

SCIENTIFIC AND THEORETICAL BASES OF FORMATIVE EVALUATION OF EDUCATIONAL ACHIEVEMENTS OF STUDENTS ON THE EXAMPLE OF EDUCATION OF ELECTRIC CIRCUIT

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Abstract. The paper discusses the theoretical foundations of assessing student achievement based on new education standards. The features of formative evaluation, definitions of the concepts of evaluation, evaluation and marking are given. An example of a physics lesson on the use of formative estimation techniques is presented.

Keywords: content of education, educational standard, expected results, key and subject competencies, formative assessment, assessment of educational achievements of students.

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1. Introduction

Now, there are many questions are raised by the problem of the content of general education and how to assess the educational achievements of students.

The following main approaches to reassessing the goals, objectives and essence of the content of general secondary education can be distinguished.

Firstly, it is a competence-based approach, in which education is focused on the result and the formation of key and subject competences.

Secondly, a student-centered approach, in which the main thing is the personality of the student, increasing his participation in the educational process, activation and self-esteem.

Thirdly, it is an activity approach based on a rational combination of classroom-lesson and group forms of classes.

In the Kyrgyz Republic, in 2014, new generation subject curriculum for subjects of the Grades 5-9 were developed and introduced into school education on a competency basis. Hence, the expected results and assessment of educational achievements of students become different.

In order for students to achieve high-quality results in the process of educational activities, modern assessment should be:

- understandable to all participants in the educational process;
- flexible;
- multi-instrumental;
- psychologically comfortable;
- multi-part.

In order to effectively assess the educational achievements of students, the teacher must skillfully use various types of assessment: diagnostic, formative and summative. In this article, we aim to discuss the use of formative assessment in the classroom.

Formative assessment is a purposeful, continuous process of observing a student's learning. Formative assessment is an “informal” (most often mark-free) assessment. It is based on criteria-based assessment and feedback. “If the results of the assessment are used to improve the learning process, taking into account the identified needs, the assessment becomes “formative”.

Such an approach to assessing the achievements of students is in demand, which would eliminate negative aspects in learning, would contribute to the individualization of the educational process, and increase educational motivation and educational independence of students. One of these approaches is formative assessment, which can also be called assessment to improve learning.

Formative assessment, being an integral part of a student-centered approach to teaching students, radically changes the role of the teacher, who becomes not just a translator of information, but also a facilitator of the educational process. Personally, oriented technologies make it possible to organize the educational process based on cooperation between the subjects. Interaction between teacher and student becomes more trusting and friendly, open and accessible. Evaluation is carried out continuously, the very process of movement towards a qualitative result is evaluated, i.e. student progress. The student independently and consciously identifies his gaps and works together with the teacher to eliminate them. Assessment is transformed into self-control and self-esteem (Demidova & Korovin, 2004; Gutnik, 2004; Maron & Maron, 2004, Peryshkin, 2006; Schildkamp *et al.*, 2020; Shakirov *et al.*, 2012).

It is not the student who is assessed, but his work. In addition, when evaluating work, the emphasis is on its positive aspects, not disadvantages.

We also want to focus on understanding the terms themselves and their definitions, which are often used as synonyms in our country. However, they should be distinguished. In this, we rely on the definition of the following authors.

EVALUATION is the process of observing the learning and cognitive activities of students, as well as the process of describing, collecting, registering and interpreting information about a student in order to improve the quality of education.

EVALUATION (another meaning that we use in the education system of Kyrgyzstan) is the result of the assessment process, assessment activity or action, qualitative feedback information.

A MARK is a symbol, a conditionally formal, quantitative expression of the assessment of students' educational achievements in numbers, letters or otherwise.

The formative assessment techniques include hand signals, traffic lights, brainstorming, one-minute essay, three-minute pause, mini-test, elective test, self-assessment diaries, formative survey, inner and outer circle, one-sentence summarization, verbal assessment, written comments, two stars and a wish and many others.

Let us try to imagine how you can use formative assessment techniques in the classroom.

2. Lesson topic: Electrical circuit and its parts

Lesson objectives from a student's perspective:

Teaching: they know how to draw electrical circuits, assemble the simplest electrical circuits.

Educational: show interest in the study of physics, take good care of the equipment, and observe safety precautions when working with electrical devices.

Developing: know how to observe, conduct experiments.

Lesson type: combined (explanation of new material + conversation + training workshop).

Equipment for the lesson: slides, emoticons, samples of electrical circuits, a magnetic board, a current source - a galvanic cell, a key, electric lamps, an electric bell.

2.1. Organizational moment (*Creation of a favorable environment*)

- Greetings.

2.2. Communication setting up on the topic

Electrification, Electric current, Electroscope, Electrometer, Ammeter.

2.3. *Intellectual warm-up (based on the results of which the students will be divided into two groups)*

1. Where do we get our electricity?
2. How does it get to us?
3. What will happen if the electric current in our apartments is cut off?
4. What is the electric current?
5. Why is the light on?
6. Why is the bell ringing?
7. Why does the vacuum cleaner work?
8. What scientist discovered the earth's gravity?
9. What scientist discovered the volume of objects of irregular shape?
10. What does the physics study?
11. Why do we need physics in our life? Etc.

2.4. Formative survey: *students have to answer "Yes" or "No"*

1. Electric current is ... the ordered movement of charged particles.
2. Electric current flows ... only in solids.
3. Is the electrical machine a power source?
4. Divergent charges ... sometimes attract, sometimes repel.
5. Electric current is directed from - to +.

Having thus divided into two groups: "Newton" and "Archimedes", let us unravel the following questions.

2.5. Confused logical chains. *Electrical devices*

- 1. Electrometer - a device for measuring current strength
- 2. Ammeter - a device for measuring voltage
- 3. Electroscope - a device for measuring el. Charges
- 4. Voltmeter - a device for monitoring el. charges.

After the answers, each group is given a light bulb, with the help of which they have to make lighting in the national dwelling of the Kyrgyz people - a yurt. The teacher encourages everyone to work actively.

CREATING A BACKGROUND FOR A NEW THEME.

(Pictures are projected on the screen)

- What is shown in the first picture?

- The electrophoric machine.
- What is shown in the second picture?
- The thermo element as a current source.
- Which item is shown as a current source?
- The photocell is shown as a current source.
- What is it?
- Galvanic cell (battery).

Teacher's word: So, we found out where the current source comes from. How should we use the current source? Today during this lesson we will learn what an electrical circuit is, learn how to connect its parts and draw a diagram.

The electrical circuit consists of a current source, consumers and control devices. Now, happy people, pay attention to the screen: we will study the symbol on the diagram of electrical devices and devices. Then we will touch some of these conventional signs with our hands. Let's practice the memory test. Signs are given here. Write down what these signs are.

- Galvanic cell,
- Connector or disconnecter,
- Electric lamp,
- Electric bell,
- Connection of conductors, etc.

2.6. Reflection (for each correct answer)

- What does it take to make the electrical circuit work?
- What power sources do you know?
- Why do we need electric current?
- Give examples of consumers in the classroom, at home, on the street.
- The power source is connected to consumers by means of which ... connecting wires,
- There is another important part of the electrical circuit.
- In Paris in 1881, at the electrical engineering exhibition, everyone was surprised and delighted with this invention. Have you guessed what it is?
- This is a switch. Why do we need to use it?
- In technology, different types of closing and disconnecting devices are used. Write the closing devices.

Lesson summary.

Output. The electrical circuit consists of:

- 1 - current source,
- 2 - consumers,
- 3 - closing device,
- 4 - connecting wires,

Demonstration of turning on light bulbs.

Can you draw an electrical circuit?

- What is the name of the electrical circuit drawing?
- How are electrical appliances labeled?

2.7. Mini-test.

- With using what are the current-consuming devices connected for their work?
- Conductors.
- What is the function of an electric current performed by an electric bulb?
- The consumer.

- In which circuit is there always current?
- In the ring (solid).

What is the name of the directed motion of charged particles in a conductor?

- Current.

Brainstorming: How Are Schemes Different? Is there a mistake, no mistake? What is included in these electrical circuit diagrams?

2.8. Instructions on safety when working with electric current.

- Do not touch exposed wires when the power is on.
- Carry out all corrections in the circuits with the power supply disconnected.
- When assembling the chain, the key is closed only after checking the last!

2.9. Implementation of the laboratory work "Assembling electrical chains".

Objective: to learn how to assemble electrical circuits.

2.10. Homework:

Draw a diagram: current source, 2 lamps, ammeter, key. Put +,
Assemble the chain.

2.11. Relaxation. Lesson summary. Ratings (emoticons are counted, marks are given, verbal feedback is given).

3. Conclusions

Concluding we can say that the use of strategies and techniques of formative assessment in the lesson may definitely give good results, the quality of the teaching itself and the formation of key and subject competencies in students may be increased. The skillful application of different types, methods and techniques of assessment to collect data on the level of understanding of the topic, the formation of students' skills allows the teacher to differentiate learning, i.e. take into account the needs and capabilities of each student, and students - to control their own learning and form the maximum competencies they need both in the learning process and in later life.

References

- Demidova, M.Yu., Korovin, V.A. (2004). *Methodical reference book of a physics teacher*. Mnemosina.
- Gutnik, E.M. (2004). *Thematic and lesson planning for the textbook by A.V. Peryshkin*. Physics grade 8, Bustard.
- Maron, A.E., Maron, E.A. (2004). *Didactic materials*. Physics grade 8, Bustard.
- Peryshkin, A.V. (2006). *Physics grade 8*. Bustard.
- Schildkamp, K., van der Kleij, F.M., Heitink, M.C., Kippers, W.B., Veldkamp, B.P. (2020). Formative assessment: A systematic review of critical teacher prerequisites for classroom practice, *International Journal of Educational Research*, 103, 101602.
- Shakirov, R.Kh., Burkitova, A.A., Dudkina, O.I. (2012). Assessment of educational achievements of students. *Methodical Guidance*, Bishkek, Bilim, 80p.