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Providing quality mathematical training for students with different types of thinking and with different interests in conditions COVID-19

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***Abstract*---**The aim of the study the article highlights that the process of teaching mathematics to non-mathematics students is complicated by the limited time of the educational process, low motivation of their cognitive activity, psychological barriers of students, assessment and self-assessment of their academic achievements, lack of non-standard tasks. Proposing ways to solve these problems will create conditions for enhancing the cognitive activity of such students in the process of learning mathematics in conditions COVID-19.

***Keywords*---**mathematical training, non-mathematics students, cognitive activity, mathematics lessons, different types of thinking, COVID-19.

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Introduction

Differentiation of mathematics education should take into account not only differences in the levels of development of students of different ages, but also provide quality mathematical training and activity of students with different types of thinking and interests in conditions COVID-19. This necessitates the creation and application of such educational technologies that would solve educational and educational tasks taking into account the specifics of teaching mathematics to students of different groups (according to aspects of profile and level differentiation) taking into account individual characteristics of these students [15; 22]. This problem is especially true for teaching mathematics to non-mathematical students who do not have the ability to do mathematics, do not find it applicable in everyday life or do not link future professional activities with mathematics, so often have no interest in studying it. The organization of mathematics education for such students is characterized by a number of local contradictions that need to be resolved:

1. The purpose of studying the mathematics of such students is to form a general mathematical culture of the individual, which provides mastery of certain techniques of mathematical activities for successful participation in public life. However, in such classes the importance of mathematics education is leveled, students do not always understand that mathematics is the main tool of their mental development.
2. Mathematics is a compulsory subject for non-mathematics students, but it is studied mainly according to the standard level program, which provides for 3 teaching hours per week. Students of such classes have a heavy workload of important disciplines (language, history, art). Together, these factors reduce motivation and, consequently, cognitive interest in the study of mathematics.
3. Non-mathematics students often have a negative attitude to the study of mathematics, certain psychological barriers. Therefore, they do not try to understand the essence of educational material, do not use it in unusual situations, everyday life or in modeling future professional activities, which contradicts the main task of studying mathematics - providing conditions for students to achieve practical competence.
4. Students often choose to study the humanities out of a desire to "avoid" mathematics, but much of it is external independent assessment in mathematics on the same tasks as mathematics students. Then they get mostly intermediate points and enter universities, where they continue to study mathematics. However, the level of their motivation and mathematical training does not always meet the expectations of teachers and does not contribute to successful preparation for future professional activities.

This can be generalized into a global contradiction between the objective need to intensify the cognitive activity of non-mathematics students in the process of learning mathematics and the lack of appropriate methodological support in conditions COVID-19. Finding ways to form a positive motivation in mathematics lessons through the optimal selection and structuring of educational material, further improvement of forms, methods and tools of teaching should be the subject of special study.

The aim of the study

Develop and experimentally test ways to teach mathematics to non-mathematics students, aimed at enhancing their cognitive activity

Methodology

Research methods

Theoretical: analysis of psychological and pedagogical, scientific and methodological literature, normative documents in the context of research; analysis of the peculiarities of the organization of the educational process in mathematics; classification, systematization and generalization of current ways of activating students' cognitive activity in the context of research; theoretical design and modeling of the educational process of high school students in mathematics lessons; methods of mathematical statistics.

Empirical: pedagogical experiment; pedagogical observation of conversations with teachers, non-mathematics students, students of physics and mathematics faculties of pedagogical universities (on the main issues of the research problem); questionnaires for teachers who teach natural sciences and mathematics for non-mathematics students; analysis of oral answers and written works on mathematics of non-mathematics students.

The study was conducted among non-mathematical students studying in the graduating classes of secondary schools in Ukraine. At the beginning of the experiment to determine the levels of activity of non-mathematics students (total number of respondents – 281) were conducted their psychological testing, diagnosing control work, as well as the teacher's assessment of the level of their cognitive interest. Then the actual possibilities of solving the problem of activating the cognitive activity of non-mathematics students through the use of techniques and means of intensifying the process of teaching mathematics, formation and development of students' cognitive interest in studying mathematics and taking into account psychological and pedagogical characteristics of non-mathematics students. 2 groups of students were created. The experimental group studied according to the developed model of training, and in the control group studied in the usual most common conditions of teaching mathematics. Determining the level of student activity at this stage of the experiment was carried out on the same sections as in the previous stage.

Methodological basis of the research: conceptual provisions of the theory of cognition; the concept of educational activities; psychological theories of thinking; theory of gradual formation of mental actions; theory of developmental and problem-based learning; heuristic learning theory; provisions of didactics and methods of teaching mathematics about the system approach and structure of the didactic cycle; provisions on the role of tasks and exercises in the formation of knowledge, skills and abilities; modern concepts of school mathematics education development; theoretical foundations of the structure of modern lesson methods; provisions of the methodology of teaching mathematics on computer support of the process of teaching mathematics.

Features of mathematical education of different students are highlighted in a number of recent studies. Ukrainian researchers emphasize that the mathematics teacher should pay special attention to setting goals and objectives and selecting the content of tasks [10; 12; 16; 18; 21; 26]. At the same time, its activities should be aimed at identifying and selecting effective methods and techniques, forms and means of learning that would ensure the formation and development of cognitive interest, cognitive activity and cognitive independence of students in the process of learning mathematics [1; 2; 14]. This directs the cognitive activity of students to the awareness of the need to know the mathematical apparatus as an effective tool for mental development through the solution of non-standard problems and the organization of self-assessment [4; 5; 8; 17].

Then the joint activities of teachers and students in the process of teaching mathematics provides an increase in their activity in the process of teaching mathematics, including the level of academic achievement in mathematics, positive emotions, level of learning and learning in each lesson of mathematics [13; 20; 27]. This leads to positive changes in the motives, interests, emotions of students.

Results and Discussion

Non-mathematics students choose the humanities specialized of study, which provides for an expanded and in-depth study of subjects of socio-humanitarian or philological cycles. As a result of data analysis, it was found that almost a quarter of high school students in Ukraine choose to study in the humanities classes.
According to the Concept of Specialized Education in School of Ukraine (2013) [11] the purpose of teaching in the humanities classes is to create conditions for quality education of high school students in accordance with their inclinations, abilities and needs, ensuring their professional orientation in the future continuity between general secondary and professional social-humanitarian or philological education, providing opportunities for continuous self-improvement of the individual.

Mathematics in classes with a humanities specialized is a basic subject. The content of mathematics education in high school, in particular in classes with a humanities specialized, are:

- expanding students 'competencies on identical transformations of expressions (power, logarithmic, irrational, trigonometric), solving relevant equations and inequalities;
- completion of the formation of the concept of numerical function as a result of studying power, exponent, trigonometric classes of functions, the formation of skills to study and use them to describe and study phenomena and processes;
- acquaintance with ideas and methods of differential and integral calculation, formation of elementary skills of their practical application;
- formation of practical competence in recognizing random events, calculating their probabilities, applying basic statistical-probabilistic models in solving educational and practical problems and processing experimental data in the process of studying subjects of the natural cycle;

- formation of a system of knowledge about spatial figures and their basic properties, methods of calculating the areas of their surfaces and volumes, as well as the ability to apply the acquired knowledge in solving practical problems;
- formation of the idea of axiomatic construction of mathematical theories.

To determine the state of the problem of mathematical training of non-mathematics students in modern Ukrainian school, we conducted a survey of teachers of natural sciences and mathematics (172 respondents) and students with humanities classes (198 respondents), monitoring the process of teaching mathematics to students of these profiles, study and analysis of the experience of mathematics teachers in classes with non-mathematical specialized of study. Respondents had the opportunity to choose several answers.

According to 61.6% of surveyed teachers who teach science and mathematics in classes with a mathematical profile of learning is most "comfortable" to conduct lessons in the disciplines of science and mathematics, 35% of respondents believe that in classes with a natural science profile, 21.6% - in classes with economic profile of study, and only 10% and 5%, respectively, indicate classes with humanitarian and sports-aesthetic profile of study. It should be noted that 45% of respondents believe that it is most difficult to work in senior classes, while 51.6% indicated classes with sports and aesthetic profile of education as the most problematic, 36.6% - classes with a humanitarian profile of study, 18.3% - classes with a mathematical profile of study and 10% of respondents noted classes with economic and natural sciences profile of study. Among the reasons for the difficulties of pedagogical activity in classes with a humanitarian profile of teaching, teachers of natural sciences and mathematics most often indicate the following (Table 1).

Table 1. The reasons for the difficulties of teachers of natural sciences and mathematics that arise in working with non-mathematics students

Reasons for the difficulties	*Percentage of respondents*
It is difficult to teach the material because it is difficult and incomprehensible for students	41.6 %
It is difficult to teach the material in a plain language	16.6 %
It is difficult to get students interested in their subject: they have a different focus	48.3 %
The textbook for classes of this profile does not reflect its specifics	25 %

Analysis of mathematics lessons in classes with a humanities profile [24] showed that:

1) insufficient attention is paid to checking homework, most students do it either partially or superficially;
2) the announcement of the purpose and objectives of the lesson is often formal;
3) when motivating students to learn a new topic, teachers mostly give examples from the textbook without analyzing the possibility of using this material in

future professional or daily activities, but actively involve historical material to develop students' interest in the topic;
4) when presenting new material, teachers do not pay enough attention to creating a problem situation and independent work of students;
5) mathematics teachers make extensive use of visual aids, but the use of the latest information technology is limited to demonstration programs, including Power Point;
6) most of the tasks to be solved are of a reproductive nature, only sometimes for students with a higher level of learning opportunities teachers offer tasks of an applied nature;
7) only some methods of interactive learning technologies are involved and almost no seminars, mutual learning, practical or laboratory work, didactic games, tests, conferences, etc .;
8) control of students' academic achievements is carried out according to traditional methods (independent and control works with multilevel tasks); analysis of results is carried out in the form of work on errors, and the organization of self-control of students is given insufficient attention;
9) insufficient account is taken of the psychological state of students during the lesson of mathematics.

In our opinion, the activation of cognitive activity of non-mathematics students in the process of learning mathematics is determined by the following features:
1) high positive emotional tension in the classroom: humanities students in the math class should feel free, relaxed, not afraid of solving problems;
2) increased attention to solving problems during the study of theoretical material in its fundamental role;
3) focus on the ability to apply the material in everyday life and the specifics of future professional activities: tasks and examples should contain information of environmental, psychological, linguistic or socio-historical nature;
4) creating a situation of success in teaching mathematics, in particular, stimulating a positive assessment of the most important for students of humanities types of tasks;
5) mastering by students of methods of memorization of educational material, sign-symbolic activity;
6) formation of skills and abilities of self-control.

To study the learning motivation of non-mathematics students while studying mathematics and identifying its features, students were offered a questionnaire, the results of which are presented in Table 2.

Table 2. Features of learning motivation of non-mathematics students in the process of learning mathematics

Motives of learning activity in the process of studying Mathematics	*Number of students (%)*	*Number of students (persons)*
Requirement of parents, school administration, teachers, classmates, friends	18.2 %	36
To be an educated person who has his own opinion on any issue and is well-informed in	23.7 %	47

many branches of modern science		
To study successfully and get a certificate with good grades	63.6 %	126
To gain deep and solid knowledge	27.3 %	54
To be always ready for the next lessons	27.3 %	54
Not to lag behind in the study of Science and Mathematics	9 %	18
To ensure successful future professional activity	27.3 %	54
To achieve respect of the teacher	9 %	18
To be an example for classmates, friends	0	0
To avoid punishment for underachievement	45.5 %	90
To get intellectual pleasure	9 %	18
To apply acquired knowledge in professional or daily activities	4.5 %	9
Interest in Mathematics as a science	2 %	4

Students' mathematical competence belongs to both key and subject competencies. That is, mathematical competence for all students, including non-mathematicians, should be among the qualities of personality and provide opportunities for effective activity in various fields. Also, mathematical competence as a subject competence means the experience gained by non-mathematical students specific to mathematics activities related to the acquisition, understanding and application of mathematical knowledge and methods of activity. Analysis of the actual results allowed to identify a number of problems:

1) the problem of limited learning process in time: because in classes with a humanities profile, mathematics is studied at the standard level, it is difficult to ensure the effectiveness of mathematics lessons for 3 hours a week. This problem causes a lack of time to solve applied or non-standard problems, which should ensure the formation of skills to apply mathematics in everyday life;
2) the problem of motivating the cognitive activity of non-mathematics students during the study of mathematics: the content of teaching mathematics does not reveal to students of these classes answers to questions about the purpose of their study of mathematics;
3) the problem of psychological barriers of non-mathematics students during the study of mathematics: often students have a negative attitude to the study of mathematics, which is manifested primarily in difficulties in doing homework, various written work or independent problem solving;
4) the problem of lack of evidence and tasks of increased difficulty in teaching mathematics: often mathematics teachers working in these classes, omit strict justifications of mathematical facts, theorems, are mostly limited to solutions of training exercises, almost not paying attention to non-standard, creative character;
5) the problem of assessing and self-assessing the academic achievements of non-mathematics students in mathematics: often mathematics teachers formally transfer experience in classrooms with a different profile of learning with a decrease not only in the presentation of material but also the level of requirements for knowledge control.

The study made it possible to characterize in particular the psychological and pedagogical features of the study of mathematics by non-mathematics students. They are characterized by thinking in images, not abstract constructions, so you always need visual examples in the process of learning new material. When perceiving graphs of functions, mathematical formulas or writing definitions and theorems with the help of symbols; Reproduction of formulations of definitions or proofs of theorems often lacks a deep understanding of what has been studied, high school students are not able to make a plan to prove the theorem or give a fragment of it. Non-mathematics students need expanded explanations when solving problems and individual teacher consultations.

According to the identified features, in order to implement a differentiated approach to teaching mathematics to non-mathematics students, it is important to combine them into different groups. Based on the level of education and learning of students (3 groups) and the level of formation of motives for learning mathematics (3 groups), 9 groups of such students were identified (Figure 1).

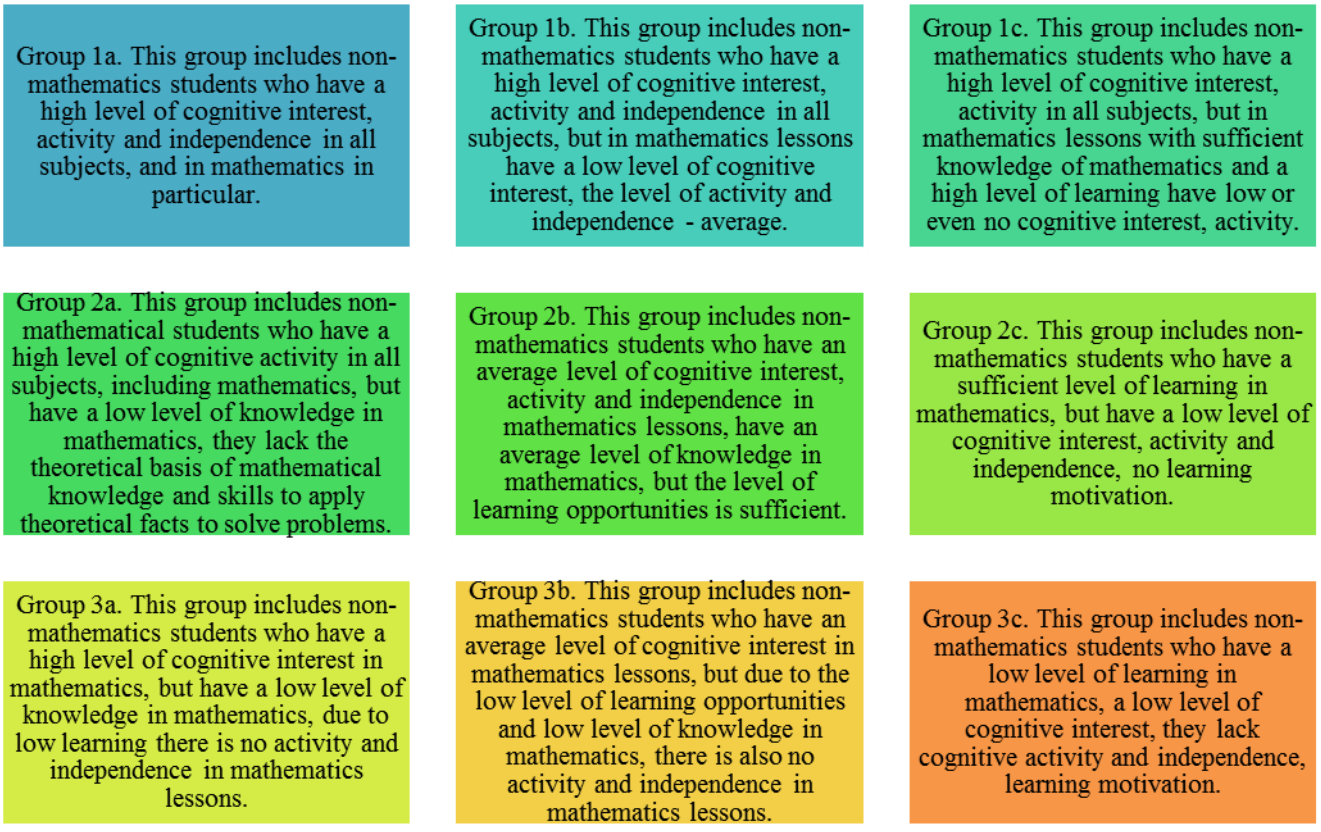

Figure 1. Groups of non-mathematics students in mathematics lessons

Accordingly, we implemented the experimental teaching of mathematics to these students, taking into account the principles of differentiation of learning. That is, in the future, all stages of the educational process, we carried out taking into account the division of non-mathematics students into groups, choosing the

forms, methods and techniques, means of teaching mathematics in accordance with their characteristics.

The study argued that the study of new material should begin with a didactic attitude, in the process of which the teacher should create in students a personal interest in learning the material. The study showed that in algebra and analysis lessons the most effective form of organizing students' learning activities at this stage is frontal work, and the most effective method is a teacher's conversation about applied aspects of new material and its use in future professional activities. In geometry lessons, special attention should be paid to the use of material in everyday life, design, construction, etc.

It is established that at the stage of motivating students through the situation of impression it is important to interest each student, to capture the unexpected situation, which should relate to the future professional activities of these students. The most effective forms of organizing educational activities for students of such classes in algebra lessons and the beginnings of analysis are independent work with educational material, work in pairs and in groups under the guidance of a teacher. Among the methods, the didactic game, the use of emotional color of the material and historical references on the topic that most interested or impressed students proved their effectiveness. At this stage, it is advisable to offer students long-term homework to solve applied problems, build a project.

The study substantiates that at the stages of setting goals and objectives of the topic it is effective to formulate students' personal goals and objectives of its assimilation by filling in the relevant tables. Such activities also address the issue of updating students' basic knowledge. Also, at this stage, filling in the "Self-Confidence Scale" will help to overcome psychological barriers to their acquisition of mathematical knowledge. According to our research, school lectures are an effective form of learning new material in mathematics lessons by non-mathematics students.

In the process of studying new material in algebra lessons and the beginnings of analysis, the school lecture proved its effectiveness by presenting a problematic epigraph, the message of the plan for the development of new material. Students are invited to control their perception of the material in different ways: by creating a lecture plan, asking questions to the teacher, highlighting unclear points, compiling abstracts of lectures, reference notes, tables or diagrams. The peculiarity of this lecture is the introduction of elements of actualization of basic knowledge, explanations without the use of complex mathematical terminology, a large number of examples given by teachers and students, the presence of algorithmic prescriptions, samples of activities.

In geometry lessons for non-mathematics students while studying new material, the feature of such lectures should be increased attention to exploratory forms of work [19]. At the same time, it is expedient to compile reference summaries, make drawings for theorems, formulate inverse statements to theorems and illustrate them, replace certain properties in definitions or theorems and analyze the obtained statements. An important component of working with non-mathematics students is to illustrate the practical application of the material being studied,

with their own examples, solving applied problems, preparing reports on historical topics.

We will show the use of these techniques on the example of a fragment of a mathematics lesson for non-mathematics students at the stage of motivation to learn new material on the topic "Numerical Functions" (Grade 10).

Excerpt from the lesson

The teacher invites students to get acquainted with applied tasks from different professional fields and independently choose one of them to solve as a long-term homework [23; 25].

a) sociology: in 1980, about 4.4 billion people lived on Earth, and population growth was 1.7 % per year. Under conditions of such growth, build a graph of population change, plotting the decade on the abscissa, and the population (in billions) – on the ordinate. What should be the population of the planet while maintaining the same growth rate in 2015 and what was it really like? What will be the population of the planet while maintaining the same growth rate in 2050? in 2222? [23];
b) economy: dependency of the daily milk yield y (in liters) on the age of the cow x (in years) is expressed by the function $y = -9.53 + 6.68x - 0.49x^2$, provided that $x \in (2; 12)$. Plot a graph of this dependency and determine at what age the cow will give the most milk [23];
c) ecology: when studying the ecological state of rivers, scientists established dependency $y = 0.958 + 0.13x - 0.225x^2$ of the river flow rate y (in m/s) at different depths $x \in [0; n]$, where n is the greatest depth of the channel (in m). Plot a graph of this dependency and determine at what depth the speed of the river will be the greatest [23];
d) history: find your own data on world gold prices for the last century. Plot a change in world gold prices depending on the years of the last century and determine whether it defines a function. Determine if there is a gap at which the graph can define the function, try to define it in different ways;
e) linguistics: choose your favorite work and try to build a graph for it that corresponds to Zipf's law of word frequencies;
f) sports: find the data for predicting the results of athletes in weightlifting. Plot a dependency graph of the result in the classic lifting of two kettlebells on their weight. Determine the type of functional dependency. With the help of a graph determine the number of lifts of two kettlebells weighing 32 kg, if the athlete performed such an exercise with kettlebells weighing 26 kg 118 times.

In the future, the teacher asks students to make reports on previously found historical information on the topic.

Expected response from students. The first steps in the formation of the concept of function were made in Ancient Babylon [3]. Here were created tables of reciprocals of numbers, their squares and cubes, the sums of squares and cubes of numbers. In fact, these are table values of functions $y = 1/x$; $y = x^2$; $y = x^3$; $y = x^2 + x^3$.

The different stages of conducting mathematics lessons for non-mathematics students should be carried out taking into account the division into groups

according to their characteristics. For students of groups 1c, 2c, 3c it is advisable to present a problematic epigraph: the teacher, naming the topic of the lesson, gives the epigraph to the topic, so students of these groups are more focused on new material.

For example, when studying the topic "Elements of probability theory" (grade 11), the epigraph can be taken from an excerpt from a letter by B. Pascal to P. Fermat: "Most people think that if they do not have complete knowledge about something they don't know anything about it at all. I am sure that this kind of opinion is deeply wrong. Partial knowledge is also knowledge, and incomplete confidence also has some significance, especially when I know the degree of that confidence. Someone may ask, "Is it possible to measure the degree of confidence in numbers?" Of course, I will answer: people who gamble base their confidence on this - I will note at once that the degree of possibility (confidence) of the event I called the probability" [3].

For students in groups 1b, 2b, 3a and 3b, it is advisable to announce a plan for learning new material. If the lecture plan is formulated in the form of questions, then during the lesson the possibility of a conversation is provided. Students are more actively involved in the process of solving the tasks identified in the plan.

The use of elements of self-control and self-assessment by students is appropriate for students in groups 1a and 2a. During the lecture, these students are asked to control their perception of the material in different ways. It develops students' initiative in asking questions to the teacher, establishes skills of self-perception and self-evaluation. Some points of the lecture plan, which contain statements known to students, concerning additional or reference material, can be offered to cover the students themselves. As our research shows, the following teaching methods and techniques are the most effective in these geometry lessons in classes with a humanities profile (Table 3).

Table 3: Methods of teaching mathematics to non-mathematics students

Group	*Teaching methods and techniques*
1a and 2a	- giving own examples and counterexamples; - geometric support of proving theorems; - formulation of converse of the theorems, checking their correctness, - giving examples and their illustration; - replacement of certain properties in definitions or theorems by other properties and analysis of the obtained statements
1b, 2b, 3a and 3b	- illustration of the studied material in a foreign language; - creation of reference notes; - providing drawings to the theorems
1c, 2c and 3c	- illustration of the practical application of the material being studied; - preparation of reports on historical topics; - search for connections between learning material and the environment

Let’s illustrate these techniques with examples.

In the 11th grade, after solving the task "Determine the number of integer solutions to inequality $log_{90}(x-10)+log_{90}(x-11) \leq 1$" students were asked to analyze and verify obtained results (Fig. 2) [9]. In particular, to put forward hypotheses about solutions to inequality $log_{90}x + log_{90}x \leq 1$ and test them analytically. These tasks initially caused a negative due to the immaturity of the ability to solve them, but then they became the basis for the formation of associative series: roots of the equation – null functions, solutions to inequality – intervals of the constant sign of the function. Thus, the situation of success was fixed in students' minds through the formation of skills to involve software to solve the problem or task.

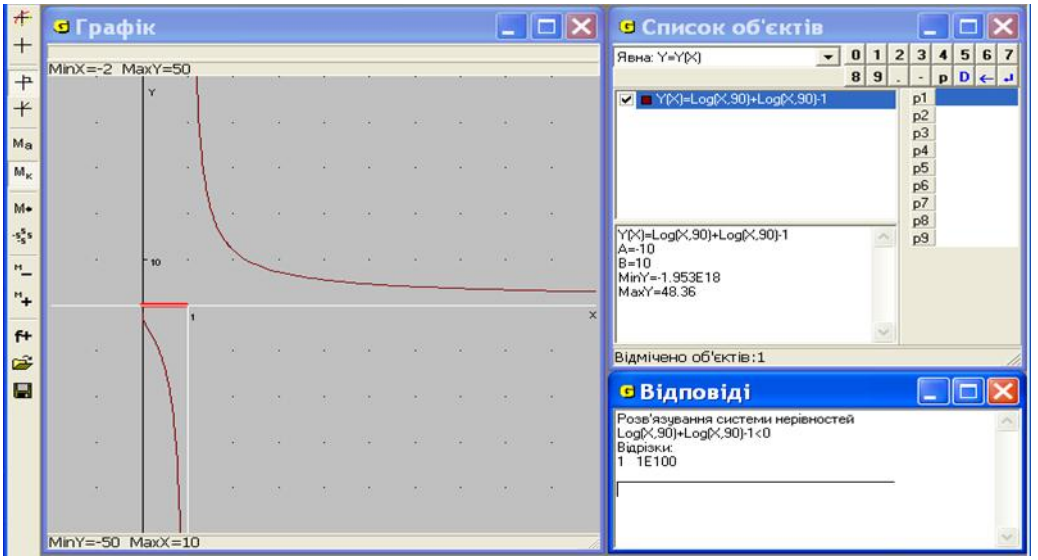

Figure 2. Illustration to the task

While studying the topic "Derivative and its application" (Grade 11), students, solving the task "Find the derivative of the function $y = 2x^2 - 4x$ and make graphs of both functions", created their task with a non-standard wording: "In the figure (Fig. 4) find graphs of functions that are derivatives of quadratic functions, the graphs of which (I, II, III) depict the fish in the figure (Fig. 3)".

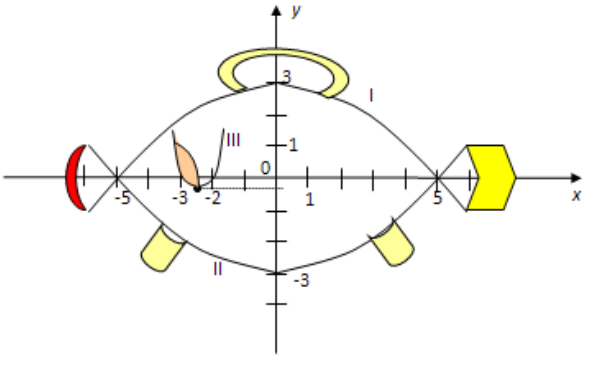

Figure 3. Illustration to the task

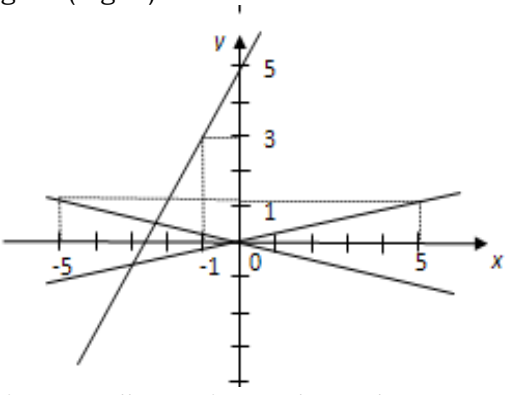

Figure 4. Illustration to the task

Activation of cognitive activity of non-mathematical students during the formation of skills and abilities should create conditions for each student to achieve practical competence. The main feature of teaching mathematics to non-mathematics students at this stage should be the formation of skills to find ways to solve the problem with a minimum amount of knowledge. It is advisable to use the following techniques: filling in the gaps in the task, filling in tables with additional questions to the problem, compiling algorithmic instructions, giving your own examples and finding errors in the proposed, giving counterexamples to the problems solved in the textbook, didactic games and more.

In the course of the research it was established that lessons of formation of skills, generalization and systematization of knowledge, skills should be conducted in the following forms: psychological training lesson, integrated lesson, laboratory-practical lesson, conference-lesson. We also held a mathematical competition "Mathematics for all".

The study identified requirements for mathematical problems for non-mathematics students, taking into account the specifics of their studies: variability of conditions, variability of ways to solve problems, the role of mathematics in everyday life, ensuring the implementation of interdisciplinary links in other disciplines, accessibility and non-standard formulation of the task [23; 25]. Offering non-mathematics students such problems in mathematics lessons, collectively discussing their solution in the form of a heuristic conversation, providing comments and tips on how to solve it helps to increase the level of tasks that they are able to perform with minimal outside help.

The main feature of the control and evaluation activities of mathematics teachers in classes with a humanities profile is to take into account not only the level of mastery of specific mathematical knowledge, skills and abilities to solve typical mathematical problems, but also the level of motivation to study mathematics. The study proposes a three-level structure of the system of thematic control for each topic. Types of control such as mathematical dictation, didactic games and "silent questioning" are effective, as well as lessons of control and assessment of knowledge, skills and abilities of students in the form of lessons-tests. At all stages of control and evaluation of academic achievements of non-mathematics students in the process of learning mathematics, considerable attention should be paid to the organization of self-control of students by filling them self-assessment tables, self-control tests. In particular, for students of groups 1a and 2a such forms of written current control as mathematical dictation with tasks that require not only memorization of educational material, but also the ability to justify their answers are effective, and for students of groups 1b, 2b, 3a and 3b appropriate there is a didactic game "Brownian motion" and "Information vacuum". To test the knowledge of theoretical material by students of groups 1c, 2c and 3c, it is more appropriate to use such an oral form of current control as "silent questioning" [6].
Activation of cognitive activity of non-mathematics students in the process of learning mathematics should be considered as a joint activity of mathematics teachers and students themselves, aimed at overcoming negative attitudes and psychological barriers to learning mathematics, which manifests itself in increasing student activity through the formation and development of cognitive interest. mathematics as a means of mental development), cognitive activity

(students 'desire to understand and solve problems of a non-standard nature) and cognitive independence (improving students' self-assessment activities) [24].

In determining the levels of cognitive activity of students with humanities profile in mathematics, it is advisable to rely on such indicators of activity of non-mathematics students as a positive attitude to the subject, levels of success, energy, initiative, intensity, emotionality found in math lessons. The proposed classification of levels of activity of non-mathematics students in teaching mathematics contains three steps: low, medium and high.

The main provisions of the study of the activation of cognitive activity of non-mathematics students in mathematics lessons were tested experimentally. The sections showed that in experimental classes as a result of the introduction of the developed teaching methods the level of student activity in mathematics lessons increased (Table 4).

Table 4. Levels of activity of non-mathematics students in mathematics lessons

Level of activity	*At the beginning of experiment*				*At the end of experiment*			
	experimental group		*control group*		*experimental group*		*control group*	
	Number	*%*	*Number*	*%*	*Number*	*%*	*Number*	*%*
High	8	4.68	12	7.40	54	31.58	9	5.56
Medium	80	46.78	79	48.77	98	57.31	87	53.70
Low	83	48.54	71	43.83	19	11.11	66	40.74
Total	171	100	162	100	171	100	162	100

The study was accompanied by statistical processing of the results and their interpretation. The representativeness of the sample was evaluated according to Pearson's criterion χ^2. Comparison of activity levels in the two groups of students was performed using Student's t-test in two stages.
Initially, the sample values of variances in both groups were compared. The following ratio
$F = S_1^2 / S_2^2 = 35.66 / 30.90 = 1.154 < F_0 = 2.014$

was obtained. The calculated value of the Fisher test is less than the critical value. This allows us to assert the equality of variances at the level of significance of 0.05, differences in the numerical value of the calculated variances are explained only by random reasons and can not be the basis for the statement of significant differences in variances of both distributions. Then the degree of discrepancy between the sample averages was assessed. The calculated value of the t-test in our case is
$t = 2.014 > t_0 = 1.96$.

Thus, the alternative hypothesis of a significant discrepancy between the sample results is true at the level of significance of 0.05, the difference in the total score can not be explained only by random reasons. In the course of the experiment, it was confirmed that the level of activity in teaching mathematics to non-mathematics students who studied according to the method focused on activating

their cognitive activity is objectively higher than the same indicator in the group studying traditional methods.

Conclusions

1. Features of mathematical education of non-mathematics students in conditions COVID-19 are as follows:
    - the study of mathematics causes significant difficulties for students;
    - constant and purposeful work on diagnosing individual-typical features of these students is extremely important for solving the problems of mathematical education of students.
2. The main thing in the process of studying mathematics by non-mathematics students should be their awareness of the need for systematic work on the subject. It is then that the teaching of mathematics to such students will be based on the cooperation of teacher and students in the priority role of the teacher - as a mentor, and the student - as a acquirer of knowledge, skills and abilities.
3. In our study, we proceed from the fact that the main goal of studying mathematics in classes with a humanities profile should be the development and mastery of mathematical material by students at the level of skills to apply it in everyday life or future professional activities. In the process of learning mathematics, non-mathematics students should be aware of the role of mathematics as an element of general human culture, and the interdisciplinary links between mathematics and humanities.
4. In our opinion, emphasis in the goals and objectives of teaching mathematics to non-mathematics students should also be placed on achieving a high level of intellectual development of humanities students, forming their mental activities, ability to produce ideas and use acquired knowledge, skills and abilities in everyday life.
5. Ensuring high-quality mathematical training of students with different types of thinking and different interests is based on the formation of positive motivation in students to learn mathematics through sound selection and structuring of educational material, further improvement of forms, methods and means of learning students, united by the criteria of learning, learning and the level of formation of motives for learning mathematics.

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