

ISSUES OF DEVELOPING SPATIAL IMAGINATION IN TEACHING DRAWING GEOMETRY

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ABSTRACT

This article describes the development of spatial imagination in students through effective methods, and at the same time teaching the spatial view of shapes using the AutoCAD program. The advantages of using AutoCAD software in the formation of spatial perception in students are presented.

Keywords: Drawing geometry, straight line, plane, straight line traces, imagination, central projection, parallel projection, position problem, metric problem.

INTRODUCTION

Currently, large investments are being made in our country to further improve construction, production and innovative technologies on a large scale. There is a need for experienced, skilled specialists in this field. Such specialists must have a broad mindset and imagination, a high level of creativity, and at the same time be excellent creators. Identifying such students, that is, future specialists, in higher educational institutions and directing students to the fields is one of our main goals. In this regard, the disciplines of drawing geometry and drawing, engineering computer graphics are also of great importance. Therefore, in order to reform and further improve our country, our President Sh.M. Mirziyoyev is sharply putting forward the idea and demand that "without new thoughts and ideas, there is no progress and innovation." In one of his speeches, our President emphasized that "the further development of not only academic science, but also science in higher education institutions is an important task." One of the conditions for perfect mastery of knowledge in modern technology is to increase graphic literacy, that is, the ability to read and execute drawings. This implies a thorough study of the science of drawing geometry, which is the basis of drawing drawings.

LITERATURE ANALYSIS AND METHODOLOGY

It is no exaggeration to say that the science of drawing geometry has an advantage over other sciences in some sense in developing students' spatial imagination. This is because this science involves creating various images of geometric shapes. In addition, it is possible to recreate the image of a certain detail or object using rules or a given text. It is clear that just as there is no limit to this science, there is no limit to imagination and thinking in understanding this science. In order to understand and comprehend the problems in geometric geometry, the student must have a strong imagination. The main source of human imagination is imagination. A free imagination directed towards a goal plays a decisive role in human activity. As for spatial imagination, it teaches us to create images, that is, drawings, on a plane. No one in our lives has been able to see or touch a point, a plane, a straight line, or a

section with their own eyes. Therefore, we all know very well that this is impossible. Although we cannot touch these things, we need imagination to feel their existence. A point, a straight line, a plane are all simple geometric shapes, and exercises are performed between them. These are positional problems, metric problems, and constructive problems. The level of activity of a student in geometric geometry directly depends on his mental potential, thinking, and imagination.

MUHOKAMA

Hozirgi vaqtida bo'lajak chizmachilik va chizma geometriya o'qituvchilarining tasavvuri qoniqarli darajada emas. Albatta, buni o'zgartirish yoki mana shu holatda saqlab qolish fan o'qituvchisiga bog'liq. Boisi o'qituvchining dars o'tish metodi, talabalarga qay darajada yetkazib bera olishiga bog'liq. Bizning ushbu tadqiqotimizda ham ayni damda dolzarb bo'lib kelayotgan masalani bartaraf etishga qaratilgan bir qancha fikrlar bayon qilinadi. Bizning tadqiqotimizda asosiy muammo bo'lgan talabalar tasavvur va tafakkurini rivojlantirish uchun bir qancha fikrlar bayon etilgan. Bularidan biri shuki, oliy ta'lim muassasalarida o'qitiladigan chizma geometriya fanini chizma yoki rasmlarsiz tushuntirishning imkoniy yo'q. Chunki talaba biz gapirayotgan so'zimiz, qoidamiz tasdig'ini chizma orqali ko'rmasa unda hech qanday tasavvurga ega bo'lolmaydi. Shunday ekan biz buni zamoniy axborot texonologiyalariga tayangan holda zamonaviy multimedialardan foydalanib mavzuni tushuntirishni yo'lga qo'yidik. Buni qanday amalga oshirish mumkin? Qanday qilib? Va shu kabi bir qator savollar tug'ilishi tabiiy. Bizning taqdiqotimiz shundan iboratki, biz dars mobaynida talabalarga mavzuni tushuntirar ekanmiz, AutoCaD dasturidan foydalangan holda mavzuni to'laqonli yoritib berish. Dars mobaynida mavzuni yoritish uchun doskaga chizib tushuntiradigan bo'lsak geometrik jismlar, shakllarning hajmini uning ko'rinishini to'liq ko'rsata olmaaymiz. Boisi, biz foydalanadigan doska tekislikdan iborat. Yuqorida aytib o'tilgan dasturimiz ya'ni AutoCAD bir qator keng ko'lamli xususiyatlarga ega. Bunda jismning shaklni, hajmini, tuzilishini, rangini ko'rsatib bera oladi. Bu dastur faqat chizma geometriya fani uchun emas balki chizmachilik, grafik tasvirlash asoslari, topografik chizmachilik, perspektiva, arxitekturaga oid bo'lgan fanlarda ham juda keraklidir.

DISCUSSION

Currently, the imagination of future drawing and drawing geometry teachers is not satisfactory. Of course, it depends on the subject teacher to change this or keep it in this state. It depends on the teacher's teaching method and how much he can convey it to students. In this study, we also present a number of ideas aimed at eliminating this currently relevant issue. In our study, we present a number of ideas to develop the imagination and thinking of students, which is the main problem. One of these is that it is impossible to explain the subject of drawing geometry taught in higher education institutions without drawings or pictures. Because if the student does not see the confirmation of our words and rules through drawings, he will not be able to have any imagination. Therefore, we have set out to explain the subject using modern multimedia, relying on modern information technologies. How can this be done? How? And it is natural that a number of such questions arise. Our research is that when we explain the topic to students during the lesson, we fully cover the topic using the AutoCAD

program. If we draw and explain on the board to cover the topic during the lesson, we cannot fully show the size and appearance of geometric objects and shapes. Therefore, the board we use consists of a plane. The above-mentioned program, AutoCAD, has a number of wide-ranging features. It can show the shape, size, structure, and color of the object. This program is very useful not only for drawing geometry, but also for drawing, graphic design basics, topographic drawing, perspective, and architecture.

RESULT

This proposal that we have mentioned is not only to develop spatial thinking in students, but also to teach students to use modern information technologies. So, if there are cases where students do not fully understand the topic during the lesson, they can understand it by reviewing it if the lesson is recorded. As proof of our words, we will give an example of exercises on constructing intersection lines of various geometric flat shapes using the algorithm for constructing the intersection point of a straight line with a plane in the AutoCAD program. First, we will construct the projections KL of the intersection lines of the planes given by the triangles ABC and DEF in the order shown in the drawing below. To construct the intersection line of the planes ABC and DEF , one of them, the intersection of the sides EF and ED of DEF with the ABC plane, i.e., the points K and L , is determined. For this, we can draw an auxiliary frontal plane through the sides EF of the triangle. This plane will be the projections of the lines 1 and 2 of the intersection with the ABC plane. The sides E and F of the triangle are 1,2 or the point of intersection with the ABC plane is determined as K . And as a result, the following drawing is formed, that is, the intersection lines of the planes. As you can see, the result we expected, our drawing, expressed in colors, is achieved quickly and easily.

CONCLUSION

In conclusion, if the issues of how to solve problems in graphical geometry and how to teach it are addressed correctly, the development of students' spatial imagination will be ensured. Only then will we have young specialists who have their own independent thinking, creatively approach problems and find solutions.

The development of spatial imagination is important in teaching graphical geometry, because this subject requires not only theoretical knowledge, but also practical skills. Spatial imagination plays an important role in developing students' ability to imagine three-dimensional objects and represent them in drawings. Here are some approaches to address these issues:

1. Using visual materials: Develop students' spatial imagination by showing them three-dimensional models, diagrams, and graphs. Using 3D modeling software (such as SketchUp or GeoGebra), students can put their imaginations into practice.
2. Interactive lessons: Conduct interactive lessons that encourage students to actively participate. Spatial thinking can be developed by working in groups, solving problems, and sharing ideas with each other.
3. Targeted exercises: Prepare specific exercises for students to test their spatial imagination. For example, tasks such as drawing given geometric shapes in 3D format or converting them into other shapes.

4. Games and simulations: Use games and simulations that develop spatial imagination. Through this, students can consolidate their knowledge in an interesting and interactive way.
5. Drawings and sketches: Teach students to create geometric shapes using drawings and sketches. They can do this manually or with the help of computer programs.
6. Connecting theoretical knowledge with practice: Connecting geometric theories with practical problems, thereby further strengthening students' spatial imagination.
7. Developing spatial analytical thinking: Providing students with deeper information about the properties of geometric objects, symmetry, proportions, and other mathematical concepts. With the help of these approaches, it will be possible to develop students' spatial imagination in teaching the subject of drawing geometry. This will help them improve their general mathematical knowledge and be able to apply geometric concepts in practical life.

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