JournalNX- A Multidisciplinary Peer Reviewed Journal
ISSN: 2581-4230, Website: journalnx.com, June 18th & 19th, 2020

DEVELOPMENT OF GRAPHIC COMPETENCE OF FUTURE TEACHERS OF TECHNOLOGY

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Abstract: the article discusses the pedagogical conditions for the formation of graphic literacy of students in establishing theoretical knowledge, practical skills and the formation of rational techniques for working on a projection drawing.
Key words: structural elements, projection of a model, graphic literacy.

The purpose of determining the complex of pedagogical conditions affecting the development of students' abilities, the organization of the educational process taking into account these conditions, the development of technology for its development and experimental verification of its effectiveness and the adjustment of experimental and methodological materials and discussion of the results of experimental work.

The technology of conducting a stating experiment consists in revealing the level of graphic literacy of students. in establishing theoretical knowledge, practical skills and the formation of rational techniques for working on a projection drawing

The experimental tasks were designed so that the shape of the models included various structural elements: a stiffener, a window, a hole, cutouts, allowing maximum use of the acquired theoretical knowledge and the corresponding practical skills.

The task was developed in six versions of the same level of complexity, the correlation coefficients of the complexity of projecting certain elements of the surface of the model were determined by counting the graphic operations used, as well as an expert assessment of their complexity.

Images of models 1–6 are shown in Figure 1 [1].

Table 1 Sum of surface elements

№ моде ли	The number of curved surfaces	The degree of difficulty in projecting them	The number of flat surfaces	The degree of difficulty in projecting them	The total number of surface elements	The total value of the degree of complexity of surface elements	Correlation coefficient 0.7–0.9
–	3	2.7	14	12,6	17	15,3	0.9
–	3	2.7	15	13,5	18	16,2	0.9
–	3	2.4	19	15,2	22	17,6	0.8
–	2	1.7	20	16	22	17,7	0.8
–	4	2.4	20	12	24	14,4	0.6
–	4	2.4	18	10,8	22	13,2	0.6

The correlation coefficient is determined by the formula:

$r=1-6\Sigma d^2 n/(n^2-1)$

The sum of the surface elements and the number of mutually intersecting of them, taking into account the correlation coefficients, are shown in tables 1 and 2.

Where x, x1, y, y1 is the number of surface elements of the model

An example for counting r is the number of surface elements M-1 and M-2 (models № 1 and №. 2):

$d_1 = dx1 - dy1$

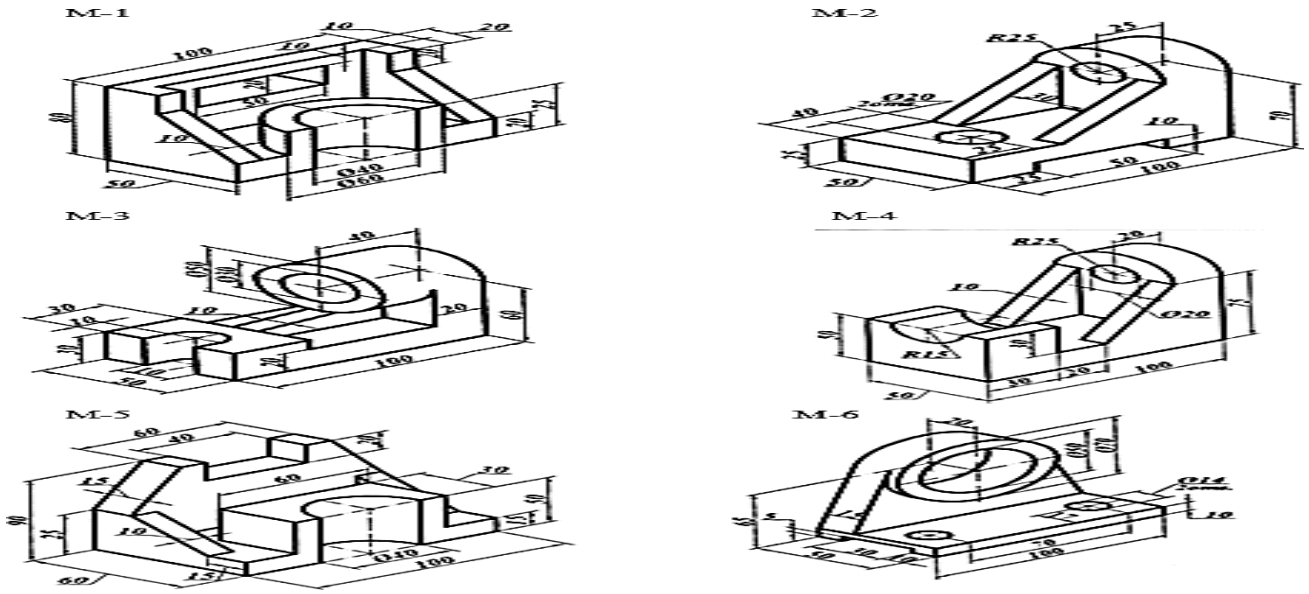

Fig. 1. Image of models

Table 2

Model N.	1	2	3	4	5	6
R∩Ts	3	7	6	6	2	8
The degree of difficulty in projecting them	01	02	02	02	01	03
П∩П	20	15	19	14	20	14
The degree of difficulty in projecting them	06	04	05	04	06	04
П∩Ц	2	3	3	3	1	4
The degree of difficulty in projecting them	01	01	01	01	01	02
Rus.Ts	3	3	5	4	2	2
The degree of difficulty in projecting them	01	01	02	01	01	01
R∩P	5	8	5	8	7	4
The degree of difficulty in projecting them	02	02	01	03	03	01
Pus.Ts	1	3	3	2	1	1
The degree of difficulty in projecting them	01	01	01	01	01	01
Ц∩Ц	–	–	–	–	–	1
The degree of difficulty in projecting them	0	0	0	0	0	0
Total number of intersecting surfaces	34	41	41	37	33	33
The total value of the degree of complexity of projecting intersecting surfaces	1,2	1,1	1,2	1,6	1,3	1,2
Correlation coefficient	04	04	03	04	08	06

Table 3 The sum of the volume parts of the model

№ models		1	2	3	4	5	6
For outdoor surround	mustache Ts	2	2	2	2	1	1
	Projection difficulty	03	02	02	02	01	01
	P	4	5	4	5	5	4
	Projection difficulty	05	05	04	05	02	04
parts	Ts	2	3	3	3	1	1
	Projection difficulty	03	03	03	03	02	06
	Correlation coefficient	03	03	02	03	1	–
For internal volumetric parts	mustache Ts	1	2	2	2	1	3
	Projection difficulty	03	06	05	05	03	05
	P	1.1	1	–	–	1	1
	Projection difficulty	03	05	05	05	03	01
	Ts	1	2	2,1	2	1	3
	Projection difficulty	03	04	05	05	03	04
	Correlation coefficient	01	03	03	011	03	05

As can be seen from Tables 2–4, the sum of the elements of surfaces, intersecting surfaces and volume parts M, taking into account the coefficient φ, differs insignificantly, which can be neglected and these image objects be considered identical in complexity of their shape.

When conducting an expert assessment of the complexity of projecting surface elements and volumetric parts M, we turned to twelve drawing experts.

For example, G.T. Urazbaeva arranged the models in the following order 5, 2, 6, 1, 3, 4, explaining that the M-4 has more prismatic and cylindrical surfaces, which complicates the construction of the intersection of this hole with other structural elements on the drawing. M-5 is less complicated, since there is only one cylindrical hole in it. The teachers justified that the tasks were of approximately the same level of complexity both in terms of the number of elements and the complexity of constructing their drawings.

Tables 3 and 4 of the results of expert evaluations of models according to the level of complexity of drawing their drawings and diagrams 1–6, reflecting the number of samples of difficulty levels, do not allow us to unambiguously determine the degree of complexity of the shape of image objects due to the lack of a single parameter for comparison. In order to eliminate this drawback, we determined the total score of expert evaluations by multiplying the position number by the number of samples.

For example, the sum of points S of expert assessments M-1 is equal to:

S = 1 * 2 + 2 * 2 + 3 * 2 + 4 * 3 + 5 * 2 + 6 * 1 = 4 0

The total score of expert assessments of the complexity of the shape of the models is only a small difference. It cannot have a significant impact on the final results of testing the level of graphic literacy of subjects.

Students' graphic works were evaluated on a 3-point scale.

point - the task is not solved or the number of images that do not reflect the shape of the model correctly is selected. Incorrectly dimensioned.

point - the task was performed mostly correctly, but some errors were made in the selection of the necessary images, which do not affect the unambiguity of understanding the shape of the model, and there are also inaccuracies in drawing sizes.

Errors in drawings of models made by students of software and TTM in percent:

Table 4

Points	PO	*TTM*	General
1	*28,75*	*23,75*	*26,25*
2	*71,25*	*76,25*	*73,75*
3	–	–	–

In the process of experimental learning, the task was set of gradual development among students: the ability to make judgments and conclusions independently, the ability to analyze and synthesize the studied educational material, the skills of collecting, systematizing and analyzing facts that make it possible to identify additional information about a particular educational material, the ability to isolate, record the main thing, to think from various points of view of the facts obtained, imagination as an integral component of scientific and methodological work, observation, an increased ability to notice and focus attention on all, even at first glance, insignificant sides of the studied processes and phenomena.

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