CURRENT RESEARCH JOURNAL OF PEDAGOGICS
(ISSN –2767-3278)
VOLUME 04 ISSUE 12 Pages: 21-28
SJIF IMPACT FACTOR (2021: 5. 714) (2022: 6. 013) (2023: 7. 266)
OCLC – 1242041055
Publisher: Master Journals

Journal Website: https://masterjournals.com/index.php/crjp

Research Article

PEDAGOGICAL CONDITIONS FOR DEVELOPMENT OF PRACTICAL AND CREATIVE SKILLS OF STUDENTS IN "ENGINEERING COMPUTER GRAPHICS"

Submission Date: December 09, 2023, **Accepted Date:** December 14, 2023,
Published Date: December 19, 2023
Crossref doi: https://doi.org/10.37547/pedagogics-crjp-04-12-05

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ABSTRACT

In this article, one of the best ways to implement the integration of engineering and computer graphics as pedagogical problems with specialized subjects is the technology of improving the teaching of educational materials based on modern graphic programs. A number of proposals have been made regarding the problems of teaching engineering and computer graphics, as well as optimal solutions for achieving quality education. Theoretical solutions for teaching engineering and computer graphics are presented.

KEYWORDS

Design, skill, interdisciplinary, intellectual-creative process, computerization, computer graphics, creativity, practical-creative skill.

INTRODUCTION

In the concept of development of the higher education system until 2030, "formation of educational programs in accordance with the interests of students and the needs of personnel customers through the development of curricula based on individual educational trajectories, aimed at the formation of creative thinking and practical skills in students, important tasks such as introducing methods and technologies aimed at strengthening competencies, directing the educational process to the formation of practical skills. This, along with increasing the quality of professional training of future specialists, creates the need to develop their independent practical and creative skills.

Modern reality, the changes taking place in society require changing the model of any specialist. One of the important tasks of the transition to the credit-module system in the higher education system of our

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republic is the organization of independent work of students. Independent work as a form of educational activity in accordance with the requirements of the state standard of the higher education system is an integral part of the educational process. Independent and meaningful work of students in accordance with the state educational standard, work programs created for academic subjects, tools for providing classroom teaching: textbooks, study guides and methodical guides, educational and software packages, etc. is determined.

RESEARCH METHODOLOGY

It is analytically reasonable to study the level of development of teaching competence (scientific and scientific-research, production-technological, design-constructive, experimental-research skills, skills) of the subject "Engineering and computer graphics" during the period of conducting the research attention is paid to For this, the criteria for this case study are based.

They consist of:

1. Possession of theoretical knowledge and graphic competence qualities.
2. Ability to design using computer graphics, quickly create products.
3. Ability to freely create a design-constructive product based on alternative (computer) programs (technologies).
4. Ability to create design and construction products using digital technologies.

Based on these criteria, the following indicators of mastering knowledge, skills, qualifications and design qualities were determined.

LITERATURE ANALYSIS

In our research, we look at interdisciplinary integration as a pedagogical problem and investigate the development of professional competencies in the students of 60712500 - Vehicle engineering (automotive transport) on the basis of the integration of "Engineering computer graphics" and "Specialization" subjects. Because the need to implement interdisciplinary integration aims to create a person who is knowledgeable, independent and creative in all aspects.

According to Abduqudusov O.A., the integrity of the material world, the unity of theory and practice, the change and development of the universe, society and thinking are the methodological basis of interdisciplinary integration. The psychophysiological basis of interdisciplinary integration comes from the nature of human thinking, that is, thinking. Because interdisciplinary integration makes it possible to learn new aspects of the studied objects and serves as a basis for the formation of knowledge, skills and abilities, as well as personal qualities, which are wide and deep in scope, and in essence, in the form of an integrated system [11].

Since the issue of interdisciplinary integration is one of the general aspects of improving the educational methodology, during our research we identified the following as the main difficulties in the implementation of the integration of "Engineering computer graphics" and "Specialization" subjects: the use of uncoordinated concepts and expressions; lack of separation of main ideas, theories and concepts from the educational material; the internal relevance of scientific knowledge, that is, the fact that knowledge is not logically complete, is not taken into account; Dispersion of academic subjects, their content is not connected and they are not studied consistently.

According to V.N. Fedorova, "Interdisciplinary integration is the reflection of such dialectical interactions that are objectively practiced in nature in the content of academic subjects and are studied by

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modern science, therefore, interdisciplinary integration is considered as the equivalent of interdisciplinary communication. it should be taken into consideration." V.N. Maksimova describes interdisciplinary integration as "a systematic didactic phenomenon that has a certain structure, structure, functions and ways of implementation in the entire pedagogical process." And A.V. Usova considers that "interdisciplinary integration is considered as a reflection of the interrelationships between science directions and the integration of science with production, which objectively exists in the content and methods of teaching from an epistemological point of view."

ANALYSIS AND RESULTS

60712500 of higher educational institutions – the total volume of the educational load, classroom hours and independent study hours for the training of bachelor-teachers in the direction of education in the field of vehicle engineering (automotive transport) change is given. From the analysis of Table 1, it can be seen that the hours of independent education in the curricula of the 60712500 - Vehicle engineering (motor transport) course compared to the total hours are 40.7% in the 2017-2018 academic year, 2018-2019 and 2019 - 43.9% in the 2020 academic years, 51.8% in the 2020-2021 and 2021-2022 academic years, and 54% in the 2022-2023 academic year. In the 2017 curriculum, 40.7% of the hours allocated for independent education are allocated to the total educational hours, in the 2022 curriculum it is 54%, the difference is 13%.

The analysis of the organization of students' independent work shows that the increase in the share of independent education in the current curriculum will help students develop their practical and creative skills by directing them to work independently and engage in creative activities in the information environment. means directed.

Table 1

60712500 – Changes in the amount of hours in the curriculum of the vehicle engineering (automotive transport) course

The year the curriculum was approved	Total hours of study	Auditorium hours	Hours of independent study	Share of independent education
2017-2018	7344	4352	2992	**40,7%**
2018-2019	6588	3690	2898	**43,9%**
2019-2020	6588	3690	2898	**43,9%**
2020-2021	4980	2400	2580	**51,8%**
2021-2022	4316	2080	2236	**51,8%**
2022-2023	5400	2482	2918	**54%**

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The transition to new curricula and programs with a simultaneous reduction in the hours allocated to classroom training has predetermined an increase in the share of independent work of students in the study of many departments and topics of academic subjects. and requires the search for new approaches to organizing their educational activities, not only monitoring their knowledge, but also improving the independent work process, effective organization.

As determined in the Decision No. 824 of the Cabinet of Ministers of the Republic of Uzbekistan dated December 31, 2020 "On measures to improve the system related to the organization of the educational process in higher education institutions", teaching is "credit In the "module system" the study load is divided into 40 - 50% classroom hours and 50 - 60% independent working hours.

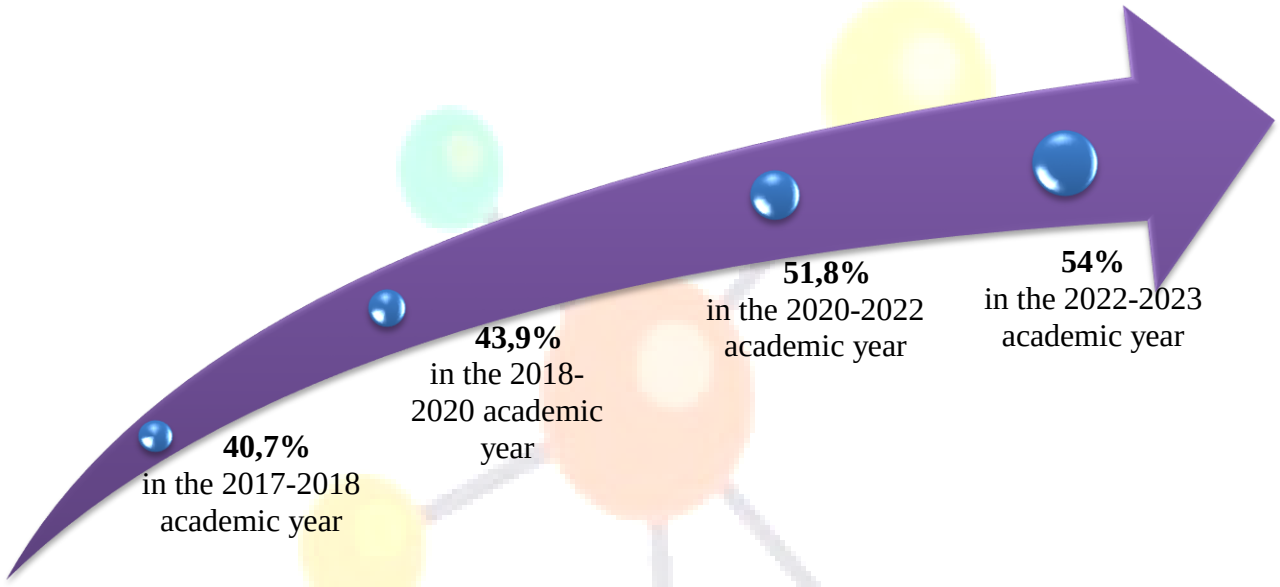

Figure 2.4. 60712500 - Increase of independent study hours in the curriculum of the vehicle engineering (automotive transport) department

60712500 – The subject "Engineering computer graphics" in the curriculum of the field of vehicle engineering (motor transport) is planned in the Block of General Professional Sciences, and is mainly planned for 4-5 semesters. Changes in classroom and independent study hours of "Engineering computer graphics" subject over the years are presented in Table 2.

Table 2

Changes in classroom and independent study hours in the subject "Engineering computer graphics" over the years (in the 2022-2023 academic year)

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Course	Total hours of study	Auditorium hours					Independent education	
		Total	Lecture		practical		Alloted hour	% of total study hours
			Alloted hour	percentage of study hours, %	Alloted hour	percentage of study hours, %		
1 course	180	90	16	9%	**74**	**41%**	90	**50%**
2 course	156	78	18	11.5%	**60**	**38.5%**	78	**50%**
3 course	180	90	30	16.7%	**60**	**33.3%**	90	**50%**
4 courses	128	68	26	20.3%	**42**	**32.7%**	60	**47%**

60712500 – If we analyze the distribution of classroom training and independent training of the subject "Engineering computer graphics" in the direction of vehicle engineering (motor transport), in the 1st and 3rd courses of the 2022-2023 academic year, the general hours are 180 hours, of which the share of independent education is 90 hours, or 50%, the total hours of science in the 2nd year are 156 hours, of which the share of independent education is 78 hours, or 50%. The total hours of the 4th course "Engineering computer graphics" are 128 hours, of which the share of independent education is 60 hours or 47%.

Independent education of students on the basis of the credit-module system is considered an integral component of educational and methodical activities, and is the individual performance of theoretical and practical tasks based on the time limit set for the skills and qualifications that students need to acquire.

In our study, the variation of the hours allocated for practical training in "Engineering computer graphics" of the 60712500 - Vehicle engineering (automotive transport) course section is shown in Figure 2.2.

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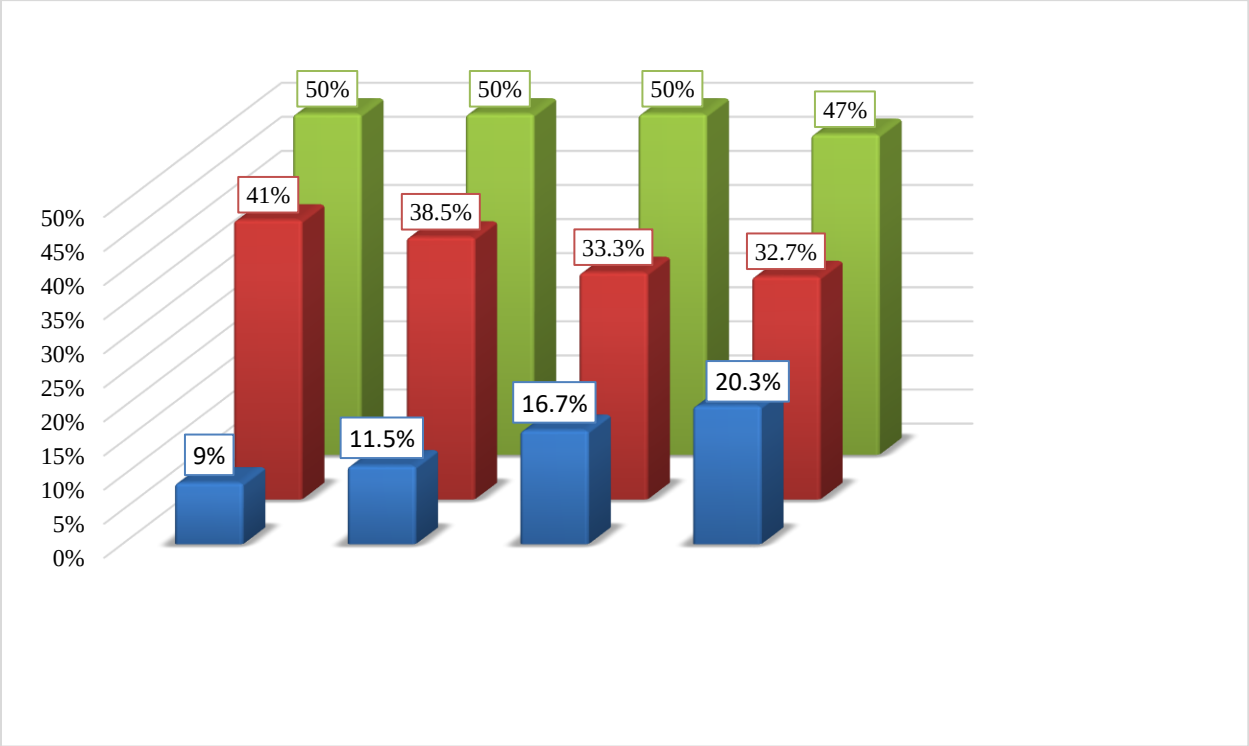

Figure 2. 60712500 – Changes in study hours in the field of vehicle engineering (automotive transport) in the section of courses

If we analyze the change of the hours allocated for lectures and practical training in the graph by the courses, in relation to the total hours allocated for science in 4 courses, lecture training accounted for 20.3%, practical training for 32.7%, 3 16.7% of lectures in the course, 33.3% of practical lessons, 11.5% of lectures in 2 courses, 38.5% of practical lessons, lectures in 1 course compared to the total hours allocated for science training is 9%, practical training is 41%. It is known to us that in practical lessons, students are required to independently perform the assigned tasks based on their theoretical knowledge under the supervision of the teacher, to approach the process of the task creatively, which is the basis for the formation of practical and creative skills in students.

It consists of forming the mental and scientific potential of students, developing students' creative skills through independent work, systematic analysis of assignments and tasks, ensuring independent work of students, and developing methodological support of science for students to work independently. In addition, teachers are required to have an individual approach to each student and direct the student to independent education.

The analysis of scientific and methodical literature and our own pedagogical practice allow us to highlight typical difficulties in organizing and conducting independent education of students.

CONCLUSIONS AND SUGGESTIONS

Based on the analysis of literature, scientific research, we came to the conclusion that it is appropriate to direct our research to the development of creative

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abilities of students in the process of independent education.

First of all, based on the sequence of the process of developing students' creative abilities, to determine the main approaches to the development of students' creative abilities to the independent learning process, and to determine the pedagogical and organizational conditions for the development of student's creative abilities, to develop a model and methodology for developing student's creative abilities we define conducting research work as the main task.

In order to determine the necessity of teaching the science of engineering computer graphics, it is appropriate to study and analyze a number of research works of foreign and domestic scientists, the educational direction of technical higher education institutions, and the content of the science of engineering computer graphics we determined;

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COMPUTER GRAPHICS. Збірник наукових праць ΛΌГОΣ.