

ACTIVATING COGNITIVE ACTIVITY IN THE PROCESS OF MATH EDUCATION IN SECONDARY SCHOOL

Abstract: This article defends the thesis that self-employment is a form of activating cognitive activity in the learning process. It promotes understanding, understanding and understanding of learning information, enhancing the sustainability of knowledge and skills. Self-help increases the possibilities of applying the knowledge gained in different learning and life situations, shaping students' active, conscious attitudes towards learning, organizing and discipline in terms of learning activity. Self-employment plays an important role in assessing process and learning outcomes, self-assessment in learners, control and self-control. It provides differentiation and individualization in education, which is one of the most important tasks in modern school education.

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Introduction

Education is one of the factors, promoting the development of the human personality. It is a peculiar kind of cognitive activity, in the process of which pupils gain new skills and acquire knowledge. However, it needs to be highlighted that the tutor is the one who directs, stimulates and creates a suitable learning environment. Stimulating the educational process is imperative for the thorough development of students. The knowledge obtained through one's own efforts are the longest lasting. Education should be accompanied by skill forming, used for solving various issues. Self learning in this aspect is the main means of achieving better results.

Exposition

In the didactical literature, prominent researchers offer diverse definitions about the self-learning habits of pupils. In this article, we will catch a glimpse of a part of these definition and treat some of them as a foreground for our further perception of individual work

R. M. Mikkelson provides the following interpretation: „Under the term individual work we should understand task completion by the students without aid from the teacher, but still under his supervision.” [2]. M. Andreev complements this summary with „Pupils accomplish it without the tutor's direct help, relying on knowledge, skills and habits, but with a clear goal set by the teacher.” [1, p. 361]

By individual work of the pupils according to R. V. Sroda – „we have to interpret such an activity, which leads to maximum participation, creativity, independent thinking and initiative.” [2].

Outstanding psychologist B. P. Esipov provides a summed up explanation of individual work, which plays a role in math lessons. „The individual work of the pupils included in the education program is a process which is done without the teacher’s involvement, however, under his authority and in specifically allotted time; the students are constantly aspiring to achieve the set goal, making use of their mental or physical competencies(or the two of them combined) in one form or another. ”[3, p. 15]. The advancement of cognitive abilities, understanding the education gained in the course of the student’s individual work is of significant importance for gaining autonomy as a character trait.

The educator plays the role of an organizer and operator of such kind of work. He directs and guides learners in their efforts of mastering the mathematical knowledge, for its strengthening, generalization and transforming it into long lasting skills and competencies.

The lesson is only the beginning of the individual work where under the teacher’s guidance, the students perform this activity. It further expands, deepens, diversifies, changes and is reflected upon outside of the classroom, in the form of homework, course work, extracurricular activities and other types of competitions where the tutor cannot directly intervene in the process.

Every new piece of work has to rely on previously gained experience and to provide insight into more efficient command of mathematical knowledge by the students. Mathematics provides a great deal of opportunities suitable for organizing and conducting diverse forms of student-based work.

Along with the introduction of brand new educational programs, the need of more modern means of learning, such as interactive boards, tablets, computers etc. is rising. This kind of aid encourages self-preparation and translates to an easier grasp on the learning material.

In the article, examples of problem solving using a dynamic mathematical software, given for self-preparation will be shown.

Students are given such a task, which they have to solve using specialized software in order to reach the following statement: „In a triangle the bisector is between the height and the median, build on the same peak with the bisector”. The program enables every student to construct his own drawing, to experiment, observe, vary by types of triangles and formulate a hypothesis. The teacher works along with the students, while encouraging them to experiment. This way the pupils can visualize different variants and explore diverse situations on their own, as shown on figures 1, 2 and 3.

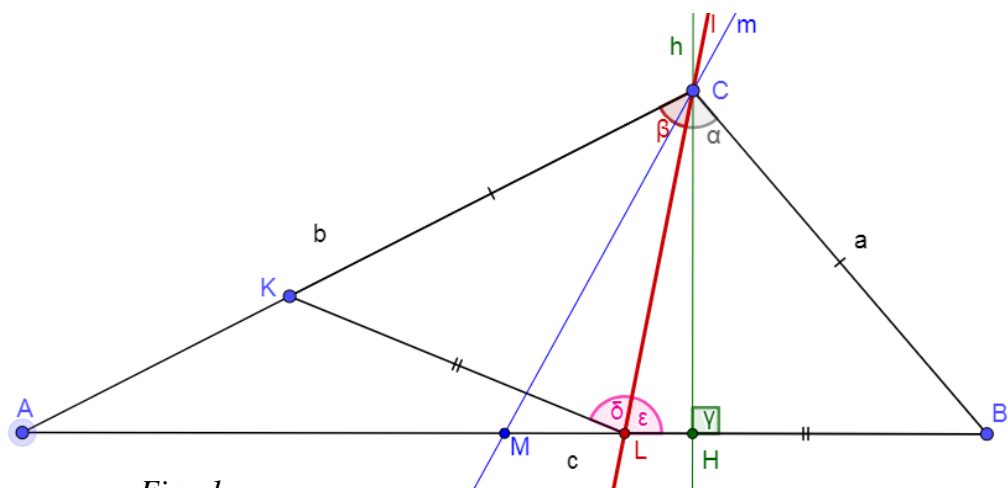


Fig. 1

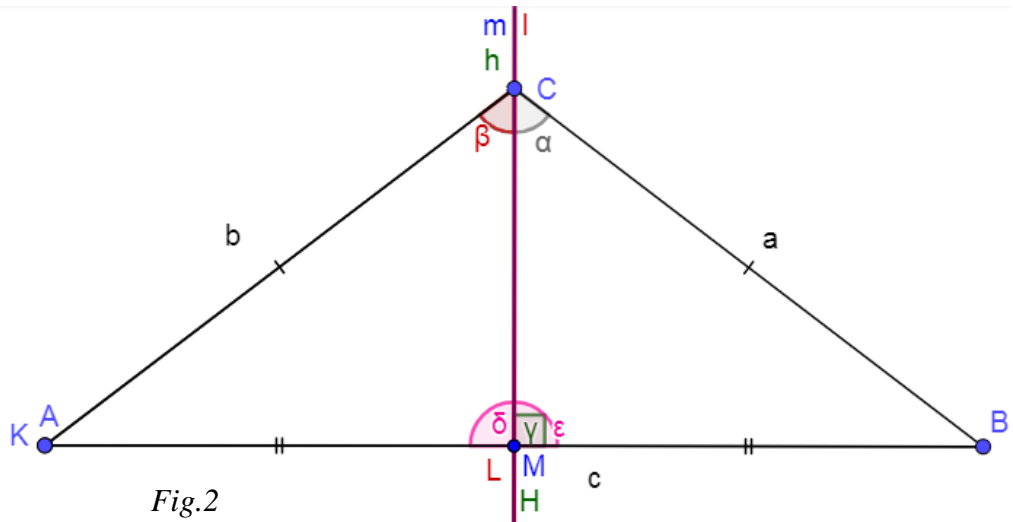


Fig.2

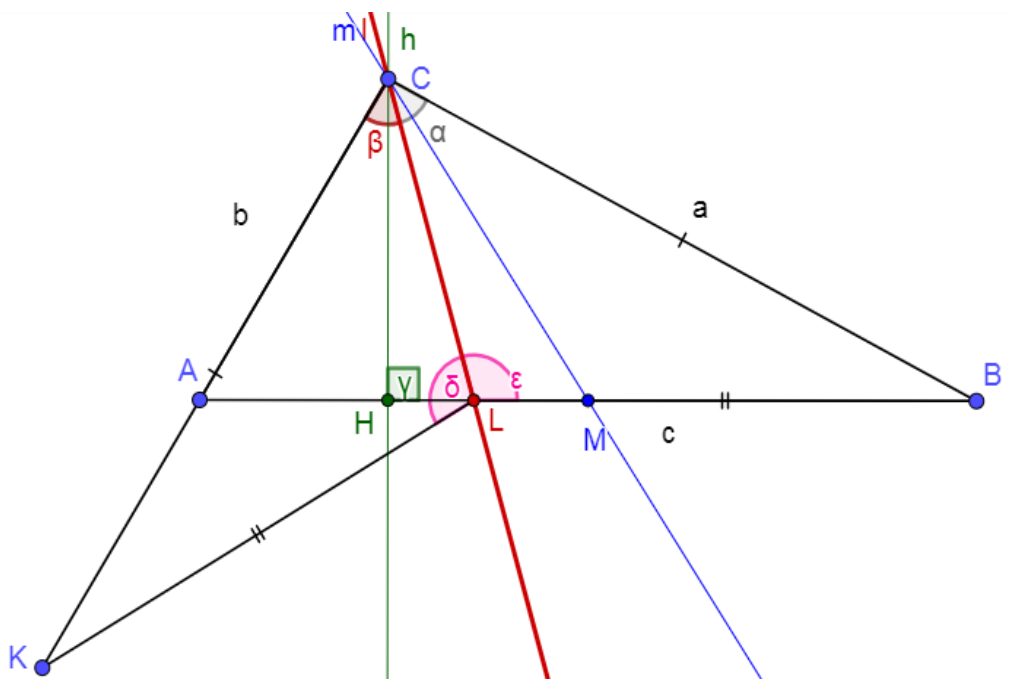


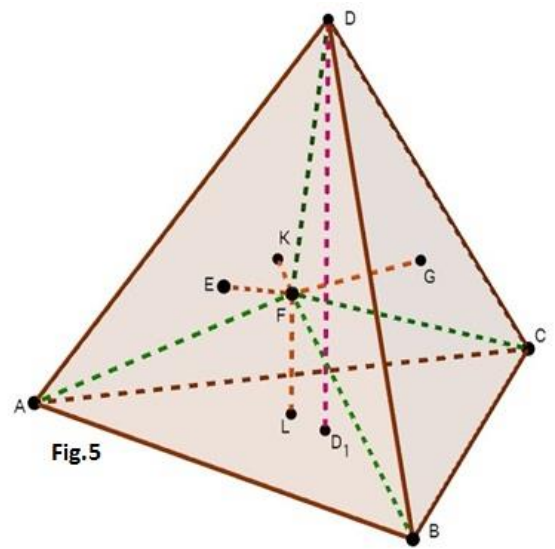
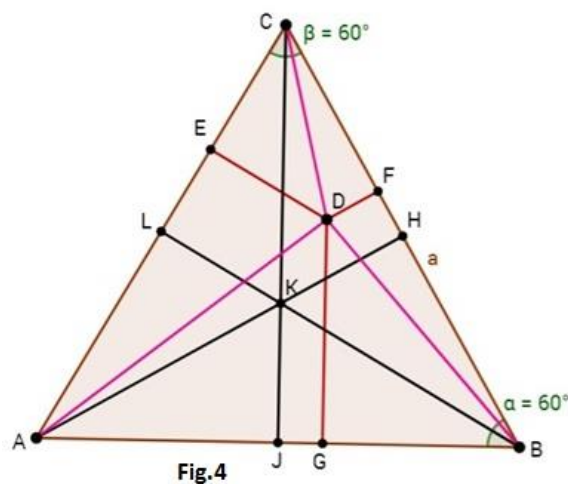
Fig.3

The following example is for individual work with problem solving, in which the already known analogous task is used. In didactical literature they are encountered as a model and prototype task. During the lesson, students solve the model task under the supervision of the teacher, while the prototype task is given as homework.

Model task: Prove that the sum of the distances from any point in the interior of an equilateral triangle to its sides is equal to the length of its height.

The drawing made by the students for this problem is shown on fig. 4

Prototype task: Prove that the sum of the distances from any point, internal to a given correct tetrahedron, to its walls is equal to the length of the tetrahedron height. (fig.5)



Skillful usage of the mathematical software enhances the procedure of gaining new knowledge, as an educational environment is created where the student constructs and interacts with different mathematical objects. Conditions for executing computer guided reasoning are created, for formulating hypothesis based on characteristics and laws, which are then confirmed or denied with the use of deductive reflections. This way conditions for forming research prowess in learners are created.

Such problems are also suitable for a project for individual completion.

Regardless of the form or organization of the individual work of the students, it contributes to activating the cognitive activity and helps expand mathematical horizons. Smart usage of this type of work within the mathematical education, aids in developing the student's independence as his a trait of intellectual activity.

Conclusion

On one hand, individual work which is neatly organized and directed by the math teacher, contributes the most to achieving higher outcomes in the learning process. On the other hand, utilizing such kind of self-preparation allows important aspects of the pupil's personality to be built – such as will, criticality and above all self-reliance.

References:

1. Andreev, M., "Didaktika", "Narodna prosveta", Sofia, 1987
2. Georgiev, T., "Samostoyatelnata rabota na uchenitsite ot srednia kurs", "Narodna prosveta", Sofia, 1961
3. Esipov, B. P., "Samostoyatelnata rabota na uchenitsite po vreme na uroka", "Narodna prosveta", Sofia, 1963
4. Karakasheva, L., "Samostoyatelnata rabota na studentite - teoretichni i prilozhni aspekti", UI "Episkop Konstantin Preslavski", Shumen, 2015
5. Kirsanov, A. A., "Individualizirane to na uchebnia protses kato sredstvo za razvivane poznavatelnata aktivnost i samostoyatelnost na uchenitsite", "Sovetskaya pedagogika", Kazan, 1963
6. Ogorodnikov, I., "Didakticheski osnovi za povishavane samostoyatelnostta i aktivnostta na uchenitsite", "Sovetskaya pedagogika", Kazan, 1962
7. Pashov, I., Zd. Kraycheva, "Samostoyatelnata rabota na uchenitsite v obuchenieto po matematika", Ministerstvo na narodnata prosveta, Sofia, 1972