

# PEDAGOGICAL SCIENCES

## INTERPRETATION OF THE CHARACTERISTICS OF THE ELEMENTS OF THE “ASSESSMENT OF STUDENT ACHIEVEMENTS” BLOCK OF THE INFORMATICS SUBJECT CURRICULUM APPLIED IN GENERAL EDUCATION SCHOOLS OF AZERBAIJAN BASED ON THE “SYSTEM-STRUCTURE” APPROACH

**Ibrahimov F.,**

*Sheki branch of ADPU,*

*doctor of pedagogical sciences, professor*

**Abdurahmanova G.,**

*Sheki branch of ADPU,*

*head teacher*

ORCHID: <https://orcid.org/0000-0001-9361-4121>

**Garayeva G.**

*Sheki branch of ADPU,*

*doctoral student, head teacher*

ORCHID: <https://orcid.org/0000-0002-8347-5145>

### Abstract

In the article, it is emphasized that the curriculum reform is conditioned by the need to ensure the adequacy of the implementation of education in Azerbaijan to the challenges of the 21st century, to train a creative, self-developing personality. Also, in the research work, the importance of the educator's reference to the “system-structure” approach both in familiarizing himself with the essence of the “General education program” and in his practical activities related to its implementation is drawn into the center of attention.

The article presents adequate generalizations of the evidence collected on the basis of the “system-structure” dialectical approach, which aims to reveal the nature of the subsystems included in the “Evaluation of Student Achievements” block of the “block-scheme” form of the structure of the Informatics curriculum in Azerbaijan secondary schools.

**Keywords:** Educational program, curriculum, subject curriculum, “block-scheme” form of the curriculum, evaluation of student achievements, diagnostic, formative, summative assessment, in-school assessment, analytical and holistic assessment scheme, evaluation tools, assessment standards.

*Relevance of the research topic.* Observations show that mistakes are made in the activities of educators in the application of the Informatics subject curriculum at the general education level. This has a negative effect on the level of efficiency of the teaching process of Informatics.

It is undeniable that the level of understanding of any real existence (objective existence) has a determining effect on the results of using it in adequate directions. On the basis of our scientific observations conducted over the last ten years (at the stage of applying a new approach to the philosophy of general education in Azerbaijan), we have come to the conclusion that in the process of using the subject curricula (including the Informatics subject curriculum), the errors manifested in the activities of the educators are based on a number of reasons, as well as the failure of the subject curriculum. its essence is not sufficiently honestly understood by these subjects.

Based on our experience of scientific activity, we claim that the “system-structure” approach (the idea of L.Bertalanf [14;8], which is the basis of system analysis) is the most reliable dialectical method of understanding any objective reality (material or spiritual) and

getting to its essence. in other words, it is a way of spiritual awakening (it is essentially a form of cognitive movement). The analysis of the materials we have collected gives reason to say that this method is insufficiently used in the theoretical and technological directions regarding the discovery of the essence of the Informatics subject curriculum and the determination of its application methods. so that

*Interpretation of generalizations formed on the basis of research materials.* It is known that “in the 21st century, the main value in the life and development of both society and each of its members is a creative, self-developing personality” [15; 16] and there is also the fact that education cannot exist outside the realities of the changing world [11]. Therefore, since the main value in the modern period is a creative, self-developing personality, the educational process should form creativity and self-development abilities in the child. This, in turn, is based on the activity, the need to understand and the abilities, which are interpreted by the schematic representation below (see Diagram 1):

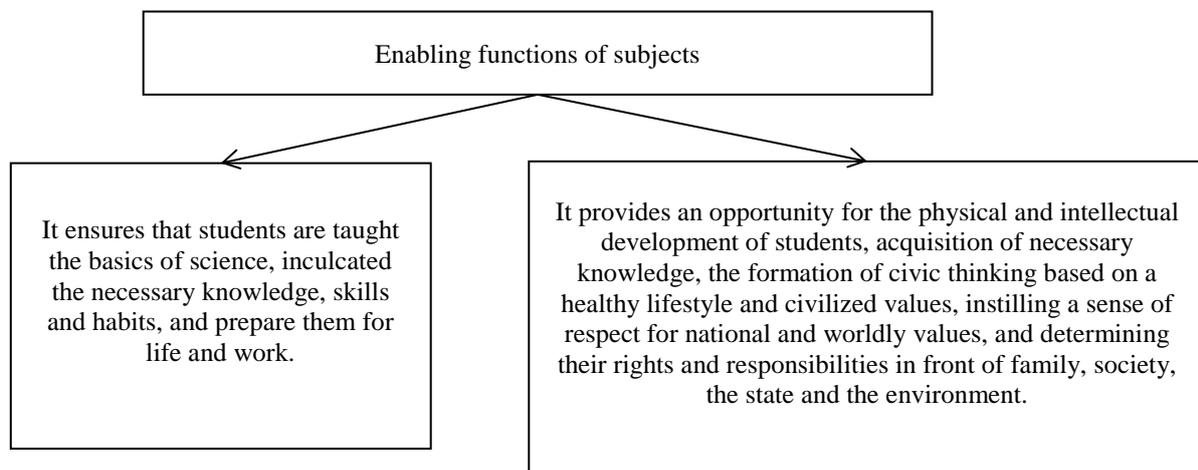


communicate in a foreign language and so on. to evaluate the results of his work; to follow public behavior, as well as relevant safety and medical-hygiene rules, healthy lifestyle norms; to demonstrate that he has national, moral, legal, aesthetic values, citizenship position, and leadership qualities; to work together in solving problems, to evaluate the performance of oneself and others in the collective work process; to communicate in a foreign language and so on. to evaluate the results of his work; to follow public behavior, as well as relevant safety and medical-hygiene rules, healthy lifestyle norms; to demonstrate that he has national, moral, legal, aesthetic values, citizenship position, and leadership qualities; to work together in solving problems, to evaluate the performance of oneself and others in the collective work process; to communicate in a foreign language and so on. to evaluate the performance of oneself and others in the collective work process; to communicate in a foreign language and so on. to evaluate the performance of oneself and others in the collective

work process; to communicate in a foreign language and so on.

The listed skills of the student who has completed his general education - the general learning results are formed as a synthesis and dialectical unification of the results targeted in the teaching process of all subjects taught in general education schools.

“Revealing the child's creative abilities and realizing them, creating favorable conditions for the formation of his personality is one of the main goals of education” [7; 290-292]. There is no doubt that subjects, which are the main enabling components of the implementation of general education, are of high value as an important tool in the formation of the personality of schoolchildren. The "enabling" functions of subjects have found their expression in the "Education Law of the Republic of Azerbaijan" [2; 21-23]. The mentioned functions can be presented in the form of a scheme as follows (Scheme 2):



*Scheme 2.*

Based on the official state documents, we can say the opinion that “the content of general education subjects is divided into different levels of education and aims at the following iyearxic goals”:

- to improve reading, writing and calculation skills in primary education, to form basic knowledge about man, society and nature, elements of logical thinking, aesthetic and artistic taste and other characteristics;
- oral speech and writing culture, communication skills, cognitive activity, the development of logical thinking, the formation of relevant knowledge and ideas about the subjects included in the educational program, as well as the development of world civilization, the ability to use modern information and communication tools, events to provide the ability to evaluate and determine their own future directions of action;
- the realization of talents and abilities, preparation for independent life and professional choice, formation of an active citizen position, respect for national and universal values, human rights and freedoms and tolerance, free use of modern information and communication technologies and other technical means, acquiring the basics of economic knowledge, communicating in one or more foreign languages, etc. provide (see [2] for more details).

In the listed system of knowledge, skills and habits, what is obtained at different educational levels in the teaching of Informatics is included as a component. The relevance of the mentioned components has found its expression in the official document [1].

Due to our adequate generalization to our subjective meaning, it is of particular importance that the subject teacher (as well as the teacher teaching the Informatics subject) honestly knows the tasks set before the general education (the expected general results). This is necessary for the activity related to the educational process to be put into a result-oriented system.

As is known, the goal is a system-creative component in all processes, as well as training-activity. In addition, in order to make the goal a reality (otherwise, the result will not be produced), it is very important to implement the training process in what content, based on what strategy, based on what evaluation mechanisms [12;71].

As is known, the teacher should be able to find both theoretical and practical answers to all questions related to the learning process. He should know which model he uses in the process of which he is a facilitator and what specific features this model has. This model combines the advantages of traditional models.

Based on what we have said, it can be concluded that the Informatics subject curriculum is a set of documents that reflect all the activities aimed at achieving the general learning outcomes by setting the main goals of Informatics training in secondary schools and are directed to the capabilities and needs of each student. The computer science curriculum is designed on the basis of result-oriented content standards and involves regular assessment of progress in student achievement to ensure mastery of the standards, and while setting content standards, the main goal is to gradually increase the speed of progress in student achievement, and it prioritizes the instilling of necessary skills needed in daily life by students. [1].

The teacher is one of the subjects of the “enabling function” in the implementation of the educational program. The level of his penetration into the essence of the mentioned program has a conditioning effect on the effectiveness of its activity. Therefore, it is important to refer to the “system-structure” approach both in getting to know the essence of the program and in the practical activities related to its implementation, which the analysis of research materials and our work experience brings us to this conclusion.

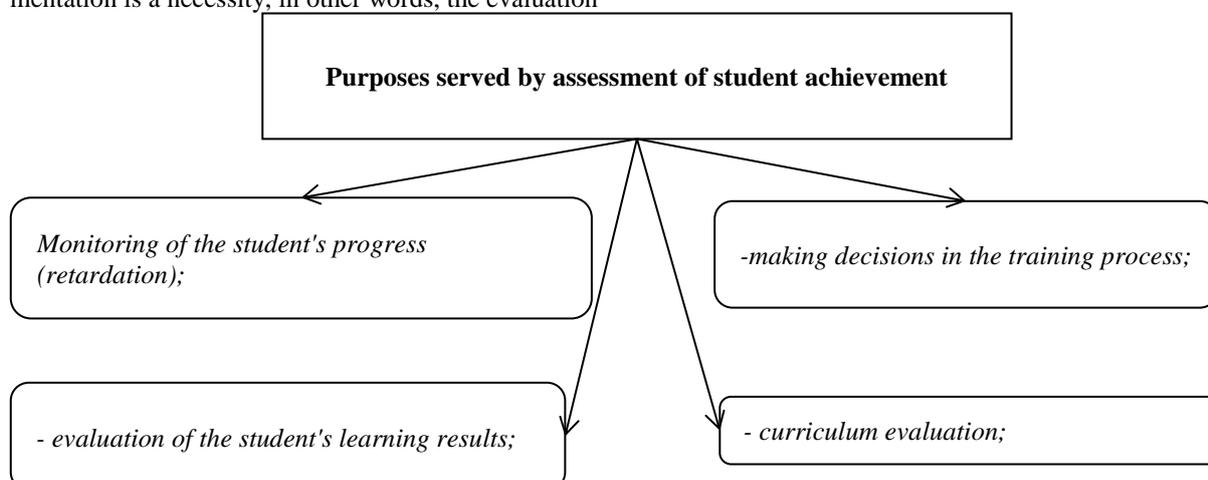
The educational program (curriculum) determines the content of education and the rules of mastering it for different levels of education in accordance with state educational standards [9; 106-107]. The educational program includes the curriculum, teaching programs for subjects, recommendations on methodical provision, assessment and other relevant educational technologies [8;173]. Listed are subsystems of the Education program - complete.

The main goal in determining content standards for subjects is to set goals for the mastery of those standards by each student. In order to achieve knowledge and skills according to the accepted standards, the activity of each student should be continuously stimulated, and the necessary conditions should be created for them to master higher-level standards. Ideally, no learner should be allowed to fall behind throughout the school year, but instead, the focus should be on each learner's progress. Despite what has been said, it can be argued that the application of evaluation mechanisms in the process of education implementation is a necessity, in other words, the evaluation

of the student's achievements is a continuous, dynamic (in many cases informal) process. In this process, it is important for the educators to observe the students and for the purpose of mastering the necessary part of the human experience, those who direct their activities (those who want to learn - students in general education schools) perform class work and homework, and their written and oral answers are taken into the center of attention. It should be emphasized here that evaluation is one of the main psychological problems of group life (cooperative-based activity). It is a well-known fact that the emotional or intellectual, moral or aesthetic values that people give to each other play an important role not only in the formation of personality in the process of activity and communication, but also in interpersonal relations. Pedagogical assessment appears as a special type of assessment. It has been proven many years ago that price is of great importance as an educational tool. It was determined that the grade has a profound effect not only on the student's intellectual work, but also on the affective-will area, the level of assertion, the formation of intentions and attitudes through the feelings of success and failure experienced by him. In school experience, grades have historically emerged as a means of creating motivation.

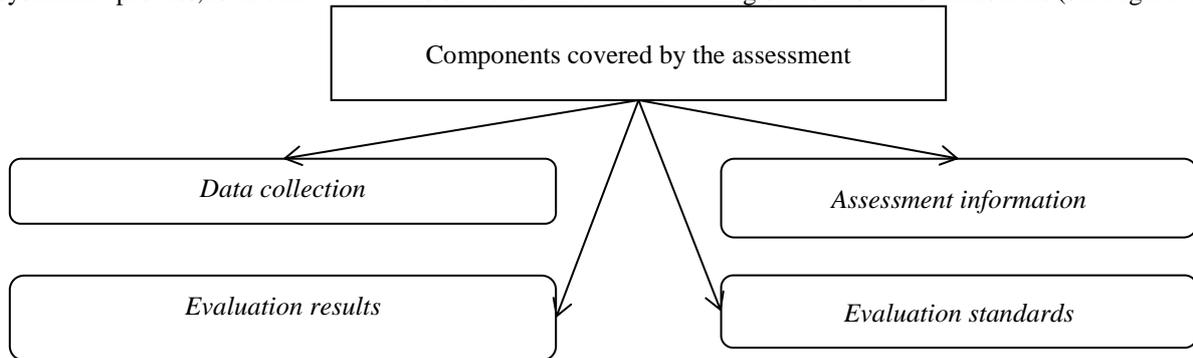
The issue of objectivity of pedagogical assessment has always been relevant. No matter how much importance is given to grade criteria in pedagogy and subject teaching methods, subjective factors play an important role in the evaluation process. It should not be forgotten that the effects of pedagogical assessment are an important psychological-pedagogical problem, related to the formation of the demand-motivation field (forming the student's demand-motivation field, creating favorable conditions for his self-actualization is a prerequisite for the effectiveness of teaching activities).

The results of a properly conducted assessment allow making decisions about the teacher's activity, how well this activity meets the needs of students, as well as the need to make appropriate changes in the curriculum, planning and textbooks. Assessment of student achievements is considered as the process of collecting information about the student's ability to acquire knowledge, use it, and draw conclusions, and serves the following purposes (see Scheme 3):



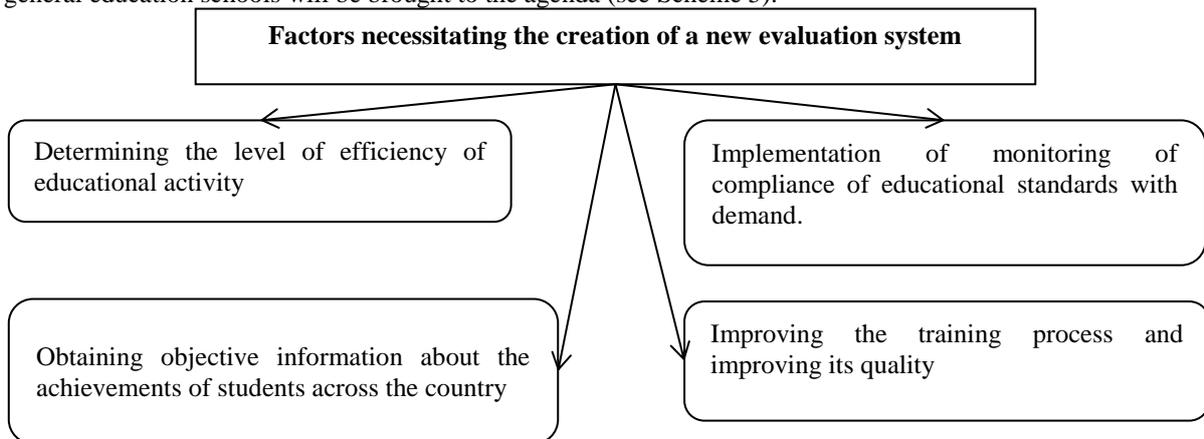
Scheme 3.

Assessment and learning processes are seen as two interrelated aspects of education. Evaluation, which is a systematic process, is an effective means of feedback between learning outcomes and stakeholders (see Figure 4).



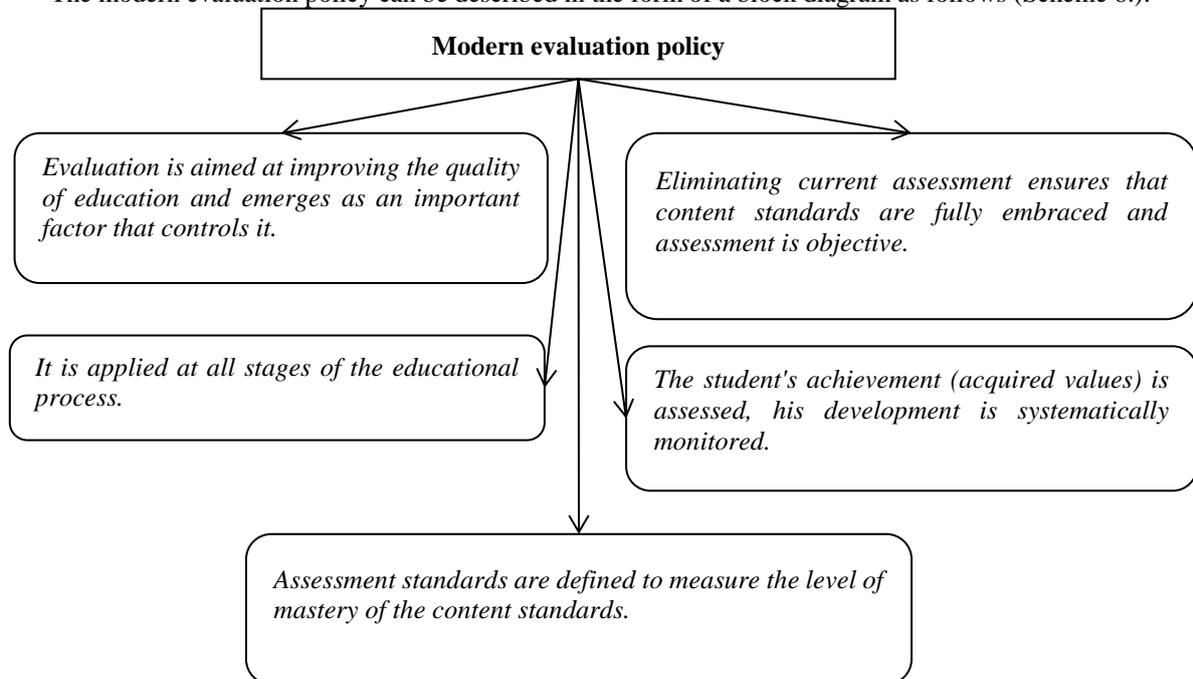
Scheme 4.

It is stipulated that a new evaluation system related to the application of the curriculum model in Azerbaijan's general education schools will be brought to the agenda (see Scheme 5).



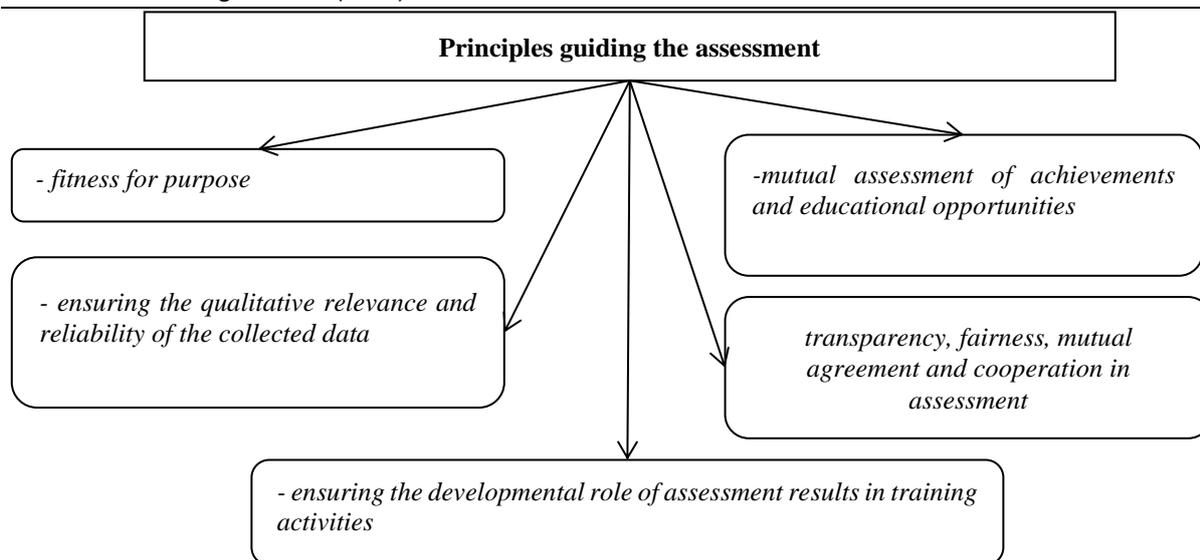
Scheme 5.

The modern evaluation policy can be described in the form of a block diagram as follows (Scheme 6.):



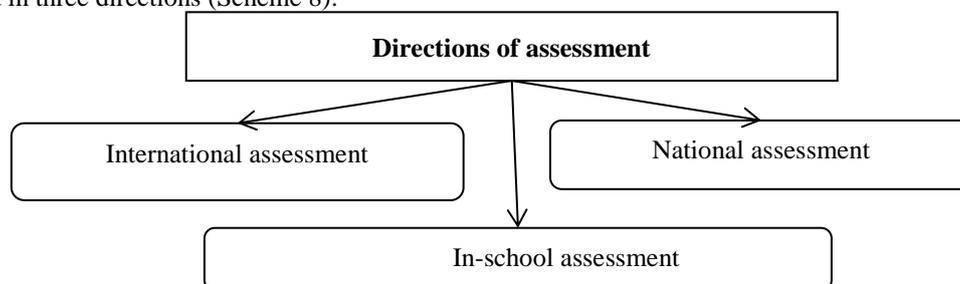
Scheme 6.

A number of principles should be kept in focus in the implementation of the evaluation process. These include (Scheme 7):



Scheme 7.

There are directions of assessment with different form, content and purpose. In Azerbaijan, assessment is carried out in three directions (Scheme 8):



Scheme 8.

In particular, let's emphasize that national and international evaluation are evaluation studies conducted to determine perspectives in education and are carried out by special institutions. In-school assessment is a formal assessment and serves to move students from grade to grade, from one educational level to another.

*International assessment:*

- a) It is based on international standards;
- b) It is the result of integration processes in society;
- c) Creates an opportunity for citizens of each country to study in other countries;
- d) It is held by international and national experts.

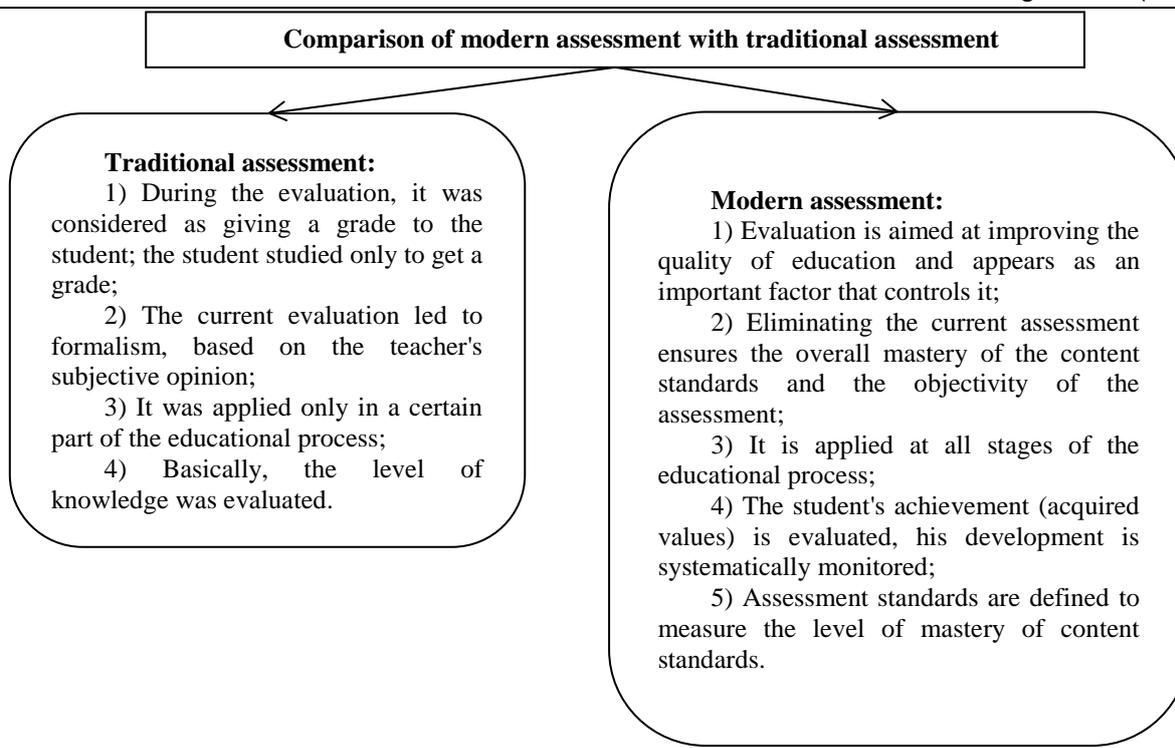
*National assessment:*

- a) It is held by national institutions;
- b) It is conducted in order to determine the level of training results at all levels and levels.

*Types of in-school assessment:*

- a) Diagnostic assessment (initial level assessment);
- b) Formative assessment (monitoring of development);
- c) Summative (final) assessment [9; 338-340].

As a side note, let's note that in order to clarify the nature of the modern assessment, it is useful to compare it with the traditional assessment, and we consider it acceptable to conduct the said comparison according to the following parameters (see Scheme 9):



Scheme 9.

In order to increase the efficiency of the comparison, the interpretation of the traditional and modern assessment by components can be given in the form of a table as follows (see: Table 1)

Components	Traditional assessment	Modern assessment
<b>Objectives</b>	It was considered focused on the development of knowledge, skills, and habits; In reality, the level of knowledge was mainly assessed.	It is focused on the development of knowledge, skills, habits, values, personality; the student's achievement (gained values) is evaluated, his development is systematically monitored.
<b>Roles and responsibilities</b>	Assessment was seen as giving a grade to the student; the student studied only to get a grade; it was applied only in a certain part of the educational process.	Evaluation is aimed at improving the quality of education and appears as an important factor that controls it, it is applied at all stages of the educational process.
<b>Types and directions</b>	In-school current and final assessment	International, national, intra-school assessment; Diagnostic, formative, summative assessment
<b>Features</b>	It was more formal, imprecise, based on the teacher's subjective opinion, and unsystematic.	It is based on the standard. It is more objective, accurate, adequate, systematic.
<b>Criteria, indicators</b>	It is a subject-based achievement assessment; More quantitative indicators are considered.	Based on assessment standards; Quality indicators are taken into account.
<b>Methods and tools</b>	Limited and inflexible (oral response, tests, tests)	More diverse and flexible (interview, conversation, observation, rubrics, assignments, cooperation with parents and other subject teachers, oral responses of students, analysis of students' writing, results of test tasks).
<b>Forms</b>	Intra-class, intra-school	Intra-classroom, intra-school, centralized.

Let's specially emphasize that the diagnostic assessment serves to determine the initial level of the student's knowledge and skills, directly selects the teaching strategies of the teacher, and the diagnostic assessment:

- 1) Enables flexible changes in training objectives and strategies according to circumstances;
- 2) It allows to get information about students' interests, outlook, environment;
- 3) Creates conditions for individual approach and differential training. In this

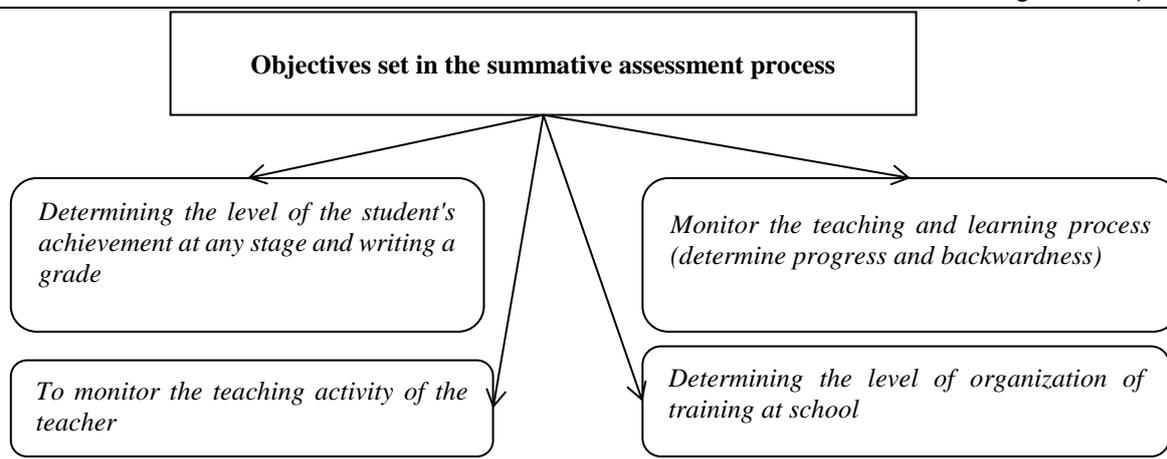
process, the following goals are aimed: 1) To obtain information about the initial level of knowledge and skills of each student; 2) In planning the training process, take into account the individual development characteristics of students and provide an individual approach; 3) Determine the training strategy. The time of the diagnostic assessment is determined as follows: 1) At the beginning of the school year, teaching units; 2) As appropriate - at the beginning of sections and chapters; 3) When a necessary situation arises (when a student comes from another school, changes a class, etc.). The results of the diagnostic assessment are not recorded in official documents, the written notes are reflected in the teacher's notebook, stored in class and student portfolio. According to the purpose of diagnostic evaluation, it is carried out in two forms: continuous and short-term. Continuous diagnostic assessment: 1) is carried out at the beginning of the educational level and school year, in a certain part of several lessons; 2) aims to study the current state of knowledge and skills of students in the class; 3) during which the teacher learns the areas of development (cognitive, social-emotional, physical-motor) in which the student's knowledge and skills are included, he uses more the observation method and the tool that implements this method - the observation chart; 4) in the process, the method of cooperation with parents and other subject teachers and survey tools are used to collect more detailed information about the student; 5) it is conducted at the beginning of educational units, in a certain part of a lesson; 6) the purpose of the process is to collect information about the necessary knowledge and skills of the student in the subject; 6) during which the teacher checks the student's knowledge and skills on any topic and section, and uses assessment methods such as assignment, interview, project, and, accordingly, study, oral question-and-answer, and presentation tools. [5; 294-299]

The formative assessment, which determines the main essence of the in-school assessment, is the constant monitoring of the student's learning activity and the assessment of the level of knowledge and skill acquisition resulting from the content standards determined for any stage of the learning process. Formative evaluation is carried out in order to monitor the progress and setbacks of the student towards the realization of the accepted standards, to eliminate the problems encountered at this time and to guide the student. In this process, the students get acquainted with the assessment criteria in advance. Formative assessment ensures systematic monitoring of the development of each student in the classroom. The teacher adjusts the teaching process through this assessment, learns the needs of students who are not successful and gives them extra help. Formative assessment is conducted in order to help students achieve learning outcomes and succeed in summative assessment as a result. In scientific sources, the goals set in this process are formulated as follows.

The student: 1) to achieve his learning results by forming his knowledge and skills; 2) study training needs; 3) to monitor their progress in the field of training; 4) to investigate the reasons for failure and ensure its development; 5) monitor the acquisition of basic knowledge and skills expected in the content standards for each subject; 6) to develop the ability of self-evaluation and, finally, 7) to ensure the correct orientation and efficiency of the educational process. Formative assessment is conducted in order to help students achieve learning outcomes and succeed in summative assessment as a result. In scientific sources, the goals set in this process are formulated as follows. The student: 1) to achieve his learning results by forming his knowledge and skills; 2) study training needs; 3) to monitor their progress in the field of training; 4) to investigate the reasons for failure and ensure its development; 5) monitor the acquisition of basic knowledge and skills expected in the content standards for each subject; 6) to develop the ability of self-evaluation and, finally, 7) to ensure the correct orientation and efficiency of the educational process. Formative assessment is conducted in order to help students achieve learning outcomes and succeed in summative assessment as a result. In scientific sources, the goals set in this process are formulated as follows. The student: 1) to achieve his learning results by forming his knowledge and skills; 2) study training needs; 3) to monitor their progress in the field of training; 4) to investigate the reasons for failure and ensure its development; 5) monitor the acquisition of basic knowledge and skills expected in the content standards for each subject; 6) to develop the ability of self-evaluation and, finally, 7) to ensure the correct orientation and efficiency of the educational process.

According to our opinion, in order to carry out formative assessment and register the results, the teacher should develop the following skills: Determine which standard (according to the subject) will be implemented in the subject; Determine evaluation criteria based on content standards; Develop rubrics for 4 achievement levels (eg level 1, level 2, level 3, level 4) for each assessment criterion.

Summative assessment consists of minor, major and final summative assessment. Small and large summative assessment is carried out in order to measure the student's achievement level with the tools developed on the basis of assessment standards in accordance with the relevant content standards by concluding a certain stage in the learning process. Summative assessment is an assessment of students' achievements according to standards at any stage of education (term or section, semester and year). The most important aspect of the summative assessment is to find out at what level the students have achieved the application of the acquired knowledge. Summative assessment is a reliable indicator of the level of mastery of content standards (Scheme 10).



Scheme 10.

Various assessment methods and tools are used for data collection. These include the following:

- 1) Assessment methods are procedures used to collect information about students' learning activities;
- 2) Evaluation tools are tools used to implement that method.

3) Depending on the type of evaluation, methods and tools are different.

Recommendations on the methods and tools to be applied in diagnostic, formative and summative assessment have been included in scientific sources. Among them are the following, which we appreciate (Scheme 11.1; 11.2; 11.3):

Scheme 11.1.

Methods and tools used in diagnostic assessment

Methods	Means
Assignment	Studies
The interview	Teacher registration form
Cooperation with parents and other subject teachers	Conversation and teacher's questionnaire

Scheme 11.2.

Methods and tools used in formative assessment

Methods	Means
Oral and written presentation	Observation sheets, self-evaluation sheet
Research project rubric (scheme)	Criteria table
Test	Criteria rating scale
Self-assessment	Test tasks
Games	Self-assessment sheets
	Observation sheets

Scheme 11.3.

Methods and tools used in summative assessment

Methods	Means
Project	Presentation
Oral inquiry	Question and answer
Test	Test tasks
Assignment	Assignment, study, laboratory works

We share the following generalizations:

1) Although test tasks are currently gaining popularity as an assessment tool, the teacher teaching the subject should not be addicted to test tasks in diagnostic, formative and even summative assessment;

2) Among the methods that develop students' oral and written speech skills, logic and thinking, independent thinking ability - project (evaluation tool - students' presentation and criteria table drawn up by the teacher), oral survey (evaluation tool - registration sheet for oral speech skills), inspection should use writing works (problem and example solution) extensively;

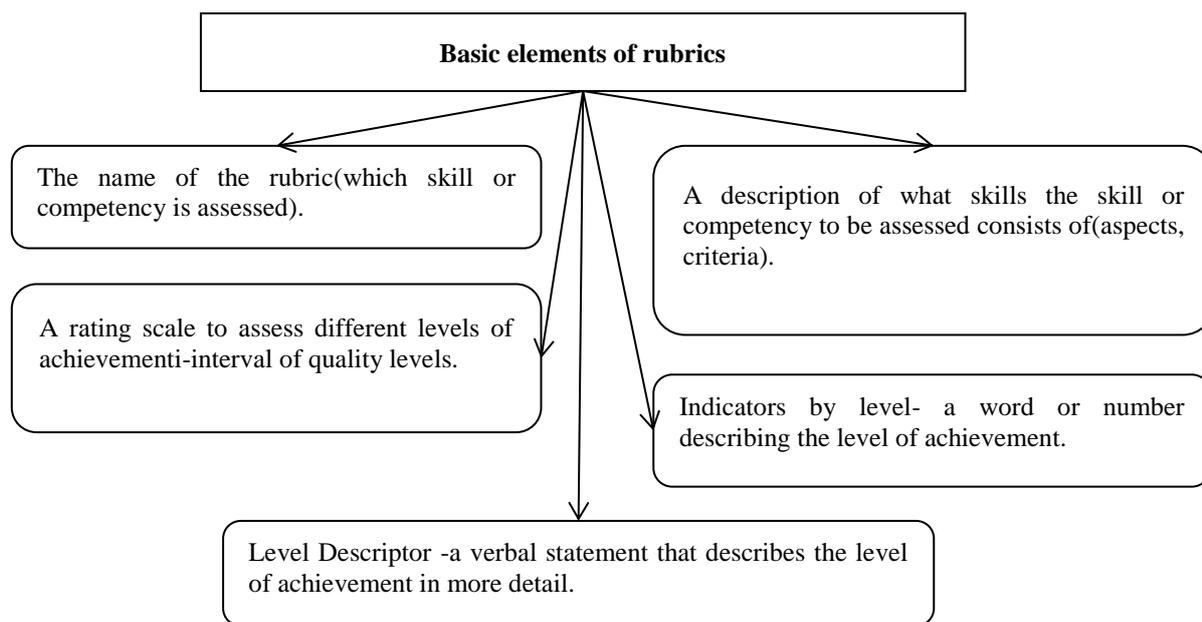
3) It is recommended to use test tasks not continuously, but whenever possible, and without hesitation in summative assessment [9; 345-346].

We value rubrics highly in formative assessment. It is an evaluation scale of the student's achievement level based on the rubric-criterion. It answers two main questions:

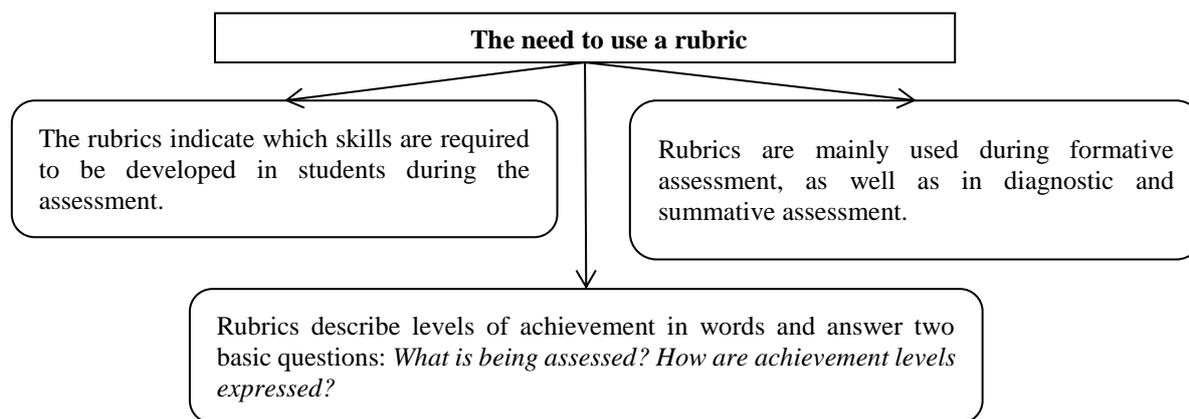
- 1) What should I assess (skill criteria)?
- 2) What are the possible achievement levels for this criterion? A rubric describes a skill or outcome on a continuum of increasing quality (low to high). A rubric can act as both a method and a means of assessment. A rating scale is a mechanism for assigning a

grade (points or words) to the level of achievement [5; 295-297].

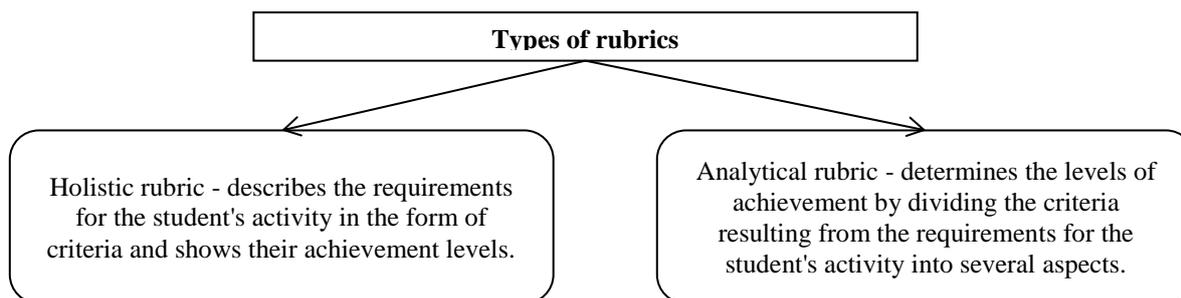
A rubric is one of the most useful methods of formative assessment, but it can also be used in diagnostic and summative assessment (Scheme 12.1; 12.2).



Scheme 12.1



Scheme 12.2



Scheme 12.3

Rubrics have advantages. These are the following:

1. Rubrics make assessment more fair, objective, reliable and consistent.
2. To develop rubrics, teachers define their own criteria for the relevant conditions and thereby better describe the learning objectives.
3. Rubrics reduce the time teachers spend evaluating student work.
4. Rubrics provide teachers with useful information about teaching effectiveness.

5. Rubrics help assess telogenic (students with different abilities) classes through a range of quality levels [9; 345-346].

The process of preparing rubrics includes a certain sequence of steps. In scientific sources, those steps are presented in the following order:

*Step 1.* Identifying the title of the rubric by setting the learning objective.

*Step 2.* Describe aspects (criteria) (To express the description in the form of a scheme).

*Step 3.* Specifying the number of achievement levels (4-6 levels) and expression (indicators).

*Step 4.* Write a verbal description of the descriptors of all levels of achievement, first identifying the highest and lowest levels of the scale, and then the scales in between [15].

Regarding the comparison of holistic and analytical rubrics, the following generalizations can be presented, which are important for practical pedagogical activity:

1. Holistic assessment describes the overall picture of student achievement. Analytical evaluation determines the marks of the student in separate fields of activity, and provides more detailed information about the achievements of the students by consistently evaluating their activities.

2. Holistic assessment is fast, analytical assessment takes more time [5; 299].

As mentioned, the holistic rubric provides an overall impression of the student's work and is often based on a 4-6 point scale that reflects performance levels.

These are the advantages of holistic assessment: is a quick assessment that describes an overall picture of student achievement. It would not be wrong to attribute these to its weaknesses: it does not provide detailed information, it may be difficult to give a general assessment.

It is advisable to use holistic rubrics in the following cases:

1. When you want to get an instant picture of achievement;
2. If a single aspect is adequate to determine quality.

Analytical rubric, as mentioned, assigns separate grades for multifaceted aspects of the student's work (activity). A scale of 4-6 points is used to evaluate each aspect.

It can be attributed to the advantages of analytical evaluation: provides more detailed information, more consistent assessment for each student, class and year. We can attribute the following to its weaknesses: assessment requires a lot of time (it takes time).

In the following cases, it is recommended to use the analytical rubric:

- a) When you want to see the relative advantage and weakness;
- b) When you want to get detailed information (feedback);
- c) When you want to evaluate complex activity or result;
- d) When students are asked to evaluate their understanding or activity [9; 348-349].

There are several recommendations for grading based on rubrics. These include:

- 1) Determine the training goal (knowledge, skills, attitudes, etc.);
- 2) Think about what you want students to know and be able to do;
- 3) Choose the purpose of assessment (diagnostic, formative, summative); decide what type of rubric to use (holistic, analytical);
- 4) Identify the aspects (criteria) that are interesting to you and describe these aspects;

5) Determine how to express different levels of achievement;

6) Specify the number of achievement levels (or evaluation points);

7) Express level descriptors;

8) Write a verbal description of all achievement level descriptors.

It should be emphasized here that it is not enough to use only "quantification" methods. Along with it, it is appropriate to use the following "qualitative evaluation" methods: Constructive notes in writing and checking works; "Portfolio" system; Verbal (with words); Mutual evaluation; Self-assessment; Removal of rating; Evaluation through emotional attitude; Criteria table.

*Scientific novelty and theoretical significance of the research work.* 1) The importance of the application of the "system-structure" approach method, which was formed as an important branch of the dialectic regarding the discovery of the essence of the subject curriculum (specifically, the Informatics subject curriculum and the determination of its application methods), was brought to the attention of researchers; 2) The discovery of the essence of the Informatics subject curriculum at the general education level and its application the solution of one of the cognitive issues that determines the solution of the problem of processing in the optimal version – "The interpretation of the characteristics of the elements of the "Assessment of Student Achievements" block of the Informatics subject curriculum applied in secondary schools of Azerbaijan based on the "system-structure" approach was presented.

*Practical significance of the research work.* We hope that the solution of one of the important cognitive issues that determine the solution to the problem of uncovering the essence of this or that subject curriculum (as well as the Informatics subject curriculum) applied at the General Education level and its application in the optimal version – "Evaluation of Student Achievements of the Informatics Subject Curriculum Applied in General Education Schools of Azerbaijan" "Interpretation of the characteristics of the block elements based on the "system-structure" approach" will have a positive effect on the formation of the environment for the elimination of errors manifested in the activities of educators in the application of the Informatics subject curriculum.

*The result.* 1) The level of understanding of any real thing (objective existence) has a determining effect on the results of using it in adequate ways. 2) In the application of any subject curriculum (as well as the Informatics subject curriculum) at the general education level, making mistakes in the activities of educators negatively affects the efficiency level of the teaching process of this subject; 3) In the process of using the curriculum of the subject of informatics, the basis of the mistakes manifested in the activity of practical educators is based on a number of reasons, as well as a lack of honest enough understanding of its essence by these subjects; 4) "System-structure" approach is the most reliable dialectical method of understanding any existing thing, getting to its essence; 5) The "system-structure" dialectical method of the "system-structure" approach

was not used in the theoretical and technological directions regarding the discovery of the essence of the curriculum of the subject of informatics and the determination of its application methods; 6) One of the cognitive issues aimed at solving the problem that creates the basis for the manifestations of the error caused by the "gap" regarding the discovery of the essence of the informatics subject curriculum and the determination of the ways of its application is "system-structural" "interpretation based on the approach" and our research summary presented in this direction benefits the teaching process of this or that subject.

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