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Content

Agricultural sciences

THE INFLUENCE OF MINERAL FERTILIZATION ON THE NUTRITIVE VALUE AND BIOCHEMICAL COMPOSITION OF THE LEAVES OF DIFFERENT MULBERRY VARIETIES

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Abstract

Based on the results of the experiment, it can be stated that the physiological processes in each variety determine different demands for mineral substances. When applying N90P90 per hectare to the Emin-tut and Firudin-tut varieties, the quantity of mineral substances in the leaves increased, and the nutritive quality of the leaves improved. However, the Kokuso-70 variety did not reach the same level as the other varieties.

Keywords: *varieties, mineral fertilizers, chemical composition of leaves, feeding, fodder quality, nutrition, cocoon, raw silk.*

As a result of long-term selection work in our republic, highly productive mulberry varieties such as Khanlar-tut, Emin-tut, Firudin-tut, Gozal-tut, Bakhcha-tut, Kamil-tut, Yunis-tut, and Mahsati-900 have been developed. These varieties surpass the widely spread "Cir-tut" in productivity and fodder quality by 2-3 times.

One of the most important ways to achieve high yields from mulberry plantations is the timely and proper implementation of agro-technical care measures. As is known, during the silkworm feeding period every year, all leafy branches of the mulberry tree are cut. To regenerate its branches and leaves, the mulberry tree absorbs a large amount of nutrients from the soil. This leads to a decrease in soil nutrients and a reduction in leaf yield. To prevent this, applying organic and mineral fertilizers to mulberry plantations is a key measure.

Discussion of Results: *The use of fertilizers by the mulberry tree is closely related to its physiological processes. The experiments were conducted at the Faxralı experimental base of the institute in a high-stem plantation consisting of Emin-tut, Firudin-tut, and Kokuso-70 mulberry varieties, where different fertilizer doses were tested. The field experiment was carried out in four repetitions, with 12 trees in each. Ammonium nitrate and powdered superphosphate were used as mineral fertilizers. Fertilizers were applied in the spring when the buds of mulberry trees began to open, at a depth of 18-20 cm in furrows dug 40-50 cm away from the trunk on both sides of the rows.*

The experimental soil was light chestnut and was characterized by the following nutrient content: at a depth of 0-20 cm, the humus content was 1.90%, decreasing with depth to 1.02% at 60-80 cm. The total nitrogen content was 0.120% in the 0-20 cm layer and 0.090% at 60-80 cm. The content of hydrolyzable nitrogen and mobile phosphorus in the experimental soil was very low. Specifically, at a depth of 0-20 cm, hydrolyzable nitrogen was 3.36 mg per 100 g of soil, and mobile P_2O_5 was 0.85 mg; at 60-80 cm, these values were 1.12 mg and 0.50 mg, respectively.

According to the experiment scheme, different variants received nitrogen at 90 kg/ha and phosphorus at 45 kg/ha separately, as well as nitrogen at 90 kg and phosphorus at 45 kg; nitrogen at 90 kg and phosphorus at 90 kg; and nitrogen at 180 kg and phosphorus at 90 kg together.

Biological and chemical methods were used to determine the fodder quality of leaves from different variants. Over two years, a silkworm feeding trial was conducted, along with a chemical analysis of leaf composition. The impact of mineral fertilizers on the nutritional value and fodder quality of leaves from different varieties was studied, and the results are presented in Table 1.

Table 1.

Fodder Value and Nutritional Quality of Different Mulberry Varieties' Leaves

Fertilizer Doses	Fodder Value (per 1 kg of provided leaves)						Yield (from 1 kg of consumed leaves)					
	Silk Cocoon Yield (in grams)			Silk Yield (in grams)			Silk Cocoon Yield (in grams)			Silk Yield (in grams)		
	X	±SX	According to the control (%)	X	±SX	According to the control (%)	X	±SX	"According to the control (%)"	X	±SX	According to the control (%)
1	2	3	4	5	6	7	8	9	10	11	12	13
EMIN-TUT												
Without fertilizer (control)	72,2	0,7	100	12,2	0,1	100	95,6	0,9	100	16,2	0,2	100
N90	73,5	1,7	102	12,8	0,3	105	96,5	1,9	101	16,7	0,3	103
P45	75,5	0,3	105	12,9	0,1	106	99,5	0,4	104	17,1	0,2	106
N90P45	72,1	1,2	100	12,2	0,1	100	103,3	1,5	108	17,6	0,3	109
N90P90	74,9	0,9	104	12,4	0,4	102	108,2	2,0	113	18,0	0,7	112
N180P90	75,2	1,0	104	12,5	0,2	102	106,2	1,3	111	17,8	0,5	110
FIRUDIN-TUT												
Without fertilizer (control)	73,7	0,6	100	12,3	0,0	100	101,3	0,3	100	17,0	0,0	100
N90	75,3	0,8	102	12,8	0,2	104	102,1	1,7	101	17,4	0,2	102
P45	77,6	0,7	105	13,2	0,2	107	109,0	1,6	108	18,4	0,4	108
N90P45	77,0	1,8	105	13,1	0,4	107	108,6	3,2	107	18,5	0,7	109
N90P90	78,4	0,8	106	13,1	0,1	107	110,0	1,4	109	18,2	0,2	107
N180P90	76,8	0,6	104	12,6	0,2	103	107,7	0,7	106	17,8	0,3	105
KOKUSO-70												
Without fertilizer (control)	74,5	1,8	100	12,9	0,5	100	104,3	2,4	100	18,1	0,6	100
N90	75,1	2,4	101	13,1	0,2	102	103,7	2,4	99	18,0	0,1	100
P45	74,2	0,4	100	13,1	0,2	102	103,3	1,6	99	18,3	0,3	101
N90P45	74,3	0,5	100	12,8	0,1	100	98,3	1,2	94	17,0	0,2	94
N90P90	79,3	0,9	106	12,9	0,4	100	100,8	1,7	97	17,6	0,3	97
N180P90	71,8	0,6	96	12,5	0,3	97	99,5	1,1	95	17,3	0,4	96

As seen in the table, the fodder quality of leaves, i.e., the amount of nutrients available per 1 kg of leaves, depends on the type and dosage of mineral fertilizers as well as the biological characteristics of the studied varieties.

Silk cocoon and raw silk yield, as well as the nutritional value of the leaves, meaning the amount of cocoon and raw silk produced per 1 kg of leaves consumed, have significantly changed. When nitrogen-90 and phosphorus-90 kg fertilizers were applied per hectare, the fodder value of the leaves increased by 4-6% on average over two years for the mulberry varieties Emin-tut, Firudin-tut, and Kokuso-70, with no significant change in the Kokuso-70 variety within the experimental error. A similar pattern was observed for the nutritional value of the leaves. Compared to the control, the increase was 12% and 7% for the Emin-tut and Firudin-tut varieties, respectively, while no increase was observed in the Kokuso-70 variant.

As seen, in the variants where nitrogen-180 and phosphorus-90 kg were applied, the increase in the Emin-tut and Firudin-tut varieties was at the same level as in the nitrogen-90 and phosphorus-90 kg variants. However, in the Kokuso-70 variant, a decrease was even observed compared to the control. This indicates that the Kokuso-70 variety showed practically no response to an increase of 90 kg of nitrogen per hectare. Thus, it becomes clear that the nutritional value of the leaves changed to varying degrees depending on the fertilizer doses applied to different mulberry varieties.

Based on the results of the experiment, it can be stated that the demand for mineral substances differs depending on the physiological processes occurring in each variety. In the Emin-tut and Firudin-tut varieties, the application of nitrogen-90 and phosphorus-90 kg increased the amount of mineral substances in the leaves, improving their fodder quality. However, the Kokuso-70 variety did not reach the level of these varieties.

As mentioned above, the effect of different fertilizers on the chemical composition of the leaves of different varieties was studied, and the results are presented in Table 2. It should be noted that the leaf samples were taken in accordance with the general methodology during the 3rd (5th of May) and 5th (20th of May) instars of the silkworms, fixed in an autoclave, and analyzed in the biochemistry laboratory of AzETII. Therefore, the amount of total water, total nitrogen, crude protein, crude ash, cellulose, and nitrogen-free extractives in the leaves was comparatively studied over two periods, and very interesting results were obtained.

As seen in the table, the amount of water in the leaves changed significantly depending on the mineral fertilizers and varieties. For instance, in the Emin-tut variety, when nitrogen-90 and phosphorus-45 kg were applied, the water content was 72.5% in the 3rd instar, and 70.8% in the 5th instar; for the nitrogen-90 and phosphorus-90 kg variant, it was 73.3% and 70.3%, respectively; and for the nitrogen-180 and phosphorus-90 kg variant, it was 72.0% and 69.8%. In the Firudin-tut variety, the water content was 72.3% on 5th May and 70.0% on 20th May for the nitrogen-90 and phosphorus-45 kg variant, and 73.3% and 74.3%, respectively, for the nitrogen-90 and phosphorus-90 kg variant; in the nitrogen-180 and phosphorus-90 kg variant, it was 73.5% and 70.0%. In the Kokuso-70 variety, the water content ranged from 73.8% to 70.8% in the fertilized variants between 5th May and 20th May, and was lower than the control in all cases. It is evident that the water content in the leaves was lower in all varieties compared to the 3rd instar, which should be considered in practical sericulture.

During the leaf analysis, the amount of total nitrogen present was also studied. According to this indicator, although there was no sharp difference between the varieties and fertilizer variants, noticeable changes were observed. In the Emin-tut variety, the total nitrogen content was between 3.48-3.28% in the 3rd instar (5th May), and between 2.69-3.41% in the 5th instar (20th May). In the Firudin-tut variety, the total nitrogen content was between 3.28-3.54% on 5th May, and between 2.62-3.01% on 20th May. The Kokuso-70 variety differed from these varieties, as the total nitrogen content ranged from 3.54-3.29% in the 3rd instar (5th May), and from 2.62-3.48% in the 5th instar (20th May).

One of the factors that seriously affects the development and productivity of the silkworm is the protein content. This depends on tree care, fertilization, and the biological characteristics of the variety. The analysis results show that the amount of protein is directly related to the amount of total nitrogen, which is why higher protein content is observed in all fertilizer variants during the early instars of silkworms, while relatively lower values are observed during the 5th instar. In the Emin-tut variety, for the nitrogen-90 and phosphorus-90 kg variant, the protein content was 21.75% in the 3rd instar (5th May) and 19.31% in the 5th instar (20th May).

The same trend is observed in the nitrogen-180 and phosphorus-90 kg variant, where the protein content was 20.40% on 5th May and decreased to 16.81% on 20th May, meaning that as the leaves age, the nutrient content starts to decrease.

A similar result was observed in the Firudin-tut variety as well. In the variant where nitrogen-90 and phosphorus-45 kg were applied, the crude protein content was 21.31% on 5th May and 20.40% on 20th May. In the variant with nitrogen-90 and phosphorus-90 kg, the protein content was 20.40% on 5th May and 18.81% on 20th May.

In the Kokuso-70 variety, a more significant decrease in protein content was observed. In the variant with nitrogen-90 and phosphorus-45 kg, the protein content was 20.06% on 5th May and 16.37% on 20th May. For the nitrogen-90 and phosphorus-90 kg variant, the protein content was 20.62% on 5th May and 16.81% on 20th May.

One of the main components that make up the leaf composition is crude ash. As seen, the amount of crude ash varied considerably between the varieties, periods, and fertilizer variants. The amount of ash in the leaves increased significantly in the 5th instar (20th May) compared to the 3rd instar (5th May). For example, in the Emin-tut variety, in the variant with nitrogen-90 and phosphorus-45 kg, the amount of crude ash was 7.22% in the 3rd instar and 10.50% in the 5th instar. In the Kokuso-70 variety, in the variant with nitrogen-90 and phosphorus-90 kg, the crude ash content was 8.69% on 5th May and 10.12% on 20th May. However, the Firudin-tut variety did not reach the levels of these.

Table 2.

Fodder Value and Nutritional Quality of Different Mulberry Varieties' Leaves

Fertilizer Doses	Sampling Date	Water Content in the Leaf	Total Nitrogen	Crude Protein	Crude Ash	Cellulose	Non-nitrogenous Extractive Substancesr
1	2	3	4	5	6	7	8
EMIN-TUT							
Without Fertilizer (control)	5.V	73,0	3,93	23,42	8,51	8,46	50,44
	20.V	71,8	3,28	20,40	10,59	9,05	51,07
N90	5.V	72,2	3,67	22,93	7,76	10,66	49,45
	20.V	69,8	3,21	20,06	9,16	9,70	52,26
P45	5.V	73,3	3,41	21,31	8,98	8,66	51,90
	20.V	69,8	3,41	21,31	8,85	9,94	51,00
N90P45	5.V	72,5	3,28	20,40	7,22	8,66	54,51
	20.V	70,8	3,28	20,40	10,50	9,96	50,20
N90P90	5.V	73,3	3,48	21,75	9,38	9,03	49,42
	20.V	70,3	3,08	19,31	9,26	10,00	52,40
N180P90	5.V	72,0	3,28	20,40	8,66	9,76	51,68
	20.V	69,8	2,69	16,81	8,12	9,00	56,91
FIRUDIN-TUT							
Without Fertilizer (control)	5.V	72,8	3,28	20,40	8,94	8,80	47,32
	20.V	71,3	3,28	20,40	8,30	9,99	52,34
N90	5.V	72,5	3,54	22,16	8,55	8,70	54,60
	20.V	70,8	2,62	16,37	8,51	9,73	56,42
P45	5.V	72,5	3,28	20,40	8,71	10,60	48,98
	20.V	71,5	3,08	19,31	8,06	10,06	53,59
N90P45	5.V	72,3	3,41	21,31	8,81	9,36	48,67
	20.V	70,0	3,28	20,40	8,69	9,80	52,12
N90P90	5.V	73,3	3,28	20,40	7,23	10,23	46,96
	20.V	74,3	3,01	18,81	8,60	10,33	53,25
N180P90	5.V	73,5	3,28	20,40	7,76	9,43	53,24
	20.V	70,0	3,21	20,06	7,70	9,00	54,30
KOKUSO-70							
Without Fertilizer (control)	5.V	74,3	3,41	21,31	9,27	9,43	50,81
	20.V	71,5	3,54	22,16	8,89	8,93	51,10
N90	5.V	73,8	3,54	22,16	9,43	8,33	50,95
	20.V	71,2	3,28	20,40	8,79	8,66	53,17
P45	5.V	72,8	3,41	21,31	8,58	8,31	53,60
	20.V	70,8	3,08	19,31	8,88	9,56	53,34
N90P45	5.V	72,8	3,37	20,06	7,82	9,03	53,99
	20.V	71,2	2,62	16,37	9,26	10,20	55,24
N90P90	5.V	73,5	3,30	20,62	8,69	8,33	53,29
	20.V	72,0	2,69	16,81	10,12	10,53	53,62
N180P90	5.V	72,5	3,29	20,56	8,70	8,80	52,74
	20.V	70,8	3,48	21,81	9,10	9,83	50,35

As seen in Table 2, there was not much difference between the varieties and fertilizer variants in terms of the cellulose content in the leaves. The amount of cellulose ranged from 8.33% to 10.66% across the variants. The amount of non-nitrogenous extractive substances in the leaves was also studied, and it was found to vary depending on the varieties and the fertilizer doses. For example, in the Emin-tut variety, in the variant with nitrogen-90 and phosphorus-45 kg, the non-nitrogenous extractive substances were 54.51% on 5th May and 50.20% on 20th May, while in the variant with nitrogen-180 and phosphorus-90 kg, the values were 51.68% and 56.91%, respectively. In the Firudin-tut variety, these values were 48.67% and 52.12%, and 53.24% and 54.30% for the two dates. In the Kokuso-70 variety, they were 53.99% and 55.24%, and 52.74% and 50.35%, respectively.

Conclusion: *The chemical analysis shows that the non-nitrogenous extractive substances in the leaves change depending on the variety and fertilizer doses, which influences the life, development, and productivity of the silkworm. The results of the research indicate that despite the same agro-technical conditions, the varieties differ biochemically. The Emin-tut and Firudin-tut varieties show a requirement for nitrogen-90 and phosphorus-90 kg fertilizers, while the Kokuso-70 variety lags behind.*

Thus, it becomes clear that the combined use of biological and chemical methods provides a more reliable evaluation of the leaf and variety's feed quality.

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USE OF THE MULBERRY GENE POOL FOR THE CREATION OF NEW MULBERRY VARIETIES AND THEIR BIOMORPHOLOGICAL CHARACTERISTICS

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Abstract

The article discusses the gene pool of mulberry and the creation of new mulberry varieties from various forms. Information is provided on the biomorphological characteristics of the newly created varieties. Observations on the new mulberry varieties and their productivity indicators are also presented.

Keywords: *gene pool, biodiversity, mulberry, variety, form, phenological observation, productivity.*

Azerbaijan's rich and favorable soil and climate conditions allow for the production of ecologically clean products while also ensuring the preservation of biodiversity. These conditions create a suitable environment for the production of competitive products for global markets.

The conservation of biodiversity, the collection of genetic resources, the establishment of a gene pool, and its transmission to future generations are among the primary objectives in our country.

Historically, every field has experienced periods of both decline and progress. Nevertheless, the conservation and maintenance of the gene pool are crucial for the future development of this sector, as its progress depends on genetic diversity.

It is known that there are 24 species of the mulberry genus distributed worldwide. Mulberry varieties are classified into fruit-bearing, ornamental, and fodder types. The fruit-bearing varieties include Shah-tut, Bidaneh-tut, Tehran-tut, and Khar-tut; the ornamental varieties include Golden-tut, Weeping-tut, and Snake-tut; and the fodder varieties include Zarif-tut, Sikhgoz-tut, Khanlar-tut, Emin-tut, Baghcha-tut, Fakhrali-tut, and Gozal-tut, which were developed by research scientists.

Through long-term planned selection efforts by mulberry breeders, new varieties and forms have been developed from the wild mulberry population, which are more suitable for silkworm feeding and produce higher yields of cocoons and raw silk under agronomic care conditions.

The founder of mulberry science in Azerbaijan was I.K. Abdullayev. Under his leadership, various mulberry varieties were created using both analytical and synthetic selection methods.

Currently, selection studies on mulberry are ongoing, and new varieties are being developed using various breeding techniques. These efforts not only contribute to the establishment of a feed base for sericulture in Azerbaijan but also enrich the mulberry gene pool.

The aim of our scientific research is to develop economically significant new hybrid mulberry seedlings that meet the modern requirements of sericulture. This includes studying the different ploidy forms in the mulberry gene pool, creating new breeding material, and conducting research on 11 varieties in the X-series variety trial plantation for submission to state variety testing. The study also aims to conduct trials on selected forms and identify the most productive varieties based on their biochemical leaf composition for submission to state variety testing. Additionally, the research focuses on identifying the most valuable hybrid combinations in the areas of fruit breeding and seed selection within the existing gene pool at the Fakhrali base.

The observations conducted on trees in the trialed varieties and forms are of great practical significance.

Starting in March, phenological observations were carried out on selected forms to study their growth and development phases during the growing season. Depending on climatic conditions and the genetic characteristics of the varieties, their growth and development phases occur at different times. Understanding these phases helps determine the appropriate varieties for feeding silkworms at different stages of growth. Bud swelling, bud break, gender differentiation, and fruiting degree were examined in

the varieties, and the obtained results are presented in Table 1. Studying these characteristics is essential for determining the timing of silkworm egg incubation, which has great practical importance.

Table 1.

Results of studying the growth and development phases of the tested varieties

#	Variety name	Bud swelling	Bud opening	Leaf formation					Gender of varieties	Flowering and fruiting rate of varieties	Mass maturation of male flowers	Mass maturation of fruits
				1st	2nd	3rd	4th	5th				
1	S10-1	29. III	7.IV	11.IV	14.IV	16.IV	19.IV	22.IV	♂	medium	24	-
2	S10-2	29.III	7.IV	10.IV	14.IV	20.IV	22.IV	25.IV	♀	low	-	26.V
3	S10-3	30.III	11.IV	13.IV	15.IV	19.IV	23.IV	26.IV	♀	low	-	26.V
4	S10-4	2.IV	8.V	13.IV	17.IV	21.IV	25.IV	30.IV	♀♂	medium	-	-
5	S10-5	3.IV	13.IV	17.IV	20.IV	24.IV	27.IV	30.IV	♀	low	-	29.V
6	S10-6	11.III	13.IV	18.IV	22.IV	26.IV	29.IV	3.V	♂	low	-	28.IV
7	S10-7	30.III	9.IV	16.IV	19.IV	22.IV	25.IV	29.IV	♂	low	29.IV	-
8	S10-8	30.III	7.IV	16.IV	21.IV	25.IV	27.IV	1.V	♀	medium	-	29.V
9	S10-9	1.IV	9.IV	15.IV	21.IV	23.IV	26.IV	30.IV	♀♂	low	-	-
10	S10-10	2.IV	10.IV	14.IV	20.IV	24.IV	26.IV	1.V	♀	medium	-	29.V
11	Gozal-tut (control)	28.III	6.IV	9.IV	12.IV	15.IV	19.IV	21.IV	♀	high	-	26.V

The most crucial stage in the trial of new varieties is the study of leaf emergence percentage, as well as leaf yield per tree and per hectare of plantation.

During the 5th-6th days of the 5th instar of silkworms, leaf yield was recorded for each variety in three replications, with five model trees in each replication. The obtained results are presented in Table 2.

Leaf emergence is one of the key indicators affecting leaf yield. Depending on the hereditary characteristics of the varieties, leaf emergence varied significantly, ranging from 14.04% to 56.00%. In the control variant, Gozal-tut, it was recorded as 50.00%.

The amount of leaf yield per tree varied between 1.8 kg and 6.6 kg among the studied varieties, while in the control variant, it was 5.0 kg. Leaf yield per hectare, in a plantation with a density of 4x2 spacing (1,250 trees per hectare), ranged from 10.00 to 82.50 centners. Among the studied varieties, S10-3, S10-8, and S10-5 were distinguished in terms of leaf yield per hectare.

Table 2.

Leaf yield of tested varieties

#	Variety name	Leaf emergence (%)	Leaf yield	
			kg/tree	area/hectare
1	S10-1	24,71	2,1	26,25
2	S10-2	26,00	2,6	32,50
3	S10-3	55,00	6,6	82,50
4	S10-4	14,04	0,8	10,00
5	S10-5	48,57	3,4	42,50
6	S10-6	36,36	2,0	25,00
7	S10-7	36,00	2,3	28,75
8	S10-8	56,0	5,6	70,00
9	S10-9	19,35	1,8	22,50
10	S10-10	29,00	2,9	36,25
11	Gozal-tut (control)	50,00	5,0	62,50

After studying the biochemical composition of the varieties to determine their feed quality, they will be submitted for State trials. Following this, these varieties will be included in the gene pool.

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Arts

THE PIANIST ELMIRA ALIYEVA'S ROLE IN THE DEVELOPMENT OF AZERBAIJAN PIANO PERFORMANCE

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РОЛЬ ПИАНИСТКИ ЭЛЬМИРЫ АЛИЕВОЙ В РАЗВИТИИ АЗЕРБАЙДЖАНСКОГО ФОРТЕПИАННОГО ИСПОЛНИТЕЛЬСТВА

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Abstract

The presented article is aimed at the comprehensive study of the creative path of pianist Elmira Aliyeva, revealing her main and individual qualities in the successful implementation of pedagogical, performing and scientific-creative activities at a high level. Professor Elmira Aliyeva's important contributions to the development of the Azerbaijani piano school are undeniable. Elmira Aliyeva worked for the formation of our national musical culture with her extensive activities as a soloist, concertmaster and teacher. The article describes the pianist's wide repertoire and unique interpretation. It was determined that although Elmira Aliyeva as a pianist included the works of famous European composers in her repertoire, she preferred the works of representatives of the national composition school.

Аннотация

Представленная статья направлена на всестороннее изучение творческого пути пианистки Эльмиры Алиевой, выявление ее основных и индивидуальных качеств в успешном осуществлении педагогической, исполнительской и научно-творческой деятельности на высоком уровне. Важный вклад профессора Эльмиры Алиевой в развитие азербайджанской фортепианной школы неоспорим. Эльмира Алиева своей обширной деятельностью в качестве солистки, концертмейстера и педагога внесла вклад в формирование нашей национальной музыкальной культуры. В статье рассказывается о широком репертуаре и уникальной интерпретации пианиста. Установлено, что хотя Эльмира Алиева как пианистка включала в свой репертуар произведения известных европейских композиторов, она отдавала предпочтение произведениям представителей национальной композиторской школы.

Keywords: *Elmira Aliyeva, pianist, interpretation, composer's works, Chopin, playing, Rachmaninoff, sonata, Musa Mirzayev.*

Ключевые слова: *Эльмира Алиева, пианистка, интерпретация, произведения композитора, Шопен, игра, Рахманинов, соната, Муса Мирзаев.*

Introduction. *The presented article is aimed at the comprehensive study of the creative path of pianist Elmira Aliyeva, revealing her main and individual qualities in the successful implementation of pedagogical, performing and scientific-creative activities at a high level. Professor Elmira Aliyeva's important contributions to the development of the Azerbaijani piano school are undeniable. Elmira Aliyeva worked for the formation of our national musical culture with her extensive activities as a soloist, concertmaster and teacher. She studied at the Baku Music Academy named after Uzeyir Hajibeyli in the class of People's Artist M.R. Brenner. During her years of study, she learned from his teacher the secrets of playing the piano, achieving high professionalism and expressive intonation.*

Elmira Aliyeva remained faithful to the traditions of M. Brenner in her creative activity and developed these traditions in her art. During her studies, Elmira Aliyeva made successful speeches at a number of events and attracted the attention of musicians with her high-level interpretations. In his repertoire, the works of Haydn, Mozart, Beethoven, Liszt, Schumann, Chopin, Tchaikovsky, Rachmaninoff were especially favorably received.

In Elmira Aliyeva's interpretation, the works of the famous Polish composer Frederic Chopin occupied an important place. Elmira Aliyeva interpreted the works of this composer, who was awarded the title of "the heart of the piano", with special enthusiasm. She included Chopin's works both in the concert repertoire and in the subject program of the "Piano" specialty at the Baku Music Academy, where she worked, and taught the students with great enthusiasm.

The main part. Pianist Elmira Aliyeva, while interpreting and teaching Chopin's works, touched on a number of important performance issues: reviving the artistic image and revealing the character of the work, paying attention to the issues of pure intonation.

Elmira Aliyeva gave a wide place to the works of Russian composers in her performance, and repeatedly referred to the works of Sergei Rachmaninoff. In order to characterize the colorful images in S. Rachmaninov's works, she played the culminating part especially prominently, and he paid close attention to the dynamic strokes in the text of the sheet music. Pianist Rafig Guliyev wrote: "The piano works of the famous Russian composer Sergei Rachmaninov were depicted with extremely clear, bright and bright colors in the interpretation of Elmira Aliyeva" [3, p.117]

The pianist has repeatedly turned to the works of French composers. For example: K. Saint-Saëns' Second Concerto for the piano was met with great interest in the performer's interpretation. She prefers the works of impressionist composers, considers the works of K. Debussy and M. Ravel to be piano pearls, and approached these works in his own way. The pianist expertly demonstrated the specific characteristics of the impressionism style in his interpretations. When teaching these works, he recommended paying attention to delicate dynamism and strokes.

She evaluates the works of the genius composer I.S. Bach as masterpieces and performs these works in his own unique style. The pianist interpreted the composer's "Preludes and Fugues" in a simple and bright manner, at an academic level.

Talented pianist Elmira Aliyeva prefers the works of the representatives of the national composition school: Gara Garayev, Fikret Amirov, Jovdat Hajiyev, Arif Malikov, Musa Mirzayev and included in her repertoire rich piano works. According to musicologists and music critics, he was a high-level performer of the genius Gara Garayev's "Sarskoselo statue". When the pianist interpreted this work, he reflected the emotions inherent in Gara Garayev's inner world and professionally expressed the pianism methods in the work.

Turning to the creativity of our famous composer Fikret Amirov, the pianist performed his "Variations for Piano" in an inimitable style. When interpreting the variations, the pianist tried to emphasize the national color, and managed to convey the images as they were in each variation. In the process of working on the main theme, she followed various dynamic strokes to achieve expressive sound.

Turning to Musa Mirzayev's creativity, the performer interpreted the composer's "Lyric sonata" and "Sonata-Capriccio" for piano with great virtuosity. The composer's "Lyric Sonata" is in three parts, the first part is Allegro moderato, the second part is Adagio, and the third Rondo is in Allegretto grazioso tempo. Here, Elmira Aliyeva expresses an optimistic character and praises the feelings of the human heart through the developing dynamics.

In the working part of the sonata, the struggle of tonalities, dynamic development, richness of alteration signs attract attention. Here, the pianist played the notes with emphasis and applied the marcato stroke to increase the tension a bit. In general, the pianist used the legato stroke in the lyrical works, and the markato in the solemn works.

The second part of the sonata has a melancholic character and is rich in melodic and polyphonic elements. The second part is written in Adagio tempo, 4/3 time, in the key of E minor, with frequent alternation of 4/3 and 4/4 time signatures. In this part, Elmira Aliyeva seems to have put forward the goal of conveying the various, multifaceted thoughts of a passionate person to the listener, and by combining the melodic line with the contrast of dynamic signs, she has created an exciting-emotional image.

The third Rondo part of the sonata is the most complex part in terms of performance technique. The pianist clearly characterizes artistic images by starting the main theme in the fortissimo (ff) nuance and immediately moving to the mezzo-piano (mp) nuance.

"Sonata-capriccio" composed by Musa Mirzayev in 1962 is one of the most widespread and popular piano works. "Sonata-capriccio" was played for the first time at the Plenum of the International Union held in Moscow and gained great fame and was loved by the music community. Pianist Elmira Aliyeva included "Sonata-Capricci" in her repertoire and performed it many times at domestic concerts and on concert tours to foreign countries. The first performer of "Sonata-capriccio" in Baku was our late pianist Rafig Guliyev. Elmira Aliyeva supported the interpretations of pianist Rafig Guliyev, whose performance art she greatly respects, and benefited from his performance methods in her own interpretation.

The form of "Sonata-Capriccio" incorporates classical traditions and serves to reveal the artistic content of the work. Although the traditional form retains its specificity, the content is filled with new images every time. The pianist managed to convey these images as they are. The composer freely uses complex polyphonic forms in the work, and the pianist characterized the unity of national music and classical form. The innovation characteristic of the composer's work was embodied in Elmira Aliyeva's interpretation. Elmira Aliyeva also worked as a professional concertmaster.

Fragments from the ballet "The Legend of Love" by our famous composer Arif Malikov, preludes for piano were among the pianist's favorite works. While playing the works of Azerbaijani composers, the pianist mainly tried to express the national color more prominently, and strengthened the national sound in the work by playing melismas with emphasis. At the same time, the pianist pays attention to rhythm issues in the process of interpretation of national works: in works starting with syncopation and khanakhariji, she tried to draw attention to the opening part of the work by sounding the first note a little louder. The pianist demanded a more subtle approach to matters of intonation by gently sounding the jumps of simple and complex intervals found in the works he interpreted. She even played the dissonant intervals in such a gentle and soft way that the sharp and contrast was not so noticeable.

In 1950-53, she worked as a soloist of the State Trio under the Azerbaijan State Philharmonic with violinist T. Bakikhanov and cellist S. Aliyev.

Pianist together with a number of outstanding performers: Bulbul, Lutfiyar Imanov, Firangiz Ahmadova, Sabir Aliyev, Aghababa Bunyadzade, Sona Aslanova and Rauf Atakishiyev, honored artists Rasim Abdullayev, Yuriy Abdullayev, Eldar Iskenderov, Anatoliy Mamedov, Etibar Dadashli, Adila Babayeva, Salima Gayibova. working, he accompanied them with great skill. Pianist was awarded the Honorary Decree of the Supreme Council of Azerbaijan as an active participant of all Plenums and Meetings of the Union of Composers, Decades of Azerbaijani art and literature.

In his activity as a concertmaster, the pianist turns to the works of Azerbaijani and world composers and adequately copes with the most complex and difficult works from the point of view of performance. World-famous musician M. L. Rostropovich said: "I know pianist Elmira Aliyeva as an excellent teacher and chamber music performer. His performance with cellists in the ensemble at All-Union competitions made me feel good" [1, p. 18]

Elmira Aliyeva interpreted the double concerto for piano and cello of our outstanding composer Suleyman Alasgarov with the utmost virtuosity. While playing this piece, the pianist interpreted the note text and dynamics as they were, adhering to the composer's opinion. However, at some points, when necessary, he slightly interfered with the tempo issues and managed to make the piece sound more attractive.

Along with performing, Professor Elmira Aliyeva has trained a generation of hundreds of talented performers by performing pedagogical activities. Paying attention to all the small details in the teaching process, the pianist used unique methods to develop students' musical sense and rhythm. As a result of these methods applied by him, talented young people were formed and the Azerbaijani piano school continued to develop. Tarlan Seyidov writes about this: "Elmira Aliyeva preferred the polyphonic works of I. S. Bach to develop the musical sense of young pianists, and mainly the etudes of Leshhorn and Liszt to strengthen the sense of rhythm. He required students to be more creative in the teaching process, to reveal the character of the work and to create expressive intonation." [2, p.56].

Conclusion. *Thus, Professor Elmira Aliyeva took important steps in the development of Azerbaijani musical culture and the formation of a piano school. Studying the pianist's creative path is considered relevant for our modern times. Thus, his performance style, activity as a concertmaster, pedagogical activity and scientific-publicist works are a school for our future generations. Elmira Aliyeva's creativity is important for every musician, and her creativity embodies the successes of the Azerbaijani piano school.*

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Chemical sciences

THERMODYNAMIC STUDY OF THE As_2Zn AND As_2Cd_3 COMPOUNDS BY THE ELECTROMOTIVE FORCE MEASUREMENTS WITH LIQUID ELECTROLYTE

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Functional materials with prominent characteristics are selected for their response to electrical, magnetic, optical or chemical impulses. Among such materials metal pnictides have attracted considerable attention due to their applications in fabrication of electronic, optoelectronic, and spintronic devices such as light emitting diodes, solar cells, photodetectors, lasers, topological insulators and so on [1,2].

To improve methods for the directional synthesis of promising applied materials and the development of their single crystals, it is important to construct corresponding phase diagrams, as well as to study thermodynamic properties of the intermediate phases formed in them [3]. Thermodynamic properties of compounds and intermediate phases are very important in terms of gaining information about their thermal behavior and the microstructure evolution with temperature. There are only few works devoted to the thermodynamic study of zinc arsenides [4, 5, 6]. These works are mainly dedicated to the determination of their enthalpies of the formation and heat content with different methods and are significantly different from each other. Taking into account the above, presented work is dedicated to the study of thermodynamic properties of the As_2Zn and As_2Zn_3 compounds by means of the electromotive force (e.m.f.) measurements with a liquid electrolyte. Different modifications of the e.m.f. method is widely used for the thermodynamic study of binary and more complex inorganic systems. Depending on different factors such as nature of constituting compounds, measurement temperature etc. different types of solid and liquid electrolytes can be used for the emf measurements [7].

The As–Zn binary system is characterized by the formation of two intermediate compounds, As_2Zn and As_2Zn_3, which melt with open maximum at 770°C and 1015°C, respectively. As_2Zn_3 compound undergoes phase transitions at 190°C and 770°C [8].

To study the thermodynamic properties of zinc arsenides, alloys of different compositions have been chosen from the T-x diagram of the Zn-As system [8]. To determine the standard integral thermodynamic functions of the As_2Zn compound two samples with 20 and 30 at.% Zn compositions have been taken from the As- As_2Zn phase region of the Zn-As binary phase diagram. Similarly, alloys with the 40 and 50 at.% Zn compositions have been taken from the As_2Zn - As_2Zn_3 two-phase region of the T-x diagram to determine the thermodynamic properties of the As_2Zn_3 compound. Samples were prepared using 99.999% chemical pure elementary components (Zn and As) of the Alpha Aesar company. Synthesis was carried out by co-melting of elemental components in vacuum-sealed quartz ampoules. After synthesis, the samples were subjected to heat treatment below solidus for ~100 hours. The phase composition of the prepared samples was confirmed by the powder X-ray diffraction (PXRD) method. For experimental studies, electrochemical cells with the following sequence were constructed:

(-) Zn (solid) / glycerol, Zn^{2+} / Zn in alloy (+)

Measurements were made using a Keithley 2100 6 ½ digital multimeter in the temperature range of 298-430K. It was defined that e.m.f. values are constant in the heterogeneous field, and the temperature dependences of e.m.f. for all samples are linear. Experimental results were processed by the least squares method, and linear equations of the E = a + bT type were obtained. Partial molar thermodynamic functions of zinc in the indicated phase areas at 298 K were calculated based on these linear equations. The integral thermodynamic functions of the As_2Zn and As_2Zn_3 compounds were determined using the virtual-cell reactions method. Obtained thermodynamic functions are fundamental physico-chemical indicators of zinc arsenides and can be included in various electronic databases and used in thermodynamic calculations.

Keywords: *EMF method, thermodynamic properties, As_2Zn, As_2Zn_3, Dirac materials, pnictides*

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THE ROLE OF PROBLEM-BASED LEARNING IN THE FORMATION OF CRITICAL THINKING SKILLS IN CHEMISTRY

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ХИМИЯДАҒЫ СЫНИ ОЙЛАУ ДАҒДЫЛАРЫН ҚАЛЫПТАСТЫРУДАҒЫ ПРОБЛЕМАЛЫҚ ОҚЫТУДЫҢ РӨЛІ.

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РОЛЬ ПРОБЛЕМНОГО ОБУЧЕНИЯ В ФОРМИРОВАНИИ НАВЫКОВ КРИТИЧЕСКОГО МЫШЛЕНИЯ В ХИМИИ

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Abstract

This article examines the effectiveness of problem-based learning in teaching chemistry and its role in developing students' critical thinking skills. The problem-based learning method aims to enhance students' active cognitive engagement, fostering their creative and analytical abilities. Research shows that this approach contributes to deeper subject knowledge acquisition, the development of research skills, and increased academic motivation.

Аңдатпа

Бұл мақалада проблемалық оқытудың химияны оқытудағы тиімділігі мен оқушылардың сыни ойлау дағдыларын қалыптастырудағы рөлі қарастырылады.

Проблемалық оқыту әдісі оқушылардың белсенді танымдық қызметін арттырып, олардың шығармашылық және аналитикалық қабілеттерін дамытуға бағытталған. Зерттеулер нәтижесі бұл әдістің оқушылардың пәндік білімді терең меңгеруіне, ғылыми-зерттеу дағдыларын дамытуына және оқу мотивациясын арттыруына ықпал ететінін көрсетті.

Аннотация

В данной статье рассматривается эффективность проблемного обучения в преподавании химии и его роль в формировании навыков критического мышления у учащихся. Метод проблемного обучения направлен на активизацию познавательной деятельности учеников, развитие их творческих и аналитических способностей.

Исследования показывают, что данный метод способствует глубокому усвоению предметных знаний, развитию исследовательских навыков и повышению учебной мотивации.

Keywords: *Problem-based learning, critical thinking, chemistry teaching, cognitive engagement, research skills, motivation, teaching methods.*

Кілт сөздер: *Проблемалық оқыту, сыни ойлау, химияны оқыту, танымдық қызмет, зерттеушілік дағдылар, мотивация, оқыту әдістері.*

Ключевые слова: *Проблемное обучение, критическое мышление, преподавание химии, познавательная деятельность, исследовательские навыки, мотивация, методы обучения.*

Кіріспе. *Қазіргі заманғы білім беру оқушылардың XXI ғасырдың негізгі дағдыларын дамытуға бағытталған, олардың арасында сыни тұрғыдан ойлау ерекше орын алады. Химия – жаратылыстану пәндерінің бірі ретінде, осы дағдыларды қалыптастыру үшін тамаша платформа болып табылады. Күрделі құбылыстарды зерттеу, химиялық процестерді талдау және қолданбалы есептерді шешу арқылы студенттер пәндік білімді игеріп қана қоймай, ақпаратты талдау, түсіндіру және стандартты емес шешімдерді табу қабілетін дамыта алады. Сыни тұрғыдан ойлауды дамытудың тиімді тәсілдерінің бірі – проблемалық оқыту. Бұл әдіс білім алушылардың шешімдерді өз бетінше іздеуді, баламаларды талдауды және қорытындыларды қалыптастыруды талап ететін оқу жағдайларын жасауға бағытталған.*

Дәстүрлі әдістерден айырмашылығы, проблемалық оқыту білім беру процесінде оқушының белсенді рөліне назар аударады, бұл оқуды мағыналы етеді және білім алушыны ынталандырады [6].

Химияны оқыту шеңберінде проблемалық оқыту теориялық білімді олардың практикалық қолданылуымен біріктіруге мүмкіндік береді, оқушылардың зерттеу және аналитикалық қабілеттерін дамытуға жағдай жасайды. Мысалы, экологиялық мәселелермен немесе күнделікті өмірдегі химиялық процестермен байланысты міндеттер тақырыпқа деген қызығушылықты оятады және нақты деректермен жұмыс істеу дағдыларын қалыптастырады. Бұл мақалада химиядағы проблемалық оқытудың мүмкіндіктері мен артықшылықтары қарастырылады, оның сыни ойлауды қалыптастыруға әсері талданады және оны білім беру практикасында практикалық іске асырудың мысалдары келтірілген [8].

Негізгі бөлім: *Проблемалық оқыту білім алушылардың білім беру процесіне белсенді тарту әдісі ретінде олардың сыни тұрғыдан ойлау, ақпаратты талдау және оны іс жүзінде қолдану қабілетін дамытуға бағытталған. Химияда бұл тәсіл ғылыми дүниетанымды қалыптастыруға кең мүмкіндіктер ашады, оқушылардың ғылыми қызығушылығын дамытады және алған білімдерін күнделікті өмірге біріктіруге ықпал етеді. Проблемалық оқыту Джон Дьюи, Лев Выготский және Джером Брунер сияқты ғалымдардың идеяларына негізделген, олар оқушының оқу процесіне белсенді қатысуының маңыздылығын атап өтті. Бұл тәсілдің негізгі мақсаты проблемалық сұрақтар қою және шешімдерді іздеу арқылы оқу материалын өз бетінше түсіну қабілетін дамыту болып табылады. Джон Дьюидің теориясына сәйкес, оқыту фактілерді пассивті есте сақтау емес, оқушының терең талдауды қажет ететін нақты немесе имитацияланған мәселелерге тап болатын белсенді процесі болуы керек [1]. Лев Выготский "жақын даму аймағының" маңыздылығын атап өтті, мұнда студенттер өздерінің қазіргі білімдерінің шекарасында, бірақ қол жетімді даму аймағында мәселелерді шеше алады. Джером Брунер проблемалық оқыту тек білімді ғана емес, сонымен қатар оның жаңа жағдайларда бейімделу қабілетін қалыптастыратынын атап өтті.*

Химияны оқытуда проблемалық оқытуды практикалық мәселелерді шешу, эксперименттер жүргізу, жобалау қызметі және химиялық процестерге қатысты өзекті мәселелерді талқылау арқылы жүзеге асыруға болады. Теориялық білімді оларды қолданумен біріктіретін проблемалық жағдайлар оқушылардың химияны ғылым ретінде тұтас түсінуін қалыптастыруға ықпал етеді. Мысалы, тапсырма: "қышқыл жаңбырға қандай химиялық процестер ықпал етеді және олардың қоршаған ортаға әсерін қалай азайтуға болады?"оқушылардан" қышқылдар мен негіздер " тақырыбы бойынша білімді ғана емес, сонымен қатар жаһандық экологиялық проблемаларды түсінуді де талап етеді. Мұндай тапсырманы орындау кезінде студенттер атмосфераға зиянды заттардың шығарындылары туралы деректерді талдайды, қышқыл жаңбырдың әсерін зерттейді және олардың алдын алу жолдарын ұсынады [4].

Проблемалық оқытудың тиімділігін бағалау үшін мектептердің бірінде 9-сынып оқушылары арасында зерттеу жүргізілді. Оқушылар екі топқа бөлінді: бақылау тобы ақпаратты есте сақтауға және көбейтуге бағытталған дәстүрлі әдістеме бойынша оқытылды, ал эксперименттік топ жобалық тапсырмаларды, нақты жағдайларды талдауды және зертханалық эксперименттерді қоса алғанда, проблемалық оқытуды пайдаланды.

Эксперименттік топқа арналған тапсырмалардың бірі реактивтер концентрациясының химиялық реакция жылдамдығына әсерін зерттеу болды. Оқушылар эксперимент жоспарын өз бетінше әзірлеп, есептеулер жүргізіп, реакция жағдайларының оның жылдамдығына әсері туралы қорытынды жасауы керек еді [5].

Зерттеу нәтижелері эксперименттік топ студенттерінің сыни тұрғыдан ойлаудың жоғары деңгейін көрсеткенін көрсетті. Олар талдауды қажет ететін тапсырмаларды жақсырақ орындады, стандартты емес тәсілдерді тапты және логикалық негізделген шешімдерді ұсынды. Сонымен қатар, мұндай сабақтар оқу процесіне қатысу деңгейін арттыруға ықпал етті. Оқушылар проблемалық оқытуды қолдану химия сабақтарын қызықты әрі пайдалы еткенін, сонымен қатар теория мен оны практикалық қолдану арасындағы байланысты жақсы түсінуге көмектескенін атап өтті.

Проблемалық оқытудың тиімділігінің негізгі факторларының бірі-бұл оқушыларды сұрақтар қоюға, жауап іздеуге және нәтижелерді сыни тұрғыдан бағалауға ынталандырады [2].

Проблемалық есептерді шешу процесіне тартылған оқушылар өз бетінше ойлау дағдыларын, ақпаратпен жұмыс істеу және негізделген шешімдер қабылдау қабілетін дамытады. Мысалы, реакция өнімдерінің шығуына әртүрлі факторлардың әсерін зерттеу студенттерге олардың білімін өнеркәсіптік химияда, медицинада немесе экологияда қалай қолдануға болатынын түсінуге көмектеседі.

Проблемалық оқытудың тиімділігі оның тұрақты оқу мотивациясын қалыптастыру қабілетімен де байланысты[3]. Нақты немесе имитацияланған тапсырмалармен жұмыс істейтін студенттер өздерінің күш-жігерінің құндылығын көреді, өйткені олар алған білімнің өмірде қалай қолданылатынын түсінеді. Мысалы, суды тазартуға, қалдықтарды қайта өңдеуге немесе жаңартылатын энергия көздерін пайдалануға байланысты тапсырмалар оқушылардың бойында химиялық білімді ғана емес, сонымен бірге экологиялық сананы да қалыптастырады.

Осылайша, химиядағы проблемалық оқыту сыни ойлауды қалыптастырудың тиімді әдісі ғана емес, сонымен қатар оқушылар үшін оқуды қызықты, тәжірибеге бағытталған және мағыналы етудің әмбебап құралы болып табылады.

Қазақстанда проблемалық оқытуды зерттеу

Қазақстанда проблемалық оқыту әдісі көптеген ғалымдардың назарында болды. Бұл әдістің тиімділігін зерттеу арқылы оның білім беру процесіндегі рөлі мен артықшылықтары анықталды.

Ә.М. Мұханбетжанова өз еңбектерінде бастауыш білім беру интеграциясы, оның методологиясы мен теориясын зерттей отырып, проблемалық оқытудың оқушылардың танымдық қабілеттерін дамытудағы маңыздылығын атап өтеді. Оның зерттеулері оқыту әдістерін жаңғыртуға бағытталған.

Т.Б. Байназарова өз еңбектерінде бастауыш сынып оқушыларының эстетикалық тәрбиесін жетілдіру үшін пәнаралық кіріктіру мен проблемалық оқыту әдістерін қолдануды ұсынады. Оның зерттеулері оқушылардың сабаққа деген қызығушылығын арттыруға бағытталған.

Г.К. Есполова зерттеулерінде проблемалық оқытудың оқушылардың зерттеушілік дағдыларын қалыптастырудағы рөлін атап көрсетеді. Ол проблемалық жағдайларды қолдану арқылы білім алушылардың аналитикалық ойлау қабілетін дамытуды ұсынады.

З.Қ. Сапанова проблемалық оқыту әдістерін оқу процесінде тиімді қолданудың жолдарын зерттеген. Оның жұмыстары оқушылардың теориялық білімдерін тәжірибемен ұштастыруға негізделген.

Осы зерттеулер проблемалық оқытудың оқушылардың сыни тұрғыдан ойлау қабілетін, шығармашылық белсенділігін және зерттеушілік дағдыларын дамытудағы маңызды рөлін көрсетеді. Қазақстандық ғалымдардың еңбектері бұл әдісті білім беру процесінде кеңінен қолдануға ықпал етеді.

***Қорытынды**. Проблемалық оқыту химияны оқуда оқушылардың сыни ойлауын дамытуда шешуші рөл атқарады. Бұл әдіс оқушылардың өз бетінше талдау, гипотеза, дәлелдеу және шешім қабылдау дағдыларын қалыптастыруға бірегей мүмкіндіктер береді. Дәстүрлі тәсілдерден айырмашылығы, проблемалық оқыту белсенді танымдық іс-әрекетке назар аударады, пәнге деген қызығушылықты оятады және білім беру процесін мағыналы етеді.*

Жүргізілген зерттеулер химияны оқытуда проблемалық жағдайларды қолдану білімді жақсы меңгеруге, аналитикалық қабілеттерді дамытуға және оқушылардың мотивациясын арттыруға ықпал ететінін көрсетті. Проблемалық-бағдарланған тапсырмалармен жұмыс істейтін оқушылар қатысудың, зейіннің және алған білімдерін іс жүзінде қолдануға дайындықтың жоғары деңгейін көрсетеді.

Проблемалық оқытуды мектеп практикасына енгізу білім беру мақсаттарына қол жеткізуге ғана емес, сонымен қатар оқушыларды нақты өмірлік және кәсіби міндеттерді шешуге дайындауға мүмкіндік береді. Бұл әсіресе сыни тұрғыдан ойлау, ақпаратпен жұмыс істей білу және негізделген шешім қабылдау қабілеті сияқты түлектердің құзыреттілігіне қойылатын заманауи талаптар аясында өте маңызды.

Осылайша, химиядағы проблемалық оқыту оқушылардың сыни ойлау дағдыларын қалыптастырудың тиімді құралы болып табылады, олардың жан-жақты дамуына және қазіргі әлемнің қиындықтарына дайындалуына ықпал етеді. Осы саладағы қосымша зерттеулер оқушылардың әртүрлі дайындық деңгейлеріне бейімделген жаңа әдістемелік тәсілдерді әзірлеуге, сондай-ақ проблемалық оқытудың білім беру және кәсіби жетістіктерге ұзақ мерзімді әсерін зерттеуге бағытталуы мүмкін [7].

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SYNTHESIS OF NITROGENOUS HETEROCYCLES BASED ON ADAMANTYL-CONTAINING AMIDOALKYLATING REAGENTS

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Introduction.

Heterocyclic compounds occupy a significant place among physiologically active substances. A special place among them is occupied by compounds having an adamantyl radical as a substituent. The specific physiological activity of such heterocycles is known from many examples. However, their availability varies quite significantly, which is determined by the method of synthesis. The development of new methods for the synthesis of adamantyl-containing heterocycles is an urgent problem of organic synthesis and, therefore, is the subject of this study.

Condensation of adamantoilizotiocyanate with 2-aminotiazol.

Thiazole derivatives show pharmacological activity: antimicrobial antiviral and antihistamines, diuretics and mitodepressants.

We have found that the interaction of adamantoylisothiocyanates with 2-aminothiazole in anhydrous acetone causes spontaneous condensation of intermediate N-acylthioureas into the corresponding alkyl-5-thioxo-3-thia-4,6,7a-triazaindene (I-V).

The yields of the reaction products ranged from 65 to 78%. Their structure was established by IR, NMR and mass spectrometry.

Example of synthesis of condensed 1,3,5-hexahydrotriazine system using adamantylcontaining iminoalkylating reagent.

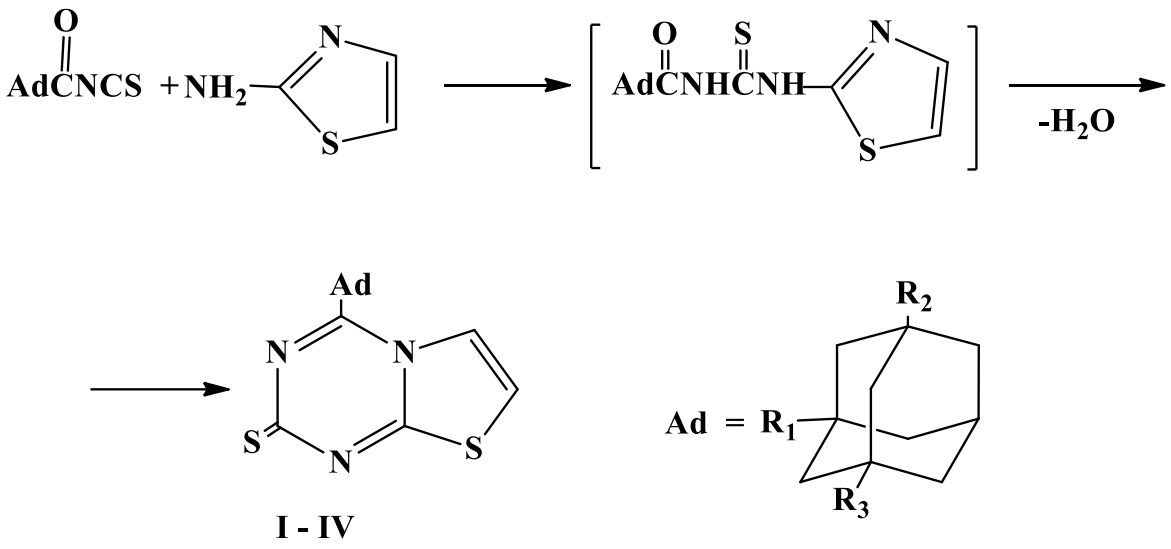
Heterocyclic compounds of various natures serve as the basis for many natural and synthetic biologically active substances, and also have a number of other useful properties. Many of them are used, for example, as organic semiconductors, photoactive materials, antioxidants, additives for fuels and oils, materials for active media of liquid lasers, technical and food dyes, preservatives. Along with great practical significance, heterocyclic compounds are of undoubted theoretical interest as models for studying the relationship between the chemical properties of compounds and their structure, as well as for developing methods of organic synthesis, which is directly related to the structure of the compound. The most important, in this case, are the size of the cycle, the degree of saturation, the nature and number of heteroatoms.

1,3,5-Triazines are usually most readily prepared by reactions of 2,4,6-trichloro-1,3,5-triazine. However, the ring system can also be synthesized by condensation reactions.

The aim of this work is to test the possibility of using an adamantyl-containing imidoalkylating reagent in the condensation reaction.

Reagents from Lancaster were used as starting compounds. The structure of intermediate and final compounds was proved by IR and NMR spectrometry and mass spectroscopy.

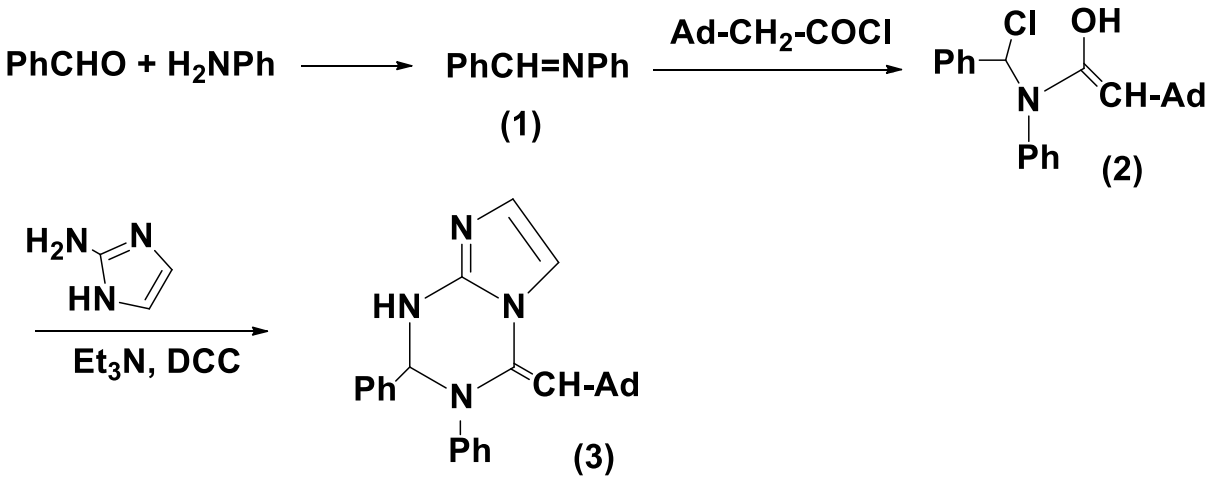
The starting compound for the synthesis of the imidoalkylating reagent (2) was Schiff's base (1), which was obtained from benzaldehyde and aniline by a standard procedure. After isolation, imine (1) was treated with 1-adamantylacetic acid chloranhydride in dichloroethane. Equimolar amounts of 2-amino-imidazole as a condensation component, triethylamine and dicyclohexylcarbodiimide (DCC) were added to product (2) without isolation. The reaction took place at reflux for 2 hours. The yield of the condensation product (3) was 43%.



I - IV

Ad = R_1, R_2, R_3

I: R_1=R_2=R_3=H; II: R_1=R_2=H, R_3=CH_3; III: R_1=H, R_1=R_3=CH_3;
IV: R_1=R_2=R_3=CH_3; V: R_1=R_2=H, R_3=CH_3, p-Ph



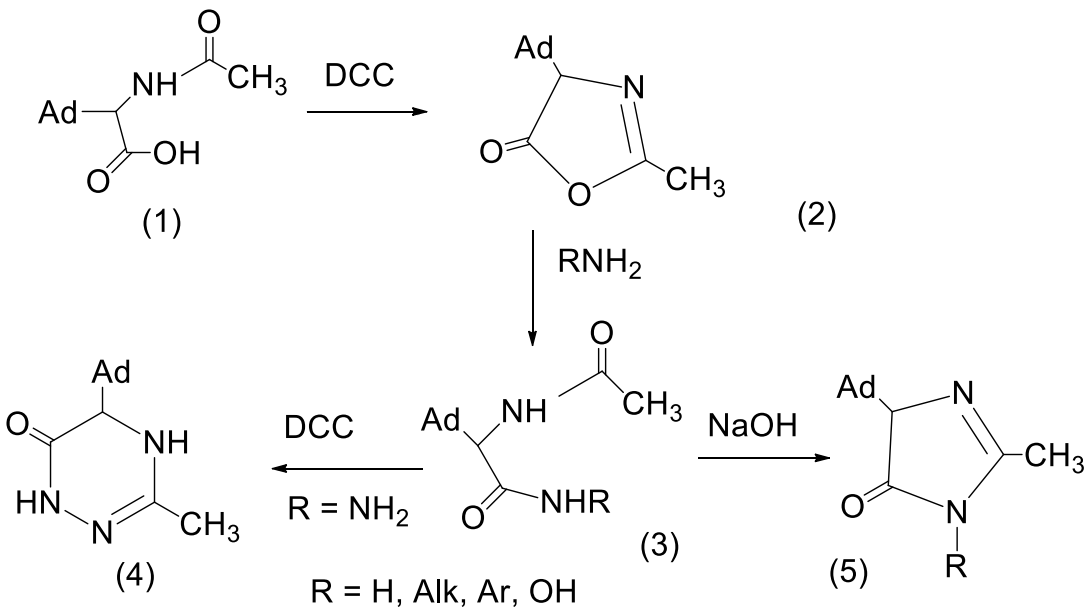
The method developed by us for the synthesis of compound (3) is a separate example of the synthesis of such systems. Wide possibilities for obtaining a family of similar compounds are opened by varying the substituents in the starting imide, adamantyl radical, and amine condensation component.

Cyclization of 1-adamantylglycine derivatives.

The intramolecular cycles discussed in this section necessarily involve a functional substituent in the a-position to the adamantium nucleus and proceed, in most cases, with the participation of the amide group.

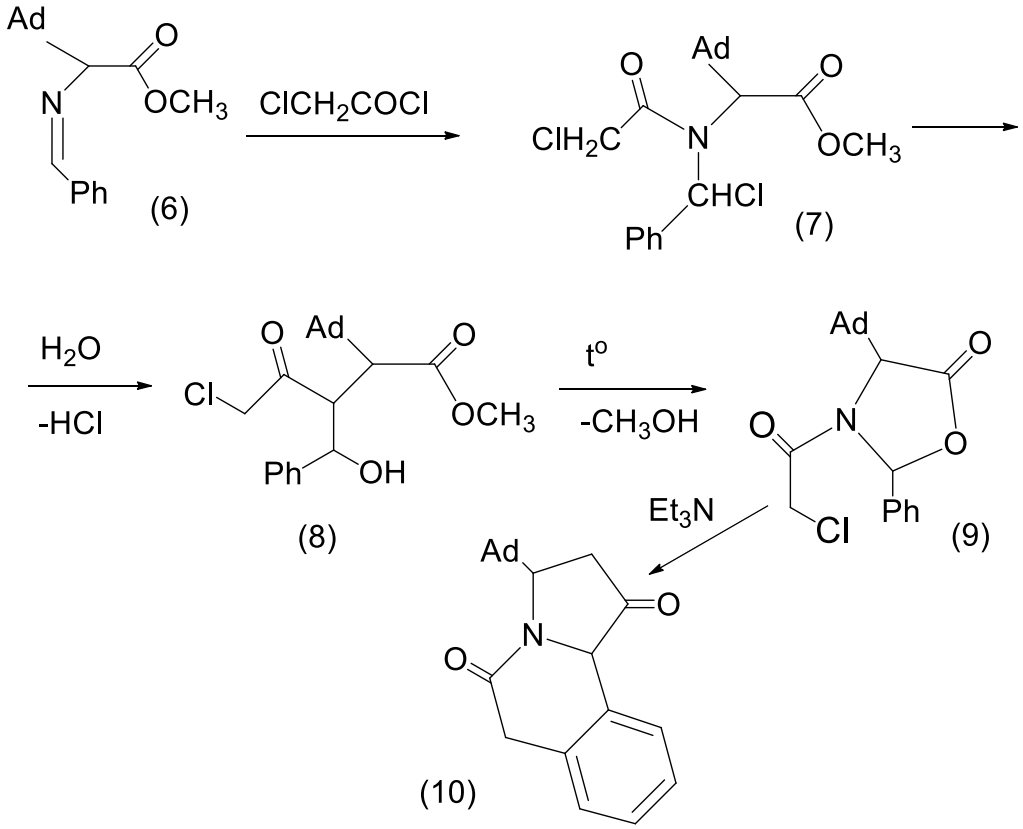
As can be seen from the scheme, treatment of acylated 1-adamantylglycine (1) with dicyclohexylcarbodiimide (DCC) in dry chloroform leads to oxazolone (2). Cleavage of the latter with various nucleophiles: ammonia, primary and secondary amines, hydroxylamine, hydrazine and its organic derivatives gives derivatives of a-acylaminocarboxylic acid (3). Upon dehydration of synthons (3), depending on their structure and condensation conditions, derivatives of 2-imidazolin-5-one (5) and 1,2,4-triazine (4) are obtained. The yields of compounds (2), (4), (5) were 85%, 73%, 77%, respectively.

Identification was carried out by IR, NMR spectroscopy and MS spectrometry.



Another important synthon derived from 1-adamantylglycine is the Schiff base (6). The amidoalkylatin reagent (7) was obtained from it by treatment with monochloroacetic acid chloride in toluene. Without isolation, it was converted to an oxy derivative (8). Oxazolone (9) was obtained by azeotropic distillation of methanol in 84% yield. The addition of triethylamine to a solution of compound (9) in benzene, followed by reflux for 3 hours, resulted in heterocycle closure (10) in 69% yield.

Identification was carried out by IR, NMR spectroscopy and MS spectrometry.



We used the synthesis methods presented in the monograph Drach B.S., Brovarets V.S., Smoliy O.B.//Synthesis of nitrogen-containing heterocyclic compounds based on amidoalkylating agents/ Kyiv.: Naukova Dumka, 1992.- 174 p.

Economic sciences

COMPETITIVE ANALYSIS OF THE GEORGIAN TELECOMMUNICATIONS MARKET BASED ON THE PRACTICAL EXAMPLE OF LEADING COMPANIES "MAGTICOM", "SILKNET" AND " CELLFIE

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Abstract

The purpose of this study is to conduct a competitive analysis of the Georgian telecommunications market at the current stage using the practical example of the leading companies "Magticom", "Silknet" and "Cellfie". The theoretical and methodological basis of the study is the relevant publications, as well as Internet resources, which reflect the analysis and evaluation of the practical experience of the above-mentioned companies.

This paper outlines innovative strategies for digital management. The mission, slogan and goal of the companies are presented. The positive and negative aspects of the Georgian telecommunications market at the current stage are identified; also, as a conclusion, the criteria for its effectiveness are formulated.

Keywords: *Georgia, telecommunications, market, competitive, company.*

"Magticom" is the largest company operating in Georgia. Its owners are American companies: International Telcell Celular LLC and Telcell Wireless LLC. "Magticom's" subsidiary is LTD "Deltacom". It is the first operator in Georgia that not only provides full telecommunications services, but also offers customers services using all technologies available in the world. It is constantly focused on technological innovations, services that meet world standards, and customer satisfaction. On February 12, 2021, the global consulting company "umlaut" recognized "Magticom's" Network as the best in Georgia. "Magticom" has implemented a 5G Network. One of the company's main values is Charity and Corporate Social Responsibility. "We do Georgian work" - with this motto, "Magticom" has implemented hundreds of projects to support Georgian Culture, Art and Education. Its contribution remains unprecedented - as of February 28, 2025, the company has contributed 2,853,355,278 GEL to the Georgian Economy [1].

In April 5, 2023, "Cellfie Mobile" introduced its new brand "Cellfie" in Tbilisi. "Cellfie Mobile" is a Georgian telecom company that creates a new experience in the communications market. Thanks to its developed digital ecosystem, "Cellfie Mobile" is at the forefront of digital transformation, the essence of which is readiness for innovations, including technological innovations. At the center of "Cellfie Mobile" digital world is the subscriber, and the company adapts all modern achievements to the needs of its users.

Thus, "Cellfie Mobile" combines many years of experience in the local telecom industry, significant international practice and a successful history of digital transformation.

The company has adapted and implemented the best standards of the Global Telecom Industry, including in the areas of Ethics and Compliance, user data protection and efficiency and transparency of business processes. Today, "Cellfie Mobile" serves more than 1.3 million customers in Georgia.

As noted in the current report, the main idea of " Cellfie" is to be by the subscriber's side at all stages of his life and in any situation. The Georgian brand's constant pursuit of innovation leads to the provision of new opportunities for the successful implementation of professional and personal goals.

Therefore, the goal of "Cellfie Mobile" is to give its subscribers the opportunity and motivation to get even more out of technological advances, while making it easy, enjoyable and time-saving for them. With "Cellfie Mobile", the subscriber can have a life full of diverse interests, as well as the inspiration to start something new and fully express themselves. "Cellfie Mobile" offers everything the subscriber needs in one place: communication, information exchange, learning and Talents development, travel, entertainment or work opportunities. With "Cellfie Mobile", the subscriber uses his smartphone 360 degrees.

"Cellfie" traditionally supports the local competition of the global hackathon, Nasa Space Apps Challenge 2025. "Cellfie" has been supporting the hackathon for the sixth year and helps the winners present their ideas at the international level.

The hackathon is held annually in up to 300 different cities around the world and brings together thousands of participants globally. The main theme of the 2024 hackathon was "The Sun Touches Everything". For two days, the participants worked intensively and found an innovative solution to the acute problem around the issue, based on NASA data. At the next stage, the winners of the local hackathon presented their works at the Global level and participated in the main hackathon of the Nasa Space Apps Challenge.

In addition to working as a team on their own projects, the participants had the opportunity to attend seminars led by leading specialists in the country during the hackathon [2].

Management of "Silknet" believes that everything is connected. For them, as a leading telecommunications provider, whose services are used by more than 2 million people, this philosophy is more than a slogan.

"Silknet" is an integral part of Georgia's digital ecosystem and strives to create the future of a technologically strong country. "Silknet"`s Management understands well how the latest technologies simplify everyday life and increase business success. For years, they have been at the forefront of innovations. It is precisely through innovations that they have set new standards in the telecommunications industry.

The company's history actually begins in 2009 and has gone through many important stages since then.

"Silknet" was the first provider to bring fiber-optic Internet directly to apartments. "Silknet's" home Internet currently covers 320,000 households.

In 2012, they were the first to introduce IP television with a rewind function. Interactive television was a real revolution in the Georgian telecommunications market. Silk TV has become an indispensable choice for families. Today, 253,660 families use this service.

In 2017, "Silknet" issued bonds on the local stock exchange. This was another statement of sustainable development and reliability from the company's management.

In 2018, "Silknet", with the acquisition of "Geocell", became a full-fledged convergent operator and offered its customers a full range of telecommunications services with the Silk+ product.

In 2019, it became the first Georgian private company to issue Eurobonds. "Silknet" Eurobonds are now traded on the Euronext Dublin stock exchange and represent the most attractive investment among Georgian Eurobonds.

After the acquisition of "Geocell", "Silknet" was able to do even more by making infrastructure investments. In 2020, it created the fastest Gigabit 4.9 LTE mobile Internet, the speed of which was 7 times higher than the fastest 4.5G previously available in the country. Its mobile Network now connects 1,800,000 people.

In 2023, Georgia was the first to introduce fifth-generation technology and offer 5G internet to the population of Tbilisi.

The Company's Management continues to innovate and grow, while remaining true to its core philosophy: "Everything is connected." "Silknet" ensures that this connection is uninterrupted, reliable and of high quality.

2021
Began Cooperation with SAS;
2020
Issued a depositary receipt related to Eurobonds;
2019
Acquired the franchise of Euronews Georgia and established Silk Media LLC;
Partially converted shareholder loans into equity;
Issued Eurobonds and refinanced all bank loans;
2018
Acquired "Geocell" mobile and Global TV Group;
2017
Issued and published a public bond in GEL;
2016
Acquired and merged the remaining 15% stake of GMN;
2015

Merged with Vtel Georgia (fixed wireless broadband);

Signed an agreement with Servicenet for technical support of the cable Network, connection of new subscribers and Network expansion;

2014

Acquired "WiMax Georgia" (fixed wireless broadband);

Acquired a 51% stake in Karva (IPTV software, operational and technical support);

2013

Acquired an 85% stake in GMN (pay TV channels);

2012

Founded "NG Georgia" (National Geographic Magazine);

2011

Acquired "Novus" (television broadcasting rights);

Offered IPTV service to customers;

2010

Started offering FTTH service;

2009

"Silknet" was founded by JSC "United Telecom", LTD "Adjara Telecom" and LTD "Vanex".

*The company's **Mission** is:*

To make access to innovative technologies a part of everyday life.

*The company's **Vision** is:*

With high-tech products, we contribute to the success of people and businesses.

*The company's **Policies** are: Supplier Anti-Corruption Policy; Security Policy and Supplier Code of Conduct [3].*

Conclusion:

According to the results of the comprehensive study of the mobile services market conducted by the Communications Commission, the methodology, the circumstances investigated and the conclusions made by the experts, the Georgian mobile communications market is uncompetitive, requires prior regulation and "Magticom" is an operator with significant power [4].

With the obligations assumed under the Association Agreement, Georgian legislation needs to be fully aligned with the European one, for which it is necessary to conduct a market analysis and assess the markets that are subject to mandatory study for regulatory purposes in order to improve the effectiveness of competition in the telecom market and access to wholesale Network elements. To achieve this goal, it is important that within the framework of the European Electronic Communications Law, there is a European Commission Recommendation on Regulated Markets and methodological rules for defining relevant markets, which should be guided by European regulatory authorities in conducting market analysis and defining the relevant regulatory framework. These recommendations are essential for Georgia to achieve its goal of dynamic approximation to the EU regulatory framework. A comprehensive study conducted by the Communications Commission has ensured the implementation of the above-mentioned goal [5].

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ALBANIA'S MACRO-POLICIES OVER THE YEARS FOR ECONOMIC GROWTH

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Abstract

Many developed countries and mainly large world economies are progressing by implementing the advantage that the country grants. In this wave of change, Albania can not be a spectator. Financial services and a significant portion of public services are on the path of change to an ever-increasing extent. Of course, the difficulties and challenges of such a process are inevitable but at the same time the benefits from it are significant and vital for a developing country like Albania, which seeks to make up as much as possible the difference in development with developing countries. The European Community to wich it aspires to integrate. In this material will be focused exactly the presentation of this new revolutionary form of development that the world is taking, as well as the acquaintance with the Albanian reality and the challenges it is expected to face.

Keywords: *Economic growth, GDP, globalization, development*

The world economy has experienced a high growth rate in recent decades, preceded by an even higher growth rate in world trade. Together with technological developments, the reduction of trade barriers and liberalization trends, also caused by the developments of globalization and integration, have had a strong impact on the high pace of world trade. Over the past 20 years, the average annual growth rate of world trade has been 6%, i.e. twice as high as the growth rate of world production. Developing countries have also experienced high rates of growth in international trade. Their volume of world trade has reached 1/3, starting from the early 70s. Processed products as exports from these countries have increased significantly, taking 80% of the volume.

Where does Albania stand in this general development backdrop?

Albania is intensively involved in regional and European integration processes. In the context of fulfilling its commitments as a member of the WTO and Free Trade Agreements with countries in the region, foreign trade is moving rapidly towards liberalization. However, foreign trade indicators are not really encouraging. Over the last ten years, while the annual GDP growth rate has averaged 6.8%, the volume of trade has increased by about 13%. The situation regarding exports is even more discouraging. The export/import ratio has an average of 25.5%, causing a strong trade deficit.

Exports also suffer from the dominance of actively processed products, which offer a relatively low added value (mainly clothing and footwear) as well as a low degree of diversity, with respect to the class of exported products and target countries. The Free Trade Agreement with the EU, which is actually undergoing a negotiation process, seems to bring new challenges regarding not only foreign trade, but the Albanian economy in general. EU countries are Albania's main trading partners and liberalization with these countries is expected to be accompanied by increased competition on their side. To what extent and how will the Albanian economy be able to withstand this competition? What are the possible ways to stop the further deterioration of foreign trade indicators and even improve them? A number of factors and political actions can be mentioned, but I think that all of them can be summarized in a single notion: increasing the competitiveness of the Albanian economy.

Why is economic growth important in poor and developing countries?

Economic indicators portray the "big picture" of a country or region in terms of its economy. A single indicator or a small group of indicators attempt to give you an idea of the overall economic health of a particular geography. It can help investors assess whether financial markets are in line with economic fundamentals or if there is a mismatch. This indicates either an improvement in financial markets ahead of fundamentals or markets lagging behind. This information can be useful to investors when they are making investment and asset allocation decisions.

Economic growth can be considered among the most important indicators released. The reason it is so important is that it shows the increase in economic output, whether measured by GDP (gross domestic product), GVA (gross value added), or some other measure.

The stage of development of an economy is crucial for comparing two economies. Developed economies have a much slower growth rate (YoY) compared to emerging or developing economies. Economic growth can be considered among the most important indicators released. The reason why it is so important is that it shows the growth of economic output, whether measured by GDP (gross domestic product), GVA (gross value added), or some other measure.

The stage of development of an economy is crucial for comparing two economies. Developed economies have a much slower growth rate (YoY) compared to emerging or developing economies. As a result, comparing Albania's economic growth rates with any other country will not be accurate.

But, how has the economy performed in Albania and what has influenced its development?

The Albanian economy has had a level of growth and decline, in the same direction as the country's political models and profiles. According to the annual reports of the Bank of Albania, for the years 1980 to 1990, the average economic growth has been at the level of 0.9%. The year with the greatest economic decline is 1990 at the level of -10%. The year with the greatest economic growth is 1989 at the level of 9.8%.

For the years 1991 to 2000, the average economic growth has been at the level of 1.3%. The year with the greatest economic decline is 1991 at the level of -28%. The year with the greatest economic growth is 1999 at the level of 13.5%.

For the years 2001 to 2011, the average economic growth has been at the level of 5.3%. The year with the greatest slowdown in economic growth is 2011 at 3.1%. The year with the greatest economic growth is 2001 at 7.9%.

Economic development for the last three decades of the Albanian economy has an average growth rate of 2.5%.

-But, has the economy needed a higher level of growth than that?

Based on data from the last thirty years (1/3 of the lifespan of the Albanian state) the economy in this paper will be presented in reference to significant economic and political factors that influence economic development. These factors are not biased, due to the political system, as they do not change, except that they may have a decrease in their influential force. But, on the other hand, they should not be confused with factors that hinder economic development.

The policy of investment in education and professional training of human capital and the modernization of labor market institutions should be pursued, having clear and measurable objectives, financial incentives for the expansion of small and medium-sized firms and the transition of businesses from the informal to the formal economy. Labor market policies are also of great importance for reducing unemployment. According to the Employment Agency of the Republic of Albania, active labor market policies that have been most successful in the labor market in the Republic of Albania are the impact of inflation and economic growth on unemployment. In the case of the Republic of Albania, the Self-Employment Program and the Employment Subsidy Program, which should be increased and their efficiency should also be increased. Compared to the countries of the region, the Republic of Albania has a low percentage of spending on active labor market policies in GDP, but has a high percentage of spending on passive labor market policies, compared to other countries in the region. Regarding this structure of labor market policy expenditures, Albania should increase spending on active labor market policies, while reducing spending on passive labor market policies. Although these results are for a time period of 16 years and other variables not included in the model may be included, this was in fact the object of this study, which represents a modest theoretical and empirical contribution to further research in this field, with the aim of including a larger number of variables in the model and a longer research period.

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Jurisprudence

ARTIFICIAL INTELLIGENCE AND LAW

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Abstract

Artificial intelligence technologies are currently developing intensively, including due to the development of sustainable neural network technologies and cloud computing infrastructures, fuzzy systems technologies, entropy control, swarm intelligence, evolutionary computing, etc. At the same time, the global problem today is the almost complete absence of legal regulation and technical regulation of the foundations, conditions and features of the development, launch, operation and activity, integration into other systems and control of the use of artificial intelligence technologies. This article is devoted to the study of the specifics of legal regulation of the use and development of artificial intelligence. Some approaches to the definition of artificial intelligence and the features of legislative support for the relevant area, existing in the scientific literature, are considered, the author's concept of artificial intelligence is developed and presented through the disclosure of its main features. In particular, according to the proposed definition, artificial intelligence is an artificial complex cybernetic computer-software-hardware system that has the properties of substantiveness, autonomy, as well as the ability to perceive and analyze data, self-learn. The article considers the issue of positioning an artificial intelligence system as a special form of personality (for example, the so-called "electronic person"), that is, endowing it with a certain legal personality, depending on various factors and the scope of such a system's operation. The article also notes the main possible approaches to the legal support of the use and development of artificial intelligence systems, in particular, these include preemptive universal-total legal regulation and legal regulation aimed at regulating specific artificial intelligence systems being created. The main risks and uncertainties associated with artificial intelligence and having significant significance for the adoption of legislation in this area are studied. Conclusions are formulated regarding how it is necessary to form legislative support for the use and development of artificial intelligence: consistently, taking into account the specifics of specific areas of its application, as well as ensuring a balance of interests of individuals, society and the state regarding the proper provision of security and protection of individual rights and interests associated with the development of innovations for the benefit of the whole society.

Keywords: *artificial intelligence, technologies, legal support, robot, law*

Artificial intelligence has succeeded in many areas of production, commercial operations and various spheres of human activity. Robots and computers are gradually replacing humans in enterprises, agriculture and other areas where work is associated with a large amount of information. Such areas as banking, accounting, law, government services, military affairs, advertising and insurance are also affected by artificial intelligence. If we talk about the most important areas, we can highlight law enforcement activities, which are responsible for maintaining public order and security, both for citizens and the state as a whole.

"Artificial intelligence is a new phenomenon that has not been sufficiently studied in a number of respects. Artificial intelligence differs from conventional computer algorithms in that it is able to teach itself based on accumulated experience. This unique function allows artificial intelligence to act differently in similar situations, depending on previously performed actions. Therefore, in most cases, the effectiveness and potential of artificial intelligence are rather unclear".

There is no established, generally accepted definition of the concept of "artificial intelligence" today. According to our author's definition, artificial intelligence is an artificial complex cybernetic computer-hardware-software system (electronic, including virtual, electromechanical, bio-electronic-mechanical or hybrid) with a cognitive-functional architecture and its own or relevantly accessible (given) computing power of the required capacity and speed, possessing:

– the properties of substantivity (including a certain subjectivity, including as an intelligent agent) and autonomy in general, as well as elaborative (having a tendency to improve) operationality,

– high-level capabilities to perceive (recognize, analyze and evaluate) and model surrounding images and symbols, relationships, processes and environment (situation), self-referentially make and implement their decisions, analyze and understand their own behavior and experience, independently model and correct for themselves algorithms of actions , reproduce (emulate) cognitive functions, including those related to learning, interaction with the outside world and independent problem solving,

– the ability to self-referentially adapt one's own behavior, autonomously deeply self-learn (to solve problems of a certain class or more broadly), to homologate oneself and one's subsystems, including developing homologated "languages" (protocols and methods) of communication within oneself and with other artificial intelligences, substantially perform certain anthropomorphic-emulating (conventionally attributed to the prerogative of a person (a rational being)) cognitive (including cognitive-analytical and creative, as well as those related to self-awareness) functions, to take into account, accumulate and reproduce (emulate) experience (including human experience).[1, p.93]

Artificial intelligence has succeeded in many areas of production, commercial operations and various spheres of human activity. Robots and computers are gradually replacing humans in enterprises, agriculture and other areas where work is associated with a large amount of information. Such areas as banking, accounting, law, government services, military affairs, advertising and insurance are also affected by artificial intelligence. If we talk about the most important areas, we can highlight law enforcement, which is responsible for maintaining public order and security, both for citizens and the state as a whole.

Risks of Artificial Intelligence

There are a number of specific risks that this technology carries. Let's look at the main ones.

Bias

Artificial intelligence is widely used in facial and voice recognition systems, mainly for access control, as well as in various scoring systems in the banking and insurance sectors, in law enforcement tools, etc. Some of these systems have a significant impact on business and people, but they are also subject to bias and errors that can arise due to the human factor. In addition, the data used to train these AI systems can be distorted. In recent years, there have been numerous news stories about how facial recognition algorithms developed by Microsoft, IBM Face++, and other companies have demonstrated "biases" in determining the gender of people. They were more accurate in gender attribution for white men.

Another example of AI bias has prompted Amazon to stop using AI for hiring. The algorithm favored male candidates because it was trained on data obtained from men. Bias problems can arise for various reasons, but the most basic is an unbalanced selection of data for training neural networks. The phenomenon even has a name: algorithmic unfairness. And so far, no one has come up with a way to guarantee that the next algorithm will make only fair judgments.

Poor service delivery

Almost a philosophical question: who is to blame for an accident involving autonomous cars - the owner of the car or the company that developed it? The owner, the company, or the pedestrian who violated traffic rules? Autonomous cars are the most obvious concern about AI when it comes to the quality of service delivery. But they are not the only one. Who is responsible for erroneous medical advice generated by a poorly trained neural network if it results in human health being harmed? Nowadays, AI creators often "wash their hands of it", referring to the essence of generative neural networks. It is assumed that they generate content: text, image or video, which would be as close as possible in context to the user's request. The answer of such networks will be plausible, but it will be correct only to the extent that the information on which the AI was trained was actually correct. The size of data sets for training neural networks is huge, and there are no generally accepted standards for filling such databases yet.

Privacy and security of corporate confidential information

Every time a user writes a prompt to solve some practical task, they tell the artificial intelligence details either about their private life or about the company for which they do this work with the help of AI. The lack of information about what the owners of the AI service do with this data - whether they delete it, save it, analyze it, use it in additional training of the neural network model - worries defenders of digital rights of people and information security services of corporations. There is also no solution to this problem yet, except for obvious digital hygiene: many companies this year issued an ultimatum for their employees to tell ChatGPT and similar technologies any corporate information.[2,p. 200]

Copyright

The recent strike of Hollywood screenwriters became a vivid illustration of this threat. The screenwriters did not agree with the fact that film companies used generative neural networks to create scripts for films. The scriptwriters' claims can hardly be called unfair: after all, scripts written by real professionals were used to train neural networks. And this was not always done with the permission of the authors. As a result of the strike, the scriptwriters achieved restrictions on the use of AI in the creative process: for example, artificial intelligence cannot create or rewrite literary materials, and any materials created by AI will not be considered source material. At the same time, scriptwriters can use AI to write texts. However, in addition to scriptwriters, there are many copyright holders in the visual arts, music, literature and other creative fields where AI can take away the bread and butter of content creators. In other words, the reasons for concern regarding AI do not just exist in theory - they have already been confirmed by real events. That is why governments of different countries have begun to regulate this area by law.

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Medical sciences

USE OF GINKGO BILOBA EXTRACT IN THE CORRECTION OF AUTONOMIC DYSFUNCTION IN PATIENTS WITH ARTERIAL HYPERTENSION

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ВИКОРИСТАННЯ ЕКСТРАКТУ GINKGO BILOBA У КОРЕКЦІЇ ВЕГЕТАТИВНОЇ ДИСФУНКЦІЇ ХВОРИХ НА АРТЕРІАЛЬНУ ГІПЕРТЕНЗІЮ

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Abstract

The aim of the study was to optimize the treatment of patients with arterial hypertension (AH) and autonomic dysregulation by incorporating Ginkgo Biloba extract into the comprehensive antihypertensive therapy.

The results were obtained from a study of 38 patients with stage II, grade 2 arterial hypertension, aged 40 to 59 years. The patients were randomized into two groups. The main group consisted of 18 patients, who, in addition to basic antihypertensive medications, received a preparation based on Ginkgo Biloba extract, Bilobil-Intens (KRKA, Slovenia), at a dose of 120 mg per day for 3 months. The comparison group (20 patients) received traditional antihypertensive therapy, including angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, calcium antagonists, and thiazide-like diuretics.

The severity of autonomic disturbances was assessed using the A. M. Veyn questionnaire (2000), with quantitative scoring. To evaluate the autonomic regulation of the heart, heart rate variability (HRV) indicators were determined. A variation pulseogram was used to assess indicators that provide a qualitative evaluation of autonomic tone (mode, variation range, mode amplitude). Additionally, secondary indicators such as the autonomic balance index, autonomic rhythm index, and regulatory system tension index were calculated.

In all patients with AH at the beginning of treatment, certain dysfunctions of cerebral and subcortical structures were observed, associated with signs of autonomic dysfunction, particularly sympathetic hypertonia, according to the Veyn questionnaire. After treatment with the addition of Bilobil-Intens, there was a more pronounced normalization of autonomic regulation, as evidenced by a decrease in qualitative symptoms of autonomic dysfunction (such as the frequency of vasovagal episodes and syncope).

Analysis of variation pulseometry results indicated that, after taking Bilobil-Intens as part of comprehensive treatment, the sympathetic nervous system tone decreased, as shown by significant changes in indicators such as mode, variation range, mode amplitude, autonomic balance index, and autonomic rhythm index. The level of centralization of circulatory control decreased in both groups, with a statistically significant difference after treatment in the main group, as indicated by changes in the regulatory system tension index.

Conclusion. Patients with arterial hypertension associated with autonomic dysfunction syndrome require the inclusion of effective autonomic regulators, such as Ginkgo Biloba-based phytotherapeutic agents, in the standard therapy regimen. This will contribute to achieving targeted blood pressure levels more quickly and clinically stabilizing the condition.

Анотація

Метою дослідження була оптимізація лікування хворих на артеріальну гіпертензію з розладами вегетативної регуляції шляхом включення в комплексну гіпотензивну терапію екстракту Ginkgo Biloba.

Результати роботи отримані при дослідженні 38 хворих на артеріальну гіпертензію (АГ) II стадії, 2 ступеня, віком від 40 до 59 років. Пацієнти були рандомізовані у дві групи. В основній групі хворі (18 пацієнтів) додатково до базисних засобів призначали препарат на основі екстракту Ginkgo Biloba Білобіл-інтенс (KRKA, Словенія) в дозі 120 мг на добу впродовж 3 місяців. Пацієнти групи порівняння (20 осіб) отримували традиційну гіпотензивну терапію, що включала інгібітори ангіотензин-перетворюючого ферменту або блокатори ангіотензинових рецепторів, антагоністи кальцію, тіозидоподібні діуретики. Вираженість вегетативних порушень оцінювали за допомогою опитувальника А. М. Вейна (2000) із кількісним визначенням їх у балах. Для кількісної оцінки вегетативної регуляції серця визначали показники варіабельності ритму серця (ВРС). За даними варіаційної пульсограми визначали показники, що дозволяють дати якісну оцінку вегетативного тонусу (мода, варіаційний розмах, амплітуда моди). Крім того, обчислювали ряд вторинних показників (індекс вегетативної рівноваги, вегетативний показник ритму, індекс напруженості регуляторних систем).

У всіх хворих на АГ на початку лікування спостерігалися певні порушення функції церебральних і підкоркових структур, що асоціювалися з ознаками вегетативної дисфункції, а саме, симпатикотонії, згідно з даним опитувальника по Вейну. Після лікування з додатковим використанням препарату Білобіл-інтенс у хворих спостерігалася більше виражена нормалізація вегетативної регуляції, на що вказувало зменшення якісних симптомів вегетативної дисфункції (зокрема частоти вегетосудинних кризів та замлінь).

Аналіз результатів варіаційної пульсометрії свідчив, що після прийому Білобілу-інтенс в комплексному лікуванні хворих знижувався тонус симпатичної нервової системи, про що свідчать достовірні зміни таких показників як мода, варіаційний розмах, амплітуда моди, індекс вегетативної рівноваги та вегетативний показник ритму. Рівень централізації управління кровообігом зменшувався в обох групах із достовірною різницею після лікування в основній групі, на що вказують зміни індексу напруженості регуляторних систем.

Висновок.

Хворі на артеріальну гіпертензію, асоційовану з синдромом вегетативної дисфункції, потребують включення до стандартної схеми терапії ефективних вегетокоректорів, одними із яких є фітозасоби на основі екстракту Ginkgo Biloba, що сприятиме більш швидкому досягненню цільових рівнів артеріального тиску та клінічній стабілізації захворювання.

Keywords: *arterial hypertension, autonomic imbalance, Ginkgo Biloba extract.*

Ключові слова: *артеріальна гіпертензія, вегетативний дисбаланс, екстракт Ginkgo Biloba.*

Вступ. *Препарати з гінкго дволопатевого (Ginkgo Biloba) (ГБ) використовуються в медицині з давніх часів. Ginkgo Biloba – рослина, яка походить з Китаю і нині культивується переважно в ботанічних садах, парках та дендрозаповідниках. До цих пір його вважають символом довголіття у Китаї, Кореї, Японії. ГБ належить до реліктових рослин, вважається пам'яткою природи світового значення і занесене до Червоної книги як вид, що перебуває під загрозою вимирання. Сучасна клінічна та експериментальна медицина проводять масштабні наукові дослідження з вивчення лікувальних властивостей цієї рослини. Значний інтерес науковців до ГБ зумовлений особливим хімічним складом листя цієї рослини. Зокрема, в листі виявлено більше 40 діючих речовин: кверцетин (24%), гінкгетин, гінкголіди А, В, С, J (4%), білобаліди, тритерпенові сполуки (6%), кемпферол, лінолеву, хінну, гідрогінкголову кислоти, лактони, катехіни, пентозан. У насінні є масляна, валеріанова, пропіонова, гінкголова кислоти, аргінін, аспарагін, каротин, білобіл, гінкгетин, гінол. Зазначені речовини зумовлюють відповідні фармакологічні властивості екстрактів цієї рослини. Флавоноїди, глікозиди та тритерпенові сполуки спричиняють антиоксидантні ефекти шляхом руйнування вільних радикалів, зниження постішемічного накопичення вільних жирних кислот [4, 6]. Флавоноїди екстракту ГБ (ЕГБ) виявляють також протизапальні, спазмолітичні, капілярозміцнювальні, мембраностабілізуючі, антиканцерогенні властивості [2, 8, 9]. Результати досліджень свідчать про вазотропний*

ефект ЕГБ. Вазопротекторні властивості флавоноїдів ЕГБ зумовлені дилятацією артеріол та звуженням вен, завдяки чому регулюється наповнення венозного русла . В ЕГБ знайдено ряд гінкголідів, які впливають на процеси тромбоутворення. Встановлено, що ЕГБ суттєво знижує колаген-індуковану агрегацію тромбоцитів, екскрецію тромбоксану та сприяє синтезу простациклінів у судинній стінці, завдяки чому досягається покращення реологічних властивостей крові [1, 6]. Виявлено протинабрякову дію ЕГБ в клітинах мозку внаслідок ішемії [5]. У клінічних та експериментальних дослідженнях встановлено, що ЕГБ покращує метаболічні процеси в мозку та підвищує стійкість клітин до гіпоксії, в основному, за рахунок гінкголідів А і В, білобаліду та гінкгетину [3, 7]. З огляду на те, що ЕГБ виявляє різнопланові судинно-регуляторні, метаболічні ефекти, сприятливо впливає на реологічні властивості крові, доцільним вбачається застосування його препаратів у кардіологічній практиці, зокрема, при лікуванні різних проявів ішемічної хвороби серця, артеріальної гіпертензії (АГ).

АГ залишається сьогодні найбільш поширеним хронічним захворюванням, що суттєво зменшує адаптаційні можливості організму, знижує якість життя пацієнтів і підвищує смертність [1]. За даним літератури, АГ у значної частини хворих детермінована з вегетативною дисфункцією, що не завжди враховується при лікуванні і негативно позначається на результатах терапії і медичної реабілітації пацієнтів із поєднаною патологією.

З огляду на вищенаведене, метою нашого дослідження була оптимізація медичної реабілітації хворих на АГ з розладами вегетативної регуляції за допомогою комплексної гіпотензивної терапії з використанням препарату на основі ЕГБ.

Матеріали та методи дослідження.

Обстежено 38 хворих на АГ II стадії ступеня 2. Серед них було 16 чоловіків (42,1 %) і 22 жінки (57,9 %) віком від 40 до 59 років. Згідно з дизайном дослідження, всі хворі на скринінговому етапі отримували стандартну гіпотензивну терапію, що включала інгібітори ангіотензин-перетворюючого ферменту або блокатори ангіотензинових рецепторів, антагоністи кальцію, тіозидоподібні діуретики, дози яких впродовж дослідження не мінялися. Хворі, що потребували прийому бета-адреноблокаторів, глікозидів, івабрадіну з дослідження виключалися.

Пацієнти були розділені на 2 групи. Основну групу склали 18 хворих на АГ, яким на фоні стандартного гіпотензивного лікування призначали рослинний засіб на основі ЕГБ «Білобіл інтенс» (KRKA, Словенія) в дозі 120 мг 1 раз на добу впродовж 3 місяців. Групу порівняння склали 20 хворих на АГ, які приймали лише базисну гіпотензивну терапію.

Вегетативні порушення діагностували за допомогою опитувальника А. М. Вейна (2000). При цьому враховували вираженість вегетативних порушень (у балах) та їх частоту. Кількісну оцінку вегетативної регуляції серця проводили за визначенням варіабельності ритму серця (ВРС). За даними варіаційної пульсограми визначали показники вегетативного тонусу (мода, варіаційний розмах, амплітуда моди). Крім того, обчислювали ряд вторинних показників (індекс вегетативної рівноваги, вегетативний показник ритму, індекс напруженості регуляторних систем).

Результати дослідження та їх обговорення.

Аналіз клінічних симптомів вегетативної дисфункції свідчив про те, що для більшості пацієнтів була характерна симпатикотонія. Так, білий стійкий дермографізм було відзначено в 16 (88,8%) хворих основної групи та в 19 (95%) хворих групи порівняння, підвищена нервово-м'язова збудливість — у 15 (83,3%) хворих основної групи та у 17 (85%) групи порівняння, симпатоадреналові кризи — у 14 (77,8%) пацієнтів основної груп та у 14 (70%) групи порівняння. Середні значення частоти серцевих скорочень у всіх обстежених осіб (86±3,9 та 80±2,6) свідчили про схильність до тахікардії, що також є ознакою симпатикотонії.

Додаткове призначення фітопрепарату на основі ЕГБ до базисної антигіпертензивної терапії впродовж 3 місяців призвело до значного зменшення якісних симптомів вегетативної дисфункції. Білий стійкий дермографізм зберігався у 7 (38,8%) осіб основної групи та 10 (50%) пацієнтів групи порівняння, підвищена нервово-м'язева збудливість — у 8 (44,4%) пацієнтів основної та відповідно у 13 (65%) осіб групи порівняння, симпатоадреналові кризи —у 4 (22%) та 9 (45%) хворих досліджуваних груп. Це особливо відобразилось на частоті вегетосудинних кризів та зомлінь, що виникають переважно при дисфункції надсегментарних вегетативних центрів та значно погіршують якість життя пацієнтів.

Динаміка показників варіаційної пульсограми в динаміці лікування відображена в таблиці.

Таблиця

Динаміка показників варіаційної пульсограми в динаміці лікування

Показники	Основна група		Група порівняння	
	До лікування	Після лікування	До лікування	Після лікування
Мода	0,73±0,01	0,92±0,03 P<0,05	0,74±0,01	0,77±0,01
Варіаційний розмах	0,17±0,01	0,22±0,01 P<0,05	0,19±0,01	0,21±0,01
Амплітуда моди	60,9±1,98	49,74±2,08 P<0,01	60,0±1,4	59,2±1,3
Індекс вегетативної рівноваги	415±26,9	233±27,8 P<0,01	387±26,7	357±26,6
Вегетативний показник ритму	9,33±0,52	5,2±0,62 P<0,05	8,75±0,59	7,93±0,61
Індекс напруженості регуляторних систем	298±21,9	129±24,8 P<0,05	271±20,1	240±19,6

Примітка: р –достовірність змін показників у динаміці лікування

У динаміці лікування хворих основної групи виявлено зниження тонусу симпатичної нервової системи, про що свідчать достовірні зміни таких показників як мода, варіаційний розмах, амплітуда моди, індекс вегетативної рівноваги та вегетативний показник ритму. Рівень централізації управління кровообігом зменшувався в обох групах із достовірною різницею після лікування в основній групі, на що вказують зміни індексу напруженості регуляторних систем.

Отже, результати дослідження свідчать про те, що хворі на АГ, асоційовану з синдромом вегетативної дисфункції, потребують включення до стандартної схеми терапії ефективних вегетокоректорів, одними із яких є фітозасоби на основі ЕГБ, що сприятиме більш швидкому досягненню цільових рівнів артеріального тиску та клінічній стабілізації захворювання.

Висновки

1. Частота синдрому вегетативної дисфункції у хворих на артеріальну гіпертензію становить 60–70 %, що значно ускладнює перебіг захворювання та погіршує якість життя пацієнтів.

2. Хворим на артеріальну гіпертензіюз ознаками симпатикотонії доцільно призначати фітозасоби на основі екстракту Ginkgo Biloba в дозі 120 мг впродовж 3 місяців, адже вони істотно зменшують прояви вегетатвних порушень із тенденцією до відновлення вегетативного гомеостазу.

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Pedagogical sciences

EFFECTIVENESS OF DIGITAL STORYTELLING IN TEACHING ENGLISH IN THE WORLD AND IN KAZAKHSTAN

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Abstract

The article presents an overview of the theoretical foundations and practical applications of innovative and effective educational approach digital storytelling (DS) and informs of its origins, how it can be used to support teaching and how students who learn to make their own digital stories improve multiple literacy skills. The account dwells into principles, tools and benefits of DS as well as the faced challenges. The analysis of the survey conducted among students of various degrees and specialties in Astana city introduces us to the experiences and problems and considerations, thoughts and attitudes of students toward the matter of DS. While admitting the benefits of improving students' linguistic skills alongside their enhanced motivation, creativity and digital knowledge when implementing DS, the study also underlines challenges such as technical issues, time-consumption of the process, unclear educational instructions and lack of students' organizational skills. That is why further explorations and improvements in the study of digital storytelling are necessary, especially in the context of Kazakhstani educational environment; and our findings provide valuable insights for the researchers of innovative digital methods to boost students' linguistic skills in English language teaching.

Keywords: *DS, DST, digital storytelling, English language teaching, EFL, language skills.*

Introduction

In an increasingly interconnected world, knowledge of foreign languages is becoming indispensable for people seeking to succeed in a global context. With rapid technological advancement, the integration of digital tools in education has received significant attention due to its potential to revolutionize traditional teaching practices. Among these digital innovations, digital storytelling is emerging as a promising means of enhancing the foreign language learning experience, especially in speaking skills. As high school students navigate an increasingly interconnected world, foreign language skills are becoming not only an asset, but also a necessity for global citizenship and career readiness. Thus, exploring the role of digital storytelling in the development of foreign language speaking skills is of paramount importance in contemporary educational discourse. However, traditional language teaching methods often fail to cope with the complexities of language acquisition, especially in speaking skills. In response to these challenges, educators are turning to innovative pedagogical approaches such as digital storytelling to improve language learning outcomes and provide students with effective communication skills. Although research has shown that this method produces by far the most prominent outcomes, not many pedagogues use it in the Kazakhstani English classroom environments. Is it possible that the method isn't so fruitful in the end?

To obtain the answer to that question the current article gives a brief overview of the research done in the field of digital storytelling and an analysis of a survey conducted among students of various levels and majors in Kazakhstani higher educational institutions. The article presents a description of digital storytelling as an educational tool and informs of its origins, how it can be used to support teaching and how students who learn to make their own digital stories improve multiple literacy skills.

Theoretical Framework

The world is progressing, the use of digital resources has been inevitably incorporated and incurred in our teaching and learning modii. Modern competent teachers should provide students with new perspective on the integration of technology into their learning which may result in a boost of their

language skills with the help of technology use. Teachers of foreign languages consequently started integrating digitalized innovations, DS among the others. As Robin [7] says, DS refers to a compilation of digital images, texts, audio narratives, video, and music intended to educate the reader about a specific subject.

By attempting to provide a clear picture of how teachers integrate digital storytelling technique (DST), one can learn about how to facilitate meaningful use of technology into schools and motivate students [10]. Fitri et el., [1] argues that DS has emerged as a promising pedagogical approach that could help to moderate the usefulness of such a variety of digital media in the classroom.

Digital storytelling (DST) emerged from the work of Joe Lambert and Dana Atchley at the Center for Digital Storytelling (CDS), a nonprofit community arts organization in Berkley, California in the early 1990s [6]. According to Tahriri et el., [10] storytelling is one of the versatile functions of digital media. In fact, using digital media to tell a story is not only a way to put together thoughts and ideas, it is also a way to share a particular story with family, friends, and potentially the world. That what makes DS by all means meaningful to students.

DS is an educational method combining storytelling with digital tools such as images, videos, audio, and text to create multimedia narratives. Bernard Robin [7] identified the "Seven Elements of Digital Storytelling," which include a clear point of view, a dramatic question, emotional content, the narrator's voice, an impactful soundtrack, content economy, and appropriate pacing. According to Eleni Meletiadou [3] DS is a medium for blending narrative and multimedia resources, including visuals and audio, to create engaging and culturally responsive stories, defining DS as an interesting marriage of narrative, text and technology.

Digital Storytelling has become a powerful instructional tool for both students and educators [7]. The teachers should focus on the key points of DS to help their learners get the best of the practice [5]. The following steps are to be remembered while preparing students and guiding them along the lively bright road to DS. At the start of the project learners need to identify the target audience. A successful digital story starts with a well-defined audience. Such characteristics as age, gender, cultural background should be taken into account. Afterwards, students should think about the content, and make sure that the story's content and language are clear and engaging for the intended audience. Next, come with a compelling introduction. Through an emotional introduction you can attract the audience's attention. To add personal touch, encourage students to choose a topic they care about. Not only will it make a strong opening and a more engaging script, but also resonate with listeners' feelings. Such personal connections have a profound impact and strongly accord the viewers. Always remember that a good script is a solid foundation for successful DS. A well-written script is crucial for a captivating digital storytelling. Even without audio, photo and other multimedia elements, the script should be strong on its own.

DS is so appealing as a tool to promote learning English as it brings a myriad of benefits with it. The method boosts students' creativity, collaboration, and the development of 21st-century skills. Meletiadou [3] supported the idea that involving a real audience created a genuine language context where multilingual students improved their academic performance and self-confidence with the help of DS projects. As Robin [6] claims, when students create their own digital stories, they increase a full complement of literacy skills, including: research, writing, organization, technology, presentation, interview, interpersonal, problem-solving, and assessment skills.

Wei, Siriyothin, & Lian [11] say, that as a practical approach of technology-enhanced learning, the collaborative learning opportunities in DST are learner centered, emphasize interaction and doing, and promote group work for developing solutions to real-world problems. According to Xu & Hashim [12] DS brings nothing but positive impact to ESL/EFL learners in a way that fosters engagement and motivation while responding to today's educational needs.

Apart from value of exposure to a greater audience, DS brings along other significant benefits. Learners report feeling more motivated and engaged with DS activities compared to conventional classroom instruction. Another important skill being developed by DS is collaboration. Fitri et el., [1] state the implementation of DS-based tasks improves students' motivation allowing them to develop ideas and collaborate among groupmates. In the study by Wei, Q., Siriyothin, P., & Lian, A. P. [11] DST participations clearly outperformed the control group in their speaking skills after digital storytelling intervention. Many of the participants of the experiment agreed that DS allowed them to improve their technical skills, as well as their ability to input their knowledge into practice; many students indicated that DS was interesting, challenging, helpful, and enjoyable and contributed to the development of students' autonomous learning. Moreover, DS tasks provide opportunities for students to think critically and creatively while developing their stories. [1]

Multiple benefits of DS are demonstrated by studies all over the world. Oral skills are considerably improved by implementing as well as listening skills compared to traditional methods. Speaking skills are considered to be the most challenging skills out of the four fundamental language skills that need to be demonstrated. Wei, Q., Siriyothin, P., & Lian, A. P. [11] in their research among the students in their second year of study in the School of Foreign Languages in Qiannan Normal University for Nationalities proved that digital storytelling significantly improved students' speaking skills.

Research works have found positive experiences with DS among EFL learners. According to Fitri et el., [1] learners report that DS helps them develop ideas, collaborate with peers and feel more motivated to learn Some learners find the tasks involved in creating digital stories enjoyable.

Another question of curiosity is the example of plots for the stories, in other words, what students told the audience in their stories. In case of Meletiadou [3], students were asked to prepare a digital story to present their philosophy in teaching using Canva.

In spite of numerous benefits of DS, the method surely presents some challenges. It demands planning from part of a teacher as well as student; resource and time arrangement. Being able to plan effectively is a rare skill but starting to write is even a greater challenge for many learners. Samantha Morra [8] says when you are trying to write, there is nothing worse than a blank sheet of paper. Bad storytelling using digital media will simply lead to bad digital storytelling - says Robin, [7]. According to him, many students have trouble learning to formulate an educationally sound argument.

Moreover, according to Robin [7], educators must address copyright issues when using external media respecting the copyright and the intellectual property of others. Digital literacy was a main issue for some non-traditional students [3]. What concerns time arrangements it was stated as a difficulty by some students as they might feel overwhelmed that DST is a time-consuming process in the study by Wei, Q., Siriyothin, P., & Lian, A. P., [11]

Digital storytelling in Kazakhstan

After we have covered the principles and general practices of DS in EFL teaching all around the world, we will gradually approach the coverage of the use of DS in Kazakhstan. What concerns the sphere of its application, DS has been widely adopted in language teaching, especially in English as a Foreign Language (EFL) classroom. In Kazakhstan, many other countries alike, this pedagogical tool has been increasingly applied to enhance language learning and engagement. Studies show that DS boosts vocabulary development, grammar mastery, and overall language skills. For instance, in a study by Karimova et el., [2], which was conducted among 5th-grade learners in Almaty, DS significantly improved English language proficiency compared to traditional teaching methods. Pupils learned how to create and narrate stories using digital tools, enhancing their speaking, listening, and writing abilities.

Kazakhstan's integration of digital storytelling aligns with its national "Trinity of Languages" initiative, promoting trilingual education in Kazakh, Russian, and English [13]. To plan a good lesson, a language teacher follows certain criteria because multilingualism is not only a high goal set by Kassim-Jomart Tokayev, the President of Kazakhstan, but the concept of "multilingualism" is also filled with some aspects of professional plan [14]. In accordance with "Trinity of Languages" initiative, educators have been trying to employ DS to foster communicative skills, cultural and language awareness. This approach resonates with the increasing demand for digital literacy among learners. As Zhussupova& Shadiev [14] argue, quite apart from the emphasis put on lifelong learning and the acquisition of ICT skills in all areas of education in many countries, we are teachers of the language of global communication; and that communication is increasingly digitally mediated. In terms of cultural context Yakhiyarov &Doganay [13] argue the importance of tailoring storytelling activities to the students' cultural backgrounds and experiences. The usage of DS allows children to expand their repertoire and become not just performers of someone else's script, but co-creative actors improvising on a given theme [9].

The review of the experiences with DS in the Kazakhstani educational context demonstrates both educators and students' positive outcomes when using DS. It proves to be effective in various contexts at different age groups, ranging from schoolchildren to university students. Zhussupova& Shadiev [14] state DS could be integrated as a significant source in academic speaking and to improve students' public performances of multilingual groups which benefit them when applying their knowledge and performances in their professional endeavor. In the study by Karimova et el., [2] the 5th-graders in the experimental group, in which the digital story application was performed, achieved higher levels of vocabulary and grammatical knowledge compared to their peers in the control group. Yakhiyarov &Doganay [13] investigated the impact of storytelling on improving English speaking skills among pupils of Kazakhstani suburban secondary schools. The researchers studied how storytelling could address such difficulties as "fear of making mistakes, passive participation, and L1 interference". The findings of the

experiment revealed significant improvements in speaking skills particularly, as Yakhiyarov &Doganay [13] stated in communicative competence, enlarged vocabulary, enhanced pronunciation and fluency.

Students engage actively, are motivated and show enthusiasm. The study by Karimova et el., [2] reveals that storytelling sessions have allowed 5th-grade learners to articulate personal narratives, fostering both linguistic and emotional expression. This method helps to animate classroom and bridge it with real life applications as students share their creations with peers and family. Another thing, being noted by teachers, is the versatility of DS in meeting diverse student needs. By integrating multimedia resources educators can attend various learning styles, ensuring inclusivity. The steps of creating digital story – writing scripts, recording audio, and adding visuals – encourage collaboration and creativity among students [2]. According to Yakhiyarov &Doganay [13] pupils' perceptions of learning with the storytelling technique were efficient, their motivation to learning English increased.

In spite of the numerous benefits, implementing DS in Kazakhstan faces significant difficulties. The hurdles which make it difficult to promote digital stories include inconsistent Internet connection, lack of digital devices, and insufficient technical support [2] Yakhiyarov &Doganay [13] noticed initial anxiety among the pupils during storytelling in classroom. What is more, teachers are often unprepared to leverage new technologies and innovations in education. Many teachers are reluctant to integrate DS into their curricula as they are not competent at it. Unfortunately, as Zhussupova& Shadiev [14] argue, for many educators traditional educational mindsets that prioritize conventional teaching over creative methods pose resistance to innovative approaches like digital storytelling.

Research methods and materials

This study involves a mixed-method approach to examine the effect of digital storytelling in English language education among the students from various specialties and degrees in different educational institutions in Astana city who are actively learning English as a foreign language. Participants include students with varying levels of language proficiency to ensure diverse attitudes towards digital storytelling impact on language mastering.

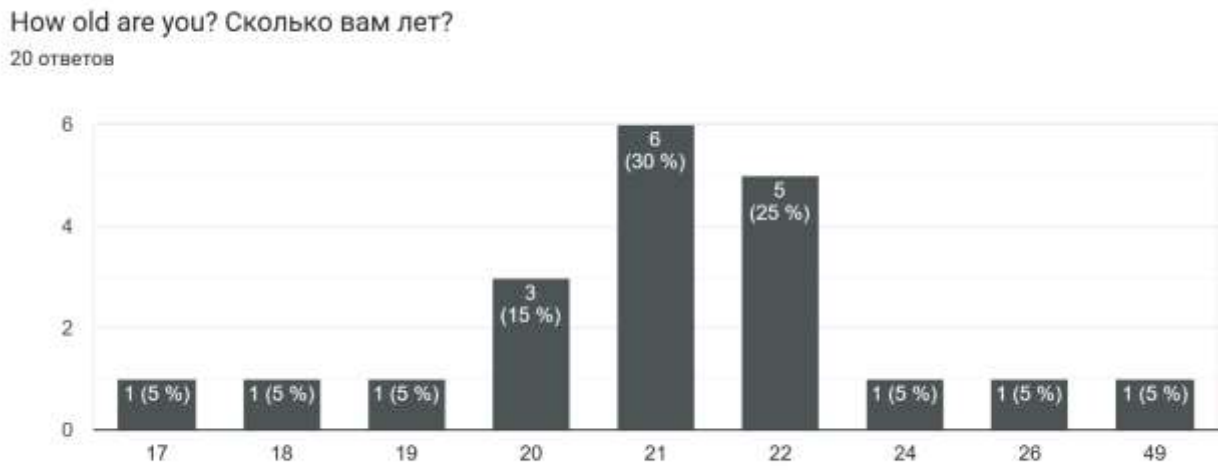
The research integrates quantitative and qualitative methods to obtain comprehensive insights into students' experiences, engagement and language development. A structured online questionnaire was designed and sent through Google Forms to collect quantitative data. The survey includes multiple-choice questions, and open-ended responses to assess students' engagements, attitudes and experienced improvements in communication skills as well as obstacles that hinder using digital storytelling.

The research methods employed in the study included data collection, data analysis, and interpretation. Conclusions were drawn on the generalization of the findings after data analysis. This methodology offers both numerical insights and personal reflections from students.

The survey conducted among the students of Astana provides insights into students' experiences and attitudes toward digital storytelling. The aim of the survey was to find out:

- *if students in year 2025 know DS technique,*
- *which tools are the most popular for creating digital stories,*
- *what were the benefits students perceived and difficulties they met,*
- *their actual attitudes to this technique.*

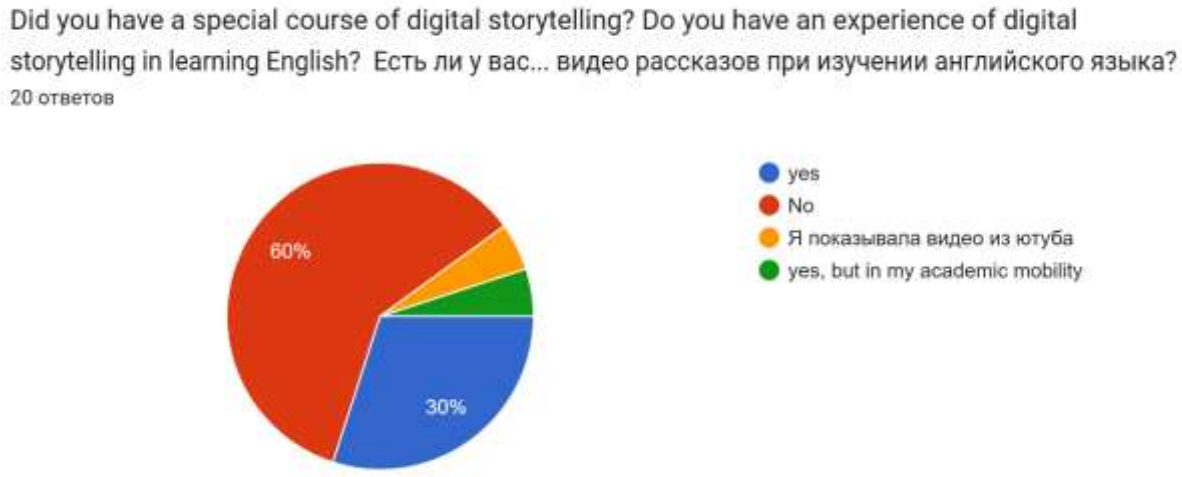
There were 20 respondents in the survey. The age range of the informants is between 17 to 49 with the majority at their early 20s (14 out of 20).



Picture 1. Age range of the respondents.

11 of them are 1-year Master students at two foreign languages. Another 3 respondents are 1-year Master students at Computer Science and Engineering, 1 is from school, 1 student is a 2nd-year bachelor at Marketing, 1student is a 3rd year Bachelor at BDA (Big Data Analysis).

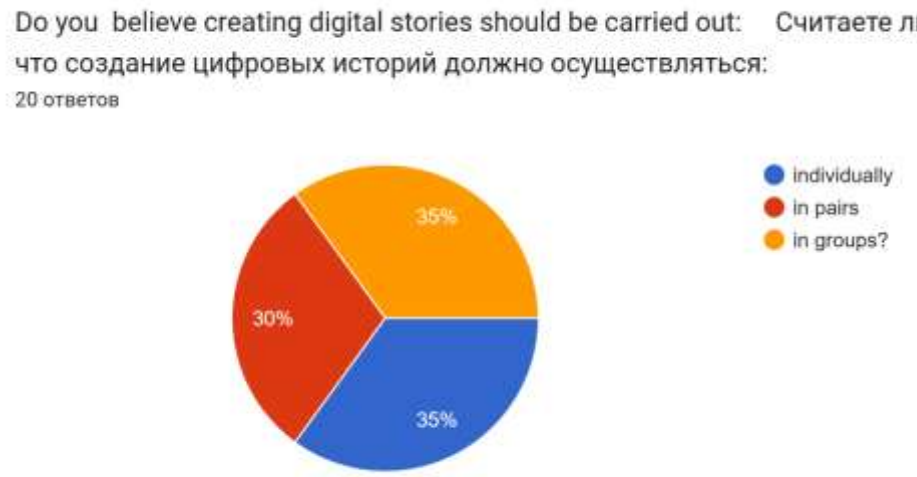
In terms of experience, although many informants have heard about this approach, only 35% have ever created digital storytelling and other 5% used it in learning English.



Picture 2. Experience of using digital storytelling.

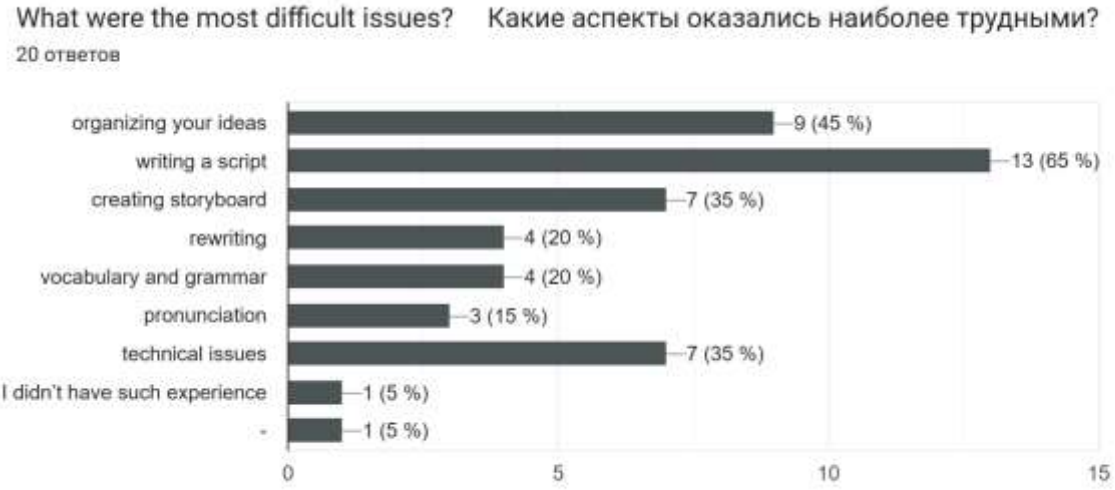
As for the grouping suitable for DS project the respondents' voices divided equally between individual, pair and group work.

Turning next to tools to design and develop DS, Canva comes top of the list with six interviewees arguing it to be very user-friendly. Microsoft PowerPoint, YouCut, Storybird, Pixton, CapCut, Pechakucha.com, Storyboard that, writereader, OBS, AdobePremierePro, Powtoon, Инстаграм сторис, animaker were also named as possible tools for DS.



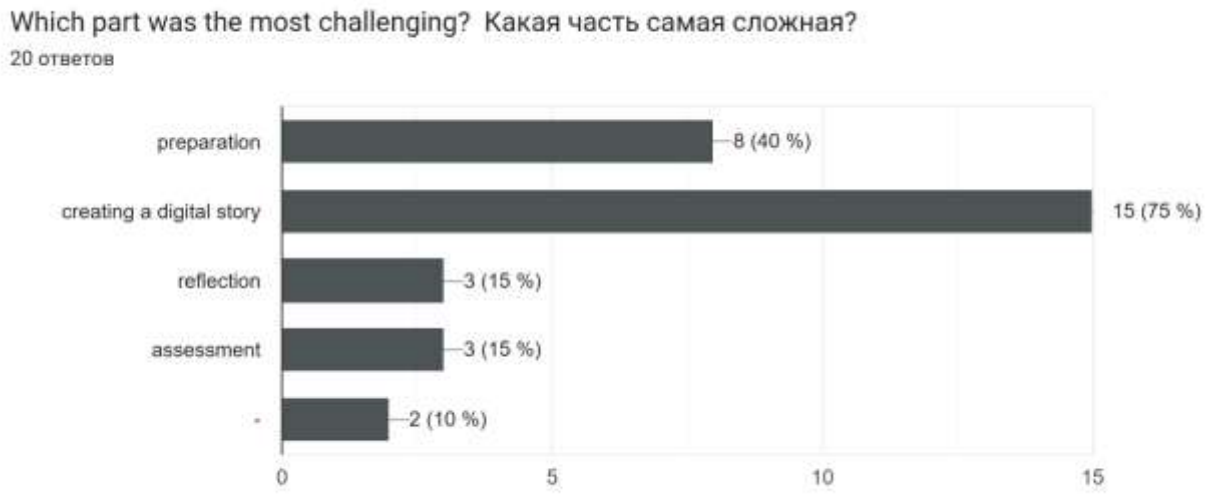
Picture 3. Preferred grouping format.

Moving on to difficulties, the majority of participants consider writing a scrip and organizing your ideas the most challenging, with 65, and 45 % respectively (informants were able to vote for multiple factors). By contrast, the language skills- vocabulary, grammar, pronunciation - were not so difficult for the students.



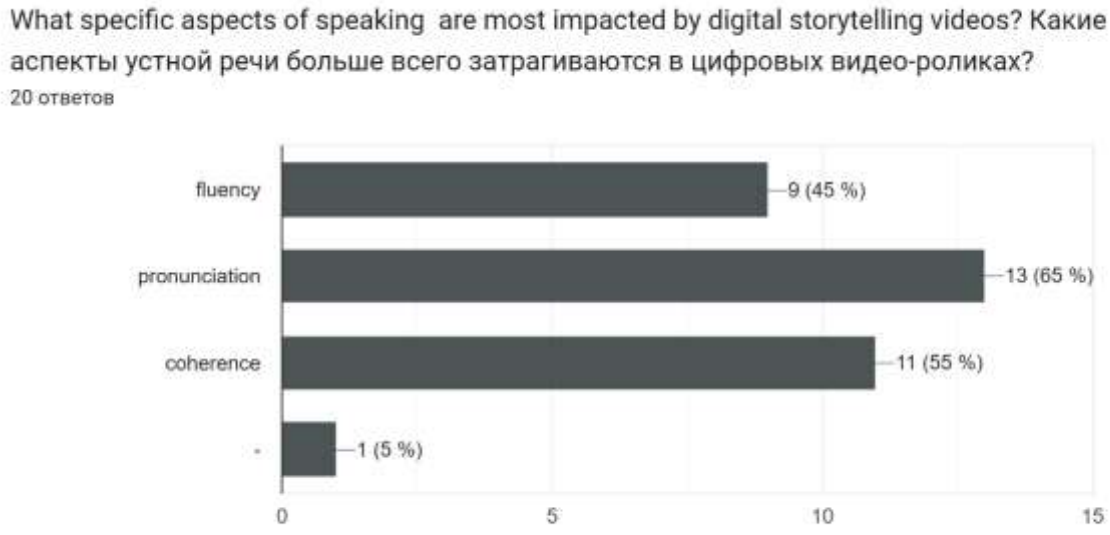
Picture 4. Difficulties of creating digital stories.

As for the challenges while developing and designing digital stories, the majority of students asserted that the process of creating the final product was the most challenging, but not the preparation or feedback.



Picture 5. Challenges of the process of DS.

In terms of benefits, referees assume that all aspects of speaking are impacted by digital storytelling resulting in increased fluency and accuracy. 65% of respondents named pronunciation as the main benefit; coherence and fluency obtained 55% 45% respectively.



Picture 6. Benefits of digital storytelling for speaking skill.

The overall trend is clearly one of support for this innovative method as those respondents who experienced working with DS found it beneficial, engaging and handy. To give a specific example, some of them mentioned: "Digital storytelling improved my speaking proficiency by encouraging me to focus on clarity, pronunciation, and fluency.", "В моем случае не думаю что сильно повлияло на мастерство речи, скорее повлияло на цифровую грамотность (научилась работать с новыми для меня инструментами)/ In my case, I don't think it had a big impact on speech skills, but rather on digital literacy (I learned how to work with new tools for me)", "I think it greatly enhanced my language skills, giving unique opportunity to practice", "Digital storytelling significantly improved my speaking proficiency, especially structuring and delivering ideas coherently." There was also, one negative comment "most of the time it was time consuming. I don't think that apart from pronunciation something was developed in terms of speaking skills through digital storytelling." One of the striking comments was "I am trying to create digital story book" which means that there are really devoted fans of this method

In fact, although only 40 % of responders created or used DS in learning English, nearly all of them utilize it either in other subjects or for personal use. A great number of students use Canva or other modern Web 2.0 apps to create and edit their stories. Most of the students find digital storytelling beneficial and the general attitude towards this method is positive. According to one of them "We had storytelling discipline in bachelor time. And I want to add it was very useful for my English skills. I think it should be for all majors at universities not only for TFL students".

Conclusion

In conclusion, world and Kazakhstani studies provide strong evidence for the efficacy of DS in enhancing English language skills, no matter if they're speaking, listening, reading or writing. Although implementing DS is a must-to-do of the modern English instruction, careful considerations of potential challenges and the provision of substantial teacher support are essential for success and maximum benefits of this pedagogical approach.

The results of the questionnaire highlight the effectiveness of digital storytelling in improving speaking skills among undergraduate students. Students' responses revealed genuine interest and positive attitudes to utilizing of digital storitelling highlighting its positive impact on language acquisition.

The survey conducted as part of this study provided further evidence of the effectiveness of digital storytelling guidelines and approaches. Feedback from participants confirmed the usefulness and necessity of the pre-designing clear instruction.

Overall, this study demonstrates the potential of digital storytelling as a powerful pedagogical tool for developing language skills in foreign language teaching. By providing theoretical framework, practical recommendations, and empirical evidence, this study provides teachers with valuable insights to improve language learning outcomes and create engaging learning environments. Further research and application of digital storytelling methodologies promise further innovation and improvement in language education practice.

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Philological sciences

TECHNOLOGY OF MODERN EDUCATION

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Abstract

A modern specialist must acquire the necessary skills to autonomously solve the tasks assigned to him, and in this regard, a new area began to take shape in the methodology of pedagogical research, in the center of which is not the teacher and the process of teaching a certain discipline as such, but the students and the mechanism for acquiring them new knowledge and skills.

Keywords: *type of learning, educational information, smartphone and social networks, communication for the younger generation*

Modern technologies inevitably make important adjustments to the structure of the modern educational process.

If students are outside of university classes, they willingly fulfill their need to gain new knowledge and communications using smartphones and other popular media.

If the screen of a smartphone or other media content is used when familiarizing with any information, then in pedagogical science this phenomenon is designated as the "second screen" [1, 87]. In this case, the smartphone acts as an additional channel of educational communication.

The traditional board acts as the first screen, and the teacher performs the function of the first communication channel in this situation. A smartphone becomes an additional channel for obtaining new individual knowledge and also becomes a means of individual communication between a teacher and a student.

This type of learning is called interconnected, and in Western pedagogical science is defined as "connected learning" [2].

In Western pedagogical science, collective studies called "Connected Learning an Agenda for Research and Design" and "Teaching in Connected Learning Classroom" were conducted in this regard. The results of these studies made it possible to conclude that such media "can become an effective basis for creating unique educational products" [3, 66].

Research proves that media tools provide increased access to new, educational information and are therefore socially significant.

This method of learning takes into account the personal interests of each student. A student or student enjoys friendly support from family and peers.

In this case, interconnected training allows you to adjust individual preferences with academic achievements and your role in the social environment.

"Connected learning" connects the university and life outside it, as it helps "mutual understanding of generations and various age and social groups" [4, 4]. This method helps create a new system of values and guidelines. It contains the principle of equality, the possibility of active social ties, and its most important quality is adaptability and taking into account the individual abilities and interests of each

student. Students have the skill of quickly responding to the most important events of regional, state or global importance.

Currently, smartphone and social networks have become a familiar way of communication for the younger generation. Their use makes it possible to supplement and expand the traditional forms of conducting the lesson, and the broadcast of the educational material takes place in a more convenient and familiar form for students.

The use of a smartphone becomes a means of self-mastering the educational material, and thus there is a transition from the teacher's monologue to his dialogue with the student audience.

The use of presentations makes it easier for students to master new material, but in this sense, they do not gain the skills to interact with this material during the learning process itself.

Sending training materials to smartphones eliminates the need to copy presentations to memory cards. Creating group chats or the possibility of individual correspondence allows students to receive the necessary documents, scientific articles and links and promptly notify students of changes or important events in the educational process.

Communication in the Internet community is created with certain educational goals, and the choice of strategy in this case is especially important. Communication between students and the teacher allows you to reduce or eliminate psychological barriers and demonstrate the correct speech images.

Chatting is about talking and sharing important learning information. In the course of communication with students, the teacher can realize educational and general developing goals and objectives.

Of course, connected learning cannot fully replace academic classroom communication between a teacher and students. Working with textbooks and manuals and using classical techniques in no case loses its significance.

Online group communication can be used as an additional, but quite effective technique for obtaining new knowledge and skills in the educational process and can improve its quality.

The process of globalization is accompanied by the active development of a number of the most advanced technologies that significantly affect the structure and content of the educational process.

Pedagogical research pays special attention to technologies that meet the needs of the modern younger generation and which can help in the professional training of future specialists who are able to "solve current problems in a competitive environment" [4, 73].

An important aspect of the educational system is the formation of critical and creative thinking of students and their ability to communicate and group work.

Such tasks can be quite successfully solved using the Quest technology in training sessions. This educational technology allows the integration of different academic disciplines and different areas of scientific knowledge. In the form "Quest is the search for the right solution to the task, and it is extremely necessary to motivate the most significant skills and competencies of the current younger generation. The ideological content of the Quest technology can be compiled with the technology of scientific projects, which began to actively develop in the United States in the 20s of the last century.

Project technology departed from the traditional principle in training, when theoretical training was the basic basis for further practical application. In this case, the project offered a solution to a specific problem that required independent activity, the ability to plan the expected results and the presence of interdisciplinary competence.

Quest technology gained particular popularity at the end of the 20th century, when a variety of computer games were developed, during which the participant had to come to certain specific results. Often, such games were based on the adventure story of fictional personnel who needed to "achieve a certain goal by overcoming a series of obstacles, puzzles and difficulties of various other kinds" [5, 49].

The content of Quest essentially remained the same, but in 1995, researcher Bernie Dodge included it in a number of other recommended learning technologies. He created at that time a rather unique educational project, which contained a series of stages, passing which students had to use all kinds of educational resources and eventually achieve their goal. In this project, among other educational resources, both the Internet and today were involved. "Quest" also includes a specific story story story and a system of role-playing game elements.

Later, in the works of Professor Tom March, "a more detailed Quest technology was developed and its special varieties were highlighted" [6, 83].

This is how March described the web quest, with the first part of the term denoting a network or web, and the second part involving search and exploration. The web quest is fundamentally different in

that all its tasks are associated with one pre-selected online platform or Internet site. This means that the solution of this quest provides for remote participation.

The task of the teacher is to provide the students with the necessary resources and, if necessary, act as a consultant on their application.

In the works of Tom March, the most important advantages of the quest as an educational technology were substantiated.

Firstly, the quest attracts the attention of students, as it contains interesting tasks that are directly related to the objective world around them. The quest is based on solving the problems that arise in real life.

The quest addresses the intellectual potential of a person and her ability to analyze, synthesize and critically assess a designated problem or situation, and it is also based on working on the Internet.

The quest as an educational technology was also developed in the studies of other scientists (M.V. Andreeva, Y.S. Bykhovsky, N.V. Nikolaeva) and was defined "as a type of educational work that requires the search and systematization of information" [7, 53]. The quest also contributes to the development of creative imagination and stimulates the solution of all kinds of problem problems. In this case, the study of information is connected with the analysis of conflicting opinions and approaches and provides for the search for one's own view and position on the problem. Therefore, quest, as a learning technology, implies scientific discussion and research search.

In the educational system, various types of quests are used. They can be conducted in virtual or real time mode and can be either short-term or long-term.

According to the form of execution, quests provide for individual and group participation and can be research, submission of new information, creative work or role-playing.

In addition, "Quest" "assumes both a linear and non-linear structure based on the plot presented in it" [8, 63].

The quest as an educational technology is designed for several stages and can be carried out outside the audience or directly during the training session. If the quest is carried out in the lesson, then the roles and individual tasks are distributed among all its participants.

Further, the tactics of working on the quest are jointly developed and the participants of individual groups share their results with each other.

All participants in the work during the solution of the quest are active when discussing individual results and evaluating the study.

An independent part of the proposed quest is those tasks that are performed individually as part of the teamwork. Moreover, each participant of the quest is personally responsible for the result obtained, which "directly depends on the final successful solution of the problem" [9, 85].

In pedagogical science, the development of a special type of quest called "Oscar Race" is proposed. It can be auditory, extra-auditory, short-term, group, but necessarily creative in nature, so it is based on a film that students should make.

The development of this type of quest provides for the achievement of personality-forming and practical subject goals included in the structure of the educational process.

The subject goal is aimed at developing the communicative competence of students, and the educational goal is associated with the expansion of knowledge about the film industry. Students, while working on the quest, acquire the skills they need to select relevant information and try to systematize it.

The educational goal of the Oscar Race quest is related to motivating students to properly plan and evaluate their own activities and to the ability of team positive cooperation.

Cinema as a type of creative activity fosters tolerance towards other cultures, languages and national traditions.

The developing goal of this quest gives students a sense of involvement in the possible success of the common cause and determines the importance of their individual role in the process of joint research.

As a rule, the structure of the quest includes several stages. At the first stage, teams of participants are formed with their own name and choice of logo. Quest buildings may include the preparation of any audio recordings or presentations on the topic under discussion. You may also be prompted to fill tables using links and other Internet resources provided by the instructor. At the second stage, each team develops an algorithm for solving the topic proposed in the quest, and the third stage provides for a joint discussion of various options for possible solutions, and as a result, the winning team is selected.

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Philosophical sciences

UOT 16

EPISTEMOLOGICAL CHARACTERISTICS OF FUZZY SET THEORY IN THE CONTEXT OF SUBJECT-OBJECT RELATIONS

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SUBYEKT-OBYEKT MÜNASİBƏTLƏRİ KONTEKSİNDƏ QEYRİ-SƏLİS ÇOXLUQLAR NƏZƏRİYYƏSİNİN EPİSTEMOLOJİ XARAKTERİSTİKASI

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Abstract

As is known, the issues of subject and object in the process of cognition, as well as the study of the relations between them, constitute one of the main directions of the theory of cognition. Taking into account the importance of this issue in epistemology, in the research work, a classification of the relations between the subject and object of cognition was carried out in accordance with the context of the study, referring to the history of philosophy. As a result of the excursion into the history of philosophy, subject-object relations were classified mainly into three groups: agnosticism - subject rigidity (This concept expresses the reflection of reality in consciousness, not as it is, but certain manifestations of it.); bijectivity - the identity of subject and object (This concept means that there is no error or partial error in the reflection of being in consciousness); subject richness (This concept, which we call subject richness, not only obtains rich ideas from the object - the perceived in the process of perception, but also embodies the richness of the possibilities of scientific and creative cognition.). The subtopic reflecting subject richness also provides a philosophical analysis of the relationship between art (works of art) and reality in accordance with the context; as a result of this analysis, a cognitive approach to the issue of why a person considers himself a participant in a real object when reading a work of art or watching works of art (film, play, fine art, etc.) has been demonstrated.

In this article, I would like to especially note that the priority direction of the research was to determine the epistemological characteristics of the theory of fuzzy sets (FST) in the context of subject-object relations. As is known, the role of certain scientific theories in changing the mutual relations between the subject and object of cognition - the perceiver and the perceived - is undeniable. The emergence of scientific theories that fundamentally influenced the philosophical worldview has brought to the fore its sometimes subjective and sometimes objective position at different stages of cognition (classical, non-classical and post-non-classical). The emergence of the theory of QSCH, like other fundamental scientific theories, has also activated the process of scientific and philosophical cognition. The epistemological characteristics of this theory have formed new ontological and substantial relations to the object of study. The study of the object in fuzzy relations with multi-valued logical considerations allows us to obtain more and more adequate ideas about the object, unlike classical logical approaches. The theory of QSCH has a special role in the transition to the post-non-classical stage of cognition by creating a new concept of multi-valued logic, as well as a new thinking model. For this purpose, a philosophical analysis of fuzzy set theory, one of the scientific theories that played an important role in the transition to the post-non-classical stage of cognition, was conducted in the context of subject-object relations (based on the classification we have made) and some epistemological characteristics were determined. Also, an epistemological analysis of the extraction of fuzzy logical conclusions by extracting classical logical conclusions in relation to the object of study was conducted. Referring to this analysis, it was justified that fuzzy models are models that promote a closer relationship between the subject and object of cognition by taking into account more parameters and qualitative indicators of the object of study.

Xülasə

Məlum olduğu kimi, idrak prosesində subyekt və obyekt məsələləri, eyni zamanda onlar arasında əlaqələrin öyrənilməsi idrak nəzəriyyəsinin əsas istiqamətlərindən birini təşkil edir. Epistemologiyada bu məsələnin əhəmiyyətini nəzərə alaraq, tədqiqat işində araşdırma konteksinə uyğun olaraq idrak subyekt və obyekti arasında əlaqələrin fəlsəfə tarixinə istinadən təsnifatı aparılmışdır. Fəlsəfə tarixinə ekskurs nəticəsində subyekt-obyekt münasibətləri əsasən üç qrup üzrə təsnifatlaşdırılmışdır: aqnostisizm - subyekt kəsadlığı (Bu anlayış idrak prosesində reallığın olduğu kimi deyil, müəyyən təzahürlərinin şüurda əksolunmasını ifadə edir.); biektivlik - subyekt və obyekt eyniliyi (Bu anlayış altında varlığın şüurda əks olunmasında heç bir yanlışlığın olmadığı və ya qismən yanlışlığın olduğu başa düşülür.); subyekt zənginliyi (Subyekt zənginliyi adlandırdığımız bu anlayış dərketmə prosesində obyektdən – dərkediləndən zəngin təsəvvürlər əldə etməklə yanaşı, elmi-yaradıcı idrakın imkan zənginliyini də özündə etiva edir.). Subyekt zənginliyini əks etdirən altmövzuda həmçinin konteksə uyğun olaraq incəsənət (sənət əsərləri) və gerçəklik arasında əlaqənin fəlsəfi təhlili verilmişdir; bu təhlil nəticəsində insan bədii əsər oxuyarkən və ya incəsənət əsərlərini (film, tamaşa, təsviri sənət və s.) seyr edərkən nədən özünü gerçək obyektin iştirakçısı hesab edir kimi bir məsələyə koqnitiv yanaşma sərgilənmişdir.

Bu məqalədə, xüsusilə onu qeyd etmək istərdim ki, araşdırmanın prioritet istiqaməti subyekt-obyekt münasibətləri konteksində qeyri-səlis çoxluqlar (QSÇ) nəzəriyyəsinin epistemoloji xarakteristikasını müəyyənləşdirməkdən ibarət olmuşdur. Məlum olduğu kimi, idrak subyekt və obyekti - dərkedən və dərkedilən arasında qarşılıqlı münasibətlərin dəyişməsində müəyyən elmi nəzəriyyələrin rolu danılmazdır. Fəlsəfi dünyagörüşünə əsaslı təsir edən elmi nəzəriyyələrin yaranması idrakın müxtəlif mərhələlərində (klassik, qeyri-klassik və postqeyri-klassik) onun gah subyektivlik, gah da obyektivlik mövqeyini önə çıxarmışdır. QSÇ nəzəriyyəsinin yaranması digər fundamental elmi nəzəriyyələr kimi elmi-fəlsəfi idrak prosesini də fəallaşdırdı. Bu nəzəriyyənin epistemoloji xarakteristikası tədqiqat obyektinə yeni ontoloji və substansional münasibətlər formalaşdırdı. Qeyri-səlis münasibətlərdə obyektin çoxqiymətli məntiqi mülahizələrlə tədqiqi klassik məntiqi yanaşmalardan fərqli olaraq obyekt barəsində daha çox və adekvat təsəvvürlər əldə etməyə imkan verir. QSÇ nəzəriyyəsi çoxqiymətli məntiqin yeni konsepsiyanı, eyni zamanda yeni təfəkkür modelini yaratmaqla idrakın postqeyri-klassik mərhələsinə keçiddə xüsusi rola malikdir. Bu məqsədlə postqeyri-klassik idrak mərhələsinə keçiddə mühüm rol oynamış elmi nəzəriyyələrdən biri olan qeyri-səlis çoxluqlar nəzəriyyəsinin subyekt-obyekt münasibətləri (apardığımız təsnifat əsasında) konteksində fəlsəfi təhlili aparılmış və bəzi epistemoloji xarakteristikaları müəyyənləşdirilmişdir. Həmçinin tədqiqat obyektinə münasibətdə klassik məntiqi nəticələrin çıxarılması ilə qeyri-səlis məntiqi nəticələrin çıxarılmasının qnoseoloji təhlili aparılmışdır. Bu təhlilə istinadən qeyri-səlis modellərin tədqiqat obyektinin daha çox parametrlərini və keyfiyyət göstəricilərini nəzərə almaqla idrak subyekt və obyektinin bir-birinə daha çox yaxınlaşmasını etiva edən modellər olduğu əsaslandırılmışdır.

Keywords: *subject, object, epistemological, ontological, fuzzy set, fuzzy model, modus ponens.*

Açar sözlər: *subyekt, obyekt, qnoseoloji, epistemoloji, ontoloji, qeyri-səlis çoxluq, qeyri-səlis model, modus ponens.*

1. Giriş

İdrak nəzəriyyəsinin əsas istiqamətlərindən birini idrak prosesində subyekt və obyekt məsələləri, eyni zamanda onlar arasında əlaqələrin öyrənilməsi təşkil edir. Bu tədqiqat işində məqsədimiz idrakın qeyri-klassik mərhələsində meydana gələn və postqeyri-klassik mərhələsində də öz əhəmiyyətli rolu və aktuallığını saxlayan qeyri-səlis çoxluqlar (QSÇ) nəzəriyyəsinin subyekt-obyekt münasibətləri konteksində epistemoloji aspektlərinə nəzər yetirməkdir. Məlum olduğu kimi, idrak subyekt və obyekti - dərkedən və dərkedilən arasında qarşılıqlı münasibətlərin dəyişməsində müəyyən elmi nəzəriyyələrin rolu danılmazdır. Fəlsəfi dünyagörüşünə əsaslı təsir edən elmi nəzəriyyələrin yaranması idrakın müxtəlif mərhələlərində (klassik, qeyri-klassik və postqeyri-klassik) onun gah subyektivlik, gah da obyektivlik mövqeyini önə çıxarmışdır. QSÇ nəzəriyyəsi çoxqiymətli məntiqin yeni konsepsiyanı, eyni zamanda yeni təfəkkür modelini yaratmaqla idrakın postqeyri-klassik mərhələsinə keçiddə xüsusi rola malikdir [7].

Hesab edirik yeni idrak mərhələsinə keçiddə xüsusi rola malik QSÇ nəzəriyyəsinin subyekt-obyekt münasibətləri konteksində epistemoloji təhlili həm də müxtəlif sahələrdə yaranan qeyri-səlis modellərin elmi-fəlsəfi anlamda bir daha zəngin təfəkkür modeli kimi əhəmiyyətini təsdiqləmiş olar.

2. Subyekt-obyekt münasibətlərinin təsnifatı

Tədqiqat istiqamətimizə uyğunluğunu nəzərə alıb, dərkedən və dərkedilən arasında qarşılıqlı əlaqələri barədə koqnitiv nəticə əldə etmək məqsədilə dünya fəlsəfi fikir tarixinin bəzi məqamlarına ekskurs etməyi vacib sayırıq. Əvvəlcədən qeyd edim ki, burada əsas məqsəd subyekt-obyekt münasibətlərinin fəlsəfi fikir tarixinə istinadən əsaslı təhlilini vermək yox, idrak subyekt və obyekti (subyekt-obyekt) münasibətlərini təsnifatlaşdırmaq və bu konteksdə QSÇ nəzəriyyəsinin epistemoloji xarakteristikasını müəyyənləşdirmək və yuxarıda qeyd etdiyimiz kimi, idrak prosesində fərqli bir təfəkkür modeli olaraq əhəmiyyətini qneosoloji aspektdə əsaslandırmaqdır.

Beləliklə, fəlsəfi fikir tarixinə istinadən [1,2,6] subyekt-obyekt münasibətlərini aşağıdakı şəkildə təsnifatlaşdırmağa nail olduq (Qeyd edim ki, təsnifat zamanı onları bir-birindən fərqləndirmək məqsədilə bəzi elmi və fəlsəfi anlayışlardan konteksə uyğunluğu nəzərə alınmaqla istifadə olunmuş və onlara yeni anlam verilmişdir):

2.1. Aqnostisizm - subyekt kəsadlığı

Bu anlayış idrak prosesində reallığın olduğu kimi deyil, müəyyən təzahürlərinin şüurda əksolunmasını ifadə edir. Obyekt subyektdən asılı olmayaraq müəyyən göstəriciləri – forma və məzmunu ilə mövcuddur, idrak isə dərketmə mərhələsinə (hissi və rasional – təfəkkür) uyğun obyektdən tam olmayan, ona adekvat bütün göstəriciləri əks etdirməyən təsəvvürlər əldə etməyə qadirdir. Yəni dərketmədə subyekt obyektdən geri qalır, subyektdə obyekt barədə yalnız müəyyən təsəvvürlər alınır.

Platonun idrak nəzəriyyəsindən (platon anamnezisi) başlayaq. Filosofa görə, bütün vacib anlayışlar insan şüurunda əvvəlcədən, yəni təcrübədən əvvəl mövcuddur və bilik yalnız nəyisə xatırlamaq, yada salmaqdır. Filosof ideyalar haqqında təlimində reallığı bir-birindən fərqləndirən iki hissəyə bölürdü: müstəqil, zaman və məkandan asılı olmayan, dəyişməz qalan ideyalar aləmi; ideyalar aləminin təsviri olaraq qavranılan dünya. Onun ideyalar nəzəriyyəsində irəli sürülən bu ontoloji dualizm, ümumiyyətlə, insanın gerçək hesab etdiyi dünyanı əsl dünya hesab etmir və onu daha üstün - real olan ideal dünyanın sönük, natamam surəti olaraq təqdim edir. İdeyaların müstəqil mövcudluğunu sübut etməyə çalışan platon epistemologiyası həm də qavranılan şeylərin ideyalarla əlaqəli olduğunu da ifadə edirdi; məsələn, dərketmə prosesində məhz məkanda qavranılan üçbucaq, dairə və s. anlayışlar sayəsində insan "üçbucaq", "dairə" və s. ideyasını xatırlayır.

Kantın idrak modelini nəzərdən keçirək. Filosof subyekt və obyekt münasibətlərində məhz subyektin obyektə olan təsirini xüsusi olaraq qeyd edir. Onun fikrincə, məkan, zaman və səbəbiyyət əlaqəsi idrakın xüsusiyyətləridir və obyektdən alınan təsəvvürlər bu xüsusiyyətlərin yaratdığı qavrayışla həyata keçirilir. Obyekt subyekt idrakının (qavrayış və təfəkkürünün) imkan verdiyi dərəcədə dərk olunur. Bu şəkildə epistemoloji yanaşmanın nəticəsi olaraq o, empirizmi və rasionalizmi sintez etməyə səy göstərir. Filosofun fikrincə, şeylər özlüyündə dərkedilməzdir və idrak yalnız təzahürləri dərk edir. Əsl bilik nə empirik, nə də rasional üsulla alına bilər, o, transsendentdir. Təcrübə və təfəkkür vasitəsilə şeylər barədə yalnız təsəvvürlər öyrənilir. Yəni obyekt barədə təsəvvürlər yalnız "şey subyektdə olan"dır - fenomendir, şüurdan asılı olmadan mövcud olan obyekt isə "şey özündə" olaraq dərkolunmaz – noumendir. Beləliklə, filosof təzahürü gerçək olan obyektdən ayırır, o, hesab edir ki, obyekt haqqında bütün təsəvvürlər idraka xas məkan-zaman formaları və səbəbiyyət əlaqələri vasitəsilə yaranır.

Şopenhauer idrak nəzəriyyəsi də dünyanı iki hissəyə bölür: dünya iradə və dünya təsəvvür olaraq. Amma hər iki hissə eyni reallığın ayrı-ayrı tərəfləridir. Filosofun substansional konsepsiyasına əsasən dünyanın əsasında idraka və heç bir məntiqə uyğun olmayan körtəbii, qeyri-şüuri iradə dayanır. Bizə isə iradənin yaratdığı dünya barədə şüurumuzun formalaşdırdığı təsəvvürlər çatır. Onun fikrincə, insan şüurunun məhsulu olan dünya, eynən Kantın qeyd etdiyi kimi, gerçək, obyektiv olan dünya yox, dünya barədə yalnız onun şüurunun strukturuna xas zaman və məkan kateqoriyalarında təsəvvürlərdir.

2.2. Biektivlik: subyekt və obyekt eyniliyi

Bu anlayış altında varlığın şüurda əks olunmasında heç bir yanlışlığın olmadığı və ya qismən yanlışlığın olduğu başa düşülür. Yəni obyekt olduğu kimi (və yaxud obyektə yaxın şəkildə) şüurda əks olunur və yaxud şüurda necədirsə obyekt gerçək olaraq elə odur. İdrak subyekt və obyekti qarşılıqlı əlaqələri konteksində müəyyən epistemoloji xarakterli fəlsəfi refleksiyalara əsasən koqnitiv nəticə ondan ibarətdir ki, idrak prosesində obyekt və subyekt arasında qarşılıqlı birqiymətli uyğunluq – biektiv münasibət mövcuddur.

Məlumdur ki, fəlsəfi fikir tarixinin müəyyən mərhələsində anlaşıldı ki, varlıq haqqında müxtəlif fikirlər təfəkkür vasitəsilə alınır. Deməli, təkcə varlığı deyil, eyni zamanda idrakın özünü də öyrənmək zəruridir. Beləliklə, ontologiyadan bilik nəzəriyyəsinə - epistemologiyaya keçid baş verdi. Təfəkkürün tədqiqinə, yəni idrak barədə fəlsəfi refleksiyalara təkan verildi.

Fəlsəfə tarixində ilk dəfə gerçək aləmi insandan asılı hesab edən sofistlər subyektivlik mövqeyini substansiallaşdırdılar. Onların fikrincə, insan həqiqətin nə olduğu barədə özü qərar verir. Protoqora görə, nə və necə hiss etdiyimiz şey əslində elə onun özüdür.

Corc Berklinin idealist fəlsəfi sisteminə görə, material dünyanın gerçək mövcudluğu inkar edilir. Onun fikrincə, ideya yalnız ideyadan doğa bilər, onun maddi qaynağı yoxdur və bu səbəbdən də ideya ideyadan başqa heç nəyə oxşaya bilməz. Filosof nəzəriyyəsində dünyanın yalnız qavrayışda mövcud olduğunu əsaslandırmağa çalışır və bildirir ki, predmet ona görə mövcuddur ki, biz ona baxırıq: mövcud olmaq – qavranılmaqdır; esse = percipi. İdrakın qeyri-klassik mərhələsinə keçiddə əsaslı rol oynayan kvant nəzəriyyənin zərrəcik-dualizm konsepsiyası sanki bu fəlsəfi təlimi təsdiq edir: maddəni müşahidəçi var edir (Qoşa yarıq eksperimenti) [8]. Lakin bütün hallarda, filosofun mövcudluqla bağlı refleksiyaları, eyni zamanda kvant fizikasının bu nəticəsi qavrayışı əsas hesab etsə də, subyekt və obyekt qarşılıqlı münasibətlərində həm də obyektin tam dərk oluna bilməməsi kimi epistemoloji nəticə də alınır.

Sensualist filosof – duyğuları idrakın yeganə qaynağı sayan Didro duyğu, təsəvvür və anlayışları obyektiv – gerçək mövcud olan predmet və hadisələrin inikası hesab edirdi. Şellinqə görə isə dərkedən və dərkolunan eynidir. O, qeyd edirdi ki, hər bir bilik obyekt ilə subyektin uyğun olmasına əsaslanır və yalnız həqiqət bilikdir, həqiqət isə təsəvvürlərin yönəldiyi predmetlərə uyğun olmasıdır.

Subyekt-obyekt qarşılıqlı əlaqələrii konteksində xatırladığımız bu və digər analoji fəlsəfi refleksiyar, idealist və ya materialist mövqedən asılı olmayaraq, idrak prosesində dərkedən və dərkolunanı eyniləşdirməklə bu qənaətə gəlməyə imkan verir ki, obyektin təsviri şüurda olandan – subyektdən fərqli deyildir. Hesab edirik bu kimi epistemoloji fəlsəfi refleksiyalar gerçəkliyə münasibətdə subyektdən kənarda olan – tranzientlə təcrübədən alınan – immanenti eyniləşdirməklə idrak nəzəriyyəsinə, o cümlədən elm fəlsəfəsinə də xeyli material bəxş edir.

2.3. Subyekt zənginliyi

Leybnis idealizminin əsas konsepsiyası budur: subyekt obyektdən zəngindir. Filosof hesab edirdi ki, obyektin xassəsi subyektdən çıxarılmalıdır. İnsan xarici prosesləri daxilən baş verən proseslər vasitəsilə anlayır və özü barədə düşünərkən həm də varlıq, substansiya, tanrı və s. olan hər şey barədə düşünür.

Lakin bu təsnifatda məqsədimiz idrak prosesində subyektin obyektdən üstün, zəngin təsəvvürlər əldə etməsini sərgiləməkdən daha çox, hissi idrakdan sonrakı mərhələdə - rasional təfəkkür mərhələsində (düşüncə, ağıl, analitik təhlil) elmi və yaradıcı təfəkkürün epistemologiyasına diqqət ayırmaqdır.

Hegel dialektikasında Mütləq ideyanın inkişafı üç mərhələdən keçərək triada yaradır: Tezis antitezisə keçir və sonda yenə tezislə yekunlaşır. Mütləq ideya öz ilkin reallığının mövcud olduğu brinci mərhələdən (bu mərhələni filosof loqika adlandırır) ikinci mərhələyə keçib maddi dünyanı yaradakən tezis mərhələsindən antitezis mərhələsinə keçir. Üçüncü mərhələdə isə yenidən Mütləq ideyaya qayıdış (tezislə yekunlaşma) baş verir. Bu mərhələdə isə o, xüsusi forma alır – ya elmi biliyə, ya da incəsənətə çevrilir.

Bu konteksdə K.Popperin epistemoloji baxışı da maraqlıdır: Reallıq üç dünyadan ibarətdir. Birinci dünya obyektiv mövcud olanların, ikinci dünya subyektin (empirik, rasional və s. dərkedilən və ya dərkedilməyən), üçüncü dünya elmi-yaradıcı fəaliyyətin (miflər, elmi nəzəriyyələr, incəsənət əsərləri və s.) yaratdığı dünyadır. Onun fikrincə (və hesab edirik tamamilə haqlıdır), hər üç dünya daimi vəhdət halındadır – üçüncü dünya yaratdığı obyektlər vasitəsilə birinci dünyanı dəyişdirib ikinci dünyaya uyğunlaşdırır.

Subyekt-obyekt qarşılıqlı əlaqələri ilə bağlı bu məqamda insanın (subyektin) incəsənət əsərlərinə (obyektə) münasibətini əks etdirən məsələ barədə bir haşiyəyə çıxmağı vacib hesab edirəm:

Haşiyə. *İnsan bədii əsər oxuyarkən və ya incəsənət əsərlərini (film, tamaşa, təsviri sənət və s.) seyr edərkən nədən özünü gerçək obyektin iştirakçısı hesab edir – məsələn, insan hər hansı bir bədii filmi izləyərkən onun sujet xəttini təşkil edən hadisələrin yaradıcı təfəkkürün məhsulu (gerçək mövcud olmayan hadisələr) olduğunu dərk etdiyi halda, o, insanda həm də gerçək hadisə assosiasiyası yaradır? (Yəni insan nə üçün həmin anda müəyyən emosiyalara qapılır, hadisələrin onların arzuladığı şəkildə baş verməsini arzulayır?)*

Cavab. *Məsələ ondadır ki, insan şüuru elə struktura malikdir ki, ehtimal olunan hər bir hadisənin gerçəkləşə biləcəyinə onda bir inam mövcuddur, yəni o düşünür ki, ehtimal olunan hər bir hadisə baş*

verə bilər. Və yaxud o, inanır ki, baş verməsi mümkün olan hər bir hadisə ehtimal olunandır. **Bu aspektdə onun düşüncəsi seyr etdiyi filmdə təsvir olunan hadisələrin hansısa gerçək bir hadisənin (ya baş verən, ya da baş verəcək hadisənin) mövcudluğu barədə təsəvvürləri oyadır. Yəni onun şüurunun hansısa bir hissəsində filmdə izlədiyi hadisənin ya baş vermiş, ya da baş verəcək hansısa hadisənin təsviri olduğu barədə təsəvvürlər mövcuddur. Məhz filmdəki hadisənin gerçək mövcudluğu barədə yaranan bu təsəvvürlər onda film barədə "reallıq" assosiasiyasının yaranmasına səbəb olur.**

Deməli, elmi biliklər və incəsənət əsərləri, doğurdan da, təsəvvürlərlə (subyekt) gerçək dünya (obyekt) arasında əlaqələr quran ən mükəmməl vasitələrdir. Sanki bu mərhələdə antitezisdən tezisə (Hegel) qayıdış baş verir və Popperin təbirincə isə "üçüncü dünya birinci dünyanı dəyişdirib ikinci dünyaya uygunlaşdırır".

Subyekt zənginliyi adlandırdığımız bu təsnifat dərketmə prosesində obyektdən – dərkediləndən zəngin təsəvvürlər əldə etməklə yanaşı, elmi-yaradıcı idrakın imkan zənginliyini də özündə etiva edir. Beləliklə, idrak subyekt və obyektinin qarşılıqlı əlaqələrinin qeyd etdiyimiz bu və digər iki təsnifatı vasitəsilə subyekt-obyekt münasibətləri konteksində QSÇ nəzəriyyəsinin epistemoloji xarakteristikasını nəzərdən keçirə bilərik.

3. QSÇ nəzəriyyəsinin subyekt-obyekt münasibətləri konteksində epistemoloji xarakteristikası

Məlumdur ki, yeni elmi nəzəriyyələrin yaranması elmi-fəlsəfi idrakda subyekt və obyekt qarşılıqlı münasibətlərinə də yeni baxışın mövcudluğunu zəruri edir. İdrak prosesində subyekt özündən kənar obyekti dərk etməklə yanaşı, həm də onun müşahidəçisidir. Doğurdan da subyekt metamüşahidəçi olaraq həm dərkedən, həm də idrak prosesinin müşahidəçisi funksiyasını yerinə yetirirr. QSÇ nəzəriyyəsinin yaranması digər fundamental elmi nəzəriyyələr kimi elmi-fəlsəfi idrak prosesini də fəallaşdırdı. Bu nəzəriyyənin epistemoloji xarakteristikası tədqiqat obyektinə yeni ontoloji və substansional münasibətlər formalaşdırdı. Səlis olmayan münasibətlərin doğurduğu qeyr-müəyyənlik şəraitində QSÇ nəzəriyyəsinin köməyi ilə qurulan modellər tədqiqat obyektinin kəmiyyət göstəriciləri ilə yanaşı, obyektə xas substansional xarakterli yeni keyfiyyət göstəricilərini də özündə etiva etməklə daha səlis və adekvat aparat rolunu icra edir [4,7,10]. Qeyri-səlis münasibətlərdə obyektin çoxqiymətli məntiqi mülahizələrlə tədqiqi klassik məntiqi yanaşmalardan fərqli olaraq obyekt barəsində daha çox və adekvat təsəvvürlər əldə etməyə imkan verir. Təbii ki, QSÇ nəzəriyyəsinin bu kimi elmi-qneosoloji xarakterisikası idrak prosesində subyekt və obyekt qarşılıqlı əlaqələrində yaranan yeni münasibətlərin epistemoloji təhlilini zəruri edir.

Çoxqiymətli məntiqin subyekt-obyekt münasibətlərində nə kimi yeni və adekvat hallar yaratdığını müəyyənləşdirmək məqsədilə əvvəlcə klassik məntiqi və qeyri-səlis məntiqi nəticələrin alınmasına aid iki sadə nümunə ilə tanış olmağı vacib hesab edirəm [11,12]. Düşünürəm bu nümunədən alınan epistemoloji nəticələr həm də obyektin ontoloji və substansional xarakteristikasında yeni münasibətlərin də üzə çıxmasını ifadə etmiş olacaq.

Məntiqi nəticələrlə bağlı modus ponens qaydasına [3,5] müraciət edək:

***1-ci hal**. Klassik məntiqdə modus ponens qaydası.*

1-ci mühakimə: A doğrudursa, B də doğrudur.

2-ci mühakimə: A doğrudur.

Nəticə: B doğrudur.

Uygun bir nümunəyə baxaq:

Nümunə 1.

1-ci mühakimə: əgər alma qırmızıdırsa (A),onda alma yetişib(B).

2-ci mühakimə: alma qırmızıdır (A).

Nəticə: alma yetişib (B).

Söhbət klassik – ikiqiymətli məntiqdən gedirsə, məlumdur ki, A və B səlis məntiqi mülahizələrdir və bu qaydanın yalnız A-nın mütləq doğru qiymətində tətbiqi mümkündür. Əgər hətta A-ya çox yaxın hansısa mülahizə doğru olarsa, bu qaydanın tətbiqi mümkün deyildir. Bu qayda yalnız mülahizələrin mütləq doğru qiymətləri üçün ödənilir və "Üçüncünün istisna qanunu"na tabedir. Yəni binar məntiqə görə, ya A doğrudur (məntiqi qiymət: 1), ya da onun tərsi (məntiqi qiymət: 0). Bu mühakimələr obyektə xas keyfiyyətin yalnız mütləqliyini ifadə etməklə subyektə obyekt barədə "ya-ya" seçimi ilə mütləq doğru bir vəziyyət (alma qırmızıdırsa - A, deməli, yetişib - B) və yaxud tərsini (alma qırmızı deyilsə - $\bar{A}$, yetişməyib - $\bar{B}$) təqdim edir.

Lakin aydındır ki, çox hallarda, xüsusilə, obyektə qeyri-səlis münasibətlər şəraitində idrak prosesi "ya-ya" seçimi ilə işləmir, subyekt tədqiqat obyektindən daha çox keyfiyyət göstəriciləri əldə etməyə

çalışır. Subyektin bu kimi koqnitiv tələbini isə yalnız QSÇ nəzəriyyəsinin doğurduğu çoxqiymətli məntiq hesabına ərsəyə gələn qeyri-səlis təfəkkür modelləri vasitəsilə həyata keçirmək mümkündür.

2-ci hal. Qeyri-səlis məntiqdə modus ponens qaydası.

Fərz edək A və B hər biri fərqli universum çoxluğun əsasında qurulmuş qeyri-səlis çoxluqlar, x və y isə bu çoxluqların uyğun elementləridir. A və B arasında müəyyən əlaqə (uyğunluq) olduğunu nəzərə alaraq modus ponens qaydasını aşağıdakı şəkildə daxil edək:

1-ci mühakimə: əgər x A-ya daxildirsə, onda y B-yə daxildir.

2-ci mühakimə: x A-ya daxildir.

Nəticə: y B-yə daxildir.

Məlumdur ki, qeyri-səlis çoxluqların hər biri elementi müəyyən dərəcə ilə çoxluğa daxildir və elementin çoxluğa daxil olma dərəcəsini ifadə edən mənsubiyyət funksiyası [0,1] qapalı intervalından kəsilməz sonsuz (kontinuum) qiymət alan funksiyadır. Yəni elementin çoxluğa mənsubiyyəti çoxlu sayda vəziyyəti özündə etiva edir. Qeyri-səlis məntiqi nəticənin alınmasını ifadə edən bu qaydada da analoji hal nəzərə alınaraq hesab olunur ki, x elementi A-ya hansı dərəcə ilə daxildirsə, y də B-yə eyni dərəcə ilə daxil olmalıdır [10] .

Aydınlıq üçün uyğun nümunə daxil edək:

Nümunə 2.

1-ci mühakimə: əgər alma qırmızıdırsa (A), onda alma yetişib(B).

2-ci mühakimə: alma açıq (tünd) qırmızıdır.

Nəticə: alma az (çox) yetişib.

Bu nümunə birincidən fərqli olaraq qeyri-səlis münasibətlər əsasında obyektin rəng çalarlarının (nümunədə yalnız ikisi nəzərdə tutulsa da, digər halların da nəzərə alınmasını üçün zəmin yaradır – məsələn: alma alaqırmızıdır – alma yarımyetişmiş vəziyyətdədir; alma qismən qızarıb – alma qismən yetişib və s.) müxtəlifliyini və bu müxtəliflik əsasında subyektə obyektin keyfiyyəti barədə uyğun adekvat nəticələr çıxarmağa imkan verir [4]. Əgər birinci nüminə irəli sürülən mühakimə əsasında obyekt barədə binar məntiq hesabına yalnız bir nəticə əldə etməyə imkan verirdisə, ikinci nümunə qeyri-səlis məntiqi nəticələr hesabına daha çox və daha adekvat nəticələr əldə etməyə imkan verir ki, əslində, bu şəkildə baş verən idrak prosesi insan təfəkküründə daha adekvat münasibətlər doğurur.

Deməli, QSÇ nəzəriyyəsi hesabına yaradılan təfəkkür modelləri obyekt barədə kəmiyyət göstəriciləri ilə yanaşı, daha zəngin kəmiyyət göstəriciləri də əldə etməyə imkan verir. Qeyri-səlis modellər subyektin obyektə daha çox yaxınlaşmasını - biektivliyi özündə etiva etməklə daha adekvat modellərin qurulmasını təmin edir. Eyni zamanda qeyd etməliyik ki, tədqiqat obyektinin QSÇ nəzəriyyəsi (qeyri-səlis modellər) hesabına həyata keçirilən qnoseoloji təhlilləri obyektin daha çox keyfiyyət göstəricilərini üzə çıxarmaqla ontoloji və substansional xüsusiyyətlərinə də müəyyən baxışlar formalaşdırır. K,Popperin qeyd etdiyinə istinad etsək görərik ki, doğurdan da QSÇ bir elmi nəzəriyyə olaraq obyekt dünyası ilə subyekt dünyasını vəhdət halına gətirməklə həm də obyekt dünyasını dəyişdirmiş olur (elmi idrak prosesində obyektdən daha zəngin keyfiyyətlər əldə edib alınan nəticələrdən elmi-praktik sahələrdə tətbiqi nəzərdə tutulur).

Subyekt-obyekt münasibətləri konteksində QSÇ nəzəriyyəsinin epistemoloji təhlili zamanı bir məsələnin də qeyd etməyi vacib hesab edirəm. Bəzi elmi-fəlsəfi mühakimələrə görə, postqeyri-klassik idrak mərhələsi subyektivlik konsepsiyasını önə çıxarmış oldu. Bunun nəticəsində obyektin "şey özündə" – noumen konsepsiyasını irəli sürən Kant idrak nəzəriyyəsinə yaxın fəlsəfi refleksiyalar aktuallaşdı. Yəni tədqiqat obyekti barədə empirik və rasional olaraq nə qədər bilik əldə olunarsa, obyekt yenə də müəyyən mənada noumen olaraq qalır və "subyekt kəsadlığı" subyektdə fenomenliyə səbəb olur. L.Zadənin öz qənayətinə görə də istənilən situasiyada qərar qəbuletmədə qeyri-müəyyənlik həmişə mövcud olur və bunun nəticəsində tədqiqat obyektinin bütün parametrlərini nəzərə almaq mümkün olmur [4,7]. Bu aspekt nəzərə alınarsa idrak prosesində "subyekt kəsadlığı" qaçılmazdır. Lakin QSÇ nəzəriyyəsi əsasında yaranan çoxqiymətli məntiq (qeyri-səlis məntiq) nəzəriyyəsi məntiqi qiymətlər oblastına kontinuum (sonsuz kəsilməz – (0,1)) xüsusiyyət verməklə tədqiqat obyektinin çoxmənalı keyfiyyət xüsusiyyətlərini də üzə çıxarmış olur ki, bu da "subyekt zənginliyi" sayıla bilər [9]. İdrak prosesində noumenlik kimi reallığa (qeyri-müəyyənlik şəraitində tədqiqat obyektinin bütün parametrlərinin nəzərə alınmasının mümkünsüzlüyü konteksində) baxmayaraq, hesab edirik bu gün QSÇ nəzəriyyəsi (QSM nəzəriyyəsi) hesabına yaradılan qeyri-səlis modellər tədqiqat obyektindən zəngin keyfiyyət göstəriciləri əldə etməklə obyektə daha çox subyekt yaxınlaşmasını – biektivliyi və "subyekt zənginliyi"ni təmin edən daha səlis modellərdir.

4. Nəticə

İdrak nəzəriyyəsində subyekt və obyekt anlayışlarının, eyni zamanda onlar arasında əlaqələrin öyrənilməsi mühüm məsələlərdən biri olduğunu nəzərə alıb, fəlsəfə tarixinə istinadən subyekt-obyekt münasibətlərinin təsnifatı aparılmışdır. Məlumdur ki, elmi-fəlsəfi idrakın müxtəlif (klassik, qeyri-klassik və postqeyri-klassik) mərhələrində obyektivlik və subyektivlik konsepsiyalarının birinin digərindən üstünlüyü müşahidə olunmuşdur. Bu tədqiqat işində postqeyri-klassik idrak mərhələsinə keçiddə mühüm rol oynamış elmi nəzəriyyələrdən biri olan qeyri-səlis çoxluqlar (QSÇ) nəzəriyyəsinin subyekt-obyekt münasibətləri (apardığımız təsnifat əsasında) konteksində bəzi epistemoloji xarakteristikaları müəyyənləşdirilmişdir. Həmçinin tədqiqat obyektinə münasibətdə klassik məntiqi nəticələrin çıxarılması ilə qeyri-səlis məntiqi nəticələrin çıxarılmasının qnoseoloji təhlili aparılmışdır. Bu təhlilə istinadən qeyri-səlis modellərin tədqiqat obyektinin daha çox parametrlərini və keyfiyyət göstəricilərini nəzərə almaqla idrak subyekt və obyektinin bir-birinə daha çox yaxınlaşmasını etiva edən modellər olduğu əsaslandırılmışdır.

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Technical sciences

DDOS ATTACKS DEFENSE AND MONİTORİNG SYSTEMS: ANALYSİS AND PERSPECTİVES

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Abstract

DDoS (Distributed Denial of Service) attacks are one of the biggest threats to modern information security. These attacks overload target systems, causing them to shut down or leading to data breaches. This thesis analyzes the various types of DDoS attacks, countermeasures, the principles of modern defense and monitoring systems, as well as future research directions in this field.

***Keywords**: DDoS attacks, traffic filtering, cloud technologies, anomaly detection, machine learning, information security.*

INTRODUCTİON

In the modern era, alongside the rapid development of information technologies, network security issues have become increasingly important. Specifically, DDoS (Distributed Denial of Service) attacks have become a serious threat to both individual users and corporate networks. These attacks aim to overload target systems, causing them to stop functioning or capture data. Therefore, the creation of effective defense and monitoring systems against DDoS attacks is one of the priority issues in the field of information security (Demir, A., & Kaya, B. (2020)).

This thesis will analyze various types of DDoS attacks, countermeasures, the principles of modern defense and monitoring systems, as well as future research directions in this field. The goal is to investigate the existing problems and solutions for preventing DDoS attacks and ensuring information security.

MATERİALS AND METHODS

This research investigates modern defense and monitoring systems against DDoS attacks using various data sources and methods. The primary objective is to analyze attack types, countermeasures, and prospective technologies to propose effective solutions for information security.

The research utilizes scientific papers, company reports, and open-source software. Technical documents from companies like Kaspersky Lab, Cloudflare, IBM, and Cisco were analyzed to gain an in-depth understanding of modern defense Technologies (Иванов, П. С. (2019)).

The study employed comparative analysis, statistical analysis, anomaly detection, and application analysis methods. For instance, traffic analysis techniques like MULTOPS, D-Ward, and defense systems like IBM Proventia Network IPS, Cisco Guard were evaluated. The application of machine learning, cloud technologies, and blockchain in combating DDoS attacks was also explored (Huseynov, Z. N., Mammadov, M. I., & Ismayilov, T. A. (2023)).

EXPERİMENTAL RESEARCH

Types of Harmful Technologies and Methods of Counteraction

Currently, one of the most widespread types of attacks is HTTP or HTTP flood attacks. The essence of these attacks is to send a large number of HTTP packets to the target server, causing the system to stop functioning or filling up the network channel. Criminals typically target sensitive pages through scripts that demand significant resources and return large responses. In some cases, attackers attempt to mimic the actions of legitimate users (Demir, A., & Kaya, B. (2020)).

The second most common type of attack is SYN flood attacks. These attacks utilize the "three-way handshake" mechanism of the TCP protocol. Zombie computers send a large number of SYN connection requests to the server but do not respond to these requests. As a result, a "half-open connection" queue is created on the server, leading to the exhaustion of system resources.

UDP and TCP flood attacks are conducted by sending large volumes of UDP and TCP packets to the target server. The main countermeasures for these attacks are traffic filtering and resource concentration. To minimize the risk of attack, it is recommended to increase the channel's throughput in advance.

If the attacked entity is a single web server, not only the databases but also the web resource itself and the scripts embedded within it can cause high load. In this case, it is essential to increase the server's resources: upgrading processor power, installing additional memory devices, or implementing other resource optimization measures. Another approach is to separate web servers into individual clusters using specialized tools. This helps to distribute the server's load more efficiently and enhance resistance to attacks.

However, the resource expansion method cannot be considered an ideal solution against network attacks and has certain limitations (Huseynov, Z. N., Mammadov, M. I., & Ismayilov, T. A. (2023)):

• Since hardware components need to be upgraded, it is not possible to immediately increase resources.

• Maintaining the maximum resource level over a long period is not economically feasible.

One of the most effective solutions to overcome these limitations is the implementation of cloud technologies. Through these technologies, resources can be dynamically increased when necessary.

Filtration Methods for Preventing Attacks

One of the most effective methods to prevent attacks is traffic filtration. This method blocks malicious requests while minimizing the impact of unreliable and suspicious requests on the system. This approach ensures the stable and continuous operation of the system without the need for additional resources.

Two types of traffic analysis are used in the filtration process (Huseynov, Z. N., Mammadov, M. I., & Ismayilov, T. A. (2023)):

1. ***Quantitative analysis** – Attempts to detect the attack based on the symptom of increased load.*
2. ***Qualitative analysis** – Detects abnormalities in traffic and prevents harmful activities. To increase the effectiveness of traffic filtration, two main tasks must be solved:*

1. *Identifying the start of the attack.*
2. *Identifying the source of malicious traffic.*

The accuracy of these tasks directly affects the success of defense measures. There are two main approaches to identifying the start of an attack:

*• **Exploitation-based approach** – Compares the current system state with data related to typical attacks.*

*• **Anomaly detection-based approach** – Compares the current system state with normative indicators.*

Both approaches have their advantages and disadvantages. Therefore, modern defense systems combine these methods. This approach provides more effective protection against both known attacks and new threats.

Main Methods for Attack Detection

One of the simplest methods is "rule-based systems." While these methods are simple and easy to apply, they have limited capabilities in detecting new and dynamic attack types.

More widespread methods are those based on quantitative analysis. Below are the key methods related to these approaches:

1. ***MULTOPS** – Analyzes the ratio between incoming and outgoing packets.*
2. ***MIB variables** – Records the number and type of packets and the number of requests.*
3. ***ACC** – Records the number of packets coming from various sub-networks.*
4. ***Network-Aware Clustering** – Groups incoming requests by sub-networks and compares them.*

5. **Hop-Count Filtering** – Measures the hop distances through the network to filter correct or incorrect IP addresses.
6. **Gateway-Based** – Divides data flows based on their impact level.
7. **D-Ward** – Checks the legitimacy of traffic based on TCP, ICMP, and UDP protocols:
   - **TCP** – Considers the number of TCP-ACK packets.
   - **ICMP** – Analyzes the number of ICMP packets.
   - **UDP** – Measures the number of UDP connections and packets.

By combining these methods, early detection and effective defense strategies can be developed, resulting in high success in combating DDoS attacks.

RESULTS AND DİSCUSSİON

The results of this research show that DDoS attacks represent a serious threat to modern information security. Attack types such as HTTP-flood, SYN-flood, UDP-flood, and TCP-flood deplete the resources of target systems, causing them to stop functioning. Various defense methods are applied to effectively combat these attacks.

Key Findings (Смирнов, В. А., & Кузнецов, Д. И. (2020)**):**

1. **Traffic Filtering**: Quantitative and qualitative analysis-based methods (e.g., MULTOPS, D-Ward) are effective for detecting and blocking malicious traffic, though they have limitations in detecting new types of attacks.
2. **Anomaly Detection**: Detecting attacks by comparing system behavior with normal conditions is more effective against new and dynamic threats, but it requires sufficient statistical data beforehand.
3. **Cloud Technologies**: While dynamically scaling resources can reduce the impact of attacks, it is accompanied by high financial costs.
4. **Machine Learning and Artificial Intelligence**: These technologies are considered promising for automatically detecting and blocking malicious traffic, but the accuracy of training models and the quality of data are crucial factors.

Discussion:

The most effective approach to combating DDoS attacks is a combination of various methods. For example, combining traffic filtering with anomaly detection provides higher effectiveness against both known and new threats. Additionally, cloud technologies and machine learning approaches facilitate the further development of defense systems.

However, challenges arise when applying these methods, such as the need to collect sufficient statistical data for anomaly detection and the precise training of machine learning models. Moreover, the high costs of cloud technologies may pose a problem for small and medium-sized enterprises.

Perspectives:

Future research directions are recommended as follows:

- **Application of Machine Learning and Artificial Intelligence**: Developing new algorithms for more accurate detection and blocking of malicious traffic.
- **Blockchain Technologies**: Using blockchain for network security enhancement and identifying attack sources.
- **Edge Computing**: Creating distributed defense systems and minimizing the impact of attacks.

Ultimately, combating DDoS attacks is a priority issue for ensuring information security. The application of modern technologies and the development of future research will contribute to the creation of more effective defense systems against these threats.

Conclusion

This work examined the basic principles of DDoS attacks. Recent DDoS attacks were tracked, and reports from various companies in the field of information security were analyzed. These reports contain information on methods for preventing network attacks and various approaches to their application.

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UDC 669-1

THE STUDY OF THE FORM OF GOLD OCCURRENCE IN GOLD-CONTAINING ORES OF CENTRAL KAZAKHSTAN

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Abstract

This work presents studies on the forms of gold found in a flotation concentrate sample. The research results showed the absence of large visible gold particles. It was established that gold in the flotation concentrate sample is present in its native form, accounting for 99.96%. Gold in the form of tellurides of various compositions accounts for no more than 0.04%. The majority of gold grains are represented by particles sized 10-38 microns – 82.89%. Approximately 63% of the gold is found in a free state.

Keywords: *Gold, flotation concentrate, forms of occurrence, minerals, chemical composition, phase composition.*

Introduction

Gold-bearing concentrates from Central Kazakhstan represent a valuable resource that plays a key role in the region's mining industry. Kazakhstan is one of the largest gold producers in Central Asia, and Central Kazakhstan, in particular, is known for its large gold deposits, such as Voskresenskoye, Akbastau, and others. Gold in these ores occurs in various forms, which determines the diversity of extraction technologies.

Gold in the gold-bearing ores of Central Kazakhstan can be found in a free state, as well as being associated with other minerals such as pyrite, arsenopyrite, and other sulfides. In quartz ores, gold is often present as fine dispersed particles, while in sulfide-rich ore bodies, it is frequently encapsulated in sulfide minerals. The composition of these concentrates depends on the type of ore and the conditions of the deposit, which affects the choice of processing and gold extraction methods [1, 2].

Ore concentrates typically contain not only gold but also other valuable and by-product components such as copper, lead, and zinc. It is important to note that the presence of various accompanying minerals, such as galena, sphalerite, and others, can significantly alter the chemical composition of the concentrates. This fact must be taken into account when selecting technologies for their processing and gold extraction, as different minerals may require specific processing methods. Developing effective gold extraction methods based on the characteristics of gold-bearing ores and their mineral composition is a crucial task for enhancing the economic efficiency of mining enterprises.

Studying the chemical composition of gold-bearing concentrates is also important for optimizing purification processes and improving the quality of the final product. Alongside this, an important aspect is the environmental safety of processing these concentrates, as many sulfide minerals can be sources of environmental pollution [3-6].

Thus, researching the forms of gold occurrence and the composition of concentrates in Central Kazakhstan is necessary for developing more effective methods of ore extraction and processing, which in turn contributes to the development of the mining industry in the region and enhances Kazakhstan's competitiveness in the global market.

The aim of the study is to investigate the forms of gold occurrence in flotation concentrates.

Research methods

The study of the forms of gold in the sample of the flotation concentrate was carried out in stages. Initially, preliminary studies were carried out using the Olympus SZX-7 stereomicroscope for the presence of large visible gold particles, followed by further studies of the forms of gold on an electron microscope.

The results and their discussion

The results of the studies showed the absence of large visible gold particles. It was established that gold in the flotation concentrate sample is present in its native form, accounting for 99.96%. The remaining part of the gold (0.04%) is found in the form of tellurides with various compositions. Due to the small amount of tellurides, the technological and mineralogical characteristics were studied only for native gold.

Figure 1 shows the granulometric characteristics of the gold grains in the flotation concentrate sample. A significant portion of the valuable component is represented by particles sized 10-38 µm, which account for a total of 82.89%. The amount of fine particles less than 2 µm does not exceed 1.73%. In the size range from 2 to 10 µm, the gold content varies from 2.88% to 5.22%.

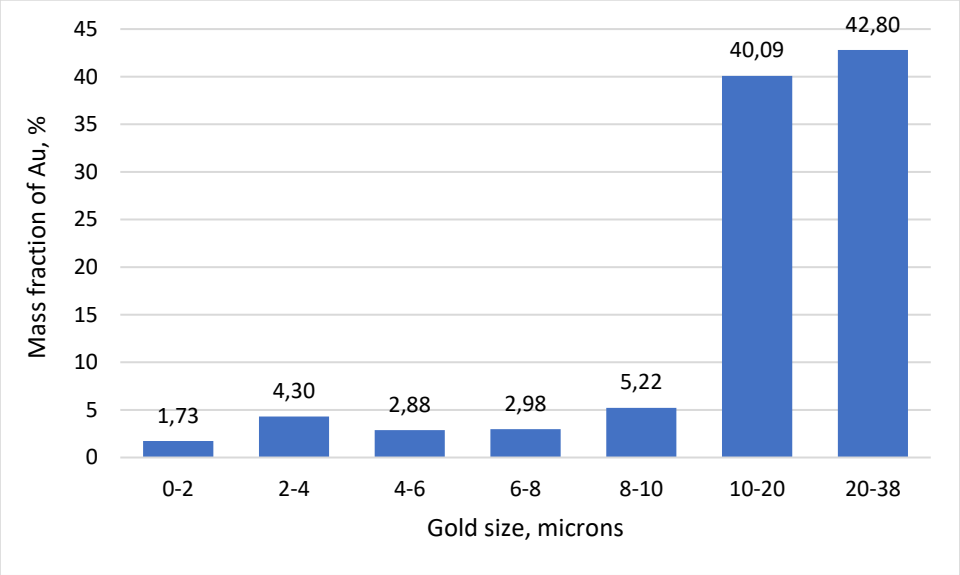


Figure 1 - Granulometric characteristics of gold

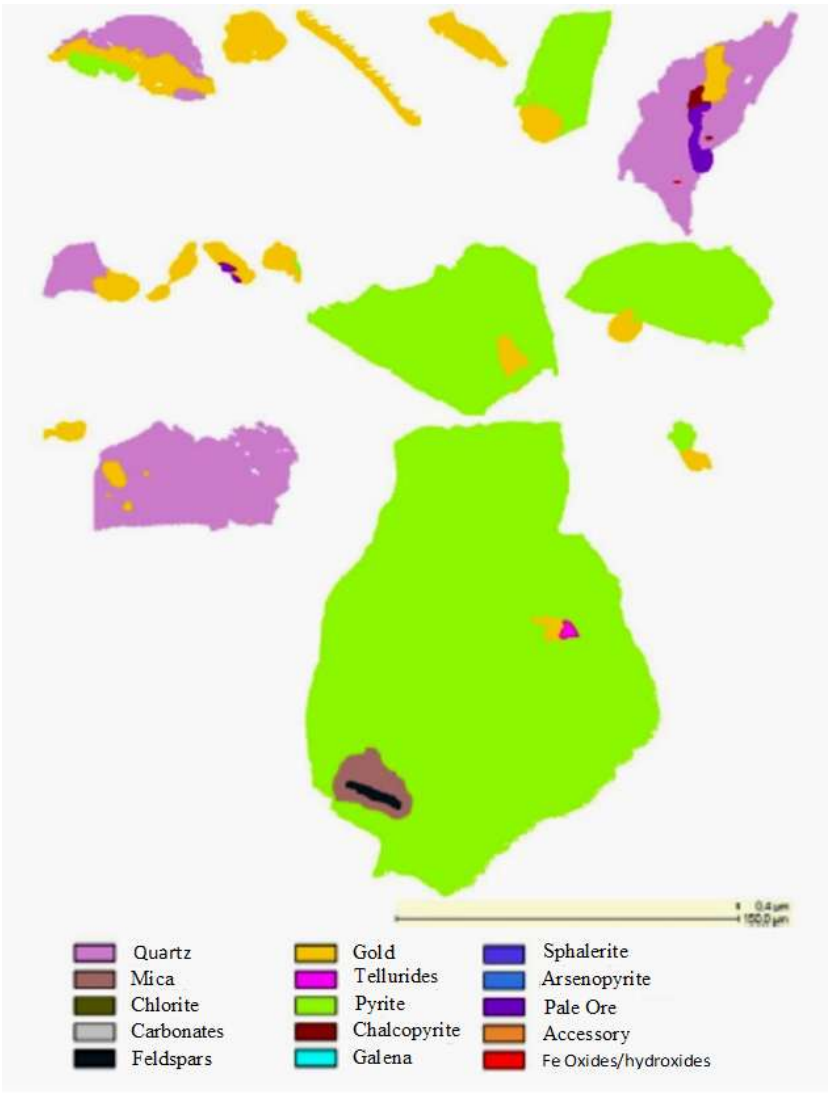
The results of the mineral associations of gold in the flotation concentrate sample, presented in Table 1, show that the matrix includes free gold and gold with partially exposed surfaces. Thus, 69.15% of the grains of the valuable component have access for the solution and reagents to the surface of the grain.

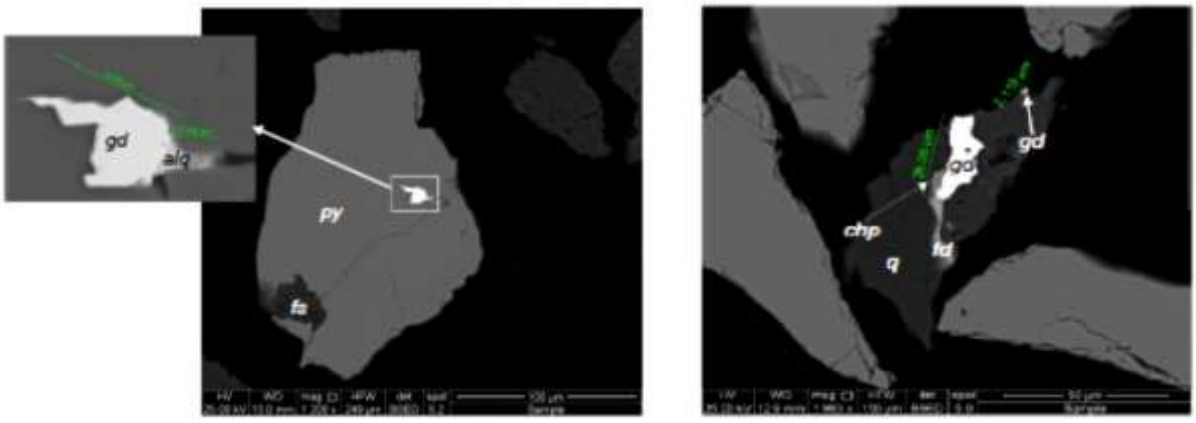
Table 1

Mineral associations of gold

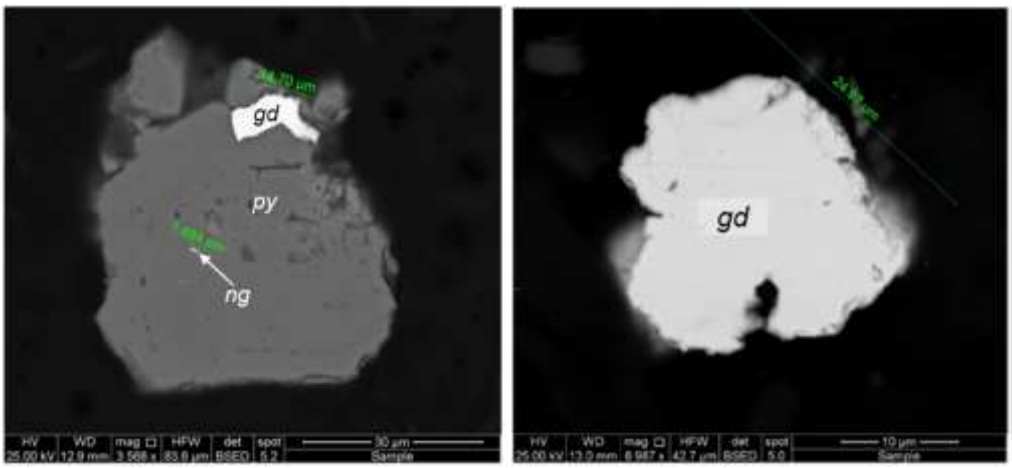
Mineral, a group of minerals	*Mass fraction of gold, %*
Background	*69,15*
Quartz	*3,07*
Mica	*0,11*
Chlorite	*0,60*
Feldspars	*0,05*
Tellurides	*0,86*
Pyrite	*25,03*
Chalcopyrite	*0,35*
Galena	*0,004*
Sphalerite	*0,11*
Arsenopyrite	*0,03*
Pale Ore	*0,62*
Accessory minerals	*0,03*
Total:	***100,0***

The main mineral associated with gold in the flotation concentrate sample is pyrite. The share of such aggregates accounts for 25.03% of the metal. In contact with quartz, the gold content is 3.07%. In association with other minerals, the gold content is in the tenths and hundredths of a percent. The established patterns are clearly illustrated by fragments of the mineral particle map of gold in the flotation concentrate sample and the associations of gold with various minerals, as shown in Figure 2.


Quartz
Mica
Chlorite
Carbonates
Feldspars
Gold
Tellurides
Pyrite
Chalcopyrite
Galena
Sphalerite
Arsenopyrite
Pale Ore
Accessory
Fe Oxides/hydroxides


gd
py
fs
gd
chp
q

a) b)



c) *d)*

a) – Pyrite (py) with inclusions of feldspar (fs) and native gold (gd) in association with the mineral lead (altaite (alq));
b) – Native gold (gd) in association with quartz (Q), chalcopyrite (chp), and pale ore (fd);
c) – Pyrite (py) with inclusions of gold of variable composition (native gold (gd), nagiagite (ng));
d) – Free grain of native gold (gd)

Figure 2 - Map of gold mineral particles in a flotation concentrate sample and images of gold grains in association with various minerals

The studies of the chemical composition of the flotation concentrate show that its chemical composition consists of 55.17% lithophile components, with a mass fraction of 55.17%. The main components are silica and alumina, with mass fractions of 36.4% and 8.26%, respectively. The total share of oxides of alkali and alkaline-earth metals, with a significant predominance of sodium oxide at 3.0%, is approximately 6.90%.

The ore-forming components in the flotation concentrate sample are mainly represented by iron and sulfur, with iron predominantly in the form of sulfides. The sulfur content is 22.90%.

The mineral composition of the flotation concentrate sample is 58% composed of rock-forming minerals. The main minerals include plagioclases, which make up 26%. The quartz content is at 18%. The mica content is 9%, and carbonates account for 5%.

The ore mineralization of the flotation concentrate is mainly represented by pyrite, which has a mass fraction of 40.7%. Other sulfides are present in trace amounts, at the level of tenths of a percent. Iron hydroxides account for 0.5% of the total mass of the sample.

Conclusions. *It has been established that gold in the flotation concentrate sample is present in its native form. The share of gold in the form of tellurides with various compositions accounts for no more than 0.04%. The main mass of gold grains consists of particles sized 10-38 μm, which make up 82.89%. Approximately 63% of the gold is in its free form. The share of locked grains is 9.23%. The main mineral in the flotation concentrate sample with which gold is associated is pyrite, making up 25%. The share of gold associated with quartz is 3.07%. In association with other minerals, gold content is found in the tenths and hundredths of a percent of the total mass of native gold.*

It is expected that the gold's resistance to the cyanidation process will be influenced by the presence of oxidized films on the surface of the metal and its association with carbonates and minerals insoluble in aqua regia.

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