers to Correct Misrepresentations

The analysis of the inspectors' responses about the strategy used by teachers to correct their learners' misrepresentations are presented in Table 2.

Table 2. Strategy used by teachers to correct misrepresentations

The strategy used by teachers to correct learners' misrepresentations	P
Direct correction	56%
The scientific approach	15.17%
The transmission of knowledge not taking into account the false representations	9%
Using discussion and explanation	5.51%
Relying on textbook activities	3.44%
Teachers do not have a clear strategy	3.44%
The tutorial activities	3.44%
Deconstructing false representations and constructing correct knowledge	2.75%
Confrontation of false representations with scientific results	1.37%

The results reveal that 56% of the sample stated that the teachers proceeded to the direct correction of the false representations of their learners and 15% announced that the teachers employed the scientific approach, 5.51% declared that the teachers relied on discussion and explanation, 3.44% stated that the teachers employed remedial activities, while a minority declared that the teachers proceeded to the confrontation of the false representations with the scientific results.

4.2.5. Difficulties Found by Teachers in Diagnosing Learners' Representations

The analysis of the responses of the inspectors questioned shows that most inspectors (89%) state that teachers have difficulties in diagnosing representations, while a minority of inspectors (11.7%) state the opposite.
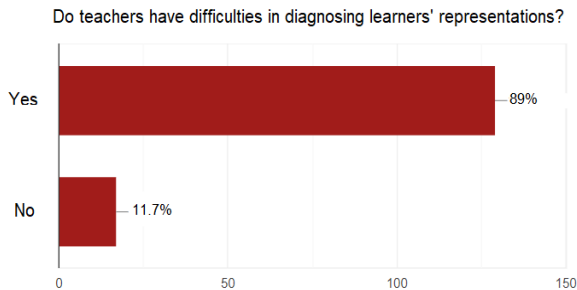

Figure 5. Percentage of inspectors who declare that teachers have difficulties in diagnosing representations

4.2.6. Reasons that are Obstacles for Teachers to Do the Diagnostic and Exploitation of Representations

The analysis of the inspectors' answers concerning the reasons that prevent teachers from diagnosing and exploiting their learners' representations is presented in Table 3.

Table 3. Reasons that prevent teachers from diagnosing and exploiting representations

Objectives reasons that may prevent teachers from diagnosing and exploiting representations	P
lack of training in science didactics	41.37%
Lack of time	30.34%
Ignorance of the importance of exploiting representations	27.58%
Lack of didactic materials.	11%
Difficulties in diagnosing and exploiting representations	7.58%
Lack of planning	6.20%
Ignorance of the scientific approach	5.51%
Lack of scientific knowledge	4.82%
The intensity of the program	2%
The use of the scientific awakening textbook	2%
Ignorance of the pedagogy by mistake	2%

The analysis of the results concerning the reasons that prevent teachers from diagnosing and exploiting the representations of their learners, shows that 41.37% of the respondents affirm that teachers do not have training in science didactics and 30.34% think that teachers do not have time to carry out these procedures, 27.58% thought that teachers were unaware of the importance of the exploitation of representations in the scientific awakening course, while a minority announced that the intensity of the program (2%) was one of the reasons that prevented teachers from doing these two procedures.

4.2.7. Use of the Investigative Approach

The analysis of the answers shows that about half of the sample declares that a small percentage of teachers use the investigative approach in the scientific awakening program (<25%) and 31% think that the percentage of teachers who use it is varied between 25% and 50%,

13.1% state that the percentage of teachers who use it varies between 51% and 75%, followed by 5.5% who announce that teachers do not use the investigative approach, while a minority (2.8%) states that the percentage of teachers who use it varies between 76% and 100%.
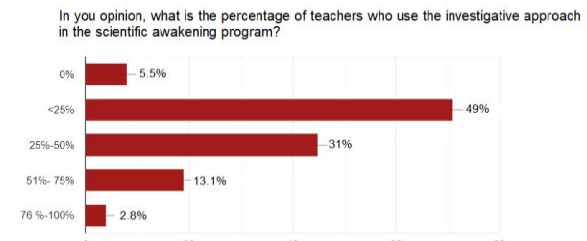

Figure 6. The use of the approach of investigation in the program of scientific awakening

4.2.8. Methods Used by Teachers in Teaching the Scientific Awakening

The analysis of the inspectors' answers about the methods used by the teachers during the teaching of scientific awakening, are listed in Table 4.

Table 4. Methods used by teachers in teaching scientific awakening

Methods used by teachers in teaching the scientific awakening	Percentage
The traditional method	44.82%
the objective method	29.65%
The scientific approach	27.58%
No answer	11.03%
The pedagogy by problem	6.89%
The investigative approach	2%

The results of the responses show that 44.82% of the inspectors state that teachers use the traditional method, followed by 29.65% declare that teachers adopt the objective pedagogy and 27.58% declare that teachers use the scientific approach, 6.89% declare that teachers use the problem-based pedagogy and only 2% announce that teachers use the investigation approach.

4.3. Difficulties Found by the Teachers of Scientific Awakening

Analysis of the inspectors' responses regarding the difficulties and constraints found by teachers when teaching scientific awakening are listed in Table 5.

Table 5. Difficulties encountered by teachers in teaching scientific awakening

Difficulties and constraints encountered by teachers in teaching scientific awakening	Percentage
Lack of didactic materials	58.62%
Teaching scientific concepts	19.31%
The use of the scientific approach	16.55%
Lack of time	12%
The content of the subject is not adapted to the cognitive level of the learners	9%
didactic transposition	3%
Identification and correction of false representations	3%
Students are incapable of constructing hypotheses	2%
Creation of problem situations	2%

The results of the responses of the sample about the constraints and difficulties found by the teachers related to the teaching of scientific awakening show that 58.62% of the inspectors state that the teachers do not have didactic tools and 19.31% report that the teachers have difficulties in teaching scientific concepts,16.55% declare that the teachers have difficulties in adopting the scientific approach, while a minority (2%) confirms that the teachers are unable to create problem situations.

4.4. The Solutions Suggested by the Primary School Inspectors to the Difficulties Encountered by Primary School Teachers

The analysis of the inspectors' responses concerning solutions proposed to overcome difficulties encountered by primary school teachers is presented in Table 6.

Table 6. The solutions proposed by the inspectors for the difficulties encountered by primary school teachers

Solutions proposed by the inspectors	Percentage
Continuous training	62.75%
Self-training	9%
Have access to didactic materials.	41.37%
Assign the teaching of scientific awakening to teachers of scientific specialties	9.65%
Increase the amount of time scheduled for teaching scientific awakening.	2%
Reduce the scientific awakening program	2.75%

The analysis of the results of the questionnaire addressed to the inspectors shows that about 63% of the inspectors state that the teachers need continuous training to overcome their obstacles in the subject, followed by 41.37% propose as a solution to have didactic materials and 9.65% propose to increase the time programmed to the teaching of scientific awakening, while a minority affirms that the program of scientific awakening should be reduced (2.75%).

4.5. The Category of Teachers Concerned by the Training

4.5.1. The Category of Teachers Concerned with Scientific Training

The results reveal that 84.8% of inspectors say that teachers with less than 10 years of experience need scientific training, followed by 59.3% who think that teachers with more than 30 years of experience need it, 55.9% who think that teachers with between 20 and 30 years of experience need the training, and 53.8% who think that teachers with between 10 and 20 years of experience need this training.
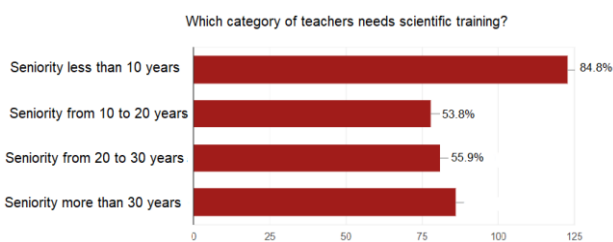

Figure 7. The category of teachers concerned by scientific training

4.5.2. The Category of Teachers Concerned by Training in the Didactics of Scientific Awakening

The analysis of the results shows that most of the inspectors (82.1%) state that the category of teachers with a seniority of less than 10 years needs training in the didactics of scientific awakening, followed by 61.4% who state that the category of teachers with a seniority of 20 to 30 years is concerned with this training and 60.7% of teachers with seniority of more than 30 years requires this training, the same percentage (60.7%) states that the category of teachers with seniority between 10 and 20 years is also concerned by this training.
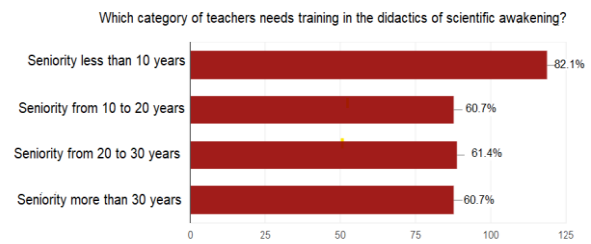

Figure 8. Category of teachers concerned by training in didactics of scientific awakening

4.5.3. The Type of Training Suggested by the Inspectors

The analysis of the responses concerning the type of training proposed by the inspectors for the benefit of primary school teachers is presented in Table 7.

Table 7. Type of training proposed by the primary school inspectors

Type of training proposed by the primary school inspectors	Frequency
practical workshops in didactics of scientific awakening	85
The scientific approach	45
exemplary and experimental courses	22
The management of the learners' representations	11
Basic scientific training	10
Digital resources	9
Determination of obstacle objectives	5
Active pedagogies	4
Didactic transposition	3
The construction of problem situations	3
Animation techniques	2

The results of the answers about the type of training proposed by inspectors show that the teachers of scientific awakening need practical workshops in didactics of scientific awakening (cited 85 once), training in scientific approach (cited 45 once), followed by experimental courses (cited 22 once),The management of representations is cited 11 once, scientific training (cited 10 once), digital resources (cited 9 once) and the determination of obstacle objectives (cited 5 once), as well as active pedagogy (cited 4 once), didactic transposition (cited 3 once), the construction of problem situations (cited 3 once) and animation techniques (cited 2 once).

5. DISCUSSION

The analysis of the questionnaire addressed to the primary school inspectors reveals that most of the respondents announce that the teachers ignore the representations of their learners, as shown in Table 1.

Indeed, according to table 3, there are several reasons that prevent teachers from exploiting the representations of their learners in the course of scientific awakening according to the inspectors' points of view, that is: lack of training in didactics of scientific awakening, lack of time, difficulties in diagnosing and exploiting the representations, the Ignorance of the importance of exploiting the representations, etc.

All didacticism agree that the students' initial representations have an important role in learning and that it is inefficient to ignore them. Indeed, if the teacher does not take them into account, they are maintained and reinforced, and "the new knowledge provided by the teachers would be very quickly forgotten and replaced by the initial representations which would only be more prevalent in the student's mind and could persist in other teaching activities" [13].

Clement [14] adds that the identification of students' representations, their obstacles to learning, makes it possible to "define pedagogical strategies that take these obstacles seriously, both in the formulation of teaching or training objectives and in the setting up of teaching situations". This is a real challenge for science didactics: teachers must be trained to bring out the students' representations, to untangle the networks of conceptions and then to help them in their process of conceptual change, on many themes, and in all scientific subjects.

The analysis of the responses also allowed us to identify a set of constraints and difficulties found by the teachers during the teaching of scientific awareness, as presented in Table 5. We can mention: Lack of didactic tools, the teaching of scientific concepts, the employment of the scientific approach, lack of time, the content of the subject is not adapted to the cognitive level of the learners, the identification and correction of false representations.

Concerning the methods used by the teachers, according to Table 4, the results show that most of the teachers adopt the transmissive approaches and the pedagogy by objective while the program of the scientific awakening insists on the necessity to adopt "the scientific investigation approach". Indeed, it is essential to teach primary school students the meaning of scientific thinking, and to teach them the methodology of problem solving, "observe, question, formulate a hypothesis, validate this hypothesis, argumentation, model in an elementary way, and finally understand the link between the studied phenomenon and the mathematical language". These steps represent and reflect the application of an investigative approach in teaching sciences.

Indeed, similar studies have shown that teachers of primary schools are uncomfortable with science teaching, and particularly with physics content [15]. They often use transmissive approaches where the student is passive.

The transmissive approach gives the students a vision that science is dogmatic and leaves the impression that it is a body of knowledge to be memorized [16].

To overcome the constraints and difficulties identified in this study, the inspectors interviewed propose, according to Table 6, to program continuous training sessions (scientific training and training in didactics of scientific awakening) for the benefit of the teachers of scientific awakening, particularly the teachers having a seniority of less than 10 years and to have didactic tools, to assign the teaching of scientific awakening to the teachers of scientific specialty, thus to reduce the program of scientific awakening and to increase the time allowed to the teaching of scientific awakening.

6. CONCLUSION

In this study, we tried to analyze the pedagogical practices related to the management of the representations of the primary school learners. The results show that most of the primary school inspectors affirm that the teachers are unaware of the representations of their learners and they encounter difficulties in the teaching of the scientific awakening course.

To overcome the difficulties found by the teachers of scientific awakening, the primary school inspectors propose to program continuous training sessions for the benefit of the teachers of scientific awakening, to have didactic materials, to assign the teaching of scientific awakening to the teachers of scientific specialty, to reduce the program of scientific awakening, also to increase the time allowed to the teaching of scientific awakening.

These results call into question the quality of initial and continuous professional training of primary school teachers, particularly with a view to improving their teaching practices in the domain of science teaching [4, 17].

Continuous training therefore appears to be a real necessity at a time when the regional centers for the education and training professions are training qualified teachers with a certain number of scientific and pedagogical skills.

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BIOGRAPHIES

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