Degree IN TEACHER OF PRIMARY EDUCATION.
Subject: Didactics of Experimental Sciences
Course: 2019-20

Chapter 6. Evaluation

6.1. Evaluation of student learning and the teaching process

According to the Royal Spanish Academy Dictionary (RAE), the word evaluation has several meanings:

1. Point out the value of something.

2. Estimate, appreciate and calculate the value of something.

3. Estimate the knowledge, skills and performance of students.

Therefore, it is in the last definition where the RAE recognises the educational meaning of evaluation, adding some connotations derived from the social value that is one of the key elements of curricular development. Therefore, assessment should not be considered exclusively at the end of the curriculum development process, as is generally done. Initially, we may ask ourselves whether it is necessary to carry out the assessment, but, in reality, we need the reasons to do it, and when it is going to be. In that sense, we can establish two main aspects to summarise:

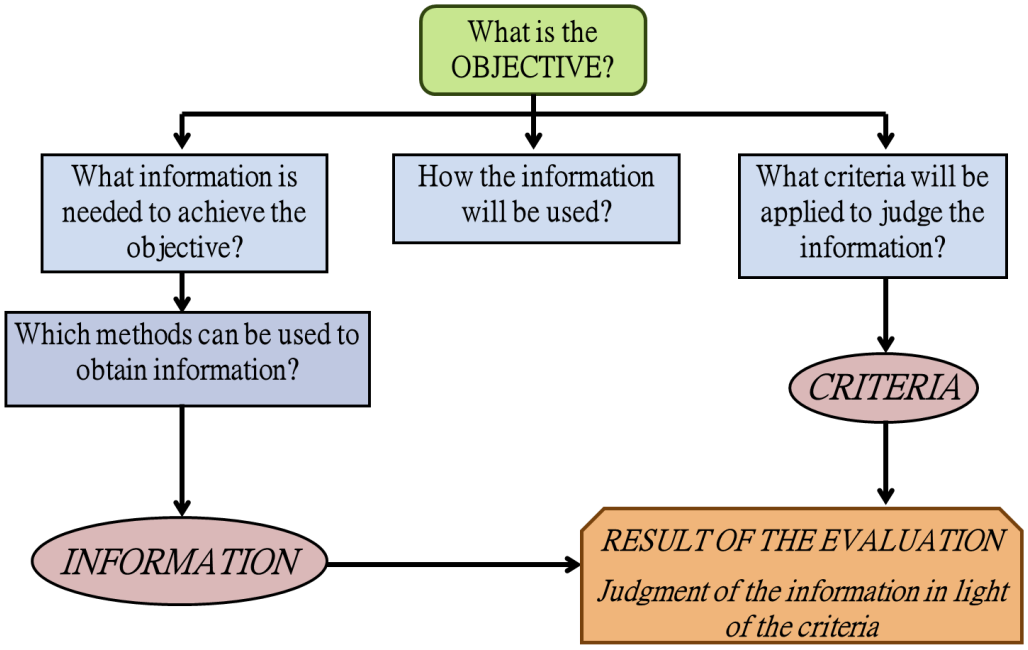
- **Learning and teaching involve evaluation:** The evaluation must not only measure the results, but it also conditions what the teachers teach and what and how the students learn. Therefore, it is necessary to consider evaluation as part of the teaching-learning process (Sanmartí, 2011).
- **It is necessary to identify errors to learn**: It is necessary to identify errors and difficulties in the ways of thinking, understand their causes and make decisions about the best way to overcome them, that is, to learn it is necessary to self-evaluate. We can remember this sentence: “from mistakes one learns”.

The difficulties and the mistakes of the students come fundamentally from their previous ideas, the fruit of the way they perceive the phenomena. These alternative ideas are, in many cases, difficult to overcome. The challenge for teachers is to recognise the causes of differences between what they propose to teach and previous ideas and, from there, to help them overcome obstacles to reduce differences.

Several studies provide evidence that a thorough review of the evaluation leads to significant improvements in learning outcomes, especially in students who have difficulty learning. According to Harlen (1998), the concept of evaluation is:

Evaluation “is the process of obtaining and using information to help make decisions or make judgments.”

In that sense, the evaluation involves making value judgments about what information is relevant to make decisions and decide which criteria should be used to obtain and judge the information obtained. The distinction between information and the criteria used to judge is essential. Highlighting the criteria on which the judgment is based distinguishes the assessment from the opinion. The selection of criteria, the type of information, and how both relate influence the judgment. Understanding the character and limitations of evaluation are essential concerning its usefulness. All these aspects form part of **the evaluation process**; in which, it is involved to pose a series of questions and take the corresponded decisions. The scheme of the process is:



The evaluation involves collecting certain pertinent information to judge and make a decision about the appropriate criteria. Therefore, the collected information and the used criteria will depend, in part, on the objective of the evaluation.

6.2. Evaluative Models

Evaluation is a complex process conceived in different ways. In that sense, there are two main ways to evaluate:

Traditional

- It pursues the quantitative control of student learning, valuing the final product, ignoring the process

School Research Didactic Model

- It regulates the teaching-learning process and allows to adjust it. A learning tool and an element that allows proposing improvements during the process

We can point out two main models for evaluation, which we will detail about different essential aspects.

Traditional Evaluation

About ***the students and the evaluation***:

- Students must not intervene directly in the evaluation of their class activity
- The teacher must correct an exam without knowing the author to avoid influences in the qualification.

About ***the meaning of the evaluation***:

- The evaluation is necessary, fundamentally, to decide on the promotion of the student
- Students, when they can respond correctly to the questions raised by the teacher in the evaluation, show that they have learned
- The teacher´s program establishes the level that students must reach at the time of the evaluation.

About ***what is evaluated***:

- The evaluation of the students must focus on essential scientific learning, and these are those related to the understanding of the concepts.
- The evaluation should focus on measuring the level reached by the students concerning the intended objectives.

About ***evaluation instruments***:

- The essential and most reliable instrument for the evaluation of learning is the written exam.

School Research Didactic Model

About ***the students and the evaluation***:

- If the students show a significant evolution of their ideas, even if they do not reach the most appropriate formulation, they should be positively valued.

About ***the meaning of the evaluation***:

- The evaluation should concern both learning and teaching.

- ❖ The evaluation is a fundamental instrument to understand and improve the teaching-learning processes.

About ***what is evaluated***:

- ❖ The learning of procedures and attitudes, as well as concepts, must be considered.

About ***evaluation instruments***:

- ❖ The evaluation should use the maximum possible number of instruments (class notebooks, participation records, laboratory work, self-evaluation reports)
- ❖ Evaluation instruments should be prepared to evaluate the students, the teacher, and the teaching.

In summary, the second model reflects a complete evaluation, that is, as an evaluative and research activity that should affect not only the learning processes of students but also the teaching processes developed by teachers.

The evaluation, therefore, must address not only the final product ("the grade") but also the processes in the classroom. Thus, a terminal and finalist evaluation raised outside the rest of the elements that make up the curriculum does not seem to be very formative.

6.3. Types of evaluation of student learning

There are different types of evaluation, depending on:

➢ **The moment of the evaluation:** We can consider three phases:

Initial evaluation (also called diagnostic): It is carried out at the beginning of the educational process to detect the initial ideas of the students.

Formative evaluation (also called procedural): It is developed throughout the teaching and learning process and functions as a regulating element of the process, favouring the construction of knowledge by the students, and it becomes an essential element of learning help.

Summative and final evaluation: It is usually carried out at the end of the process and is an average of the data obtained from the students through the used instruments.

➢ **Reasons and contents to evaluate**

Focusing on the previous phases, we can establish several aspects:

Initial or Diagnostic Evaluation	
What is it evaluated?	**What is it evaluated for?**
➢ Ideas or previous knowledge ➢ Reasoning and spontaneous strategies of the students ➢ How they elaborate and construct the proposed tasks	➢ Adapt the teaching proposal to the ideas and interests of the students ➢ Students become aware of their starting point

Formative or Procedural Evaluation	
What is it evaluated?	**What is it evaluated for?**
➢ Reasoning and strategies of the students ➢ Difficulties and obstacles in learning knowledge ➢ Evolution of the ideas of the students	➢ As positive reinforcement for student learning ➢ As a follow-up of the student learning process ➢ As a regulating element of the teaching-learning process ➢ To adjust the teaching process to the learning process

Summative and final Evaluation	
What is it evaluated?	**What is it evaluated for?**
➢ Knowledge acquisition ➢ Acquisition of strategies and processes	➢ Take stock of the different student´s results ➢ Integrate all available information about the learning process of students ➢ Support decision making to guide students

6.4. Evaluation as a regulation of learning

Every learning activity requires a process of self-regulation that is, overcoming difficulties and correcting errors understanding their causes. It is not easy to learn to self-regulate. Time is required (many students take a course or more to understand how to anticipate the action and its importance). They consider that the errors are mainly due to "distractions", and they have difficulty recognising that they have not dedicated the necessary time to plan the action (they perform the task without anticipating the possible ways of carrying it out). Moreover, it is also difficult for them to change the "rules of the game" they are accustomed to apply to pass, such as copying from others or memorising from the textbook, hiding and disguising mistakes and difficulties, or competing before they cooperate. Only the students who can

recognise their obstacles and know how to find ways to overcome them are those who will have successful learning. To recognise their obstacles, they must become aware of what they do not know and reflect on it. The challenge is that students understand that if they do not reveal what they do not know, no one can help them overcome the obstacles to learning. For example, a class journal can be an excellent evaluative-regulatory activity because it allows students to reflect on their successes and difficulties and allows teachers to obtain useful information to help them in their learning.

6.5. Evaluation as a verification of the learning

Also, one of the purposes of evaluation should be to verify student learning. In fact, during the evaluation process, we must check not only the achievement of the objectives but also identify the lack of learning. In fact, as a teacher, our task is qualified and credit the results, not only to reach the final marks (as the traditional model) but also to check our teaching process. To finish, we can consider two important aspects to verify the learning according to the law, namely, **evaluation criteria** and **evaluable learning standards**. So, according to the current law of Primary Education:

Evaluation Criteria

- Degree of acquisition of competences and achievement of the objectives of each teaching and educational stage: they are evaluation references that define what is wanted to value, what students must achieve, both in terms of concepts and procedures and attitudes. They respond directly to what is intended to achieve with the subject.

Evaluable Learning Standards

- Concretions of the evaluation criteria that allow defining the results of the learning and specify through actions what the student should know and know how to do in each subject. They should allow to grade the performance or achievement achieved. They have to be observable, measurable and evaluable since they contribute and facilitate the design of standardized and comparable tests.

For each cycle, the curriculum collects the evaluation criteria specific to the area of natural sciences, summarised in the following items:

First Cycle

1. Give examples of fundamental elements and resources of the physical environment (sun, water, air, earth, vegetation), and establish simple relationships with people's

lives. It seeks to know the ability to observe and explain some elements of the physical environment and its resources.

2. Recognise and classify the most relevant animals and plants in their environment. It aims to evaluate the ability to establish elementary criteria for classification (size, colour and way of moving).
3. Give examples associated with hygiene, balanced diet, physical exercise and rest. It is a question of verifying that they know and value the relationship between well-being and the practice of good habits.
4. Identify and give simple examples of the professions of the people around. It is a question of evaluating the knowledge and the importance it attaches to each of the professions in its environment.
5. To recognise and value some cultural manifestations present in the school, local and autonomous environment. It tries to evaluate knowledge, interest and respect for different cultural manifestations.
6. Identify the most common means of transport and communication in the environment, and know the basic rules as users and pedestrians. The aim is to evaluate the degree of knowledge of the means of transport, and the basic rules.
7. Arrange and describe changes in time in some aspects of family life and the immediate environment. The aim is to evaluate the ability to describe specific aspects of family life and the management of time units of measurement.
8. Identify differences in the elementary properties of materials, and recognise the visible effects of forces on objects, their components, and direction. It is a question of evaluating whether they identify the observable physical properties (smell, taste, texture, weight/mass, colour, hardness, state, capacity to dissolve in water or to react with any substance), and whether they are able to explain with examples the relationship between their characteristics and their uses. It will also be valued if they grasp the idea of force about movement.
9. Assemble and disassemble simple appliances and describe their operation and assembly sequence. It is a question of assessing whether they have developed assembly and disassembly skills, to explain how they work, what they are used for and the safety measures.
10. Ask questions to get information from observation, use some instruments and make records. The aim is to evaluate the ability to obtain information from a given observation, as well as the use of specific instruments.

11. To describe the cause-effect orally on the appearance, state and size of objects in everyday situations. It is about evaluating that they recognise and can evaluate observable changes in objects (oxidation, dryness, changes of state, colour, size, properties).

Second Cycle

1. Collect data and use measuring devices to recognise and explain the relationships between specific factors in the environment (relief, soil, climate, vegetation), lifestyles and people's actions, deepening the analysis of Andalusian landscapes. It is about knowing if they appreciate these relationships and if they understand the importance of adopting respectful attitudes towards the environment in order to achieve ecological sustainability.
2. Identify and classify animals, plants and rocks according to scientific criteria. It is a question of knowing whether they know these criteria for classifying living and inert beings.
3. Identify and explain the health consequences of certain habits of hygiene, diet, physical exercise and rest. The aim is to assess the ability to distinguish between harmful and health-promoting activities.
4. Identify with examples the uses that people make of natural resources, pointing out advantages and disadvantages. The aim is to assess knowledge of the elements of the physical environment and the consequences of inappropriate use. It will also assess the knowledge of some food production processes and whether it is possible to give examples of how critical the introduction of technologies is for the economy.
5. To point out some functions and the contribution to society of administrations and other organisations, as well as to know what rights and obligations we citizens have. It is a question of evaluating whether they know the functioning of some nearby organisations, and what behaviours of participation they present to favour the coexistence in the classroom.
6. Use spatial notions and reference to cardinal points to situate and situate objects, making use of maps and scale plans. It is a question of knowing if they have internalised spatial notions if they know how to locate the situation of the cardinal points and make use of them to move around in space.
7. To explain with examples the evolution of some aspect of the daily life relating it with historical facts and analysing the diverse dimensions that have contributed to the

construction of Andalusia, identifying the notion of duration, succession and simultaneity. It is a question of checking the basic notions of historical time (present-past-future, anterior-posterior, duration and simultaneity).

8. Identify energy sources and the procedures and machines to obtain them, as well as assess the importance of their responsible use. The aim is to assess whether they identify the most common energy sources, whether they relate them to their most common uses and whether they recognise appropriate use behaviours.
9. Analyse the main parts of objects and machines and their functions, and build some simple object. It is a question of evaluating if they know the parts of a machine and which is its function, also to its construction, it will be valued the cooperative work and the manual skills.
10. Obtain information on facts and make predictions, using observation and consultation of basic sources (information and communication technologies). The aim is to evaluate the ability to obtain information, to make conjectures from it, and to explain it both orally and in writing.

Third Cycle

1. Concrete examples in which human behaviour positively or negatively influences the environment, trying to analyse these issues in Andalusian landscapes. The aim is to evaluate the knowledge of human use of natural resources and how this activity can affect the ecological balance. The responsible use of water will be affected.
2. Characterise the main Spanish and planet landscapes, analyse some physical and human agents, and the impact of human activities on it. The aim is to evaluate the knowledge of different landscapes and to understand the importance of human intervention in their modification.
3. To identify and locate the human organs involved in the vital functions of the human body. It is a question of analysing if they understand the full functioning of the human body, and how individual attitudes of healthy life affect its proper functioning.
4. To analyse the changes that communications and the introduction of new economic activities have brought to human life and its environment. The aim is to assess the ability to analyse the changes that communications and transport have brought about in human activities.
5. Get to know the main governing bodies and their functions in the Municipality, Cities, Autonomous Communities, Spain and the EU. Understand the importance of

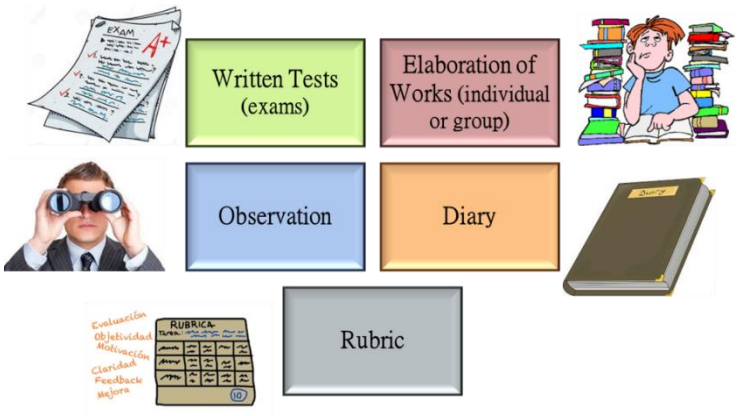
democratic participation. The aim is to assess their knowledge of the governing bodies and the functioning of public administrations.

6. Make, interpret and use plans and maps with graphic scale. The aim is to evaluate the capacity to obtain information through spatial representation (photographs, plans and maps).
7. To identify features of the way of life of the Spanish society in past epochs, as well as to situate relevant facts in the time. The aim is to assess whether indicators of lifestyles from specific past eras are recognised.
8. Plan and carry out simple research to study the behaviour of bodies in the face of light, electricity, heat and sound. It is a question of evaluating the aptitude to carry out experiences and small investigations as well as knowledge of the laws that govern these phenomena.
9. To plan the construction of appliances with a previous purpose, combining individual and teamwork, and informing about the resolution of similar problems over time, and how certain technological advances have changed life in Andalusia. It is a question of evaluating the knowledge of the different energy sources, the choice of these for their suitability for operation, and the knowledge of the different operators (wheel, brake, switch, gear).
10. Differentiate substances of daily use by their state and nature, explaining the characteristics of solids, liquids and gases. The aim is to evaluate the knowledge of the characteristics of solids, liquids and gases, and the capacity of reaction that many of these have, identifying some in domestic use.
11. Present a report with conclusions, using paper and digital support, on problems and simple situations, gathering information from different sources. It is a question of assessing the capacity to collect, select and organise information, analyse it and draw conclusions. The oral and written presentation will also name refers, as well as its clarity and cleanliness.

6.6. Evaluation Instruments

In order to apply evaluation criteria and that this can be carried out, it is necessary to have instruments that provide data and information about the process of construction of knowledge by students and that also provide information about the teaching process. Each of these instruments provides valid information for a global assessment of the student and the

teaching-learning process. Below are several evaluation tools that systematically allow the collection of information:



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