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ON THE CONNECTION BETWEEN THE DEVELOPMENT OF ELEMENTS OF IMAGINATION AND LOGICAL THINKING IN SECONDARY SCHOOLS AND PEDAGOGICAL UNIVERSITIES IN GEOMETRY LESSONS

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Annotation. This article is devoted to the development of imagination and logical thinking of students through geometric problems. The advantages of visual aids in geometry lessons in solving problems.
Keywords: imagination, logical thinking, visual aids, visualization, logical-figurative, figurative-logical, verbal-figurative, stereographic, mathematical thinking, methods of transferring these skills.

Introduction. As it was said in the first paragraph, the path of "clarity" declared by Ya.A. Komensky was expanded in the seventeenth century by the technical capabilities of the coming subsequent centuries. In the second half of the 20th century, the essence of their existence in the institutes of the laboratory of scientific and technical education was reduced to the introduction of all possible innovations in pedagogical practice. It can be noted that the apogee of the introduction of an alloy of visual and technical learning tools was the software method (the end of the sixties and early seventies of the last century), which by the end of the century was transformed into a system of programmed learning (very useful for self-education using computers). As it was noted in the mentioned work:
the creation of a visual and technical educational environment "contributes not only to the effective development of the relevant streams of educational information, but also activates the cognitive activity of students;
develops their ability to link theory with practice, with life;
forms the skills of technical culture; fosters attention and accuracy;
increases interest in learning and makes it more accessible" [1].

The principle of clarity was introduced into pedagogical practice by Jan Amos Komensky, as "a reflection of the need to involve all the senses of the student to perceive the subject of study."

According to psychologists and engineers (specialists in technical vision) and teachers, the principle of visibility is implemented through the following learning rules [2]:

1. "One cannot ignore the natural connection of nature with the child's perception and appeals to his observation. The simplest, technically imperfect, outdated manuals"[3], performed by children before or by the child himself, now have a huge educational and educational effect.
2. "Visual aids should be used not to "modernize" the learning process, but as an essential means of successful learning.
3. When using visual aids, a certain sense of proportion must be observed"[2].

In particular, the connection of interactive technical means requires the development of their inclusion in lesson plans, minute-by-minute chronometry and the exact sequence of its conduct. Having a large frame-by-frame representation of the lesson topic can spoil the perception.

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4. Use the principle of sufficiency and proportionality of the introduction of new information messages in a dosed manner. However, let us recall that the paintings in the classroom in the classrooms were one of the most important methods of teaching foreign languages to Ya.A. Komensky. Otherwise, visual aids should always be in front of students' eyes, even if it is a computer class, and even more so geometric images.

5. In order to concentrate attention, develop a search element in the learning process, the vicious practice of replacing their memory and thinking with the so-called "artificial intelligence" leads students to self-deception and confidence that they possess information. This means that an individual loses the skill of studying, but acquires the skill of searching and at the same time ceases to control the "colors" of perception. The verbalization of the goals and objectives of the material offered in the lesson can be multi-level, multi-stage. This process is especially effective in the form of educational discourse [5].

Visual visualization methods in isolation from the educational process, without context, do not play any significant role. The effectiveness of the principle of visibility is combined with the words of the teacher (according to Ya.O.Komensky). This is necessary for the student to observe certain pedagogical phenomena - ways to "acquire" knowledge, skills and abilities. The significance of the visual principle is that students visualize logical thinking, which is realized as in the form of visual-imaginative thinking. Let us recall that N.I. Pirogov once noted that "neither the visibility nor the word itself, without the ability to handle them properly.. They won't do anything worthwhile"[6].

To introduce the above, first of all, the main factor for future mathematics teachers should be such qualities as logical-figurative, figurative-logical, verbal-figurative, stereographic, mathematical thinking, the method of transferring these skills. To achieve such skills, you can achieve by studying the subject "Geometry" at a pedagogical university[3].

For example, the verbal-figurative components of educational discourse often commute in the arsenal of a qualified teacher. Making visual images verbally, and, if possible, supplementing them with computer technologies, make it possible to achieve maximum effect in a specific information and pedagogical environment of a university or school. At one time, the phenomenon of the connection between the word and the visual image was analyzed and summarized by L.V.Zankov in his book "Visibility and activation of students in learning"[5]. The most typical of them are:

"with the help of the word, the teacher provides information about objects and phenomena and then, demonstrating appropriate visual aids, confirms the truthfulness of his information;

with the help of the word, the teacher directs the observations of students, and they acquire knowledge about the relevant phenomena in the process of direct observation of this phenomenon" [5].

“It is clear that a properly organized educational discourse is more effective” [4]. The first of these can be called academic, as G.P. Shchedrovitsky said, "There is a God and carrots that need to be looked after." The second (according to Zankov) method is focused on activating the activity of students and their independent activity, while the Teacher performs the role of a staff in the hands of the walking one.

But it should be added that currently in the twenty-first century, other possibilities for combining words and clarity have appeared related to improved techniques for transmitting and consolidating

information flows, namely interactive whiteboards, a programmable series of sequential images, proofs of theorems based on sound signals from teachers, virtual systems and computer emulators, etc. But all of this does not negate the teacher's lively discourse with the student.

Now let's look at the functions of visibility in teaching mathematics:

In many studies on pedagogy, according to the methodology of teaching mathematics, recognition and reference to the thesis "Psychologists have found that visibility is necessary to ensure a number of didactic functions: acceptance (perception, preliminary understanding) by students of an educational task, motivating it, "tuning" the student to the learning process, providing the student with a general orientation for his future activities".

In the methodology of teaching mathematics, the following functions of clarity are distinguished.

1. Cognitive function.
2. Student activity management function
3. a) indicative;
   b) controlling;
   c) communication.
4. Interpretation function.
5. Aesthetic function. "So, thanks to a simple visual model, the essence of the proof becomes clear, and logic clarifies only some details of the proof."
6. Education and development of theoretical thinking. First of all, learning to create images in formal-logical, logical-imaginative thinking. V. V. Davydova: "If imagination is the ability to see the whole before its parts, then the so-understood imagination is one of the manifestations of theoretical thinking" [4].

In an in-depth study [1] it was noted that "The increased requirements for mathematical training of schoolchildren and professional training of students at the present stage of education, increasing the volume and complexity of educational material, strengthening the processes of integrating knowledge and intensifying their assimilation by students necessitate improving the methodology for studying the issues of constructing images of geometric shapes, taking into account the latest achievements of didactics" [4]. However, it is worth paying attention to the following circumstance. The connection between the didactic functions of teaching mathematics and mathematics remains very unclear. In the history of education, in particular the history of the methodology of teaching mathematics, the question should arise:

What kind of mathematics do we teach children, the future shift in the teaching staff?

What, after all, is mathematics in the world culture and the culture of every nation?

To what extent does mathematics reflect national characteristics and culture?

It is clear that the questions asked relate to the philosophy of mathematics and applied philosophy, as well as pedagogy. So, the established view of mathematics is that mathematics is one! Since antiquity, it has been monolithic, but then the question is why mathematics and especially the methodology of teaching mathematics is artificially divided (the sixties of the last century) into teaching logic and formalizations, and mathematics itself, to study its structurality without taking into account the age characteristics of youth, or axiomatization as a formal tool of scientific geometry, what is all this for?

Here is a fragment of a very worthy study on the methodology of teaching geometry and not just geometry, but image theory. "In the presentation of theoretical issues of image construction, given in the manuals of L.S.Atanasyan, V.T.Bazylev [6]; K.I.Dunichev [15]; R.A. Votrogov [36], the theory of affine transformations, the basic facts of projective geometry are significantly used, which positively affects the establishment of intra-subject connections in the geometry course of the pedagogical university. Much attention is paid to the construction of polyhedron sections, axonometric projections of points and lines, the image of points and lines using the Monge method. However, axonometry and the Monge method are not used to construct images of polyhedra of their sections, bodies of rotation, that is, those geometric objects that students will encounter in their teaching activities" [4]. Let's pay attention to the peculiarity of the text of the fragment, at the beginning of the fragment we are talking about theoretical issues in worthy textbooks, and the end of the fragment is about the Monge method and axonometry. Axonometric projections certainly develop imagination and stereographic thinking. The efforts of the "advanced" in computer technology to attract various application packages or introduce students to new environments are certainly good, but not all students are "lucky" to meet such teachers. Therefore, the conflict between theory and practice in geometry is traditionally resolved by solving problems and developing theory after the individual is ready to understand some shortcomings, for example, Euclidean geometry.

Therefore, ideally, we believe that in order to master the complex, you should study the simple! Let's note, let's highlight IT! This means getting to know the problem, growing up to its meaning, translating (verbalizing) He will introduce it into his lexicon, establish rules for "working" with concepts, if possible, enter into educational discourse with fellow students and with the Teacher to clarify the questions he (the student) has, and only then will he get acquainted with visibility and its functions. It can be argued that "You need to be ready for visibility!" In some works of scientists in this field, "an elementary presentation of image methods is given, contributing to the most successful study of certain issues of image construction"[6] i.e., the foundation of thought and action is created.

The development of teaching methods using the image of geometric shapes in a pedagogical university, as well as the formation of blocks of tasks that optimize the perception and understanding of theory, is one of the urgent problems of the comprehensive development of young people and future teachers of mathematics[6].

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