

Practical

# Assessment procedures results of training in biology

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## Abstract

The article describes the procedures for evaluating the results of training in biology. The mechanisms for monitoring the learning outcomes of a biology teacher are presented. Examples of algorithms for procedures for evaluating learning outcomes in biology are demonstrated.

**Keywords:** *procedures for evaluating the results in biology, evaluation of planned results, methods and technologies for evaluating the results of teaching biology, organizational and pedagogical conditions for conducting evaluation procedures.*

## Introduction

The use of procedures for assessing the results of training in biology is provided through normative regulation, funds of control and measurement materials, regulations, technologies and methods for conducting evaluation procedures, information support, mechanisms for using the results of evaluation, etc.

By the quality of training in biology, we mean a comprehensive description of the results of educational activities of students, reflecting the degree of their compliance with the requirements of the federal state educational standard, mainly of the level of achievement of the planned personal, meta-subject and subject results of mastering the educational program.

The application of procedures for evaluating the results in biology is based on the leading didactic ideas:

- implementation of the requirements of the federal state educational standard to the structure and content of the planned results and orientation to the development of the personal qualities of a school graduate;
- openness of the procedures for conducting intermediate and final certification for trainees, stakeholders;
- the accordance and adequacy of assessment procedures for individual, age and

ethno-cultural characteristics of the trainee's personality, including those with special educational needs;

- systematic character, purposefulness and technological quality of pedagogical monitoring.

Organizational and pedagogical conditions for monitoring the evaluation of the results of training in biology include:

- a set of invariant and variable parts of the content of control measuring materials in biology;

- a system of criteria, indexes and indicators for assessing learning outcomes;

- the implementation of material, technical and educational-methodological requirements for evaluation procedures, the use of appropriate equipment, methods and forms in accordance with the regulations of the evaluation procedure;

- filling the portfolio to stimulate the development of the student's educational trajectory.

In the practice of teaching biology, the following forms of monitoring the results were most widely disseminated:

- 1) diagnostic, focused on the actual knowledge and skills of students before studying the topic;

- 2) current, aimed at studying feedback directly in the course of studying, fixing and reflecting the mastery of new material;

- 3) intermediate certification, which assumes an in-depth study of the results of school-children's training on the main topics / sections of the program;

- 4) final certification as an evaluation of the final results of training.

After choosing the form of monitoring, the teacher establishes the main content of the training material on biology, subject to verification.

When determining control measurement materials, it is necessary to make up a regulation for the planning of the content of educational results. The regulation determines the internal organization of the evaluation procedure, based on the step-by-step development of universal training skills, activities for obtaining results in biology (Table 1). The main principles of such planning are the definition of the material necessary for mastering the material of school biology; selection of a variable control system for the formation and development of the system of wildlife knowledge; repeated reproduction instructions for assessing knowledge and universal learning activities of students by any teacher.

Table 1. Regulation of planning the content of educational results.

Name of theme (module, section) and the main content of the program	Characteristics of students activities	Planned learning outcomes		
		Personal	Meta-subject	Subject

The next evaluation procedure is the selection of methods and means of the teacher's supervising activity, organizational forms of control.

The effectiveness of the educational and cognitive activity of students and the professional work of the teacher is determined through the use of monitoring methods of the training results in biology. Reproductive and performing methods are actively used in the work of teachers of biology; informative-inducing, instructive-practical, partially-searching, productive-practical and research methods are used less frequently.

Within the framework of the rational use of forms of tracing the results of training, it is recommended to fulfill a number of requirements: the variable use of different versions of the forms of verifying the learning outcomes of students in order to ensure the individualization of training; the implementation of personal and meta-subject results; the receipt by the teacher within the shortest period of time the greatest possible amount of feedback on the degree of mastering the program; the content validity of the forms of verification to the available level of the presented results achieved by the students; the organization of a short, quick and clear answer of the student to a concrete teacher's question or task, with a compact formulation of the standard answers and a strict algorithm of actions; the ability to quickly assess the student's response to both the specific question posed and the overall control work; achievement by the student at a specific stage of assessment in accordance with the norms of assessing the realistic possible level of training.

The range of complementary forms of evaluating the learning outcomes in biology is quite large: it is, as a rule, individual, individual group, group, frontal, class-generalizing forms. According to the specifics of the organization, the feedback can be oral or written checking, role-playing or business game, seminar, homework, practical work, essay, composition. According to the results of mastering the content of biology, the teacher organizes a textual, graphic, test or other form of presentation of the interpretation of materials. According to the technology of carrying out tasks and the level of independence, independent work can be organized with a textbook or workbook, reproductive work, independent practical research, presentation of a report, defending a paper, presentation of the project, credit on Skype, exam.

Development of control and measuring materials, standards of answers in accordance with the requirements of the educational program on biology should be accompanied by equal understanding of tasks by all trainees, the optimal identification of learning indicators with reducing the time of verification, the level of preparedness and mastering by the trainees the content of the topic, the reliability of the results.

From the teacher's existing control questions and assignments, the most reliable (according to degree of confidence in this form) and valid (for adequacy, compliance) should be selected. These are questions and tasks using didactic material (maps, drawings, diagrams, textual information, dummies, models, collections, etc.); questions and tasks test tasks of closed and open type with brief and detailed answers; by types of cognitive skills for description, explanation, analysis, classification, comparison, generalization, promotion and defending the hypothesis, and others); in accordance with the forms of presentation of results (exercises, tasks, dictations, essays, compositions, educational projects and others).

In the control work, it is desirable to arrange questions and tasks in order of increasing complexity or difficulty of implementation.

When selecting control questions and assignments, the teacher must take into account different levels of activity of the thinking processes of students (according to B. Bloom). The level of activation of thinking processes "cognition" is characterized by key words and phrases "name, list, formulate, describe, establish, tell, correlate". The level of activation of thought processes "understanding" includes key words and phrases "de-

scribe what you feel about ...; tell in your own words; show the relationship; explain the meaning; add up ". "Application" is accompanied by key words and phrases "explain the purpose of the application; use this to solve ...; demonstrate". "Analysis" as the fourth level of activation of thought processes has distinctive features of key words and phrases "explain how and why explain the reasons; decompose into components; compare; classify ". The fifth level of activation of thought processes "synthesis" is combined with key words and phrases "think up another option ...; create; what happens if ...; is there another reason ...; develop a new kind of product ". The sixth level of activating thought processes "evaluation" is illustrated by key words and phrases "evaluate opportunities; express criticism; what do you think about ...; choose what you like best; set the norms; choose and select».

When carrying out the procedure of students' answers control questions and executing assignments by the trainees the biology teacher is recommended to build their pedagogical activity according to the following algorithm:

1. Short briefing on the implementation of the test work, handing out of individual packages of test and measurement materials to students. In the briefing, the teacher explains the nature of the tasks, draws attention to the sequence of their execution and filling in the answer forms (pages of the workbook, sheets), the format of presenting the result, the time periods for execution.

2. The procedure of controlling the students in the implementation of monitoring questions and tasks. The ideal scenario is when each trainee has individual control materials in electronic or printed form, each student works at a separate desk.

3. The organization by the teacher of mutual control or self-check-up. There may be several options for conducting: 1) The student completed the tasks on time and can check his work in the remaining or free after-school time. 2) The trainee completed the control tasks ahead of schedule. The teacher during the current evaluation gives him the "standards" of answers, the criteria for giving the mark. 3) The trainee receives additional control tasks for extracurricular work, evaluates them in accordance with the content of the training material in the textbook, etc.

The final stage of the evaluation procedure involves the selection of methods for evaluating learning outcomes; examination of the content of the answers.

Evaluation of the learning outcomes is carried out by comparing the results obtained with the standards according to the criterion-evaluation system of quality, is expressed in conventional signs, scores, evaluative judgments of the teacher giving meaningful interpretation of the results.

Based on the assessment of parameters and indicators of evaluation, the level or degree of successfulness of learning is determined. To assess the results of cognitive experience, there are five levels: discrimination, memorization, understanding, simplest skills and abilities. For the experience of the emotional-value attitude - neutral passive attitude, positive amorphous attitude, positive conscious attitude, positive personal attitude and creative experience - neutral-passive readiness, positive stimulus-productive response, conscious active participation, intellectual-heuristic productive activity, one's own creative activity.

The main emphasis in the processing of the responses of the students' control work of the students is done to check the specific results of the students: 1. Mastering of the system of scientific knowledge about wildlife. 2. Formation of initial conceptions. 3. Ex-

perience in using the methods of biological science, mastering the methods of providing first aid. 4. Formation of the bases of ecological literacy, representations about the importance of biological sciences.

Detailed quantitative and qualitative processing of the results of evaluating the answers of students can be done using level, element-wise (component) or operational analysis.

Results of the students' achievements evaluation can be archived in a variety of ways: in a text format (descriptions, written analyses, recommendations, reviews, personality assessment); in a graphical form (pie or bar charts, ratings, models, statistics tables, etc.); in an electronic form (automated processing of test results, computer data-bases).

The assessment results are recorded in a journal, students' diaries, reports; are transmitted to parents and the school administration (if necessary) via the electronic journal system; and are accumulated in a student's portfolio.

The efficient processing of test results allows a teacher to observe the quality of content acquisition; it reveals typical defects, errors and gaps in the knowledge of the subject, the errors in the choice and use of concepts and interpretation of terms.

Special attention should be paid to identifying the reasons and causes of defects and errors. Through interviews and counseling activity a biology teacher should ascertain the reasons for the students' current difficulties in mastering the core topics of the subject content.

In accordance with the information received on the quality of education, the biology teacher makes adjustments to the further process of studying the topic.

Depending on the results of mastering the volume of educational material, the level of complexity of the assignment, the level of the student's progress, the teacher needs to make a program of corrective measures for students (adapted individual assistance).

Corrective measures complete the procedures for assessing the results obtained, ensure the quality and effectiveness of the educational process.

Thus, in order to effectively evaluate the results of training in biology, it is important for the teacher to organize a series of procedures: collect meaningful information; to think over its quantitative and qualitative processing, analysis and comparison of data; to evaluate the reliability of the results; make arrangements for coordination and planning of further pedagogical actions.

On the basis of the above-mentioned, it is evident that the evaluation procedures are an open complex allowing the evaluation of the results of students in biology at any stage of the study in accordance with the goals of general education. The effectiveness of its functioning is determined by the peculiarities of the structural components of the content of the object; choice of means and methods for implementing technology and methods for tracking the results; organizational and pedagogical conditions for carrying out control; requirements for content selection and training facilities; scales of evaluation by criteria and measuring quality instruments of education, which determine the educational effect.

The application of a variety of procedures for evaluating the results of training in biology ensures interaction between learners and educators in accordance with the learning situation best of all, allowing to take into account the individual and age characteristics of students, giving them the opportunity to absorb the material at an acceptable rate.

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