IMPROVING STUDENTS' COGNITION ACTIVITIES IN MATHEMATICS CLASSES

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ABSTRACT

The following article deals with a systematic analysis of opportunities to improve student's cognitive abilities in Mathematics classes along with information about research on improving the methods of teaching applied sciences on the basis of innovative technologies. The pedagogical possibilities of developing non-traditional teaching methods in activating students' cognitive activity in Mathematics lessons, their application in the system of general and secondary special education have been studied. In the current conditions of Mathematics education in the academic lyceum, there is a need to set and solve the necessary general didactic, pedagogical and methodological issues, aimed at expanding the level of mathematical knowledge of students, inculcating the desire to acquire more knowledge than in the compulsory program. The use of new information technologies with the help of computer programs in the process of teaching and learning Mathematics are becoming the most fruitful and giving good results. They are able to demonstrate important concepts of a Mathematics course that provide a qualitative advantage over learning with traditional methods.

Keywords: Cognitive activity, Mathematics, innovative technology, method, education system, pedagogical opportunity.

INTRODUCTION

In the development of students' cognitive activities, special attention is paid to raising the methods of teaching Mathematics to world standards, along with the natural sciences, and accelerating the use of new teaching methods.

Specialized schools and academic lyceums envisage the implementation of didactic support of education based on innovative approaches in Mathematics lessons based on science-based concepts.

The following article and some adapted resolutions as PF-4947 of the President of the Republic of Uzbekistan dated February 7, 2017 "On the Strategy for further development of the Republic of Uzbekistan"[1]; PQ-4306 of May 3, 2019 "On measures to identify talented youth and organize a continuous system of training highly qualified personnel"[2]; resolution PQ-4708 of May 7 2020 "On measures to improve the quality of education and research in the field of Mathematics" to some extent serve for the implementation of the tasks set out in other regulations related to this activity[3].

Academic lyceums provide an opportunity to use information technology in Mathematics lessons, to develop students' spatial imagination, logical thinking, to master geometric methods of measurement and drawing. Most important thing is that, information technology develops students' ability to get information presented in the form of tables, diagrams, graphs, that helps to develop self-development and independent learning skills on the basis of modern computers.

Based on the views expressed, the use of information technology in improving the cognitive activity of students in mathematics requires pedagogical involvement of students in certain creative activities, the development of the content of these activities, methods and conditions of its organization.

LITERATURE REVIEW

The most urgent tasks are to study the scientific and theoretical basis of activating students 'cognitive activity in Mathematics in general secondary schools,to identify interrelated methods and tools to increase students' cognitive activity, to select didactic concepts, and to develop teaching methods in non-traditional Mathematics.

The Action Strategy of the Republic of Uzbekistan on five priority areas of development for 2017-2021 embodies such priorities as "radical improvement of the quality of general secondary education, in-depth teaching of high-demand subjects such as computer science, and Mathematics" [1].

At present, the use of innovative educational technologies, taking into account the achievements of modern science and technology plays an important role in activating the cognitive activities of students in general secondary schools.

Based on the above objectives, it is necessary to develop a scientific and methodological framework for teaching the elements of the development of mathematical thinking of students in specialized schools and academic lyceums, the development of mathematical competencies in students.

In methodical manual "Interesting Mathematics and problems of Olimpiads" byD.Mahmudova, G.Dustmuradova is describedinformation about the theory of numbers, natural numbers, basic theorems of arithmetic, quick calculations, interesting logical problems, rebuses, mathematical induction, learning to find regularities, sum of squares and cubes of numbers, proof of inequalities, about numerical inequalities, mean values and relations between them, inequalities proved by the monotonic property of the function, inequalities proved by the convex property of the function, trans-inequality and its applications, karamata inequality, calculation of inequalities by trigonometric substitutions, problems, some errors in solving mathematical problems [10, p. 4]. The information provided in this manual does not provide complete information on how to improve students' cognitive activities.

METHODOLOGY

On the basis of the method of analysis, textbooks, manuals, scientific and methodological literature on improving the cognitive activity of students in mathematics lessons were systematically analyzed and advanced pedagogical practices were studied and ideas were collected.

The organization of Mathematics lessons and extracurricular activities in secondary schools, the activity of students in independent learning are conducted on the basis of the observation method.

Based on the method of comparison were comparedthe methodological bases of the use of computer and information technologies in improving the cognitive activity of students in mathematics lessons and the didactic possibilities of teaching based on them were compared.

On the basis of the experimental method, the current normative documents on the organization of the educational process in general secondary schools and academic lyceums and the experience of teachers with advanced experience working in educational institutions, presentation materials based on computer programs in mathematics, logical and interesting mathematics, Olympiad issues, theoretical and practical classes were organized and conducted using electronic copies of lecture materials.

STATEMENT OF THE PROBLEM

In the system of training lectures non-traditional structures play an important role as "basic problems" (separation of the minimum number of basic problems on the topic, solving systems of equations, checking the solution of problems with colleagues, independent problem solving, participation in competitions and Olympiads); consultations (pre-prepared cards, student questions, working with cards, analysis, generalization, addition to cards); test lessons (individual tasks, oral report to a high school student, correction to full understanding in pair work, solve the problem on the card and write in the notebook); and motivation of assessments.

Activation of students' cognitive activity can and should be done in the whole course of the lesson with the help of various methods and tools[4, p. 17], [5, p. 127], [6, p. 83], [7, p. 148]. The task of such a lesson is to save time, as well as to give more pedagogical effect than traditional lessons. The learner must not only accept the image of each action, but understand it deeply[8, p. 177], [9, p. 10], [11, p. 45], [12, p. 32]. Hence, the system of goals of educational activity in this field of education can be presented in the form of some system of activities of the student, similar to the system of components of preparation for educational activity, which must be learned to perform as a result of learning.

RESULTS

In the Mathematics lessons of the academic lyceum we will get acquainted with the methodology of teaching the topic "Irrational inequalities" using the technology "Enlargement of didactic units-EDU" with the help of various examples.

№	Inequality	Solution method	Solution	Fixing up
1	$\sqrt[2n]{f(x)} > g(x)$	$\left[\begin{array}{l}\begin{cases} g(x) \geq 0 \\ f(x) > g^{2n}(x) \end{cases} \\ \begin{cases} g(x) < 0 \\ f(x) \geq 0 \end{cases}\end{array}\right.$	$x < \sqrt{x^2 - x - 110}$; $\left[\begin{array}{l}\begin{cases} x \geq 0 \\ x^2 < x^2 - x - 110 \end{cases} \\ \begin{cases} x < 0 \\ x^2 - x - 110 \geq 0 \end{cases}\end{array}\right.$ $\Rightarrow \left[\begin{array}{l}\begin{cases} x \geq 0 \\ x < -110 \end{cases} \\ \begin{cases} x < 0 \\ x \leq -10, x \geq 11 \end{cases}\end{array}\right. \Rightarrow$ $\left[\begin{array}{l} h\ no\ solution \\ x \leq -10 \end{array}\right. \Rightarrow$ Result: $x \leq -10$	$2x - 3 < 2\sqrt{x^2 - 9}$; $x - 3 < \sqrt{x^2 - 4x}$;
2	$\sqrt{f(x)} < g(x)$	$\begin{cases} f(x) \geq 0 \\ g(x) > 0 \\ f(x) < g^2(x) \end{cases}$	$x > \sqrt{x^2 - x - 12}$; $\begin{cases} x^2 - x - 12 \geq 0 \\ x > 0 \\ x^2 - x - 12 < x^2 \end{cases}$ $\Rightarrow \begin{cases} x \leq -3, x \geq 4 \\ x > 0 \\ x > -12 \end{cases} \Rightarrow x \geq 4$	$\sqrt{x^2 + 4x + 4} < x + 6$ $\sqrt{2x^2 - 3x - 5} < x - 1$

3	$g(x)\sqrt{f(x)} > 0$	$\begin{cases} g(x) > 0 \\ f(x) > 0 \end{cases}$	$x \cdot \sqrt{\frac{x+5}{x+6}} < 0$ $\begin{cases} \frac{x+5}{x+6} > 0 \\ x > 0 \end{cases} \Rightarrow \begin{cases} \frac{x+5}{x+6} > 0 \\ x > 0 \end{cases}$ $\Rightarrow$ $\begin{cases} x < -6, x > -5 \\ x < 0 \end{cases} \Rightarrow$ Result: $(-\infty; -6) \cup (-5; 0)$	$(x+3)\frac{\sqrt{6-x}}{\sqrt{8-x}} > 0$ $(2+x)\sqrt{(4-x)}\sqrt{(5-x)} > 0$
4	$g(x)\sqrt{f(x)} \geq 0$	$\begin{bmatrix} \begin{cases} f(x) = 0 \\ g(x) - defining\ field \end{cases} \\ \begin{cases} f(x) > 0 \\ g(x) \geq 0 \end{cases} \end{bmatrix}$	(x-1)$\cdot \sqrt{x^2 - x - 2} \geq 0$ $\begin{bmatrix} \begin{cases} x^2 - x - 2 = 0 \\ x \in D(x-1) \end{cases} \\ \begin{cases} x^2 - x - 2 > 0 \\ x - 1 \geq 0 \end{cases} \end{bmatrix}$ $\Leftrightarrow \begin{bmatrix} \begin{cases} x = -1, x = 2 \\ x \in R \end{cases} \\ \begin{cases} x < -1, x > 2 \\ x \geq 1 \end{cases} \end{bmatrix}$ $\begin{bmatrix} x = -1, x = 2 \\ x > 2 \end{bmatrix} \Rightarrow$ Result: $\{-1\} \cup [2; \infty)$	$(x-1)\cdot\sqrt{6+x-x^2} \leq 0$ $(x+3)\sqrt{x^2-x-2} \geq 0$ $(x+1)\sqrt{x+4}\sqrt{x+7} \leq 0$

The basic element of technology is the exercises which are considered in one session as: a) the initial problem b) solving it c) generalization. Therefore, working on a mathematical problem is done in four ways: sequential and interrelated exercises, exercises, response check (control), and the transition to a homogeneous of more complex exercises.

CONCLUSION

By defining the purpose of learning, each student can adapt to the level of learning of the material suggested by the teacher. It is very important to determine the time and place of the intermediate and final diagnosis, as well as the correction of the learning process in the formation of such tests. Such organization of lessons allows students to work individually in the learning process, to involve each student in conscious learning activities, as well as to acquire the skills of independent learning and self-examination.

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