

THE TEACHER'S FACTOR IN THE FORMATION OF STUDENTS' INDEPENDENT WORK IN MATHEMATICS

Ernazarov A.J.

Specialized school under SamSU, Highly qualified teacher on Mathematics, independent
researcher

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Abstract. *This scientific article focuses on the role of the teacher in increasing the student's social activity, forming mathematical concepts and teaching him to work independently. N. PD-5712 of the President of the Republic of Uzbekistan dated April 29, 2019 "On approval of the Concept for the development of the public education system of the Republic of Uzbekistan until 2030" and N. PD-4708 dated May 7, 2020. It is intended to ensure the implementation of decisions "On measures to improve the quality of education in the region mathematics and the development of scientific research." The exemplary thoughts of our great thinkers about understanding, cognition and perception of the world around us are described. In the moral and intellectual development of the young generation, which is our future, widely using various effective, traditional and new methods of education in the educational process, teachers are responsible for the formation of mathematical imagination in students and the further development of talented students. discussed aspects to pay attention to.*

Keywords: *talent, digital technologies, competence, thinking, skills, independent work, graphics, mathematics, thinkers, education and training, spirituality, pedagogical factor, skill and development.*

Determining the priorities of systemic education reform in secondary schools, private schools and specialized schools (Presidential specialized schools) in our country, the use of modern forms in the moral and intellectual development of the younger generation, which is our future, in the educational field. the process of broad support for various effective traditional and new teaching methods, the formation of mathematical knowledge of students and the further development of talented students, the widespread use of digital technologies in the field of education, improving the position of teachers in society to implement all this. The task has been set.

There is a particularly important aspect that should be paid attention to, these are the values of our people associated with spirituality, morality and enlightenment. Of course, without these resources it is impossible to ensure the perfection of man and the position of teacher. To improve the quality of education, first of all, we need to instill in the minds of members of society an attitude towards education and teachers based on our moral values. Because the teacher factor is also important for teaching students to work independently. It should also be taken into account that a modern and comprehensive approach to the educational process is impossible without the use of set theory. That is, the teacher must be able to find the necessary connections for easier explanation and reinforcement during the lesson.

While teaching a student to think independently in mathematics, the teacher is asked to check and prove the correctness of the concepts and information presented in the textbook, use the most convenient methods, independently think about each information and confirmation, be creative in the situation in order to learn how to approach and express your opinion in any situation.

It is clear that students face many difficulties, especially when working independently on mathematics assignments. For this reason, they need to be approached differently depending on the topic of mathematics teaching. In the process of teaching mathematics, when choosing active teaching methods, one should be guided by a number of criteria. In particular:

- compliance with the goals, objectives and principles of teaching mathematics;
- compliance of the teaching method with the content of the subject being studied in mathematics;
 - o correspond to the students' abilities: age, level of mental development (game lessons in high school are not interesting);
 - o compliance with the conditions and time allocated for training;
 - o correspond to the teacher's capabilities: experience, wishes, level of professional skills, personal qualities

For example, if we look at the expressions involved in solving various equations or inequalities as functions, show their solutions using the domain, range, and graphical representation of the function, and if we show that alternative methods exist when certain proofs are completed, solutions or evidence that I have presented to young teachers in many experimental classes and open classes on how best to express the student's imagination. Let's look at a few examples to explain this:

1-task. $\sin^3 \alpha(1 + ctg\alpha) + \cos^3 \alpha(1 + tg\alpha) < \frac{m^4 + 1}{m^2}$ prove infinity.

Justification. We know that $m^2 + \frac{1}{m^2} \geq 2$ inequality exists. That's why we $\sin^3 \alpha(1 + ctg\alpha) + \cos^3 \alpha(1 + tg\alpha) < 2$ we need to prove the inequality.

We know that inequality exists. That's why we need to prove the inequality.

$$\begin{aligned} \sin^3 \alpha(1 + ctg\alpha) + \cos^3 \alpha(1 + tg\alpha) &= \sin^3 \alpha \frac{\sin \alpha + \cos \alpha}{\sin \alpha} + \cos^3 \alpha \frac{\sin \alpha + \cos \alpha}{\cos \alpha} = \\ &= \sin^2 \alpha(\sin \alpha + \cos \alpha) + \cos^2 \alpha(\sin \alpha + \cos \alpha) = (\sin \alpha + \cos \alpha)(\sin^2 \alpha + \cos^2 \alpha) = \\ &= \sin \alpha + \cos \alpha = \sqrt{2} \cos\left(\alpha - \frac{\pi}{4}\right) < 2 \end{aligned}$$

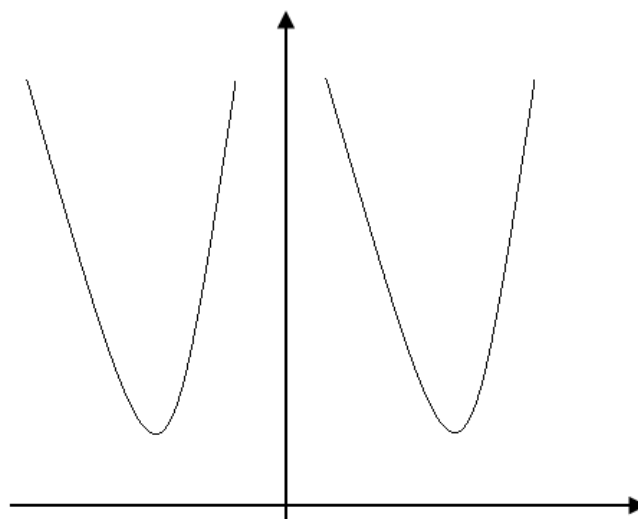


Fig.-1

Given the inequality here,

$$\left| 1 - \sqrt{\sin x \cos x} \frac{\sqrt{\sin x \cos x}}{\frac{\sin x + \cos x}{2}} \right| \geq \left| 1 - \sqrt{\sin x \cos x} \right| = \left| 1 - \frac{1}{\sqrt{2}} \sqrt{\sin 2x} \right| > \frac{1}{2}$$

The inequality has been proven.

But according to our research, even here, if the teacher does not mention the properties of fractions, differences and trigonometric functions during substitutions in the last row, almost all students in regular classes and more than half of students in specialized classes do not mention understanding this proof.

Example 3.

$(1 + \sin x + \cos x) \cdot (1 - \sin x + \cos x) \cdot (1 + \sin x - \cos x) \cdot (\sin x + \cos x - 1) \leq 1$ prove inequality.

Justification

$$\begin{aligned} & (1 + \sin x + \cos x) \cdot (1 - \sin x + \cos x) \cdot (1 + \sin x - \cos x) \cdot (\sin x + \cos x - 1) = \\ & = (\sin x + \cos x + 1) \cdot (\sin x + \cos x - 1) \cdot (1 - (\sin x - \cos x)) \cdot (1 + \sin x - \cos x) = \\ & = [(\sin x + \cos x)^2 - 1] \cdot [1 - (\sin x - \cos x)^2] = (2 \sin x \cos x)^2 = \sin^2 2x \leq 1 \end{aligned}$$

The inequality has been proven.

At the end of this proof, if the inequalities $-1 \leq \sin 2x \leq 1$ and $0 \leq \sin^2 2x \leq 1$ are explained using graphical programs or applications in some gadgets and technical tools based on the graph of a sine wave and the fact that \sin^2 is equal to 0, all students will understand to give a positive independent conclusion on the obtained evaluating the above trigonometric expression

In many of our experimental lessons, it was much easier for students in specialized classes to understand the inequalities $\sin x < a$ or $\sin x > a$ on the unit circle (more details) and on the graph below. For points $a=1/2$, $\sin x > 1/2$ will appear (Fig. 2).

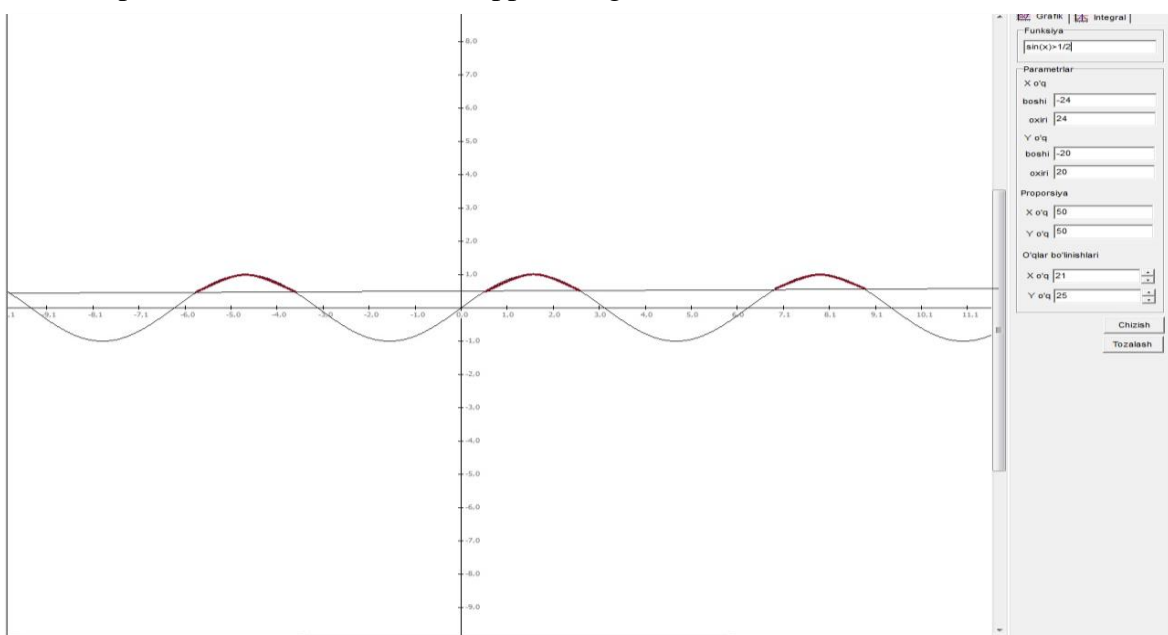


Fig-2

$\cos x < a$ and inequality for the case $a=1/2$.

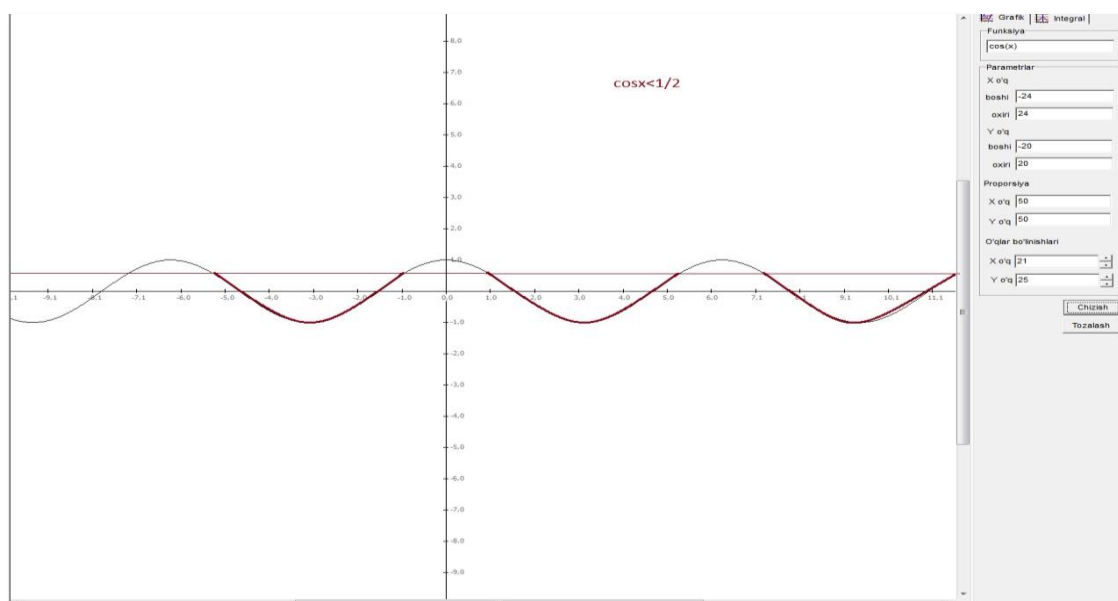


Fig -3

Therefore, we need to conduct research on improving methods of teaching independent work and the effective use of user-friendly educational applications such as Maple or MatLab. In the modern era, when digital technologies are widely used, it is necessary to apply them in the science of mathematics (in an equipped room). The teacher introduces students to the methods of logical thinking; do not allow him to think in stereotypes when solving a given problem, do not repeat exactly the problem given by the teacher or in the textbook, lead to creative research, take into account the individual characteristics of students and use their thinking abilities. opportunities to read to each student as much as possible, it is necessary to be able to set a specific task and direct it to its solution, to get used to overcoming difficulties that arise.

Farabi, one of our great scientists, has exemplary thoughts on understanding, studying and perceiving the world around us. According to Farabi, a person understands the world around him with his mind. People are social by nature—without people they can't achieve much. That is, the role of the team is important to ensure that people are smart, insightful, or talented. In addition, the influence of his intellect, the members of the study group and his teachers is very great in guiding and developing the students' talent for independent work. According to Farabi, people acquire knowledge and skills either from birth or through hard work. Teachers who monitor the educational process know this very well. Therefore, a teacher who knows how to properly organize the environment and work process in the classroom is one of the main factors in developing the competence of talented students and increasing the efficiency of their independent work.

Ibn Sina is another representative of the Uzbek people, who made a great contribution to the development of all sciences of the history of the Middle Ages, writing more than 450 works (240 of which have survived to our time). According to the pedagogical views of Ibn Sina, it is necessary to form a good (friendly) team around you in teaching a child and monitor how he uses this knowledge. Ibn Sina compares a true friend to a mirror. Because the mirror shows a person as fully as possible. According to Ibn Sina, if students can amicably accept each other's mistakes and shortcomings, if they draw the right conclusions from criticism, then such talented students will develop the skills to solve independent tasks given by the teacher in collaboration. Therefore, an important part of teaching independent work is the organization of friendship and cooperation among students. Here the teacher plays the role of forming, unifying, monitoring and deciding the

team. Because it is part of our values to listen to what the elder says and follow his instructions. Of course, this approach also depends on the level of the teacher, and there is relativity here. As at all times, Ibn Sina emphasizes that the educational process of his time is a very responsible and difficult process. Therefore, the teacher needs to determine to what extent the student has mastered this knowledge, be able to apply it independently, use different methods based on the abilities and interests of each student, be fair in relationships, and present information in a way that everyone can understand it. He also says that he must teach the lesson with such passion and facial expressions that it affects the student's psyche. In this case, if a given independent task is a logical continuation of the information given by the teacher, we can expect several solutions from students. To reach this level, students must develop work skills or be talented.

It is very important for the professional competence of a teacher to understand the essence of the following concepts and be able to convey them to the consciousness of students, in order to create in students the need for independent learning, to be able to apply acquired knowledge in practice, to acquire new knowledge and encourage innovation.

BMK – knowledge, advice, skills.

Knowledge is a set of human ideas expressed in theoretical mastery of a given subject (mathematics).

Skill – mastery of ways (methods, actions) of applying acquired knowledge in practice.

Skills are skills that have been brought to an automatic level, to a high level of perfection.

While teaching students to work independently, the teacher can determine the direction of increasing the level of competence in the field of development and evaluate the results of the activity. The competence of the teacher to teach students to independently assimilate traditional and digital information, to apply the information received in real life situations depends on the skills acquired as a result of studying the spiritual and educational heritage, as well as the knowledge gained. gained through digital technologies in the modern world and experience gained at work. Therefore, the issue of education moves from century to century, taking into account the best modern, national and universal values and various traditions. The human factor plays an important role in this. The role of scientists and teachers living and creating in this society is invaluable in polishing and enriching our spiritual, moral and intellectual wealth, passed on from generation to generation. Because at all times, education has determined the development of society.

This is a natural process: each era has its own talented youth. To develop their talent and enrich their minds with new knowledge, teachers use sources from different periods. That is, one of the main factors transmitting information is the teacher (including parents). He educates youth through a variety of literature, sources and practical examples, adding knowledge and skills gained through life experiences. If it is difficult to understand, he repeats it several times. If the students have good understanding, he gives them tasks to work on independently and makes them think. If independent work skills have not been developed, then their competence and independent work will be developed.

The task of educators is to realize in a timely manner all the creative inclinations and aspirations of children, to make them perfect, to eliminate their negative qualities, and to increasingly develop their talents and abilities. Directing and monitoring the teacher's activities is a separate process that is carried out in accordance with the purpose and content of each lesson.

Also from the teacher

- ability to attract
- Ability to work in collaboration
- Be able to listen
- Be highly cultured
- Ability to express thoughts briefly and clearly.
- create a positive mood in class
- We always strive for creativity.
- Be patient with participants.
- Ability to pay special attention to each child.
- Addressing children by “name.”
- Taking into account children’s opinions in the assessment process.
- Taking care of children's health.
- Create conditions for them.
- Humor is the ability to understand humor.
- You also need to always be in a positive mood.
- Be strict when necessary (because this is in our values).

Various classified tasks create conditions for students to explain the purpose and importance of the activity ahead of them, independently acquire knowledge, and solve a problem situation and questions arising from it. This determines the need for students to have cognitive competence, which represents conscious and independent learning. The teacher factor is also very necessary to stimulate gifted students’ need for independent learning, the ability to use acquired knowledge, create and develop.

The essence of this approach lies in the systematization of the educational process - its maximum formation by dividing it into clearly formalized and detailed elements.

Monitoring and evaluation of independent work must be systematic and reasonable.

A teacher is also needed, from time to time a deputy for educational work and a school director (for example, in the school I head, “Director’s Supervision” is carried out twice a year).

must be done Criteria for assessing the teacher and methodological association identified and communicated to students. Student's independent work

The criteria for assessing the results may be the following:

- students’ assimilation of educational material;
- from the student’s theoretical knowledge when performing practical tasks possibility of use;
- reasonableness and clarity of presentation;
- competence in accordance with the goals and objectives of studying mathematics
- level of formation

Individual assignments for independent study given by the teacher must be completed and taken into account when assessing the discipline.

Students cannot deeply understand the essence of individual topics in specific subjects by reading independently. Because to understand a topic, in addition to knowledge of previous topics, it is necessary to take into account interdisciplinary connections and, in some cases, aspects related to the topic, which will be discussed further. So, here it is important that the teacher gives a lecture, demonstrates in practice and recommends the necessary resources. That is, we use traditional teaching methods in the initial stages of teaching students to work independently.

According to the teacher's instructions, students must be convinced of the objectivity, truthfulness and correctness of the knowledge and information being studied, be satisfied and learn to prove it. If the teacher uses modern tools in the lesson, if the teacher uses digital technologies to complete tasks given for independent work, and if the teacher provides addresses of resources, the student will work more effectively in completing the task. Instructional technology should be a process that teaches the student to learn independently, acquire knowledge, and think critically. The implementation of these activities is assessed by including processes such as organization, application, improvement, analysis, investigation, comparison, synthesis, conclusion, management, control and evaluation.

By summarising it can be concluded that it is very difficult to implement the processes of teaching mathematics without the teacher's factor (especially for teaching how to work independently). The main results of pedagogical work depend on pedagogical skill. Before giving the student tasks for independent work, the teacher must explain some issues in detail and lead by example. In addition, he must try to understand what the students want through his every action and behavior. The success of teaching lies in the ability to interest students in the subject being taught. K. Niyazi noted that the basis of achievements is the correct use of time and daily systematic creative work.

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