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Research Article

SPATIAL DEVELOPMENT OF STUDENTS' IMAGINATION IN ENGINEERING GRAPHICS BY SOLVING PROBLEMS RELATED TO DESIGN

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Tashimov Nurlan Erpolotovich
Associate Professor, Tspu Im. Nizami, Head Of The Department, Uzbekistan

Tukhtakulova Zebiniso Barat Kyzy
Master's Student Of The Pedagogical Institute Of Karshi State University, Uzbekistan

ABSTRACT

This article discusses ways to develop students' spatial imagination by performing graphic tasks that include design elements in engineering graphics.

KEYWORDS

Design, engineering graphics, spatial imagination, student, tool, design elements, size, ability, graphic task, qualification, creativity, innovation.

INTRODUCTION

One of the urgent problems of today and tomorrow remains the improvement of personality in accordance with modern requirements of scientific and technological progress, education and improvement of "graphic literacy" and creativity.

Any device related to design will be related to creative thinking, that is, to innovation. Creativity refers to the creation of a necessary and useful innovation at a certain time and in a certain situation. What is generally known can be called a product of creativity, in turn, innovation is understood as a product of technical thinking that previously had no such form, at the same time an element previously unknown was introduced into it.

Novelty can be objective and subjective.

Objective novelty is a novelty, the analogue of which has not existed until now.

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Subjective novelty is a novelty that really exists, but at the same time is considered novelty only for the creator.

Design issues are understood as changing the shape and content of a particular part, device, machine and structures. This change requires the introduction of new structural elements in parts, mechanisms, devices and machines; reconstruction of parts, creation of a type that will be more productive, cheaper and convenient than the previous one.

It clarifies what is the main problem provided for the redesign of the device, the result of which is better, more productive than the previous one.

The new idea is based on the functionality of this device. The principle of operation in accordance with the achievements and shortcomings, an improved version of the device with a new idea is being thought out. It goes without saying that the result is not the same, but may be different.

Design in practice relies on graphic literacy, technological knowledge, and design skills. Initially, a new project is created, the drawing of which serves as a means of expressing the designer's idea. This is the ability to mentally create an image of a new object in the brain and transmit it through the mind by the method of graphic representation. This is the successful side of project activity in the design process.

In the creative activity of a person, a graphic image performs two interrelated functions. Firstly, a drawing is a kind of thinking tool, and secondly, a tool that gives a thought (idea).

That's why in project activities we mainly study graphic aspects.

When performing this process, it is natural to change the shape, weight and dimensions of the machine parts. The design process consists of the following stages:

* The first stage is preparatory, at which technical needs are determined;

• At the stage of second thinking, scientific information in the same field is analyzed, and at the stages of solving the problem, means and solutions are selected;

* At the third, search stage, the ideas born are compared, and the most suitable one is selected from them;

• At the fourth stage of implementation, the project is formalized using a graphic media, and the solution is checked;

When introducing a new design or upgrading an existing one, various technical production, technological, economic and similar requirements are met. These requirements are as follows:

* simplification of the design used;

* full use of the strength properties of materials;

• the correct choice of the shape of the part, as well as the development of waste-free technology in order to reduce waste during product processing;

* reduction of manual labor during finishing works;

* material saving;

* increase the service life of parts;

For example, a part consists of parts A, B, C. Let the base of part B be mentally inserted into the middle of A, and parts C-on both sides of B in a position serving as a support, and the views are drawn (Fig.1, a).

The base of the part is drawn a, and part B is drawn in its center. Then parts c are drawn on both sides (Fig.1, b). The part is treated as a whole, and the lines between the parts are erased.

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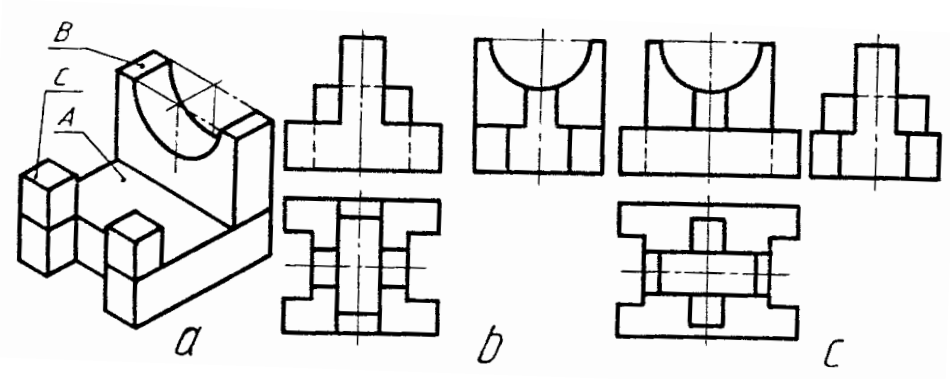

Fig. 1

You can also place part B by turning it at an angle of 900, without placing it transversely relative to A. At this point, the part will look like in Figure 1, C.

The main feature of the solution of project tasks, which distinguishes them from others, is that their solution, despite the multivariance, is characterized by the fulfillment of certain technical, technological, economic requirements for the task condition.

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