

Methods of Statistical Analysis of the Process of Organic Chemistry in the Cluster Method

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Annotation. In this article, we can see from the statistical analysis of the process of teaching organic chemistry to students in the cluster method, that is, it is mentioned that the efficiency has increased by 13%.

Key words: Cluster, experiment-test, statistic, Chi-square, Pearson criterion, physical, chemical properties, experiment, control.

Conducting organic chemistry in higher education institutions in the cluster method leads to changes in their oral and written speech. By systematizing and distinguishing the most important ones, a collection of information in a compact graphic form is formed, which forms their professional thinking. The process of clustering, in fact, when there are different types of information, the mental content is reduced and they are combined into a visual symbolic image, which, once perceived, can later be located and serve as a basis for mental practical actions. possible In the process of conducting organic chemistry in a cluster method, we can see that knowledge will increase further along with the study of independent educational topics.

It is necessary to activate the student's independent learning during the educational process. Independent education is characterized by the student's choice and implementation of the ways of posing, solving, self-control and evaluation. Currently, the educational process in higher education is aimed at the comprehensive formation of specialists, and in the conditions of their acquisition of certain professional knowledge, qualifications and skills, they must carry out comprehensive systematic work on the development and management of students' cognitive activities. requires. In higher education, the teaching process should be ready to absorb a lot of information, to form effective, creative thinking, to develop the intellectual potential of a person, to logically analyze and comprehensively process information. One of the important conditions for the organization of the educational process in the training of specialists in accordance with modern requirements is the activation of independent educational activities of students. In the system of independent education of students, the content of independent education is its basis. The content of independent education is made up of independent education materials, activities of teachers and students. Communication between teacher and student plays a key role in this. The main tool for independent learning is independent learning materials.

In order to further strengthen the students' knowledge, they were assigned the topic of independent education and they were evaluated. In order to improve the methodology of teaching chemistry in the cluster method in higher education institutions, a study guide was prepared for the 2nd year. In this manual, the organic chemistry theoretical part, laboratory exercises, practical part and independent educational topics related to each topic were given. Studying the subjects of independent education will help them master the science of organic chemistry more perfectly. After conducting knowledge of organic chemistry in higher education institutions in a cluster method, a test was conducted for the 3rd time in experimental groups.

Summarizing the results of the third stage, we present the mastery indicators of the students who participated in the experimental tests according to the evaluation criteria in the table below.

№	University	Groups	Number of students	Evaluations of students of experimental and test groups			
				Excellent "5"	Good "4"	Satisfactory "3"	You are not satisfied "2"
1	CSPU	Experience	28	6	16	6	0
		Test	28	3	9	14	2
2	GSU	Experience	60	15	26	19	0
		Test	60	8	16	32	4
3	QarshiSU	Experience	80	17	39	24	0
		Test	79	9	28	36	6
Total:		Experience	168	38	82	49	0
		Test	167	20	53	82	12

Table 1. Evaluation process of experimental works.

Summarizing the results of the 3 stages, the mastery indicators of the students who participated in the experimental tests according to the evaluation criteria are expressed in the table. It can be seen that in the results of the 1st stage, the number of students who received all evaluations in both groups are almost the same, and in the results of the 2nd stage, it can be seen that the excellent and good grades in the experimental groups have relatively increased. In the results of the 3rd stage, it can be seen that there were no students who received unsatisfactory grades in the experimental groups, and the number of students who received satisfactory grades decreased. The opposite can be seen in the test groups. It showed that the knowledge of the students in the experimental groups is higher than the theoretical knowledge, practical skills and qualifications of the students in the test groups.

The purpose of teaching organic chemistry is to teach students the theoretical basis of knowledge of organic chemistry, the basic concepts of organic chemistry, the basic laws of organic chemistry, the naming of organic substances, their production methods, physical and chemical properties, the types of reactions that occur in organic compounds and their mechanisms in a cluster method. learning, as well as forming the skills of practical application and implementation.

Chirchik State Pedagogical University												
	2	3	4	5	total	Average	dispersion	variation coeffs.	confidence interval	chi-square statistical value Critical value	efficiency	
Experimental group	0	6	16	6	28	4	0,44	16,6	3,92-4,08	8,16	1,15-1,00=0,15 0,15*100=15%	
Control group	2	14	9	3	28	3,46	0.62	22,8	3,35-3,57	7,815		
Summary	Hypothesis H ₁ is accepted											
Gulistan State University												
	2	3	4	5	total	Average	dispersion	variation coeffs.	confidence interval	chi-square statistical value Critical value	efficiency	
Experimental group	0	19	26	15	60	3,90	0,57	19,2	3,86-4,00	11,83	1,13-1,00=0,13 0,13*100=13%	
Control group	4	32	16	8	60	3,46	0,65	23,4	3,38-3,54	7,815		
Summary	Hypothesis H ₁ is accepted											
Karshi state university												
	2	3	4	5	total	Average	dispersion	variation coeffs.	confidence interval	chi-square statistical value Critical value	efficiency	
Experimental group	0	24	39	17	80	3,91	0,51	18,2	3,85-3,96	12,66	1,11-0,99=0,11 0,11*100=11	
Control group	6	36	28	9	79	3,50	0,63	22,7	3,43-3,57	7,815		
Summary	Hypothesis H ₁ is accepted											

Table 2. Statistical analysis of the results at the end of the experiment.

Since the level of reliable difference is 0.05, the value of the coefficient of Pearson's criterion was taken as $T_{mez}=7.815$ from the table. The value of T_{kuz} calculated by the "Chi-square" method was found to be $T_{kr} < T_{kuz}$ in all cases, that is, in Chirchik State Pedagogical University $7.815 = T_{kr} < T_{kuz} = 8.16$, in Gulistan State University $7.815 = T_{kr} < T_{kuz} = 11.8$ in Karshi State University $7.815 = T_{kr} < T_{kuz} = 12.0$

According to the results obtained from the students of the 2nd stage, we can see that the efficiency of students of Chirchik State Pedagogical University has increased by 15%, the efficiency of students of Gulistan State University has increased by 13%, and the efficiency of students of Karshi State University has increased by 11%. The histogram of the variation series in Table 1 above is shown in Figure 1.

ChDPU, GulDU, KarshiDU students' mastery results at the research stage are represented by a diagram.

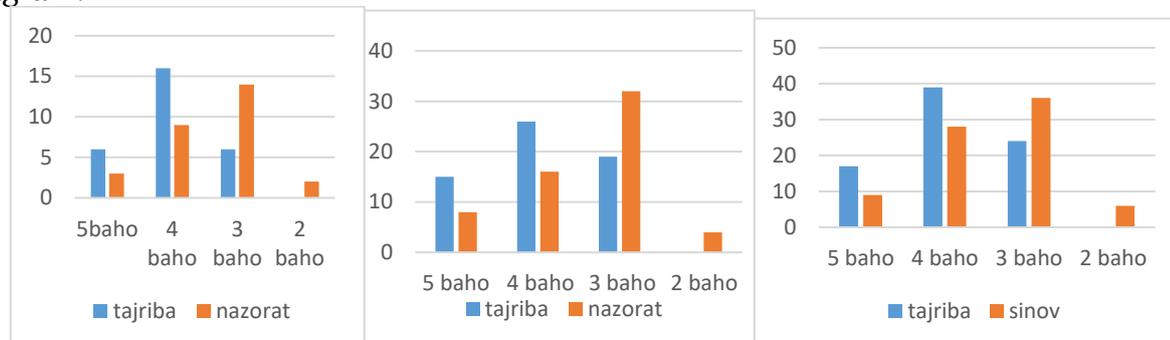


Figure 1. CSPU, GulDU, KarshiDU experimental work diagram.

As a result of the experiment, it was proved that the teaching methodology recommended by us is more effective than the traditional teaching methodology. The conducted studies confirmed the correctness of the advanced scientific hypothesis.

The level of development of any society is determined by the progress of science in it. In turn, the methods used in the development of science and technology and its teaching serve as a certain basis. Pedagogical education cluster and the problem of its practical implementation are being studied as a separate object of research in the following years. In particular, the new innovative direction related to integration and continuity in our educational cluster pedagogy and its implementation in practice is of great importance in ensuring coherence between all fields of science.

Education can achieve its intended results only if it is able to connect its roots with science and production, social life, in a word, with life, and if it enters into comprehensive integration with internal and related networks. and a state that is able to provide a deep, all-round continuous connection of science, education and economy and is able to apply it to all spheres of society's life will achieve progress. In this regard, it is no secret that significant work is being done in the field of education of our country. The goal of fundamental improvement of the education system is one of the most urgent issues: the level of knowledge of the students of general education schools, the ability to apply the learned information in life and continuous improvement.

Teaching chemistry on the basis of the pedagogical education cluster is of great importance in preparing the young generation to the level of practical application of acquired knowledge, skills and abilities, and in serving as mature specialists.

In conclusion, we can say that the efficiency index of the experimental group increased by 13% in the mathematical-statistical analysis of the students' independent study of organic chemistry in the cluster method.

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