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THE INFLUENCE OF HOMEWORK IN MATHEMATICS TEACHING ON THE INDEPENDENT ACTIVITY OF PRIMARY SCHOOL PUPILS

Abstract. It is known that since the 2008–2009 academic year, subject curricula have been implemented in the primary grades of general education schools in the Republic of Azerbaijan. Up to the present, extensive methodological work has been carried out on textbooks, methodological materials and workbooks prepared on the basis of individual subject curricula. At the same time, certain decisions have been made regarding the implementation of new teaching standards, instructional strategies and assessment mechanisms. All these innovations require primary school teachers to gain new knowledge, skills and habits. As a result, the necessity has arisen to apply new teaching technologies in the process of mathematics education in primary classes. It is also known that, like other subjects, mathematics has its own specific features. Currently, the subject curriculum applied in primary mathematics teaching focuses on developing pupils' independence, creativity and research abilities. Taking these features into account in the teaching process is very important and essential. It should be noted that the structure of the mathematics subject is organized in such a way that, during the teaching process, pupils' flexibility of thought increases, cognitive activity becomes more intense and teachers, by giving proper guidance, ensure that pupils fully master mathematical knowledge. In primary mathematics education, a wide range of teaching methods are used. The main purpose of these methods is to engage every pupil in investigation, thinking and exploration. Another important goal is to cultivate pupils' independence, logical reasoning and the ability to express their opinions on events as citizens with a correct and thoughtful attitude. Taking into account the research conducted by pedagogical and methodological scholars in previous years, we have set as our objective the study of the possibilities and way of organizing pupils' independent work in primary mathematics education in accordance with the educational policy

put forward by the independent State of Azerbaijan. A comprehensive analysis of the research works of the aforementioned authors revealed that the studies ensuring the independence of younger pupils do not fully correspond to the current requirements of the modern era. To achieve such alignment, it has become increasingly important to explore the development and application possibilities of new teaching methods. The objective of the subject curriculum implemented in primary mathematics education is not limited to delivering new knowledge through modern teaching methods but also to showing how to acquire this knowledge independently. Teaching mathematics in primary classes does not merely aim to enrich pupils' memory with new knowledge but also to promote the regular development of their mathematical thinking, ensuring that they independently acquire and assimilate mathematical knowledge. Most importantly, it focuses on forming knowledge, skills, habits, personal qualities and abilities. As a result, pupils, with the guidance of the teacher, learn to identify cause-and-effect relationships, draw conclusions, conduct analyses and carry out significant and in-depth generalizations. The scientific novelty of the article lies in the fact that it presents a methodological system that enables pupils in primary grades to acquire knowledge independently, both in the comprehension of theoretical material and in creative application. This system contributes to improving the quality of teaching and demonstrates the ways of organizing pupils' independent work during the educational process.

Keywords: primary school; mathematics teaching; homework assignments; pupils' independence; teaching methods; creative activity; thinking skills.

INTRODUCTION / ВСТУП

Statement of the problem / Постановка проблеми. The Law of the Republic of Azerbaijan "On Education" and the subsequent adoption of individual subject curricula made the reorganization of education for the future generation an important strategic objective for educators in the country. The aforementioned law specifically addresses the issue of raising the overall level of students in the educational process and enhancing its effectiveness. For the successful implementation of educational reform, teachers are primarily required to possess creativity, enthusiasm for their work, a deep love for their profession, and so on. Every teacher must be able to grasp the secrets of new educational technologies, work with new programs and textbooks, and incorporate changes arising from

the application of subject curricula into their work. The use of modern educational technologies in the classroom creates a broad incentive for students to develop creative and research abilities in the educational process. This facilitates independent and creative work by students.

If students independently master the mathematical material covered in the classroom, then we can speak of the development of each student's interest in mathematics and independent creative abilities. Creative thinking is known to be linked to intuition and constitutes one form of student mental activity. Creativity and creative thinking are closely linked; they represent such a purposeful activity that they result in the emergence of a new, original idea or proposal. After all, both thinking and imagination are essential components of creativity. Only the productive work of teachers can ensure the development of these processes.

In addition to textbooks, it is advisable to make extensive use of various literature to foster students' independent mathematical creativity. Otherwise, students are satisfied with a small amount of information and, furthermore, lack the necessary information to complete certain tasks. In mathematics education, independence is understood as the student's research and creative activity. In every mathematics lesson, the teacher should work on the use of concepts and figures that develop students' mathematical creativity [9].

The structure of the elementary school mathematics curriculum is designed to encourage students' independence and creativity throughout each mathematical topic. Therefore, this work should begin on the first day of school. By developing independent thinking from the very first day, we will continue to develop these skills throughout the years, right up until the end of 11th grade.

If we look at research conducted on teaching mathematics in grades 1–4, we see that researchers recommend focusing on developing students' knowledge, skills, and abilities primarily through practical work. They strive to understand and consolidate independently acquired mathematical knowledge through practical work. We attempted to create a new methodological system to address the problem discussed in this dissertation. Of course, engaging students in independent work is very important and beneficial to develop their research skills.

We know that teachers generally prefer to teach mathematics in various formats in elementary schools. In this case, independent lesson organization is valued as independent knowledge acquisition by students. The organization and implementation of independent work in mathematics lessons is achieved through the support and guidance of elementary school teachers teaching the class. The teacher encourages students to develop independent learning through guiding questions. Using solutions to model mathematical problems solved by the teacher in class, students can independently complete a new example or problem.

Therefore, teacher assistance is indispensable for organizing and stimulating this type of activity. When assisting students, the teacher must consider their age and the complexity of the topic or problems being solved. Furthermore, the teacher must fully and correctly select a specialized methodological system.

The concept of "independent work" is one of the most diverse and important in the history of pedagogy. Numerous scientific studies have been conducted in this regard by educational scholars and methodologists. In this regard, the ideas of prominent Azerbaijani educational scholars regarding the organization and implementation of independent work can be considered highly important and insightful [1].

Independent work for elementary school students is a vital component of the learning process. Modern education demands that we cultivate students who possess independent and creative thinking and comprehensive knowledge. Therefore, the role of independent work in cultivating these qualities is undeniable and significant. Elementary school teachers should constantly consider this in their daily work.

Independent work in teaching mathematics in elementary school can be characterized as the development of students' creative thinking; in this case, most students are able to solve a given practical mathematical problem without direct teacher intervention.

Analysis of (major) recent research and publications / Аналіз (основних) останніх досліджень і публікацій. A number of important aspects of organizing and conducting independent work of students in teaching mathematics in elementary grades have been studied in the pedagogical-psychological and methodological fields. In the works of A. Bayramov [2], A. Alizade [5], A. Adigyozaev [1], P. Pashayev [3], A. Aliyev [4], S. Gamidov [8] and others, the methods and means of organizing and conducting independent work of students, taking into account the specifics of individual academic subjects, have been thoroughly investigated.

AIM AND TASKS / МЕТА ТА ЗАВДАННЯ

The **purpose** of this study is to identify opportunities and methods for students to engage in independent learning, both in acquiring theoretical knowledge and in solving practical problems in teaching mathematics in elementary grades, and to experimentally test the effectiveness of the proposed methodological system.

The **objectives** of this article are:

- to examine the pedagogical, psychological, and educational literature on the problem under study, as well as the state of research on this issue;

- to identify instances where students can independently master the materials presented in the mathematics curriculum, textbooks, and educational and methodological literature for elementary grades;
- to study the experience of leading teachers on the problem under study, to identify the difficulties and shortcomings that arise in developing students' independent learning skills, and the reasons for these difficulties;
- to determine opportunities for independent learning in elementary grades, taking into account their age and pedagogical and psychological characteristics;
- to develop a methodological system that supports independent learning by students and define the requirements for it;
- to test the effectiveness of the methodological system that ensures independent activity of students, using a pedagogical experiment.

THEORETICAL FRAMEWORK / ТЕОРЕТИЧНІ ОСНОВИ

One of the primary and important goals of teaching mathematics in elementary grades is to maximize the potential of students, consciously and thoroughly master the material covered in the mathematics curriculum, and ensure the comprehensive development of students. It is known that children with different psychological characteristics study in grades 1–4. Therefore, students in these grades differ significantly in the various skills they acquire during their studies. The teacher must properly organize the learning process, taking into account the individual and general psychological characteristics of students. This means that elementary school teachers must strive to use a variety of teaching methods in the educational process. When organizing work with "weak" and "talented" children studying in elementary grades, each class teacher is required to possess certain knowledge, skills, and abilities [11]. During the implementation of this process, we are faced with certain questions:

1) How can we provide high-quality education in one academic hour? As mentioned above, how can we organize mathematics instruction according to the levels of "weak," "average," and "strong" students during the learning process?

2) How can we use 45 minutes of time efficiently, depending on the student's level?

3) How and to what extent can we increase interest in this subject during mathematics instruction?

4) How can we encourage students to work independently?

Consequently, the modern mathematics teaching process must be structured using modern teaching technologies correctly or in accordance with

the requirements of the modern era. By utilizing various teaching methods and lesson work methods, structured mathematics lessons become interesting for students, and students are eager to thoroughly study the mathematics curriculum material. We know that differentiated learning means dividing the whole into different parts. This means that the taught topic is divided into separate parts and assigned to students in the form of independent work. After students complete the work, knowledge related to the topic is summarized under the teacher's guidance and corresponding mathematical results are obtained. Therefore, its use in teaching through independent work is considered one of the most common forms of teaching today. Students, grouped into different groups, acquire a comprehensive and complete knowledge of the mathematical material being studied. Another goal of organizing and conducting independent work in mathematics lessons is to create sufficient conditions for each student to demonstrate their knowledge and skills to the best of their abilities [12, p. 157].

Every homeroom teacher makes extensive use of various teaching methods, including independent work, to address students' learning challenges in mathematics lessons. During the lesson, the teacher assigns each student tasks tailored to their individual abilities, using independent work methods. Students complete the tasks independently (without assistance). During this time, each student develops a sense of self-confidence. Gradually, the level of mathematical problems presented by the teacher increases, and students strive to solve them with enthusiasm. When planning a lesson, it is crucial for the teacher to consider the individual characteristics of each student—the development of their knowledge, skills, and abilities, their intellectual level, and the sequence of cognitive development. One of the optimal options for students in grades 1 and 2 of primary school is a teaching method that appropriately utilizes technical and visual aids. This type of teaching allows students to work independently and teaches them to correctly solve mathematical problems of gradually increasing complexity [10, p. 241].

Independent work is crucial for developing students' attention span when learning mathematics in elementary school. It should also be noted that the use of independent work is crucial for focusing and developing students' attention span when learning mathematics in elementary grades.

One of the main goals of teaching using modern learning technologies is strict adherence to the above rules. Based on numerous scientific and methodological studies, it can be noted that addressing the individual abilities and characteristics of each student is essential to addressing student learning gaps in mathematics, which yields very positive results. Teachers must competently explain the mathematical concepts and terms being learned and provide

guidance. For example, in addition to providing students with detailed information about the essence of arithmetic operations, teachers must also convince them that $5 + 3 = 8$ (they must fully and scientifically explain to students why the sum of 5 and 3 equals 8).

Through the implementation of independent work, it is possible not only to enhance the intellectual level of "weak" students but also to guide the development of mathematical, logical, cognitive, and multidirectional thinking in "good" and "average" students. It is crucial and significant to create a methodological system that ensures the comprehensive development of students' knowledge, skills, and abilities in accordance with the learning conditions in each class. Teachers should also explore students' interests through independent work. Given the above, teachers should prepare assignments tailored to each student's individual interests to implement independent work in mathematics throughout the learning process. If teachers fail to pay serious attention to such issues, their students will face significant difficulties in the future. This state of affairs is unacceptable [14].

A teacher's individual approach to students impacts their overall intellectual development. Pedagogical and psychological research shows that some students in grades 1–4 are dominated by logical-mathematical intelligence, while others favor verbal-linguistic intelligence. Primary school teachers must be mindful of these situations during lessons. Therefore, when teaching mathematics in grades 1–4, special attention should be paid to organizing and conducting independent work, along with other methodological approaches, when explaining new topics. For example, when solving problems such as constructing prototypes of simple geometric figures, determining the unknown in a given problem, recording a sequence of actions, etc., to refine students' thinking, their individual characteristics should be taken into account and the learning process structured accordingly. Students should independently grasp new mathematical material correctly, and the teacher should only provide guidance when necessary.

Therefore, teachers should identify the individual characteristics of each student and create conditions for the development of their mathematical and logical thinking.

The benefits of independent work in the educational process are primarily as follows:

1. The teacher has the opportunity to devote time to all students in the class;
2. They have the opportunity to pay attention and monitor each student individually;
3. Students become fully aware of how they are learning the topic;

4. Students significantly increase their self-confidence;
5. Students' interest in the subject gradually grows.

The main drawback of independent work in education is that weak students cannot get along with high-achieving students.

There are two types of independent work:

- 1) Independent work completed in the classroom during class.
- 2) Independent work completed by students after class.

It should be noted that independent work completed after class refers to independent work completed in special clubs or departmental workshops.

Independent work performed in class refers to independent work performed during the study or reinforcement of a new topic.

Let's consider the following stages of independent work performed in class:

- Forming groups to effectively organize independent work;
- Identifying the individual and general characteristics of students in each group;
- Forming new groups according to the individual characteristics of students;
- Preparing assignments by defining areas for independent work;
- Assigning and completing independent work in a specific part of the lesson;
- Evaluating new results and taking these results into account for future lessons.

"Now, given the above, how should we organize the lesson?" Let's look at the answer to this question.

To do this, consider the following example lesson:

Independent work can be organized in various ways. To organize independent group work, students are divided into groups based on the number of students in the class, and each group is worked with individually. The number of students in a group can vary. It is recommended that the teacher allocate 5–8 minutes to each group during the lesson. Given this time, each group has time to work with the teacher. This allows the teacher to focus on what the students are doing independently [5, p. 162].

During independent group work, the teacher can distribute time among all students. While the teacher works with the first group, the other groups attempt to complete the task independently. The process of independently exploring a new topic or completing assignments is straightforward. Regardless of the volume and complexity of the new material, students enthusiastically engage in the work. Such situations also foster a strong interest in mathematics. Effective

organization of independent work is characterized by a change in the nature of the general lesson. Organizing and conducting independent work in the classroom leads to the development of students' knowledge, skills, and abilities, as well as a reduction in their fatigue.

One of the advantages of organizing and conducting lessons this way is that it promotes students' comprehensive development and allows them to devote more time to students who require greater attention. According to observations and experimental results, students retain assignments completed independently for a long time, and they thoroughly absorb the material. It should be noted that independent work should be tailored to the specifics of each topic. Organizing independent work in various ways broadens students' horizons.

Methods for organizing independent work in mathematics lessons. When planning a current lesson, each teacher determines the place and role of independent work in accordance with the type, purpose, and content of the lesson. In elementary school mathematics instruction, independent work is most often used for reinforcing material and during review lessons.

Independent work in the educational process can be successfully implemented primarily through the following methodological approaches:

- independent work designed to develop students' creative abilities (answering questions, conducting research on a topic, solving problems and examples, etc.);
- independent work completed in connection with the study of a new topic;
- independent work completed to reinforce previously covered material;
- solving independently solved problems (with group work, all students complete the same task, some independently, others under the guidance of the instructor);
- independent work completed in accordance with the workload;
- independent work completed directly under the guidance of the instructor.

When elementary school students work independently, the teacher provides additional information and problem-solving examples relevant to the assignment using flashcards. This allows students to complete their independent work quickly and correctly. After repeated practice, the cards should be removed. Additional flashcards may contain informational materials, notes, illustrations, short texts, diagrams, supporting questions, a solution plan, and instances where attention should be paid to minor details in the assignment.

The teaching methods used in independent work should be closely linked to one another. It is also crucial that there is a close connection between the questions and tasks [14].

The importance of independent work when learning new mathematical material can be summarized as follows:

Not all students can master new mathematical material at the same level. Students vary greatly in their level of comprehension. Therefore, teachers must be able to differentiate between students based on their level of comprehension and prepare independent work assignments accordingly. Teachers should determine in advance what instructions they need to provide to ensure successful completion of independent work. It is crucial to consider students' knowledge, abilities, and skills in understanding new material. It is crucial for teachers to additionally prepare questions that allow students to explore independent work in various directions. It is worth noting that addressing such questions has a very positive impact on strengthening students' memorization and comprehension skills.

We know that when planning a lesson, a teacher sets a specific goal, and new results are achieved through this goal. Therefore, to achieve the right end result, a differentiated approach to the subject is necessary. To assimilate new mathematical material, teachers should devote more time to relatively weak students, as average or strong students are capable of independently mastering newly learned material.

Here are some examples of independent work performed to reinforce new material:

Independent work is considered one of the most important tasks performed during the lesson reinforcement phase. Students must solve various types of mathematical problems for independent work. During the independent work phase of the lesson, both "strong" and "weak" students have ample time to independently complete additional assignments that expand and deepen their knowledge, skills, and abilities. To reinforce the topic covered, it is essential to organize independent work so that each student can apply the knowledge, skills, and abilities acquired during the assignments within their abilities and beyond the lesson. The application of theoretical knowledge in mathematics largely depends on the design and presentation of the assignments.

The system of independent work assignments can be defined as follows:

- correct selection and placement of independent work assignments that fully correspond to the level of "strong" and "weak" students;
- preparation of additional independent work options aimed at promptly correcting mathematical errors made by students;
- preparation of independent work aimed at developing the general intellectual level of students, etc.

Monitoring and assessing students' knowledge during independent work, as well as determining the level of knowledge, skills, and abilities acquired by students, and guiding the development of acquired mathematical knowledge in the appropriate direction. Monitoring and assessing students during independent work requires a detailed and comprehensive study of a new mathematical topic using an integrative method and comparative approaches. The primary function of monitoring and assessing students is to monitor the progress of independent learning activities and promptly identify and correct mathematical errors [15, p. 208].

Thus, learning through independent work, based on the interests and abilities of each student, creates conditions for deepening and expanding his knowledge, skills and abilities, and also creates important conditions for the timely identification and complete elimination of his regression.

RESEARCH METHODS / МЕТОДИ ДОСЛІДЖЕННЯ

The methodological basis of the study is a set of principles, methods, theoretical propositions, and tools used to study, understand, and change pedagogical facts, phenomena, and processes.

Research methods include theoretical analysis, observation, interviews, document study, questionnaires, pedagogical experiments, mathematical and statistical methods, and others.

RESEARCH RESULTS / РЕЗУЛЬТАТИ ДОСЛІДЖЕННЯ

Based on the above, we have concluded that this article explored the problem of increasing students' cognitive activity through problem solving in elementary school mathematics lessons and clarified the need to develop elements for developing mathematical independence. A positive solution to this problem has been fully demonstrated based on the school's advanced pedagogical practices and the author's many years of observation and teaching experience.

Scientific research conducted in mathematics lessons in elementary grades has shown that the inclusion of simple, complex, textual, problem-based, logical, standard and non-standard problems and the process of their research have a significant impact on the development of students' mathematical and logical thinking and the formation of their independence.

We also note the following results obtained during the study:

- Enhancing cognitive activity, selecting active (interactive) teaching methods and their effective use, and creating a dialogue between teacher and

student are essential and necessary conditions for developing student independence in elementary school mathematics instruction.

- Setting cognitive and logical problems for elementary school students and discussing them in a dialogic (question-and-answer) format has a positive impact on their independent mathematical thinking and the development of logical reasoning.

- One of the main methods for developing mathematical independence in primary school students is teaching them to freely express mathematical thoughts (reasoning) while solving logical and cognitive problems and creating a favorable environment for their self-expression.

- Our scientific and methodological research confirms that engaging primary school students in mathematics olympiads creates excellent conditions for enhancing, developing, and strengthening their mathematical independence.

- Conducting extracurricular activities and mathematics clubs helps expand the horizons of elementary school students and enhance their ability to think independently in mathematics.

- The study revealed that all mathematical methods and tools should be used comprehensively and thoroughly to develop elementary school students' cognitive activity and independence in solving mathematical problems.

CONCLUSIONS / ВИСНОВКИ

The study resulted in a fully developed mechanism for fostering independence in elementary school students through solving mathematical problems. Work in this area should be continued, and the findings systematically tested.

Based on the results of the conducted scientific and methodological research, the following directions can be proposed regarding the possibilities and methods for developing mathematical independence in elementary school students:

- In elementary schools, it is necessary to ensure greater student participation in the classroom when solving mathematical problems and to create adequate conditions for them to express independent mathematical opinions;

- Increasing the number of subject Olympiads and other public surveys of elementary school students will significantly contribute to the development of their ability to think independently.

Prospects for further research in this direction / Перспективи подальших досліджень у цьому напрямі. It is extremely important for primary school students to expand their opportunities to solve cognitive and

logical problems in educational and methodological literature, which will contribute to the formation, development and strengthening of cognitive activity and independent mathematical thinking of students.

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ВПЛИВ ДОМАШНІХ ЗАВДАНЬ У ВИКЛАДАННІ МАТЕМАТИКИ НА САМОСТІЙНУ ДІЯЛЬНІСТЬ УЧНІВ ПОЧАТКОВОЇ ШКОЛИ

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Анотація. Відомо, що з 2008–2009 навчального року в Азербайджанській Республіці у початкових класах загальноосвітніх шкіл впроваджуються предметні навчальні програми. Дотепер проведено велику методологічну роботу над підручниками, методичними матеріалами та робочими зошитами, підготовленими на основі індивідуальних предметних навчальних програм. Водночас прийнято певні рішення щодо впровадження нових стандартів навчання, навчальних стратегій та механізмів оцінювання. Усі ці нововведення вимагають від учителів початкової школи отримання нових знань, умінь та навичок. У результаті виникла необхідність застосування нових навчальних технологій у процесі математичного навчання у початкових класах. Також відомо, що математика, як і інші предмети, має свої специфічні особливості. Наразі предметна програма, що застосовується у початковій школі математики, зосереджена на розвитку самостійності, творчості та дослідницьких здібностей учнів. Врахування цих особливостей у освітньому процесі є дуже важливим та необхідним. Слід зазначити, що структура предмета математика організована таким чином, що під час навчального процесу підвищується гнучкість мислення учнів, інтенсивніша пізнавальна діяльність, а вчителі, надаючи належне керівництво, забезпечують повне опанування учнями математичних знань. У початковій математичній освіті використовується широкий спектр методів навчання. Головна мета цих методів – залучити кожного учня до дослідження, мислення та дослідження. Ще однією важливою метою є розвиток самостійності учнів, логічного мислення та здатності висловлювати свою думку про події як громадян з правильним та вдумливим ставленням. Беручи до уваги дослідження, проведені педагогами та методологами попередніх років, ми поставили собі за мету вивчення можливостей та способів організації самостійної роботи учнів у початковій математичній освіті відповідно

до освітньої політики, висунутої незалежною Азербайджанською Державою. Комплексний аналіз дослідницьких робіт вищезгаданих авторів показав, що дослідження, що забезпечують самостійність молодших учнів, не повністю відповідають сучасним вимогам. Для досягнення такої відповідності дедалі важливіше досліджувати можливості розробки та застосування нових методів навчання. Мета предметної програми, що впроваджується в початковій математичній освіті, не обмежується лише наданням нових знань за допомогою сучасних методів навчання, а й показом того, як самостійно здобувати ці знання. Викладання математики в початкових класах має на меті не лише збагачувати пам'ять учнів новими знаннями, але й сприяти регулярному розвитку їхнього математичного мислення, забезпечуючи самостійне здобуття та засвоєння ними математичних знань. Найголовніше, що воно зосереджене на формуванні знань, навичок, звичок, особистісних якостей та здібностей. У результаті учні під керівництвом вчителя навчаються визначати причинно-наслідкові зв'язки, робити висновки, проводити аналіз та здійснювати суттєві та глибокі узагальнення. Наукова новизна статті полягає у тому, що в ній представлено методичну систему, яка дозволяє учням початкових класів самостійно здобувати знання, як у розуміння теоретичного матеріалу, так і в його творчому застосуванні. Ця система сприяє підвищенню якості навчання та демонструє способи організації самостійної роботи учнів під час освітнього процесу.

Ключові слова: початкова школа; викладання математики; домашні завдання; самостійність учнів; методи навчання; творча діяльність; навички мислення.

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