Pedagogical Stakes of Evaluation Practices According to the Competency-Based Approach: the Case of Physics and Chemistry Teaching in Secondary Schools in Morocco

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Abstract

Evaluation is considered a main and important element for the success of any work, especially in the field of education. The skills-based approach is also part of the educational projects that the Kingdom has carried out to improve and develop the education system.

The objectives of this research are to find out the inspector's views on the assessment of learning and its links with the associated competencies. It also aims to find out to what extent physics and chemistry teachers use modern assessment strategies and methods to qualify secondary education.

To achieve the research objectives, we conducted a field study directed at a sample of physics and chemistry inspectors for qualified secondary education.

The results of the study showed that the degree of use of the paper and pencil assessment strategy was high for the teacher, while the degree of use was moderate for the observation strategy and the communication strategy. The research results also revealed that the success rate achieved by the assessment methods used in relation to the results of the national examinations in physics and chemistry subjects is 30%, this confirms the need to review the assessment strategies used.

Keywords: *Assessment of learning, Competency-based approach, Secondary qualification, Assessment difficulties, Physics-Chemistry inspector.*

1. Introduction

Assessment is a set of procedures and operations used by the assessor to evaluate by means of tools constructed in such a way that manner enable the intended audience to perform specified tasks.

In general, the evaluative approach is seen as a process of collecting data from multiple and varied sources in order to develop an accurate estimate of what students know, understand, and can accomplish given their training experiences (De Ketele, 1996; Roegiers, 2004; Scallon, 2004; Tardif, 2006). The way of evaluation conducted influences largely the content of teaching; it generally guides the objectives, the strategies used and even the tasks used for the development of various skills (Endrizzi and Rey, 2008).

According to several researchers (Allal, 2007; Cardinet, 1975; Figari, 2001; Roegiers, 2004; Scallon, 2004; Tardif, 2006), the evaluation of learning is considered as a complex process. It leads the teacher to make a professional judgment on the skills developed by students in order to make a pedagogical or administrative decision and to communicate this judgment to various audiences.

Thus, in the teaching/learning process, the competency-based approach (Roegiers, 2007) enables students to acquire lasting competencies likely to help them in their educational path and in everyday life. It emphasizes fundamental everything to ensure better transmission of knowledge. The competency-based approach thus becomes the pedagogical basis for all

components of education. The actions and reflexes of the learner become the main source of his or her learning; it aims to put the learner at the center of the educational process in order to combat his or her failure.

Consequently, the objectives of this research are to find out the inspectors' opinion on the evaluation of learning and its relation to learning competencies. It also aims to find out the degree of use of modern assessment strategies and methods among physics and chemistry teachers in Moroccan secondary education.

This article is organized as follows. In a first part, we present the theoretical framework and the problematic that leads to the research objectives and questions. The second part deals with the methodology of our research in which we present the objectives and the description of the questionnaire addressed to the physics-chemistry inspectors. The results of the surveys conducted with the physical-chemistry inspectors to measure the objectives of our problem are described in a third part. We then conclude with the interpretations of these results.

2. Theoretical framework

Evaluation is a fundamental operation in competence-based pedagogy. For a long time confined to a control system more or less fixed in traditional practices (procedure for examining and correcting controls, calculating success or failure rates), it is part of the logic of the competency-based approach in the teaching/learning process that accompanies its various stages. This practice consists in collecting relevant and significant clues whose analysis and interpretation allow the identification of difficulties in teaching/learning situations in order to regularize and direct them and thus increase their effectiveness.

In the competency-based approach, the evaluation function changes: the emphasis is placed on carrying out criteria-based and qualitative evaluations that make it possible to check a pupil's performance according to a set of competencies (knowledge, know-how, interpersonal skills) constituted as criteria in relation to a model defined in advance. Unlike normative evaluation, the criterion-based approach does not situate students in relation to each other. What is taken into account, however, is the difference in performance (whether more or less) in relation to a percentage.

This type of assessment is based on evaluating the deviation from the desired competency through clearly defined learning objectives, i.e., with pre-established success criteria (minimum qualifications) that explain the minimum level a student must achieve.

The evaluation of competence necessarily involves confrontation with complex situations in which the learner invokes and mobilizes a set of resources (knowledge, attitudes, skills and know-how), using his or her efforts in the context of new and complex problem situations that enable him or her to demonstrate his or her abilities in an integrated and coordinated context in which he or she fulfills the extent to which he or she has adopted a specific strategy for solving them.

According to Xavier Roegiers, evaluation is the collection of a set of information in order to make a decision. Collecting this data requires setting standards that are considered as glasses set by the teacher to examine the quality of the product produced by the learner. For the implementation of these standards, an indicator taken from the observable is used to tell whether the product meets the criterion.

From this perspective, when the error is repetitive, it indicates a lack of mastery of the skill. Therefore, the student must be given at least three independent opportunities to prove competence. A student will be considered to have mastered a criterion when he or she successfully completes at least two of the three opportunities. It would therefore seem both necessary and sufficient for a student to successfully complete two out of three complex tasks in order to be declared competent.

Despite the many definitions, the multiplicity of concepts and even differences over the educational evaluation, it is necessary to agree that evaluation is a "human process" in which the educational value of knowledge, behaviors or competencies and curricula is determined in general. In order to improve the expected factors and processes and to obtain the best results and performance and thus the most effective mechanisms for investment in education.

In contrast to traditional practices, derived from behaviorist theories, where learning is usually assessed through arbitrary examinations based on the identification of individual differences among learners, and where the student must show that he or she knows the 'right answer' to a question corresponding to a set objective. The current context of the reorganization and reform of education systems, inspired by the constructivist trend, places the assessment of learning in relation to pedagogical objectives associated with complex skills or competencies and performance. This active pedagogy, implemented through the competency-based approach and the pedagogy of integration, has contributed to renewing assessment practices while emphasizing the formative function of assessment.

Consequently, pedagogical evaluation with its new conception includes modern strategies based on scientific and systematic foundations, based on the reality of what learners have learned, in a way that guarantees the quality of the educational process and its purposes. (Napoli &Raymond 2004)

In addition, this approach takes into account authentic or real situations where jurisdiction is to be exercised. Failing this, subjects are confronted with life situations, or simulated situations that are as authentic as possible, i.e. as similar as possible to life situations.

It is the evaluation, therefore, that reflects the learner's achievements and measures them in real situations. In this way, it encourages them to be engaged in valuable tasks that make sense to them.

Modern assessment strategies include the performance-based assessment strategy, the paper-and-pencil strategy, the observation strategy, the communication strategy and the self-assessment strategy.

Major headings are to be column centered in a bold font without underline. They need be numbered. "2. Headings and Footnotes" at the top of this paragraph is a major heading

3. Research Problem

The evaluation of learning is undeniably a key element of any training and teaching program. This concept has received attention and was developed in recent years. For the learner, the teacher, the school or the community, evaluation plays an essential role in measuring the progress made and identifying learning achievements, in accurately diagnosing the difficulties encountered and prescribing ways of resolving them, and, finally, in certifying the quality of learning achieved and the skills required.

In this context, the introduction of competency-based pedagogy (APC) in the curricula of the Moroccan education system was a wise decision. The choice of this approach is motivated by the conviction of decision-makers and educational stakeholders that it will help improve learning so that it is adapted to the changes and challenges of today's society.

From this perspective, the implementation of APC involves an assessment focused on skills building and development, an evaluation of the level of mastery of skills by learners at the beginning, during and at the end of each learning period. It is within this framework that the theme of the present research falls.

In this regard, the teacher's role in the process of evaluating student learning is defined as follows:

"The teacher is primarily responsible for evaluating his or her students. He assumes this responsibility, in particular by planning all of his assessment interventions, using assessment strategies and instruments appropriate to the situation, and making judgments about the progress of his student's learning and the level of development of their skills. "(MEQ, 2003, p. 19).

In formulating the problem of this research, we raised several questions, including: What is the success rate achieved by the assessment methods used compared to the results of the national physical-chemistry examinations? What are the difficulties encountered by qualified secondary school physics-chemistry teachers in acquiring the required teaching skills? What is the level of mastery of the pedagogical and professional skills required for a qualified secondary school teacher in the field of assessment to teach physics-chemistry?

In order to answer our problem, we proceeded by a field investigation approach through a questionnaire addressed to a sample of inspectors, in order to discover the difficulties in evaluating learning according to the competency-based approach of physics-chemistry teachers in qualifying secondary education and then to propose solutions to deal with them.

4. Research Methodology

To conduct this study, we opted for the questionnaire as the data collection tool. Our approach consisted in selecting a sample of eleven physics-chemistry inspectors of secondary education who were qualified, distributed among 6 provincial directorates: Hay Hassani, Moulay Rachid-Sidi Othman, Mediouna, Oujda Angad, and Laayoun.

The anonymous questionnaire is structured into five themes divided as follows:

Theme 1: Collection of general information on the surveyed inspectors,

Theme 2: Assessment and learning skills.

Theme 3: types of assessment adopted by teachers and degree of acquisition of professional and pedagogical skills.

Theme 4: the degree of use of modern assessment strategies and their various tools.

Theme 5: types of assessment and pedagogical trends.

5.   Research Results

5.1 Theme 1: collection of general information on the inspectors surveyed

The age spectrum of the inspectors surveyed is highly variable, with a clear dominance of the age group between 55 and 60 years old. This results in a wide variation in their professional seniority with a majority of inspectors in the seniority class between 35 and 40 years.
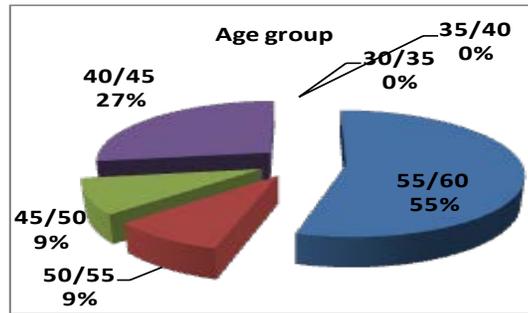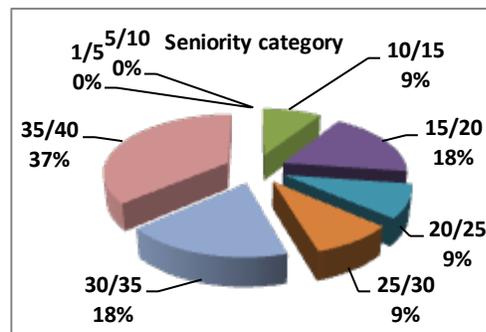

Figure 1: Age group

Figure 2: Seniority Category

5.2 Theme 2: Assessment and learning skills

Question 1: In your opinion, what are the objectives of pedagogical evaluation adopted by our educational system?
Among the objectives of the pedagogical evaluation adopted by our educational system which are repeated in the answers of the inspectors are:
-Knowledge and skills;
-Essentially, to see what is learned from the content of the curriculum;
-To check the prerequisites and determine what knowledge and skills have been acquired;
-To make the achievement of assigned objectives;
-Measuring the achievement of the general and operational objectives of the learning process by evaluating and monitoring the results of the learners, examining the extent to which they internalize and mobilize the knowledge and skills taught to them, and revealing the gaps observed during this process;
- Ensuring that students have achieved the desired goals of the teaching/learning process;
-Examine learner's mastery of certain resources (knowledge and skills) involved in the assessment process;

Question 2: What is the teacher's role in the assessment of learning?
According to the inspectors, the role of the teacher in the process of evaluating learning is:
-A pivotal role
-Analyst and proofreader
-Construct appropriate assessment situations, i.e., those that give an objective picture of choosing relevant, varied learning strategies that are conform to the needs of the students.
-Identify the location of learner errors and shortcomings in order to correct them;
-giving positive consideration to learner representations, errors, and learning difficulties;
-Diagnosis and remediation of learning difficulties
-Checking the achievement of the objectives of the teaching/learning process

Question 3: What is the importance of communication between teachers, administrators and learners parents?
The questionnaire revealed that according to the inspectors survey, the importance of communication between teachers, administrative staff and parents of learners is:
-To reassure learners and keep them informed of their experiences,
-To know their social, psychological and behavioral conditions, as well as their levels of mastery;
-To solve a range of problems facing the learner;
-Participatory monitoring of the learner's progress;
-Horizontal coordination in order to integrate all participants in the educational action;
-The mastery of processes of pedagogical remediation of gaps and eventual difficulties during the teaching/learning process or pedagogical evaluation.

Question 4: Are you aware of international assessment processes?
The Inspectors' views on international assessment processes were as follows:
-Educational programs should be consistent with international education systems.
-This is an indication of an external evaluation which makes it possible to check whether the education system has achieved the objectives set.
-There is no need for comparison because there is a difference in the pedagogies adopted, teaching and evaluation methods.

Question 5: In your opinion, to what extent has the competency-based approach achieved the objectives of the new reforms?
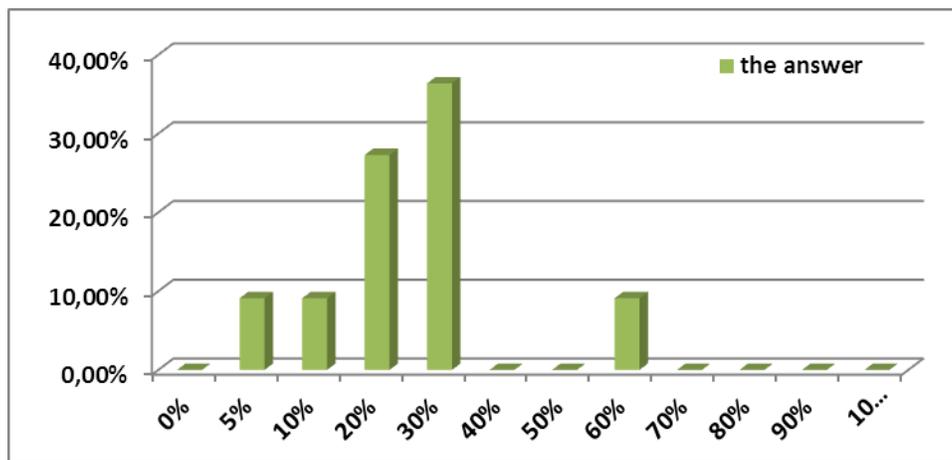

Figure 1: The rate of achievement of the objectives of the new refoms

The answer to this question is shown in graph 3. The analysis of the latter shows that about half of the respondents say that the competency-based approach has achieved the objectives of the new reforms with a percentage of less than 40%. The rate of achievement of the objectives of the new reforms is therefore enough low.

Question 6: What are the indispensable, missing, professional skills for qualified secondary school physics-chemistry teachers with regard to lesson planning, lesson implementation and evaluation of teaching and learning among students?

The essential professional skills that qualified secondary school physics and chemistry teachers lack, in the opinion of the Inspectors, are collected in Table 1.

Table 1: Professional skills that teachers lack according to inspectors

A / Planning of lessons	- Lack of advance planning as most focus on the content to be presented; - Plan the time allocated to each lesson so that there is no delay in completing the program; - Know the components of the teaching operation; - Having the pedagogical documents and didactic tools, knowledge of their content, anticipation, the choice of an appropriate strategy and the integration of experience as a basic element of the lesson, - Long-term, medium-term and short-term planning, i.e. the educational sheets.
B/ Implementation of the lesson	- Adopting diversified and motivating pedagogical and didactic approaches; - The use of teaching aids adapted to the courses; - Implementing successful pedagogical scenarios ; - Taking into account the particularities of learners, carrying out a diagnostic evaluation of learning achievements and adopting formative evaluation to support learning; - It can be said to be lesson planning rather than lesson implementation.
C/ Evaluation of teaching and learning among the students	- Assess skills by adopting contextual situations; - Diversifying Learning situations ; - Taking into consideration the content of specific circulars 142, the circulars on evaluation and choosing the content of the assessment by respecting the referential framework ;

On this subject, the inspectors say that teachers lack professionalism, because the task of the teacher today is crucial. This highlights the skills and qualities required for such a profession. A teacher must have the ability to analyse and evaluate his or her practices in order to improve and adapt them in favor of the learner, since he or she is at the center of the teaching/learning process.

5.3 Theme 3: Types of evaluation adopted by teachers and professional and pedagogical skills

Question 7: What is the rate of the types of assessment adopted by physics and chemistry teachers?
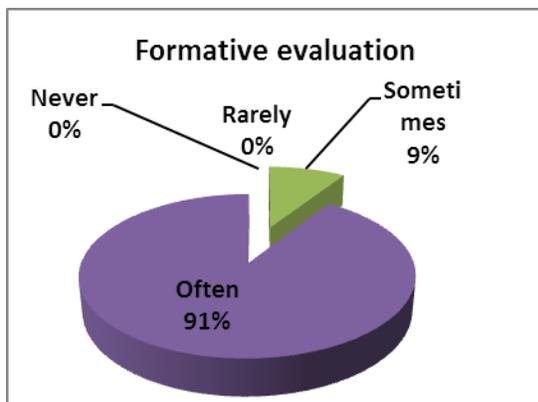

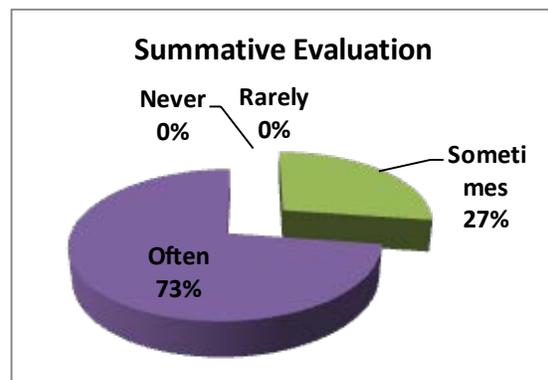Figure 4-a: Formative evaluation

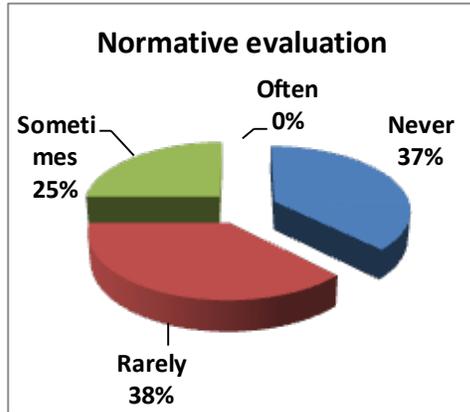Figure 2-b: Summative evaluation

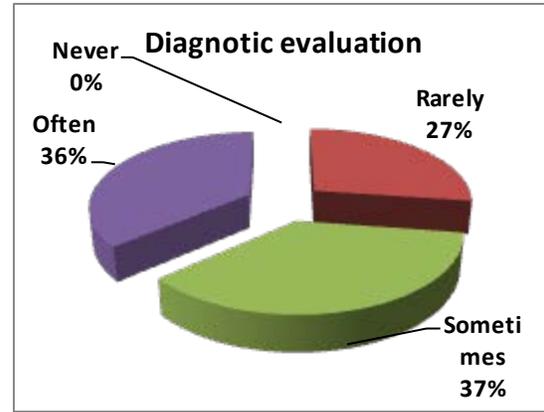Figure 4-c: Normative evaluation

Figure 4-d: Diagnostic evaluation

It emerges from the study, showed in graphs 4-a, b, c, and d, that summative evaluation is used for about 70%, formative evaluation for 90%, while diagnostic evaluation is used for 30%. As for the normative evaluation, it is sometimes present at 25%. Thus, teachers do not seem to favor diagnostic and normative evaluation.

Question 8: What is the degree of acquisition of professional and pedagogical skills required for a secondary school teacher qualified in the field of evaluation to teach physics and chemistry?
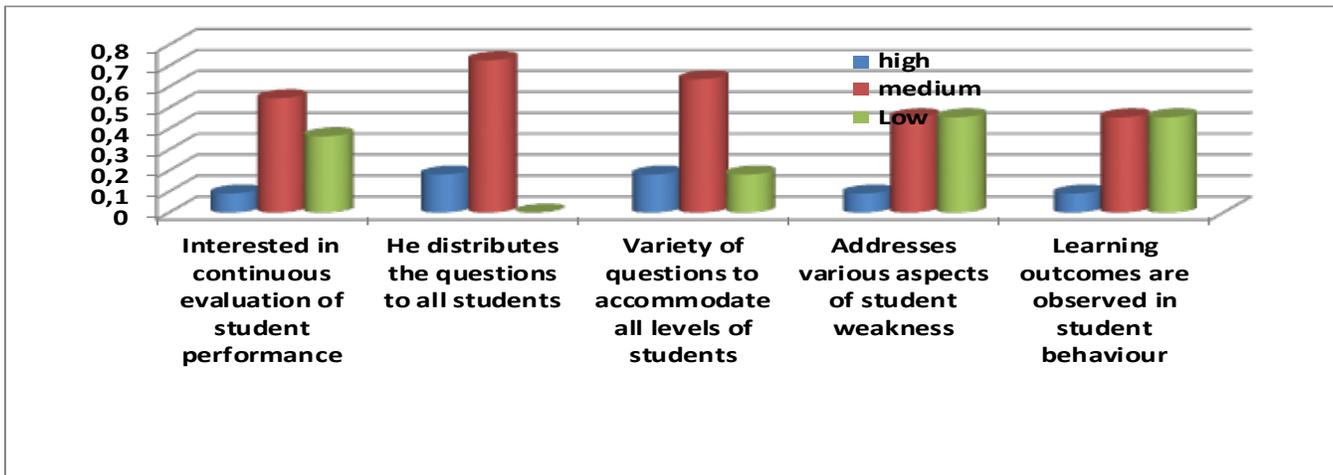
Figure 3: Degree of mastery of teaching skills

From this graph we conclude that:
- 50% of the inspectors state that the degree of continuous evaluation of student performance by physics and chemistry teachers is average.
- 70% of the inspectors judge that the degree of distribution of questions to all students by the teachers is average.
- 60% of the respondents stated that the degree of variation of questions to locate all levels of students by teachers is average.
- 40% of the respondents state that the degree of addressing various aspects of student weakness by teachers is average, while 40% say it is low.
- 40% of the inspectors state that the degree of observation of learning outcomes in student behavior is average, while 40% say it is enough low.

5.4 Theme 4: the degree of use of modern assessment strategies and their various tools
Question 9: What is the degree of use of performance-based assessment strategies?
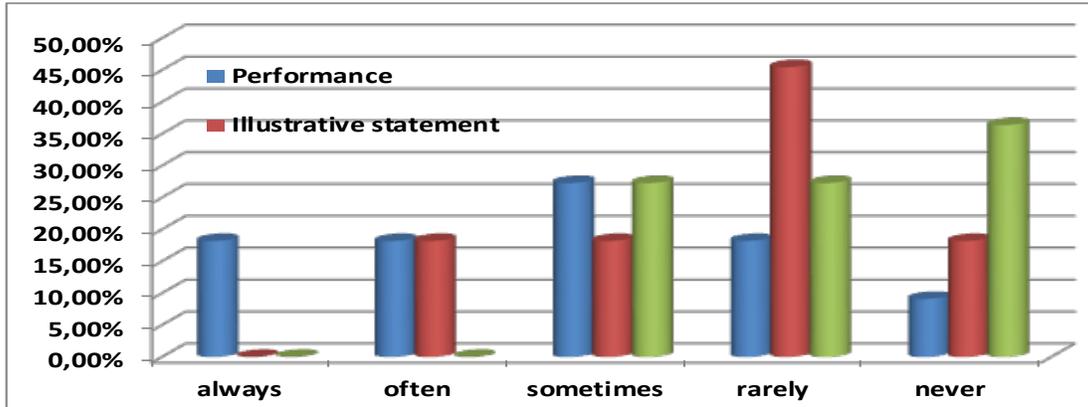

Figure 4 : Extent of use of modern assessment strategies

- Nearly 45% of the respondents pointed out that teachers rarely use the evaluation strategy based on the Illustrative Narrative Presentation.
- More than 25% stated that teachers sometimes use the Performance-based assessment strategy.
- More than half say that teachers rarely or never use the assessment strategy based on Simulation and role-playing.
Thus the rate of use of modern assessment strategies by physics and chemistry teachers is low.

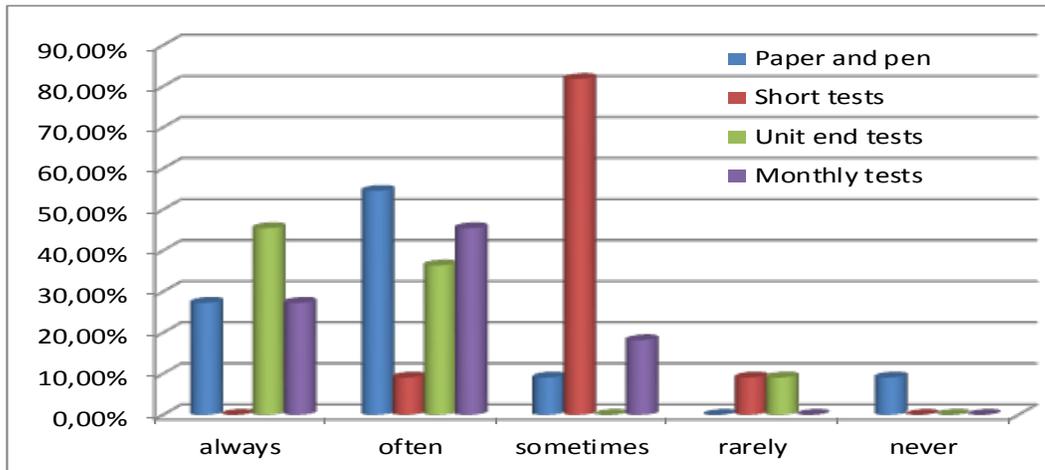*Question 10: What is the degree of use of paper-and-pencil-based assessment strategies?*

Figure 5:Evaluation strategy based on paper-pencil

According to the data in the graph above, according to the surveyed inspectors the degree of use of the paper-and-pencil-based assessment strategy by the teacher is high.
We also note that the majority of teachers use monthly tests and end-of-unit tests, while a minority of teachers uses short tests.

Question11: What is the degree of use of observation-based assessment strategies?
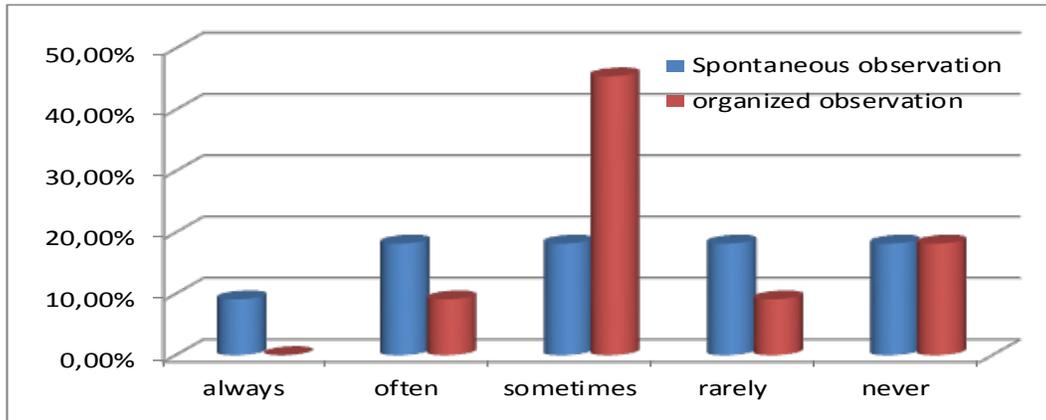

Figure 6: Observation -based assessment strategy

As can be seen from the graph above, the degree of use of the organized observation strategy is very average. While the degree of use of the spontaneous observation strategy is low.

Question 12: What is the degree of use of communication-based evaluation strategies?
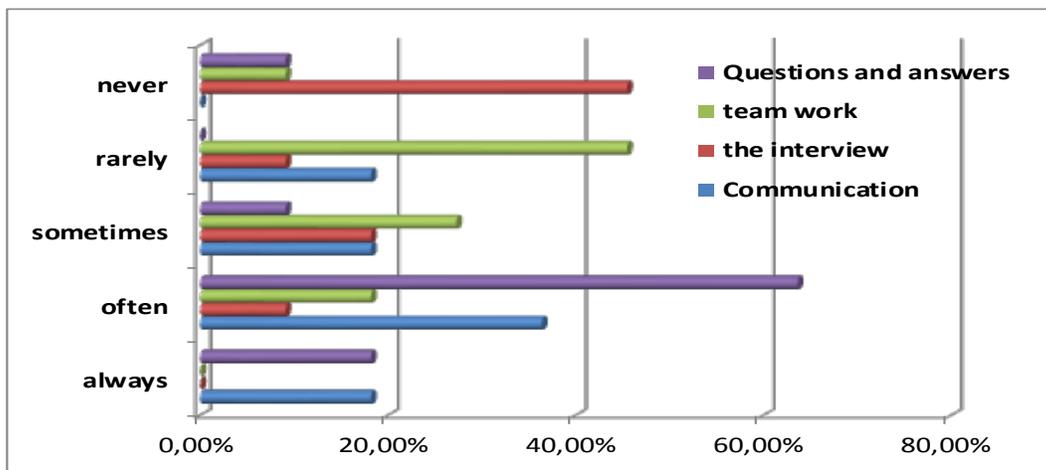

Figure 7: Evaluation strategy based on communication

The results of the study show that, in the opinion of the inspectors, the vast majority of teachers use the evaluation strategy based on questions, answers and communication. While a minority use the evaluation strategy based on group work and interview.

Question 13: What is the degree of use of evaluation strategies based on self-evaluation?
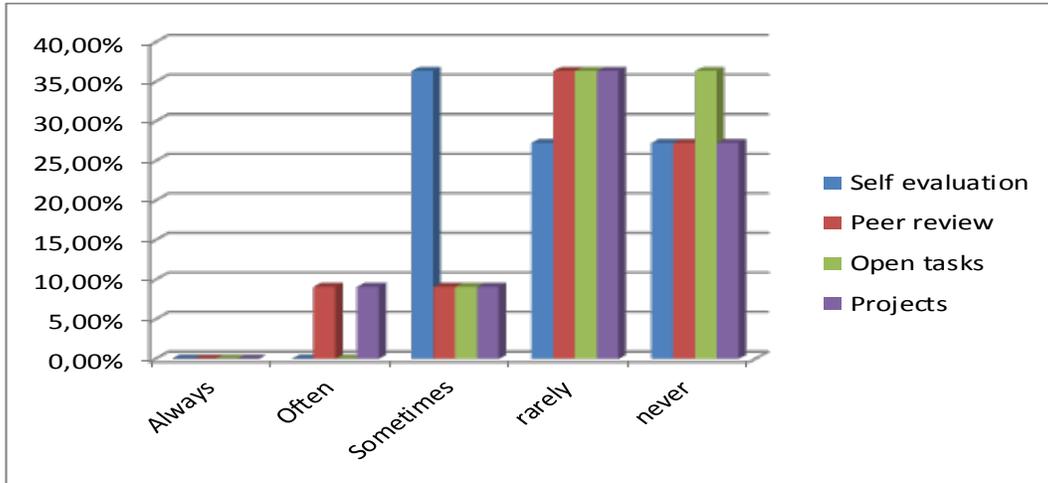

Figure 8: Evaluation strategy based on self-assessment

As can be seen, respondents report that the degree of use of evaluation strategies based on self-evaluation, peer review, open tasks and projects is very low.

Question 14: What is the level of use of the evaluation tools listed below?
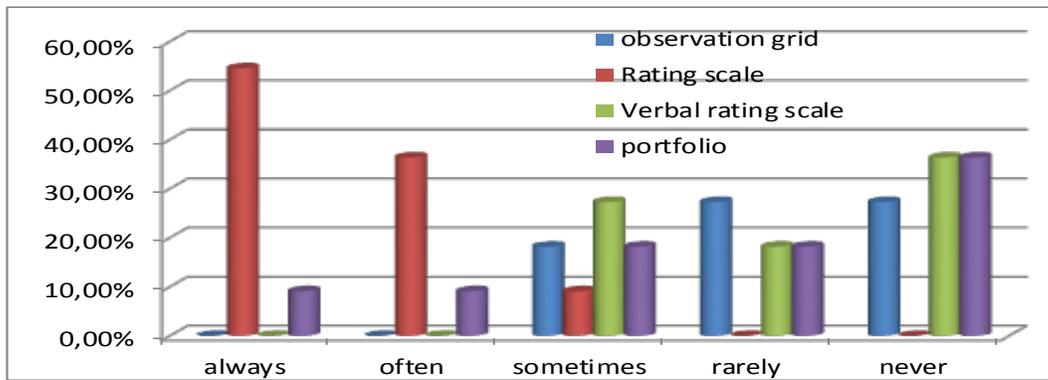

Figure 9: Degree of use of assessment tools

The graph above indicates that, in the opinion of the inspectors surveyed, this is the rating scale most commonly used by teachers. While the observation grid, the verbal rating scale and the portfolio are sometimes used by a minority.

Theme 5: Types of evaluation and pedagogical trends.

Question 15: What is the degree of compatibility between the types of evaluation adopted in our educational system and the pedagogical currents you may belong to?
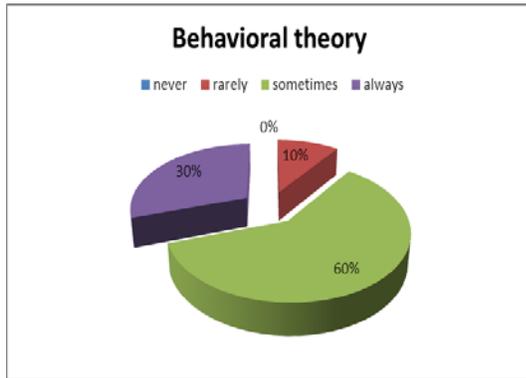

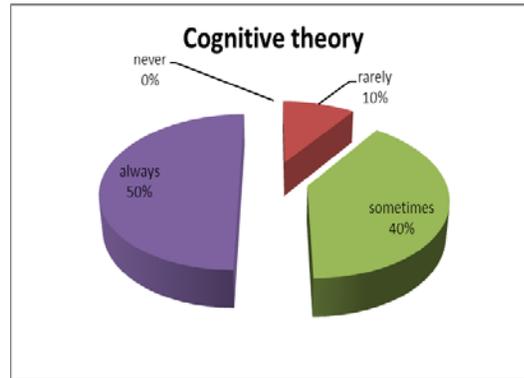Figure 12-a: Behavioral theory

Figure 10-b: Cognitive theory

We find that according to the two graphs 12-a and 12-b, the degree of compatibility between the types of assessments adopted in our educational system and behavioral and cognitive theory is very high.
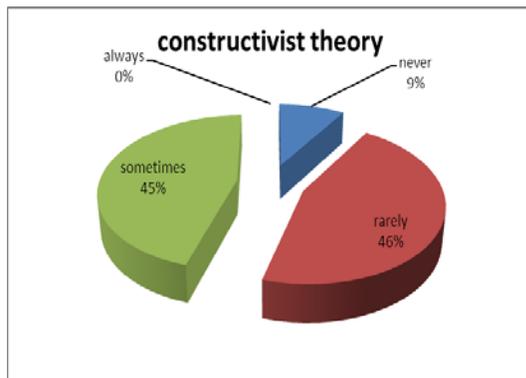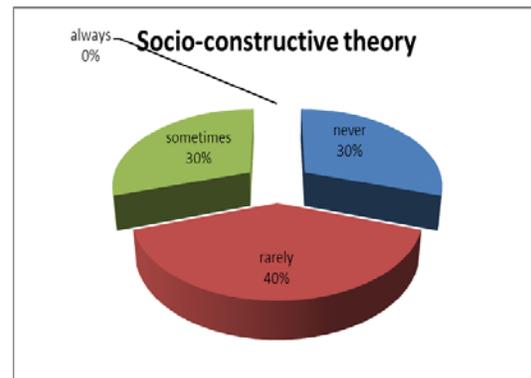

Figure12-c: Constructivist theory

Socio-constructive theory

According to the inspector's opinions (graph 12-c and graph 12-d), the degree of compatibility between the types of evaluations adopted in our education system and the constructivist and socio-constructivist theory is below average.

6. Conclusion and recommendations

The results of the study showed that the degree of teacher use of the paper-and-pencil assessment strategy was high, while the degree of use of the observation strategy and the communication strategy was moderate. With regard to the self-assessment strategy and alternative assessment tools and performance-based assessment strategies, their use was low.

The results of the research also revealed that the success rate achieved by the assessment methods used compared to the results of the national physical-chemistry examinations was 30%, confirming the need to review the assessment strategies used.

As for the types of evaluation adopted by teachers in the teaching of physics and chemistry, it was found that summative evaluation is used at about 70% and formative evaluation at 90%, while diagnostic evaluation is used at only 30%.

The field study also showed that teachers face didactic difficulties in teaching the subject due to the lack of communication and consultation between subject teachers, inspectors, pedagogical staff and training centers.

Our survey therefore reflects the state of a teacher who does not give sufficient importance to modern assessment strategies.

On the basis of the conclusions drawn from the analysis of the research results, we are convinced of the need to activate a program of training and organization of workshops and in-service training for teachers in order to fit out them with modern assessment strategies and professional teaching skills.

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