



INDEPENDENT WORK FOR THEMATIC CONTROL OF STUDENTS' KNOWLEDGE IN MATHEMATICS LESSONS

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Abstract: Independent work is such work that is performed without the direct participation of the teacher, but according to his instructions, at a specially provided time for this, while students consciously strive to achieve their goals by using their efforts and expressing in one form or another the result of mental or physical (or both together) actions [2].

Key words: Independent work, effectiveness of the educational process, reading, development, students, independent cognitive work, positive results.

Independent work is considered as the highest type of educational activity that requires a sufficiently high level of self-awareness from the student, which gives satisfaction to the student, as a process of self-improvement and self-awareness.

The effectiveness of the educational process of cognition is determined by the quality of teaching and independent cognitive activity of students. These two concepts are very closely related, but independent work should be singled out as a leading and activating form of learning due to a number of circumstances [6].

Firstly, knowledge, skills, abilities, habits, beliefs, spirituality cannot be transferred from teacher to student in the same way as material objects are transferred. Each student masters them through independent cognitive work: listening, awareness of oral information, reading, analysis and comprehension of texts, and critical analysis.

Secondly, the process of cognition aimed at identifying the essence and content of the studied subject is subject to strict laws that determine the sequence of cognition: familiarity, perception, processing, awareness, acceptance. Violation of the sequence leads to superficial, inaccurate, fragile knowledge, which practically cannot be realized.

Thirdly, if a person lives in a state of the highest intellectual tension, then he certainly changes, is formed as a person of high culture. It is independent work that develops a high culture of intellectual work, which involves not only the technique of reading, studying a book, taking notes, but above all the mind, the need for independent activity, the desire to delve into the essence of the issue, to go deep into the problems that have not yet been solved. In the process of such work, the individual abilities of pupils, their inclinations and interests are most fully revealed, which contribute to the development of the ability to analyze facts and phenomena, teach independent thinking, which leads to creative development and the creation of their own opinions, their views, ideas, their position [3].

From all that has been said earlier, it can be seen that independent work is the highest work of a student's educational activity and is a component of an integral pedagogical process, therefore, such functions as educational, educational, developing are inherent in it.

At various lessons, students can acquire knowledge, skills and abilities through a variety of independent work. All these works only give positive results when they are organized in a certain way, i.e., they represent the system.

By the system of independent work, we understand, first of all, a set of interrelated, mutually reinforcing, logically arising from one another and subordinate to common task types of work.

Every system must meet certain requirements or principles. Otherwise, it will not be a system, but a random set of facts, objects and phenomena.

When constructing a system of independent work, the following are put forward as the main didactic requirements [5]:

The system of independent work should contribute to the solution of the main didactic tasks - the acquisition of deep and solid knowledge by students, the development of their cognitive abilities, the formation of the ability to independently acquire, expand and deepen knowledge, apply it in practice.

The system must meet the basic principles of didactics: first of all, the principles of accessibility and systematicity, the connection of theory with practice, conscious and creative activity, the principle of teaching at a high scientific level.

The works included in the system should be diverse in terms of educational purpose and content in order to ensure the formation of students' diverse skills and abilities.

The sequence of homework and classroom independent work logically followed from the previous ones and prepared the ground for the subsequent ones.

But one system does not determine the success of the teacher's work on the formation of students' knowledge, skills and abilities. To do this, you still need to know the basic principles by which you can ensure the effectiveness of independent work, as well as the methodology for managing certain types of independent work.

The effectiveness of independent work is achieved if it is one of the constituent elements of the educational process, and special time is provided for it at each lesson, if it is carried out systematically and systematically, and not randomly and episodically.

Only under this condition, students develop stable skills and abilities in performing various types of independent work and increase the pace in its implementation.

When selecting the types of independent work, when determining its scope and content, one should be guided, as in the entire learning process, by the basic principles of didactics. The most important are the principles of accessibility and systematicity, the connection of theory with practice, the principle of gradualness in the increase of difficulties, the principle of creative activity, as well as the principle of a differentiated approach to students. The application of these principles to the management of independent work has the following features [3]:

Independent work should be purposeful. This is achieved by clearly stating the purpose of the work. The task of the teacher is to find such a formulation of the task that would arouse students' interest in the work and the desire to perform it as best as possible. Students should clearly understand what the task is and how its implementation will be checked. This gives the work of students a meaningful, purposeful character, and contributes to its more successful implementation.

Underestimation of this requirement leads to the fact that students, not understanding the purpose of the work, do not do what is needed, or are forced to repeatedly seek

clarification from the teacher in the process of its implementation. All this leads to an irrational waste of time and a decrease in the level of students' independence in work.

Independent work should be really independent and encourage the student to work hard when doing it. However, extremes should not be allowed here: the content and volume of independent work offered at each stage of training should be feasible for students, and the students themselves are prepared to perform independent work theoretically and practically.

Initially, students need to form the simplest skills of independent work. In this case, students' independent work should be preceded by a visual demonstration of methods of working with the teacher, accompanied by clear explanations, notes on the blackboard.

Independent work performed by students after showing the methods of work by the teacher is in the nature of imitation. It does not develop independence in the full sense of the word, but it is important for the formation of more complex skills and abilities, forms of independence in which students are able to develop and apply their methods of solving problems.

For independent work, it is necessary to offer such tasks, the performance of which does not allow actions according to ready-made templates but requires the application of knowledge in a new situation. In this case, independent work contributes to the formation of initiative and cognitive abilities of students.

In organizing independent work, it is necessary to take into account that different students need different time to master knowledge, skills and abilities. This can be done through a differentiated approach to students.

Observing the progress of the class as a whole and individual students, the teacher should switch successfully completed tasks to more complex ones in time. For some students, the number of training exercises can be reduced to a minimum. Others should be given significantly more such exercises in various variations so that they learn a new rule or a new law and learn to apply it independently to solving educational problems.

The tasks offered for independent work should arouse the interest of students. It is achieved by the novelty of the proposed tasks, the unusual nature of their content, the disclosure to students of the practical significance of the proposed task or method to be mastered. Students always show great interest in independent work, during which they explore objects and phenomena.

Independent work of students should be systematically and systematically included in the educational process. Only under this condition will they develop solid skills and abilities.

The results of the work are more noticeable when the whole team of teachers is engaged in instilling the skills of independent work in students, in classes in all subjects.

When organizing independent work, it is necessary to carry out a reasonable combination of the presentation of the material by the teacher with the independent work of students to acquire knowledge, skills and abilities.

When students perform independent work of any kind, the main role should belong to the teacher. He thinks over the system of independent work, their systematic inclusion in the educational process, determines the purpose, content and scope of each independent work, its place in the lesson, methods of teaching various types of independent work, teaches students self-control methods and exercises quality control, studies the individual characteristics of students and takes them into account when organizing independent work.

As a didactic phenomenon, independent work is, on the one hand, an educational task, that is, what the student must do is the object of his activity; on the other hand, a form of manifestation of the corresponding activity of memory, thinking, imagination when the student performs an educational task, which ultimately leads the student to obtain a completely new, previously unknown it matters, or to deepen and expand the scope of the knowledge already acquired.

For the organization of independent work, it is important for the teacher to know their forms and types, their place in the learning process.

Depending on the goals that are set for independent work, they can be [5]:

- educational;
- training;
- fixing;
- repetitive;
- developing;
- creative;
- control.

1) The meaning of teaching independent work consists in the independent performance by students of the tasks given by the teacher during the explanation of the new material. The purpose of such works is to develop interest in the material being studied, to attract each student to what the teacher explains. Here, misunderstandings immediately become clear, difficult moments are revealed, gaps in knowledge make themselves felt, which prevent the material being studied from being firmly assimilated. Independent work on the formation of knowledge is carried out at the stage of preparation for the introduction of new content, also with the direct introduction of new content, with the initial consolidation of knowledge, i.e., immediately after the explanation of the new, when students' knowledge is not yet solid.

The teacher needs to know the following features of teaching independent works: they should be composed mainly of tasks of an unproductive nature, checked immediately and not put bad marks for them.

Since independent teaching works are carried out during the explanation of new material or immediately after the explanation, their immediate verification gives the teacher a clear picture of what is happening in the lesson, what is the degree of understanding of the new material by students at the earliest stage of his training. The purpose of these works is not control, but training, so they should be given a lot of time in the lesson. Independent training works can also include the compilation of examples on the studied properties and rules.

2) Independent training tasks include tasks for recognizing various objects and properties.

In training tasks, it is often necessary to reproduce or directly apply theorems, properties of certain mathematical objects, etc.

Independent training works consist of the same type of tasks containing essential features and properties of this definition, rules. Of course, this work does not contribute much to the mental development of children, but it is necessary, because it allows you to develop basic skills and thereby create a basis for further study of mathematics. When performing independent training work, the teacher's help is still needed, you can allow using both a textbook and notes in notebooks, tables, etc. All this creates a favorable climate for weak

students. In such conditions, they easily get involved in the work and do it. Such works include the performance of tasks on different-level cards.

According to these cards, students get used to working independently. It is more convenient for the teacher to use them if he collects a set of cards on topics. Each set can consist of 8-10 variants of different levels.

3) Independent works that contribute to the development of logical thinking and require the combined application of various rules and theorems can be attributed to the anchoring ones. They show how firmly the educational material has been mastered. Based on the results of checking tasks of this type, the teacher determines whether it is still necessary to deal with this topic.

4) The so-called repetitive (review or thematic) works are very important. Before studying a new topic, the teacher should know whether the students are cognitive, whether they have the necessary knowledge, what problems can make it difficult to study new material.

5) Independent works of a developing nature can be homework assignments for making reports on certain topics, preparation for Olympiads, scientific and creative conferences, holding days of mathematics at school, etc. In the classroom - independent work that requires the ability to solve research problems.

6) Students are very interested in creative independent work, which presupposes a high level of independence. Here students discover new sides of their existing knowledge, learn to apply this knowledge in new unexpected situations. These are tasks for finding the second, third, etc. way to solve the problem.

7) Control works are a necessary condition for achieving the planned learning outcomes.

In essence, the development of texts of control papers should be one of the main forms of fixing learning goals, including minimal ones. Therefore:

- firstly, control tasks should be equivalent in content and scope of work;
- secondly, they should be aimed at developing basic skills;
- thirdly, to ensure reliable verification of the level of knowledge;
- fourth, they should encourage students to allow them to demonstrate progress in their overall preparation.

There are several types of independent work [5]:

1. Reproducing.
2. Reconstructive-variable.
3. Heuristic.
4. Creative.

1) Reproducing independent work.

This type of independent work of the student is aimed at listening carefully (or considering), memorizing and reproducing certain information. Such work is carried out by students in the study of all academic disciplines without exception. The reproduction may be verbatim and incomplete.

Reproducing independent work of the student includes:

- solving typical tasks, examples, performing various exercises based on a sample and algorithm in order to improve cognitive and practical skills;

- finding ready answers in the text of the textbook and other sources;
- design of all kinds of tables, diagrams;
- conducting observations, laboratory work, production of individual items and their parts according to the sample and instructions of the teacher;
- selection and systematization of educational material.

This type of work is carried out according to a rigid scheme by successive indications of the need to improve strictly defined actions. This method of mastering knowledge, skills and abilities allows you to assimilate the material in a relatively short time but does not provide enrichment of the experience of cognitive search, creative activity, development of creative abilities in pupils.

2) Reconstructive and variable independent work.

With this type of work, students are faced with the need for transformations, reconstructions, generalizations, the use of previously acquired knowledge and skills to solve problems, the establishment of intra- and inter subject connections.

Reconstructive and variable independent work prepares students to solve only part of the tasks, and also prepares the student psychologically and practically to find ways to apply the acquired knowledge.

Tasks of such independent work indicate only the general principle of the solution, for example, "Solve the graphical inequality", "Solve the problem using the equation". Tasks of a variable nature also include the so-called "intelligence" tasks, tasks with a "twist", many proof tasks, as well as tasks in which it is necessary to create new algorithms to solve them.

3) Heuristic independent work.

The performance of this type of work is aimed at resolving the problematic situation that it creates (organizes) the teacher during the lesson. Students do not solve the whole problem, but individual problems. As a result of such an organization, students gain experience in search activity, master the elements of creativity, but do not gain experience in conducting a holistic study of the process and phenomenon, do not acquire the ability to independently see and effectively solve cognitive and practical significant creative tasks.

In heuristic independent activity, the sequence of actions that the teacher put in front of him is used. Students independently, through trial and error, come to a solution to the problem. Much attention should be paid to work aimed at developing the skills to see the problem, make suggestions on ways to solve it, independently build evidence, draw conclusions from the facts presented, build a plan to verify them, etc.

Heuristic independent work has its advantages and disadvantages. The advantages are that it allows you to activate the mental activity of students, increase their interest, lead to a good assimilation of the material, the development of thinking, the abilities of students.

The disadvantages are as follows:

- it requires more time than when communicating ready-made knowledge;
- with this type, individual differences of students are especially strongly affected: many of them do not have time to solve the problems posed, answer the teacher's questions; and he does not have the opportunity to wait in class until everyone independently comes to the right conclusion.

4) Creative independent work.

This type of student work assumes a high level of independence. During the performance of this type of work, the student learns:

- to reveal new aspects of the phenomena, objects, events being studied;
- express your own judgments, assessments based on a comprehensive analysis of the initial data of the problem being solved;
- independently develop the subject and methodology of experimental, experimental work;
- to see and formulate a problem in a given situation, to put forward hypotheses and elaborate plans for their solution;
- apply knowledge in new unexpected situations, etc.

With creative independent work, students get the opportunity to realize their creative potential, which stimulates interest in the subject being studied and increases motivation.

Tasks of this type can be both for the development, for example, of new solutions or an action plan, and for the independent compilation of tasks. It is also advisable to use tasks with both insufficient and redundant data.

Depending on the forms of training, there are several forms of organizing independent work [5]:

1. Individual.
2. Group.
3. Frontal.

1) The individual form of organization of independent work has advantages over other forms. It consists in the fact that it better promotes the involvement of exclusively all students in the work. Each of them receives a specific task, which involves performing a certain written work. In this case, you can check the degree of participation of the student in the performance of this task. This form of organization allows you to work at an individual pace, each student can perform tasks in their own style in accordance with their skills and abilities.

The individual form of organizing independent work activates students in the sense that all students, even more passive and lazy, must complete tasks themselves, without waiting for the rest of the students, as it often happens with front-line work.

2) The group form is put forward as another form of organizing independent work. With such an organization of written works, students are divided into groups of several people to perform a particular task. The task is given to a group, not to an individual student. The group form of work regulates the cooperation of students and thereby achieves not only didactic, but also educational goals.

Groups for independent work can be structured in different ways. Firstly, these are groups that are formed based on the level of development of students. In such cases, the stronger group gets more complex tasks, and the weaker group gets less complex tasks. Secondly, the group can be formed based on the wishes of the students themselves. In this case, students with similar interests and related friendships work. Working in such a group creates particularly favorable conditions for the manifestation of personal qualities.

However, at the same time, there is a well-known danger for the activity of students in the group form of work organization: the stronger and more diligent of them begin to drown out the initiative of the more passive and weak students and solve tasks for them themselves.

Groups of two people are most effective at mutual verification. Each student performs independently the task given to the whole class, and then mutual verification is organized.

3) As the third form of organization of independent work is the frontal form.

A very important stage in the frontal form is the justification of each step of the solution.

One of the significant components of the frontal form is the comparison of different solutions, the identification of the most rational of them.

In the learning process, it is possible to combine several independent forms of work organization. For example, the combination of group and frontal forms of organizing work on a new topic helps to create the activity of students, on the basis of which they themselves come to new mathematical conclusions for them.

By properly organizing the frontal, group and individual form of students' work in mathematics lessons and skillfully combining them, it is possible to achieve significant success in equipping schoolchildren with knowledge and preparing them for the active application of this knowledge.

As a result of the work done and the approbation carried out at the school, the assumption was confirmed that the process of teaching mathematics should have a personality-oriented direction. It can also be noted that the multi-level works of thematic control aroused the interest of students with their accessibility. Students with a low level of training have the opportunity to get satisfaction from success, as there is an opportunity to work with available material. For more prepared students, there are tasks that require more effort, give additional information and arouse interest.

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