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Inhalt

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Production of Brazzein Using Cell-Free Protein Synthesis (CFPS) System

Key words*: brazzein, sugar substitute, Escherichia coli, cell-free protein synthesis (CFPS) system, multicopy pET42mut plasmid*

Annotation*. Feasibility of producing brazzein sweetener by cell-free biosynthesis procedure as an alternative to classical submerged fermentation method was evaluated in the present investigation. Chimeric RNA polymerase of T7 bacteriophage, S30-cell extract of Escherichia coli and multicopy plasmid vector pET42mut with the inserted brazzein gene were engaged for protein synthesis. The completed research resulted in the first successful demonstration of sweet protein biosynthesis in cell-free system. The volumetric brazzein yield under optimized process conditions equaled 2 mg/ml of the reaction mixture, exceeding 57 times the maximum values achieved in the previous studies applying whole-cell expression systems.*

Introduction

Sugar substitutes are substances applied to replace sucrose and to impart sweet taste to food products. As a rule, they possess lower calorie value than sugar and at the same time induce perception of sweetness in oral receptors of comparable or higher intensity.

According to the classification proposed by Calorie Control Council of International association manufacturing sweeteners and low-calorie foodstuffs, fructose, xylitol and sorbitol are referred to sugar substitutes. They are fully assimilated in the body and, like common sugar, serve as energy sources. Such sugar analogs are harmless for human health but, regretfully, they are also charged with excessive calories. A separate group of intense sweeteners is represented by cyclamate, sucralose, neohesperidin, thaumatin, glycyrrhizin, stevioside, lactulose. These compounds are not assimilated and hence bear no calorific value.

In recent years global pandemic spread of obesity and diabetes spurred up keen interest in safe low-calorie natural sweeteners with palatable characteristics. In this respect special emphasis has been focused on sweet-tasting proteins unified into a vital group of sweeteners. To date 6 native proteins capable to cause sensation of immense sweetness in humans were discovered: thaumatin, monellin, mabinlin, brazzein, pentadin, neovulin (1). They are found in plants distributed in the tropical forests of South Asia and Africa. Among the above-mentioned proteins brazzein is distinguished by super sweetness, stability and pleasant aftertaste (2), making it an extremely attractive commercial commodity.

Brazzein was originally isolated from fruit pulp of African plant *Pentadiplandra brazzeana* (2) where it was contained in amount 0.05-0.2% (w/w). It is readily soluble in water (over 50 g/l) and shows isoelectric point around pH 5.4 (3). Structurally brazzein is a monochain protein with molecular mass 6.49 kDa. The presence of four disulfide bridges determines its stability in wide pH (2.5 to 8.0) and temperature range. It was reported earlier (3), that brazzein retained sweet flavor after 2 h incubation at 98ºC or 4.5 h exposure to 80ºC.

To fit perfectly into food industry schemes the novel protein hypersweeteners should match their carbohydrate counterparts in techno-functional performance and preferentially be devoid of calorific burden. So far neither synthetic nor natural alternative sweeteners have been able to imitate adequately the organoleptic pattern of sweet carbohydrates. The major shortcomings are side flavor (bitterness, metallic taste, etc.) and not sugar-resembling time profile.

In concentration 40 g/l brazzein is 1900 times sweeter than sucrose (4), however at higher level – 100 g/l the sugar equivalence index falls to 800.

In comparison with the conventionally applied intense sweeteners brazzein displays vivid advantages described above and only high production costs restrain it to compete on a par with the recognized commercial sugar substitutes on the global market (5).
Aim of this study was production of brazzein in cell-free biosynthetic system based on lysate of *Escherichia coli* cells.

Materials and methods

The brazzein encoding construction comprised vector pET42mut (6), containing gene *kanR* responsible for resistance to antibiotic kanamycin, a strong T7 promoter and polylinker with multiple cloning sites.

Brazzein gene was chemically synthesized by «PrimeTech» company (Belarus) based on the known amino acid sequence of the protein. 3′- and 5′-ends of the gene were extended by nucleotide sequences recognized by restrictase enzymes *Nde*I and *Xho*I, respectively.

The synthesized gene was simultaneously treated by both restrictases in accordance with the protocol recommended by the manufacturer («ThermoFisher», USA) and purified using 1% agarose gel electrophoresis.

Restriction of vector pET42mut was carried out with the enzymes *Nde*I and *Xho*I. The target gene and the vector were fused by T4-ligase in line with the standard guidelines proposed by the manufacturer («ThermoFisher», USA).

The ligation mixture was used to transform competent cells of strain *Escherichia coli* XLBlue by electroporation technique. Restriction and PCR analysis of the resulting clones was conducted in compliance with the standard methods. The results were visualized electrophoretically and processed using BioRad gel recording and software system. Clone sequencing was accomplished with the aid of automatic genetic analyzer Beckman Coulter GenomeLab GeXP™ («BeckmanCoulter», USA) and the accessory commercial kit at the Scientific-Practical Center of Epidemiology and Microbiology, Belarus Republic.

The transformants were grown on LB medium supplemented with kanamycin to the final concentration 80 μg/ml. The cells with integrated plasmids were cultured in the liquid LB medium until subsequent extraction of plasmid DNA by alkaline hydrolysis.

For brazzein synthesis 1.0 ml of the reaction mixture containing 0.25 ml of 30S-cell-free extract derived from *Escherichia coli* BL21(DE3), 0.65 ml of premix, 5 000 activity units of SSo7d-T7-RNA polymerase produced as described earlier (7) and 500 ng of plasmid DNA was incubated at 30ºC during 7 h. Accumulation of the end product was traced by Peterson protein determination method (8).

Upon completion of the synthesis the reaction medium was diluted with 50 mM Na-phosphate buffer (pH 8.0) comprising 300 mM NaCl and 20 mM imidazole and applied onto chromatographic column with Ni-NTA resin («Qiagen», USA). The protein was eluted with 50 mM sodium phosphate buffer (pH 8.0) containing 300 mM sodium chloride and 500 mM imidazole. Following affinity chromatography the specimens were evaluated by SDS-polyacrylamide gel electrophoresis. Fractions incorporating the target protein were pooled and dialyzed against sterile water.

Results and Discussion

The constructions for cloning the genes of interest must include the following essential elements: the target gene, promoter and terminator recognized by the enzymes involved in replication of bacterial cells, the selective gene facilitating screening of transformed cells.

At the first research stage nucleotide sequence of brazzein gene (the size 164 bp) was isolated from commercial non-expression plasmid DNA using endonucleases *Nde*I and *Xho*I (fig. 1). The cleaved gene was ligated to the cloning vector pre-linearized for *Nde*I and *Xho*I restriction sites (fig. 1).

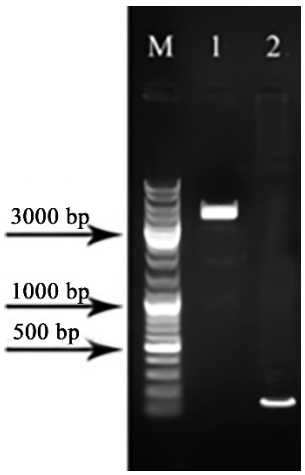

Fig. 1. Electrophoregram of restriction products derived from vector pET42a(+) (1) and brazzein gene (2). M – molecular weight marker of DNA fragments.

The resulting ligatin mixture was engaged for transformation of strain *Escherichia coli* XLBlue. DNA of bacterial colonies was evaluated by PCR analysis to verify the presence of the target gene in the right orientation.

Primers to nucleotide sequence of T7 promoter and to the sequence encoding brazzein were used to initiate the reaction. The obtained results of PCR analysis are presented in Fig. 2.

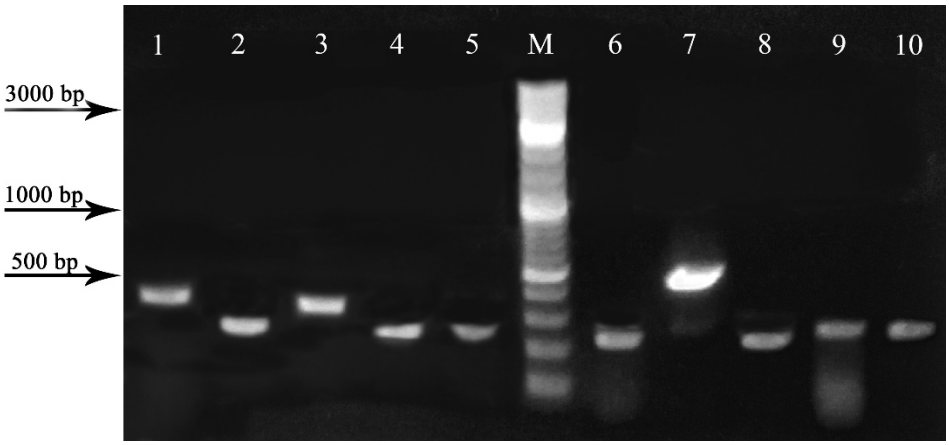

Fig. 2. Electrophoregram of PCR products assessing availability of brazzein gene in the right orientation. 1-10 – clones-transformants.

It is evident from phoregram that clones numbered 2, 4, 5, 6 and 8 carry target gene in the right orientation.

Plasmids were recovered by alkaline hydrolysis from the selected strains-transformants. The isolated circular molecules underwent restriction analysis *via* restrictase *Hind*III recognition site (fig. 3).

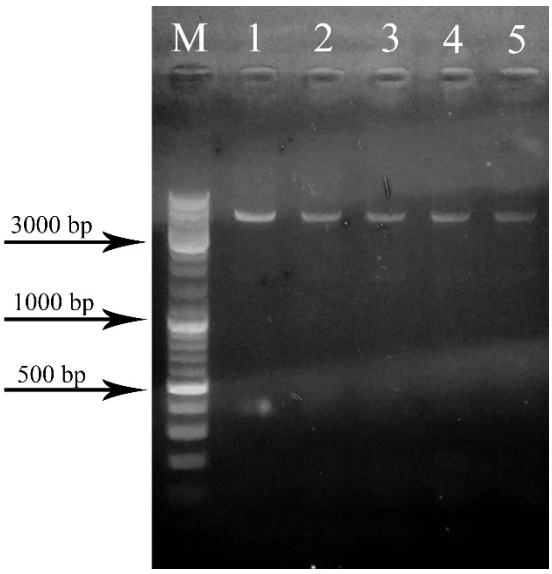

Fig. 3. Electrophoregram of restriction products. 1-5 – restricted plasmid clones.

It may be seen from electrophoregram that all derived linear molecules match theoretically calculated mass value – 5182 bp.

Sequencing of plasmid DNA has revealed in all clones lack of spontaneous mutations in the target gene region and complete coincidence with the reference brazzein gene sequence. The constructed vector was further used for expression of gene product in cell-free biosynthesis system.

At the next research stage the influence of temperature and activity level of SSo7d-T7-RNA polymerase on efficiency of brazzein synthesis was estimated in cell-free system based on S30 extract of *E. coli*. The final concentration of reaction components was as follows: 100 mM of HEPES-KOH buffer (pH 8.0), 8 mM $Mg(CH_3COO)_2$, 90 mM KCH_3COO, 20 mM of potassium phosphoenolpyruvate, amino acid set (1.3 mM each), 0.15 mg/ml of folic acid, 4 ribonucleoside triphosphates (each in concentration 1 mM), 0.05% NaN_3, 2% polyethylene glycol 8 000, 4 U/ml pyruvate kinase, 0.5 mg/ml of plasmid DNA harboring gene encoding brazzein, 0.5 mg/ml of total tRNA (from *E. coli* MRE600), extract S30 derived from *E. coli* cell lysate (30% of overall volume of the reaction mixture).

Incubation lasted 7 h in the temperature range +26ºC to +34ºC with moderate stirring. Fig. 4 illustrates correlation of volumetric brazzein yield with temperature of the reaction.

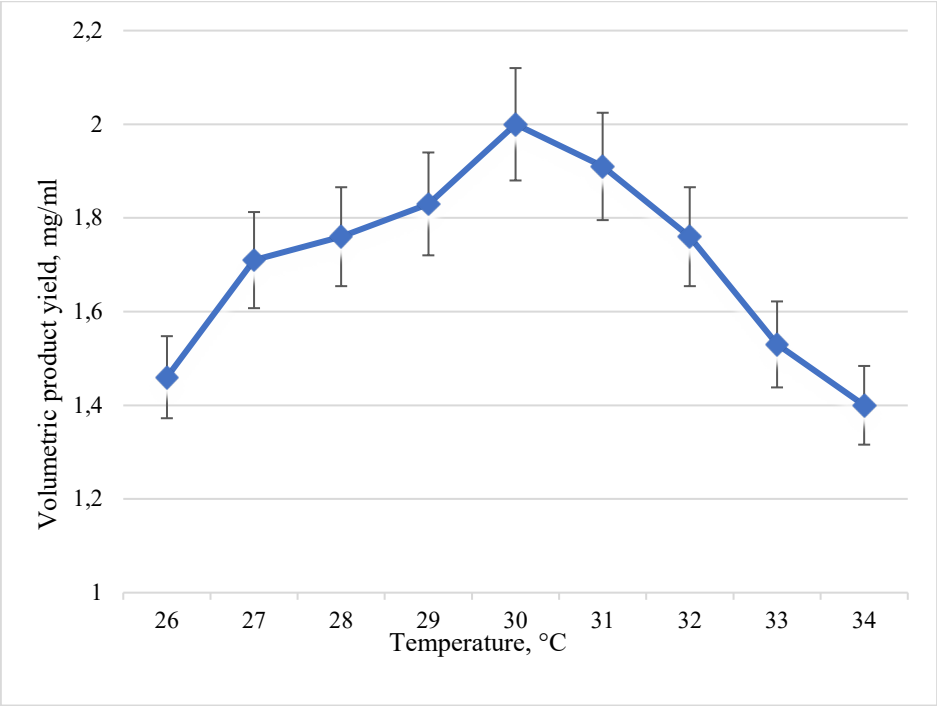

Fig. 4. Relationship between volumetric yield of brazzein synthesis reaction and incubation temperature.

It may be deduced from the graph that the maximum product yield is achieved at incubation temperature 30ºC. This value was regarded as optimal for use in further experiments. The graph of volumetric brazzein yield as a function of added SSo7d-T7-RNA polymerase amount is presented in Fig. 5. It could be assumed from the plot that optimal enzyme activity level of RNA polymerase supplied into reaction mixture equals 5 000 U/ml.

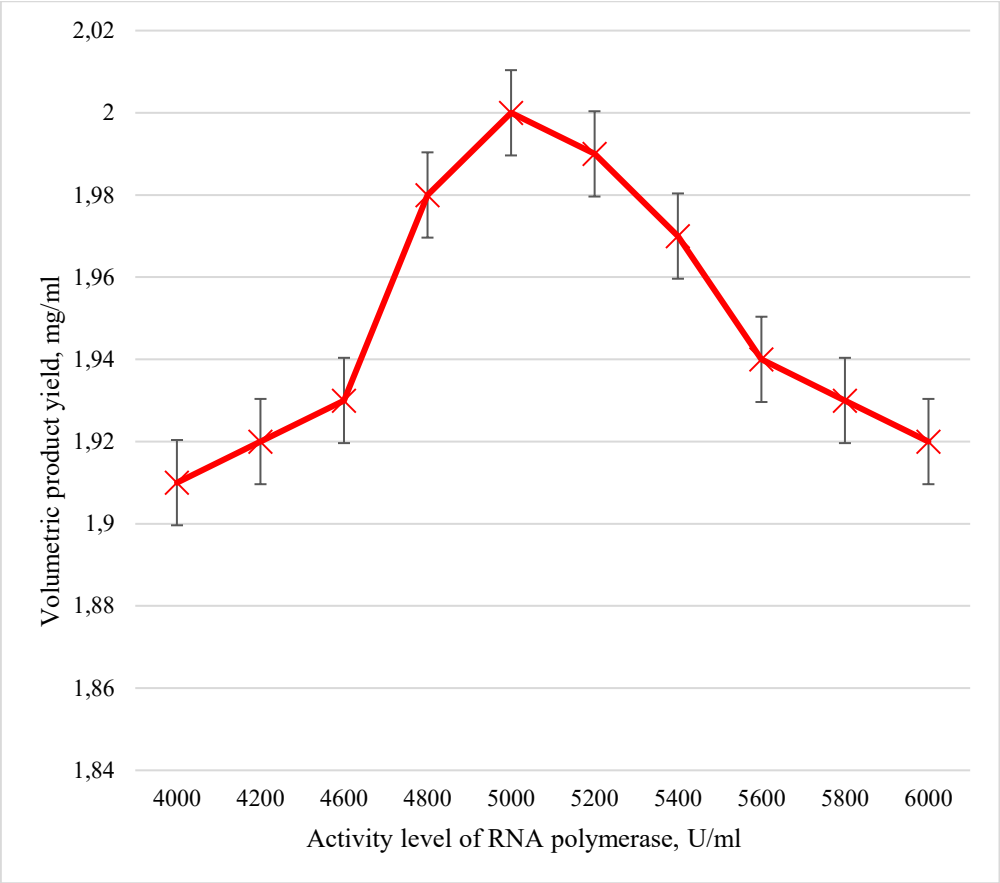

Fig. 5. Relationship of volumetric brazzein yield with enzymatic activity level of supplied SSo7d-T7-RNA polymerase.

At the final research stage a model experiment was performed in cell-free system to produce brazzein in volume 1 ml and recover it from the reaction mixture. The purity grade of protein product following electrophoresis in polyacrylamide gel and its subsequent evaluation by Imagel Lab software («BioRad», USA) exceeded 98% (fig. 6).

According to electrophoresis data, molecular mass of the synthesized protein constituted approximately 7.5 kDa whereas the similar value predicted theoretically from protein amino acid composition was estimated to be 7856 Da. It appears logical therefore that the examined protein product was deduced to be identical to brazzein.

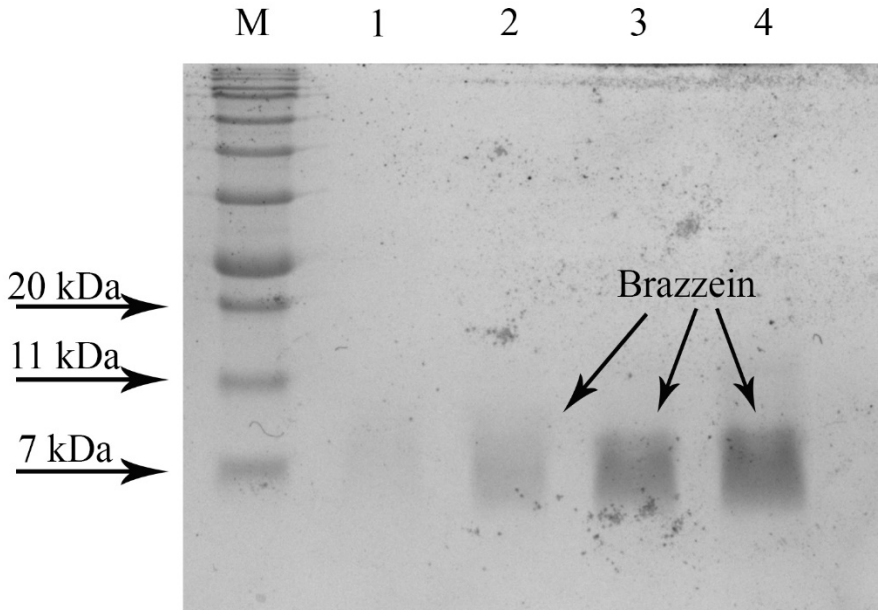

Fig. 6. Electrophoregram of brazzein fractions eluted from the column with Ni-NTA resin.

Brazzein yield in the experiment described above reached 2 mg per 1 ml of the reaction mixture by the time of incubation about 4–7 h. For the sake of fair comparison, it is worthy to state that the previous process of recombinant brazzein biosynthesis in whole-cell expression system took 10–12 h and attained maximal yield 0.030–0.035 mg/ml (9).

Conclusion

This study is the first successful demonstration of brazzein production in cell-free system. Volumetric yield of brazzein under optimized conditions equaled 2 mg/ml of the reaction mixture, surpassing thereby 57-fold the maximum values achieved in previous investigations engaging whole-cell expression systems. In our opinion, synthesis of brazzein in cell-free system may be considered as the method alternative to classical submerged culture in fermenters, and in the not too distant perspective it is likely to turn into major technology of producing this promising sugar substitute.

References:

1. *Faus I. Recent developments in the characterization and biotechnological production of sweet-tasting proteins: Appl. Microbiol. Biotechnol, 2000, Vol. 53, N 2; 145–151.*
2. *Ming D, Hellekant G. Brazzein, a new high-potency thermostable sweet protein from Pentadiplandra brazzeana: FEBS Lett, 1994, Vol. 355, N 1; 106–108.*
3. *Poirier N, Roudnitzky N, Brockhoff A, Belloir C, Maison M, Thomas-Danguin T, Meyerhof W, Briand L. Efficient production and characterization of the sweet-tasting brazzein secreted by the yeast Pichia pastoris: J. Agric. Food Chem, 2012, Vol. 60, N 39, doi:10.1021/jf301600m; 9807–9814.*
4. *Hellekant G, Danilova V, Ninomiya Y. Primate sense of taste: behavioral and single chorda tympani and glossopharyngeal nerve fiber recordings in the rhesus monkey, Macaca mulatta: J. Neurophysiol, 1997, Vol. 77, N 2; 978–993.*
5. *Neiers F, Naumer C, Krohn M, Briand L. The recent development of a sweet-tasting brazzein and its potential industrial applications. Sweeteners (Merillon JM, Ramawat KG, eds.): Springer International Publishing, 2016; 1–20.*

6. *Kazlovskiy IS, Rymko AN, Zinchenko AI. Modification of expression system of pET for using in cell-free protein synthesis: Microbial biotechnologies: basic and applied aspects: collect papers. Minsk, 2018, Vol. 10; 69–78.*
7. *Kazlovskiy IS, Zinchenko AI. Construction of strain-producer of chemeric protein consisting of RNA polymerase and DNA-affinity domain: Papers of National Academy of Sciences of Belarus, 2018, Vol. 62, N 5; 601–607.*
8. *Peterson GL. A simplification of the protein assay method of Lowry et al. which is more generally applicable: Anal. Biochem, 1977, Vol 83, N 2; 346–356.*
9. *Berlec A, Jevnikar Z, Majhenic AC, Rogelj I, Strukelj B. Expression of the sweet-tasting plant protein brazzein in Escherichia coli and Lactococcus lactis: a path toward sweet lactic acid bacteria: Appl. Microbiol. Biotechnol, 2006, Vol. 73, N 1, doi:10.1007/s00253-006-0438-y; 158–165.*

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Modern View on Analysis of Genetic Factors in Brain Tumors Development

Key words: *brain, aspects, complications, mortality.*

Annotation: t*he article includes literary analysis data on aspects of the analysis of genetic factors for the development of brain tumors, which are important for physicians, especially doctors, and the study of this problem in anatomical and forensic medical expertise remains an open question.*

Currently, there is an increase in the number of neoplasms worldwide.

Primary tumors of the central nervous system make up 1.4% of all malignant tumors and 2.4% of cancer lethality. In children, they occur with greater frequency (20-25% of all tumors of childhood) and are the second cause of death. Gliomas make up 60% of all primary brain tumors. Malignant gliomas — glioblastoma multiforme and anaplastic gliomas (anaplastic astrocytoma, anaplastic oligodendroglioma, and anaplastic oligoastrocytoma) are the most common infiltrative primary brain tumors.

Despite the significant development of modern neurosurgery, the emergence of new diagnostic studies related to the introduction of functional magnetic resonance imaging, tractography, spectral tomography, the prognosis for patients with malignant glioma remains disappointing, with a median survival ranging from 9 to 12 months.

Currently, standard treatment of patients with malignant astrocytic gliomas (anaplastic astrocytoma, glioblastoma) includes surgery and subsequent radiation and chemotherapy.

As noted in the literature, the median life expectancy of patients with glioblastomas with symptomatic therapy after verification of the diagnosis is about 3 months. According to a number of large studies, the median survival of patients with glioblastoma when using radiotherapy is 12 months, and with chemo-radiotherapy with temozolomide - 14-15 months; The survival rate of patients with anaplastic astrocytoma with the use of radiation therapy and chemotherapy based on nitroso derivatives after removal of the tumor is 23-30 months. At the same time, the radical removal of the tumor in patients with malignant gliomas is one of the prognostically favorable and significant factors. However, "radiological" radical surgery is not feasible in all cases. Infiltration of the median structures of the brain, spread to both hemispheres, infiltrative growth in functionally important areas of the brain, diffuse nature of tumor growth, and finally, primary - multiple glioma - all these are situations in which the removal can be only partial, or in general surgical activity is limited verification of the diagnosis. Such cases of intracerebral tumors are conventionally called "inoperable malignant gliomas": surgery in this category of patients is more significant in diagnostic terms. In order to verify the diagnosis, it is advisable to use stereotactic biopsy (STB).

Clinicians noted that the tactics of treatment of inoperable malignant gliomas has not yet been worked out. Apparently, the effectiveness of treatment of such patients is largely determined by the degree of malignancy of gliomas and their varieties (oligodendroglial - the most sensitive, anaplastic astrocytomas are also more sensitive to chemotherapy than glioblastoma), age of patients, prevalence of the tumor, severity of intracranial hypertension, general functional status of the patient (for example , on the Karnofsky scale), as shown for the complex treatment of intracerebral brain tumors, including distance tion, radiation and chemotherapy. For the conservative treatment of patients with glial tumors with contraindications for removal for the reasons mentioned above, the importance of these prognostic factors is not fully determined due to the small number of studies devoted to this issue.

It is also noted in the literature that secondary (metastatic) brain tumors are the most frequent neoplasms affecting the central nervous system (CNS). The frequency of metastases in the brain (MGM) surpass the primary brain tumors - malignant gliomas by 5-10 times. The frequency of occurrence of MGM is increasing in parallel with the increase in life expectancy of cancer patients, thanks to significant advances in chemotherapeutic, radiological and combined methods of treating common malignant tumors, as well as through the development and improvement of modern imaging methods, primarily the wider availability of magnetic resonance imaging (MRI). It is obvious that metastases to the brain are etiologically, as well as pathogenetic and biological, in terms of heterogeneous tumors. The authors noted that this phenomenon suggests that there are various groups within this "nosology" that differ from each other in clinical, genetic, diagnostic, therapeutic, and prognostic terms. The heterogeneity of MGM is primarily related to the biological characteristics of the primary tumor and the organ in which the primary tumor develops. Identifying the characteristics of the biological behavior of metastases to the brain, depending on their morphology, histogenesis, can become the basis for the differentiated management and treatment of this group of patients.

Statistics showed that a significant group of intracerebral metastatic tumors from 10 to 25% - according to data from various authors, are MGM from the primary undetected lesion (NGO). With

the diagnosis of MGM NGOs, the attending physician needs to determine the source of metastasis in optimal time. The use of MRI, PET and other expensive imaging methods is not always possible and not always advisable. In modern conditions of personalized medicine, the use of immunohistochemical (IHC) and / or molecular-biological research based on the preservation by metastases of the biological, morphological, biochemical, and other properties of the primary tumor, widely studied and highlighted in the modern specialized literature, is increasingly becoming more and more necessary. Modern morphological (including immunohistochemical and molecular biological) methods are able to accurately determine the source of metastasis and to make a certain distinction and division within the general group of metastases from the same organ, which has prognostic and predictive value. For example, it has been established that small cell lung cancer MHMs behave more aggressively than non-small cell forms.

It is also noted in the literature that glial tumors occupy the largest proportion among brain tumors - 45.6% (56.4% among men and 37.4% among women) and meningiomas - 27.9% (20% among men and 33.2% among women). After them, pituitary adenomas are most common - 12.2%. Neuromas of the auditory nerve account for 4.9% of the total number of brain tumors. Tumors of the remaining histological series make up 9.4% of all diagnosed brain tumors.

Of glial tumors, glioblastomas occupy the largest weight - 16.7%, and astrocytomas - 17.9%, with the proportion of malignant astrocytomas prevailing over benign 1.3 times among males and 2 times among females. Over the past decade, great progress has been made in the surgical treatment of non-cerebral tumors (pituitary adenomas, meningiomas, etc.), and the problem of treating patients with gliomas remains largely unresolved, and the results are not very encouraging.

In anaplastic gliomas, it is rarely enough to stabilize tumor growth, and the average survival of patients with low-differentiated gliomas is only 12-16 months. As practice shows, treatment of patients with glial brain tumors does not always meet modern requirements, which necessitates clarification of the components of therapy for this pathology — surgical intervention, chemotherapy and radiation therapy. References indicate that the analysis of genetic factors in the development of intracerebral tumors determination of their treatment tactics The fundamental basis for the development of a genetic analysis of astrocytomas over the past decades with The discovery of oncogenes and tumor suppressor genes. The multistage of the tumor process, based on Foulds in the concept of tumor progression, and then the clonal-selection theory of malignant growth in recent years have received a new molecular-genetic rationale. and multiple gene changes, or at least changes in two genes, have been experimentally confirmed on different models.

The authors noted that at present, the multistage processes of neoplastic transformation are associated with certain stage-specific molecular genetic disorders, which probably also takes place during a malignant progression of astrocytoma of the brain. ANS progression includes a complex of interactions of numerous genetic changes, including chromosomal abnormalities, activation of proto-oncogenes, inactivation of suppressor genes and aberrant expression of certain growth factors and their receptors. Astrocytomas are characterized by a normal karyotype or loss of the X chromosome, as well as a loss of heterozygosity in the 17p chromosome as a result of the mitotic recombination of the 17pl3–17pter region of the genome. The relationship between the degree of glioma malignancy and the loss of heterozygosity has been established. The combination of p53 and LOH 17p mutations suggests that p53 acts as a recessive tumor suppressor gene with simultaneous loss of a copy in

another allele of the 17p chromosome. Previously, it was believed that p53 mutations are associated with later stages of carcinogenesis, but it turned out that mutations of the p53 gene are closely related to the progression of astrocytomas. In addition, p53 mutations in sex chromosomes cause various types of tumors, including gliomas, in Li – Fraumeni syndrome. All these data may indicate that mutations of the p53 gene are a rather early event in tumor progression. A point mutation of the p53 gene in astrocytoma can serve as a marker for these tumor cells, as it is detected even in astrocytomas with or without loss of heterozygosity in the 17p chromosome. In addition to deletions, inactivation of the p53 gene in astrocytomas can be accomplished by binding the protein of the p53 gene to the protein MDM2, which has oncogenic potency. MDM2 overexpression limits the activity of the normal p53 gene. The results of these studies show that activation of the MDM2 gene may influence biological mechanisms that increase the invasive properties of tumor cells, including the stimulation of the expression of angiogenic growth factors. In astrocyomes, allelic mutations can be found in chromosome 19, with partial deletions of chromosome 19 occurring more often than the loss of one whole copy. Anomalies of the 19th chromosome in the 19q 13.2–13.4 region are often found in tumors of astrocytic origin, where normally there may be a suppressor gene. The application of the method of differential analysis of clones to DNA in the tissues of gliomas makes it possible to identify genes whose expression in malignant brain tumors is significantly changed compared with the normal brain. Thus, the analysis of the human genome with modern methods of molecular biology and genetics has achieved great success, and therefore, research aimed at finding mutant genes responsible for the development of certain brain diseases, as well as studying endogenous and exogenous factors regulating the expression genes.

Clinicians have found that high-grade astrocytomas diffusely infiltrate surrounding tissues and often involve the opposite hemisphere of the brain. Symptoms and syndromes depend on the location, size and speed of tumor growth. Patients with these tumors often develop symptoms of increased intracranial pressure, seizures. Focal symptoms are associated with the size and location of the tumor. These tumors cause significant swelling and a “mass – effect” and are amplified by CT and MRI studies after intravenous administration of a contrast agent. Tumor cells are found in peritumoral edema, which corresponds to changes in T2-CI with MRI.

Thus, summing up the literary analysis, it can be noted that difficult early diagnosis of glial tumors, the appearance of pronounced neurological deficit with large sizes, the impossibility of radical removal, therapeutic resistance due to an increase in the concentration of “drug-resistant proteins”, persistent low life expectancy of patients and poor quality life, despite the radicalism of the removal of the tumor and the use in the postoperative period of the combined about treatment, forces to continue the search for solutions to this problem.

References:

1. *Translator NI. Guidelines for the chemotherapy of tumor diseases: Practical medicine, Moscow, 2005; 36-46.*
2. *Podoprigora AE. Proton magnetic resonance spectroscopy in the diagnosis of bulk brain diseases. Moscow, 2001.*
3. *Zolotov AN. Features of mental disorders in cancer patients with metastatic brain damage: Abstract Thesis… cand. med. science. Rostov-on-Don, 2006.*
4. *Kurzhupov MI. Intraoperative fluorescence diagnostics and photodynamic therapy in patients with metastatic brain lesion: Thesis… cand. med. science. Moscow, 2011.*

5. *Rotin DL, Dolgushin MB, Pronin IN, Shishkina LV, Paklina OV, Setdikova GR. Metastasis of ductal adenocarcinoma of the pancreas in the brain: Oncology, 2011, Volume 3, No. 3; 78-81.*
6. *Tigliev GS. Intraoperative ultrasonography in surgery of glial tumors of the cerebral hemispheres: Polensky readings, St. Petersburg, 2002; 57-71.*
7. *Trufanov GE. Combined positron emission and computed tomography (PET-CT) in the diagnosis of brain tumors. St. Petersburg, 2005; 94.*
8. *Anthony Behin, Khe Hoang-Xuan, Antoine F Carpentier, Jean-Yves Delattre. Primary brain tumors in adults: The Lancet, Vol 361, 2003.*
9. *Henderson KH. Randomized trials of radiation in adult low-grade gliomas: Semin radiat oncol, 2001, Vol. 11; 51-145.*
10. *Hoang-Xuan K. Temozolomide and Low-Grade Oligodendrogliomas or Oligoastrocytomas and Correlation with Chro-mosome lp Deletions: J. clin. oncol, 2004, Vol. 22; 3133-3138.*

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Derivational Peculiarities of Military Discourse Phraseologisms

Key words: *seme analysis, military discourse, compound military term, phraseological unit, semantics, inner shape, expressive-emotional meaning.*

Annotation: *the article investigates derivative regulations of formation of military phraseological units on the basis of compound military terms. The author implements seme analysis and studies the peculiarities of contextual surrounding in the formation of general phraseological meaning. Theoretical part of the article is proved by corresponding examples.*

Введение

Известно, что установление семантического потенциала фразеологического значения по одной лишь словарной дефиниции не исчерпывает содержание фразеологизма. Недостаточность дефиниции при описании значения фразеологической единицы (далее ФЕ) отмечают все составители фразеологических словарей. Так, А.В. Кунин говорит о «толковании фразеологического значения» - комплексном методе, который, помимо дефиниции, включает ещё и раскрытие значения этимона ФЕ, сопоставление значения ФЕ со значением этимона, а также иллюстрацию фразеологического значения в речевом окружении или контексте (5, p. 43). Подобным же методом, несомненно, пользуются и составители разных словарей. Так, Е.А. Федорченко провёл распределение языковых единиц и проанализировал их с помощью контрарной, контрадиктивной, комплементарной и градуальной классификаций (Федорченко). Действительно, раскрытие лексико-семантических, функционально-структурных, коннотативных и денотативных особенностей языковых единиц обеспечивает адекватность переводов (1, p. 31).

Основная часть

Мнения видных исследователей фразеологии заставляют усомниться в том, что фразеологическое значение носит характер семантической синтагмы, модель которой была установлена нами относительно содержательной структуры составного военного термина (далее СВТ). Обязательность сопоставления семантической структуры ФЕ со значением образа, лежащего в основе ФЕ, необходимость раскрытия фразеологического значения в контексте, указывают на неодноплановый характер значения ФЕ, на то, что структура этого значения осложнена различного типа отношениями. Вопрос об образной основе экспрессивности ФЕ уже был подробно исследован А.Л. Кораловой (4). Однако, представляется чрезвычайно важным установление (на основе формальных данных) характера двуплановости, которая, несомненно, является базой экспрессивно-эмоциональной функции ФЕ; иными словами, определить основные отношения, особенности связей между ФЕ и

прототипом. Эти отношения определяются как отношения в системе конформного отображения (7, p. 125).

Между двумя системами (структурами) имеет место конформное отображение, если одна из них образована на основе другой, причём таким образом, что главные признаки первой структуры (системы) связаны с главными признаками другой структуры (системы) отношениями движения, подобия или инверсии (7, p. 139). Этот термин заимствован из математической логики, потому что обозначаемое им понятие, на наш взгляд, объединяет исследуемые процессы наиболее полно и удачно, а также позволяет произвести точное моделирование этих процессов. Дадим определение отношениям в системе конформного отображения. Движение – это такое развитие признака, при котором происходит его усложнение. Применительно к лингвистике можно сказать, что характер движения присущ привативной оппозиции, в которой слабый (немаркированный член) включает в себя признаки сильного (маркированного) члена оппозиции. Подобие – это такое развитие признака, которое не влечёт его качественных изменений, а влияет на место и функцию признака в системе (структуры). Инверсия – это такое развитие признака, при котором он приобретает значение, обратное исходному (3, p. 102-103).

Обозначим отношения: движения – p, подобия – s, инверсии – i. Вернёмся теперь к основной проблеме исследования и попытаемся определить значение ФЕ *lay siege to smb.* на основе отношений со значением её прототипа составного военного термина. Семантический инвентарь данного фразеологизма, установленный по словарной дефиниции, состоит из сем: S1 – to seek to win, S2 – a person's, S3 – love, S4 – persistently.

Рассмотрим, каким образом, через какие отношения связаны эти две структуры. S1 во фразеологическом значении связана с S1 в структуре составного военного термина отношением движения. Это можно утверждать на том основании, что *seek to win* обладает более широкой семантикой по сравнению с S1 surround and attack, действие, выраженное первой семой, не так узко определено и ограничено. Итак, S1 h S1 pr. семы S4 (ФЕ) и семы S4 составного военного термина связаны отношением подобия, если для составного военного термина признак интенсивности является факультативным и не всегда эксплицитно выражен, то в структуре ФЕ он обусловливает такую коннотативную характеристику, как оценочность. Наконец, S2 (ФЕ), которая на первый взгляд не имеет, казалось бы, выраженных логических связей с какой-либо семой прототипа, входит в инверсионные отношения с семой S2 составного военного термина по противопоставлению обратных значений «одушевлённость» / «неодушевлённость». Следует отметить, что последнее из установленных отношений очевидно и в поверхностной структуре составного термина *lay siege to smb.* и фразеологизма *lay siege to smb*.

Прежде, чем перейти к определению зависимостей установленных компонентов фразеологического значения, *lay siege to smb.* желательно указать на различия в содержании фразеологизмов и составных военных терминов. Очевидно, что основные элементы фразеологического значения связаны различными отношениями с элементами семантической структуры прототипа при условии, если прототип является живой внутренней формой ФЕ, воспринимаемый всеми носителями данного языка. В этом состоит одна особенность фразеологического значения. Вторая особенность, которая связана с исчезновением у ФЕ

стилистической пометы mil, присущей её прототипу, заключается в следующем. Вступая в отношения с семами собственно фразеологического значения, стилеобразующая сема составного термина, и не может определять принадлежность ФЕ к функциональному стилю языка. Анализируемое явление представляет собой образец расширения значения или выход из рамок узкой профессиональной потребительности, что неизбежно связано с появлением новых функций и особенностей языковой единицы. Как будет показано ниже, именно двуплановый аспект существования ФЕ с живой внутренней формой обусловливает её богатые экспрессивно-эмоциональные возможности.

Модель семантической структуры ФЕ *lay siege to smb.* строится на основе сопоставления с моделью составного термина. Синтаксические функции ФЕ и составных терминов одинаковы – обе единицы являются глагольными словосочетаниями. Семы S1 (surround and attack) в составном термине и S1 в ФЕ связаны отношением движения p-S1 p S1, причём S1 символизирует функцию семантической структуры составного термина.

Необходимо внести ещё одну поправку в предлагаемую модель. Выше говорилось о том, что роль семы S3(with armed forces) в составном военном термине теряет свою важность в структуре ФЕ, иными словами, эта сема затушевывается. Однако она может активизироваться в речи, как, например, в следующем высказывании: General Maccouton laid siege to her like he did to the fortress of saint-Bernand seven years ago… (G. Wylle).

Употребление ФЕ *lay siege to smb.* в этом предложении опосредовано прямым отнесением её значения к значению прототипа. Это заставляет получателя информации прибегнуть к ассоциациям, из которых делается вывод, что генерал Маккаутон «осадил сердце девушки», как это сделала его армия 7 лет назал с крепостью Сейнт-Бернард, т.е. с военной настойчивостью и прямолинейностью, не утруждая себя излишними ухищрениями, ставя своей целью одно: овладеть девушкой, как он овладел крепостью. Здесь все отношения между элементами фразеологического значения и значения составного термина (внутренней формы) определяются как подобие, кроме того актуализируется сема S3 составного термина (operations of armed forces) (3, p. 105).

В этом изменении отношений проявляется «активная роль этимона в синхронном аспекте семантики» (2, p. 62), о которой уже много говорилось и говорится. Изменение отношений в семантической структуре ФЕ, равно как и существование самих отношений, обусловливает экспрессивно-эмоциональную функцию ФЕ, создаёт всевозможные коннотации (созначения) ФЕ. В следующем примере семантические отношения между ФЕ и внутренней формой носит уже иной характер.

One day Raggles came and laid siege to the heart of the great city of Manhatten. She was the greatest of all and he wanted to learn her note in the scale; to taste and appraise and classify and solve and lable her and arrange her with individuality (Best stories of O'Henry, "The Making of a New-Yorker").

Приведённое высказывание пронизано одной мыслью – его субъект (Raggles) отождествляет город Манхэттэн с живым существом. Сема "одушевлённость" прослеживается в целой цепочке слов, связывающих контекст she – city – heart – individuality. Под влиянием этой

семантической информации отношения инверсии соответствующей семы ФЕ S2 и семы S2 pr внутренней формы перестают уже в отношении отрицания.

Проанализируем ещё несколько примеров использования ФЕ lay siege to smb.:

I must act decisively, Georgy Links thought, walking up the path through the profusely fertile garden. I must begin to lay definite siege to her (J. Wain. "Travelling Woman").

В этом высказывании нетрудно проследить увеличение смысловой нагрузки, которую несёт сема (persistently), чему в немалой степени способствует окказиональным расщеплением (deliberate).

В следующем примере также необходимо употребление ФЕ lay siege to smb с окказиональным расщеплением (deliberate).

To snatch her Edward out of the jaws of sorrows she proceeded to lay deliberate siege to Albert. (J. Galsworthy, "On Forsyte Change", "The Sorrow of Tweetyman").

Однако в последнем случае семантическая информация слова "deliberate" является внешней по отношению к ФЕ, поскольку она не согласуется ни с одной из сем, установленных в структуре ФЕ. Значение ФЕ здесь уточняется, приводится в удачное согласование со смысловой направленностью всего высказывания. Если компонент значения слова "deliberate", влияющий на восприятие ФЕ в данном контексте, обозначить, допустим, S5, то структура ФЕ в рассматриваемом случае (S4 S1 p S1 pr (S2 i S2 pr, S3)) S5, где скобки использованы вторично, чтобы показать внешнее положение S5 по отношению к семантике ФЕ в целом.

Установление отношений в структуре ФЕ с одновременным признанием их подвижности и изменчивости в результате влияния чисто речевых и контекстологических факторов может оказать большую помощь в переводе фразеологизмов с одного языка на другой (3, p. 107). Так, в первом из приведённых выше примеров активное восприятие отношений подобия в структуре ФЕ заставляет при переводе ФЕ на русский язык употребить слово «осадить», ибо любое другое не сможет адекватно передать действие генерала, который и в любви поступает так, как на войне. Совсем другим будет перевод ФЕ во втором примере. Полное погашение терминологического признака и отрицание другого указывают на активную связь с внутренней формой только через признак S4 persistence и отношения движения. Поэтому в данном случае вообще желательно избегать военных ассоциаций, сохраняя лишь признак «интенсивности действия», S4 и переводить ФЕ на русский язык: «настойчиво искал ключи к сердцу Манхэттэна», либо «решил завоевать сердце Манхэттэна». Мы проследили только два случая функционирования фразеологического значения lay siege to smb. в речи. Разумеется, они далеко не исчерпывают коннотативных возможностей ФЕ, порождаемых её двуплановой структурой.

Следующая пара примеров выбрана с целью подтверждения мысли о том, что значение ФЕ обладает основными особенностями:

1. "Big guns to Join Talks on Ulster" (Morning Star)

2. “The stage”, he went on, “is all right if you can be one of the big guns but there’s nothing to the rest of it. It takes a long while to get up” (Th. Dreiser, “Sister Carry”).

Составной военный термин – big gun S1 – big caliber heavy, S2 – gun
Фразеологическая единица – big gun, S1 – important, s2 – a person

Между S1 pr и S1 ФЕ существуют отношения движения. Этот вывод можно сделать на том основании, что путь от понятий “big caliber heavy” до “important” есть путь от более конкретного к более абстрактному – S1 p S1 pr.
Отношение S2 pr к S2 (ФЕ) следует определить, как отношения инверсии, т.к. в данном случае эксплицитно выделяется противопоставление «неодушевлённый» / «одушевлённый».

В первом из приведённых примеров установленные отношения не изменены. Во втором примере под влиянием семантической информации военного характера происходит изменение отношений движения и инверсии на отношения подобия.

Выводы

Итак, проведённое выше исследование значений некоторых фразеологических единиц современного английского языка, образованных от сверхсловных военных терминов позволяет сделать следующие выводы.

Фразеологическое значение таких ФЕ с живой внутренней формой представляет собой взаимодействие семантической структуры ФЕ и семантической структуры её прототипа в системе конформного отображения. Это взаимодействие основывается на определённых отношениях, главные из которых – движение, подобие и инверсия. Характер указанных отношений изменяется в речи согласно коммуникативным задачам говорящего (автора художественного произведения). Существование и подвижность отношений обусловливает экспрессивно-эмоциональную функцию ФЕ, её коннотативное содержание.

В структуре как ФЕ, так и составного военного термина существуют обязательные синтагматические связи. Установление отношений во фразеологическом значении (на примере ФЕ с живой внутренней формой) окажет большую помощь в переводе фразеологизмов, а также в совершенствовании дефиниций во фразеологических пособиях.

References:

1. *Ahmedov OS. Linguistic analysis of tax and customs terms in English and Uzbek and problems of translation: Abstarct thesis… doc. phil. sciences. Tashkent, 2016; 86.*
2. *Varina VG. Some problems of the internal form of the language: Linguistics and methodology. Moscow, 1974, Issue 4.*
3. *Kaplunenko VV. Some features of the meaning of phraseological units with a living internal form: Questions of phraseology of the Romance and Germanic languages. Samarkand, 1981; 97-109.*
4. *Koralova AL. To the question of linguistic imagery: Scientific notes MGPII M. Toreza, Issue 70, Moscow, 1972.*
5. *Kunin AV. The main problems of English phraseology and the creation of the English-Russian phraseological dictionary: Thesis… doc. phil. sciences Moscow, 1965.*

6. *Fedorchenko EA. Formation and development of the terminological vocabulary of customs in Russian. Moscow, 2004; 91.*
7. *Philosophical Encyclopedia. Moscow, 1957.*

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Axiological Concept in English Language

Key words: *axiology, linguistics, concept theory, language, semantics, cognitive linguistics, conceptional view.*

Annotation: *the article is a prospect of research in the field of axiology and linguistics. It will seek the conceptional view of English-speaking thinkers presented in text in discourse. The result will be the value concept reflected in language system.*

Предлагаемое диссертационное исследование посвящено выявлению и описанию особенностей репрезентации общего аксиологического концепта, изучению закономерностей его объективации в английском языке на примере конкретных аксиологических концептов.

Актуальность данного исследования обусловлена обращением к изучению нового содержательного вида концепта, как сложного и многоуровневого явления, играющего важную роль в общественном и индивидуальном сознании в целом, в культуре и общественном устройстве, в частности, что должно будет способствовать дальнейшей конкретизации параметров базовых элементов англоязычной понятийной картины мира. Такой подход к исследованию реализации концепта в языке оправдан глубокой связью речевой и мыслительной деятельности языковой личности. Ценностные константы, усваиваются в процессе воспитания и общения внутри социальной группы, зачастую бессознательно, так как их реализация в речи так или иначе находит свое закрепление в системе языка. А динамика языковой системы отражает ценностную эволюцию его носителей. Исследование включено в современную парадигму когнитивных и антропоориентированых лингвистических исследований, где особое внимание уделено мыслительной и речевой деятельности человека.

Объектом исследования является аксиологический концепт, как уникальная модель представления языкового мышления, рассматриваемый во всем многообразии проявления своих характеристик в корреляции с языковыми структурами.

Предмет исследования – репрезентация общей структуры и содержания аксиологического концепта и его конкретных семантических реализаций, его основных семантических значений в системе языковых и дискурсивны) значений английского языка в диахронии и синхронии среднего, ранне-новоанглийского и новоанглийского периодов.

Теоретической основой исследования являются положения когнитивной лингвистики, аксиологической лингвистики, психолингвистики, социолингвистики, теории текста и дискурса, функциональной грамматики, исторического языкознания.

Цель работы заключается в выявлении и описании способов реализации общего аксиологического концепта и его семантических вариантов в анлоязычных текстах в рамках когнитивно-дискурсивного, интерпретирующего, лексико-семантического, семантико-синтаксического, структурно-семантического, лингвокультороло гического подходов.

В соответствии с указанной целью поставлены следующие задачи:
1. рассмотреть структурно-содержательную многоаспектность и многоуровневость аксиологического концепта и его репрезентации в языке в рамках указанных подходов;
2. выявить и описать с помощью дефиниционного анализа основные ядерные и периферийные содержательные компонент) значения аксиологического концепта, отражающие характер языкового мышления;
3. провести комплексный концептуальный анализ языковых средств репрезентации аксиологического концепта, разработать технологию обоснованного выявления, объективации аксиологического концепта в тексте и дискурсе;
4. описать особенности объктивации аксиологического концепта и его основных семантических значений в англоязычной художественной литературе среднего-, ранне-новоанглийского- и новоанглийского периодов.

Материалом исследования служат толковые словари английского языка, а также текстовые фрагменты, отобранные методом сплошной и частичной выборки из англоязычной художественной литературы среднего-, ранне-новоанглийского- и новоанглийского периодов.

Методологической основой исследования аксиологического концепта являются сложившиеся представления о том, что: а) совокупность знаний о мире определенным образом структурирована в языковом сознании; б) процесс структуризации и реализации совокупности аксиологических значений занимает важное место как в мыслительной, так и в языковой деятельности носителя языка; в) реализация аксиологического концепта происходит на основе оценки уже имеющегося у человека опыта и обусловлена такими факторами как возраст, гендер, культурные и социально-политические особенности, взаимодействием с другими участниками речевой ситуации.

При решении поставленных задач в ходе исследования применяется комплекс общенаучных подходов (системно-структурный, функциональный, целостный) и методов (анализ и синтез, абстрагирование, классификация, моделирование и т.д.), а также следующие методы и приемы лингвистического анализа:

1) метод дефиниционного анализа для выявления структурных компонентов семантического уровня аксиологического концепта и для выявления совокупности аксиологических значений, объективирующих данный концепт в английском языке и составляющих лексический уровень языка;
2) метод концептуального анализа, при реализации которого аксиологический концепт понимается как объект анализа, что позволяет восстановить и объединить все знания и представления об этом явлении;
3) метод лексико-семантического анализа для описания особенностей реализации аксиологического концепта и выявления его основных семантических значений в текстах англоязычной художественной литературы;
4) метод структурно-семантического анализа, который служит основой для формирования и описания структуры речевой ситуации и дальнейшего изучения ее лингвокогнитивных и лингвокультороло гических составляющих;
5) метод объяснительного и динамического описания для инвентаризации, описания и классификации языковых единиц, выражающих аксиологические значения в синхронии и диахронии;
6) метод реконструкции когнитивной структуры по языковой структуре, основанный на гипотезе когнитивной мотивированности языковой формы.
7) метод когнитивного моделирования позволяет реконструировать когнитивную модель на материале конкретных языковых данных благодаря явлению маркированность, коррелирующим с понятием нормы\отклонения от нормы.

Научная новизна исследования заключается в том, что в нем впервые разрабатывается концепция обоснования нового содержательного типа концепта – аксиологического концепта, базирующегося на коллективном и индивидуальном знании человека о ценностных ориентирах мироздания; впервые разрабатывается алгоритм многоуровневого анализа общего аксиологического концепта с точки зрения репрезентации его концептуальных страт, которые реализуются в лексико-семантических, семантико-синтаксических, лингвокультурологических и прагматических параметрах в англоязычном художественном тексте; при помощи системы методов предлагается оригинальная технология обоснованного выявления объективации аксиологического концепта в тексте /дискурсе.

Теоретическая значимость работы определяется ее вкладом в дальнейшее развитие положений когнитивной семантики, аксиологии, концептологии, лингвокультурологии, социолингвистики, исторического языкознания, теории текста и дискурса.

Практическая значимость иисследования состоит в возможности применения ее результатов для исследования широкого спектра проблем в области когнитивной лингвистики и лингвокультурологии, использования полученных данных в теоретических курсах по семантическому анализу, когнитивной лингвистике, лексикологии и теоретической грамматике английского языка.

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Investigating Work of Vertical Double-Ring-Shaped Gating System

Key words*: pouring basin, sprue, runner, feeder, head, resistance coefficient, expense coefficient, stream speed, consumption of liquid.*

Annotation*: theoretical and experimental studies self-complicated gating system (GS) – vertical double-ring-shaped. The description of laboratory version such system is provided. In the system the feeders be found at four levels, upon upper and lower levers be found on one feeler, at two middle – by two feeders. Theory of calculating of flow speed and liquid flow rate, depending on the quantity of at the same time working feeders are stated. It is not only segregation of the part of the flow from one runner to a feeder that takes place in the system but also joining of fluid flows from two runners is observed. It takes stock of four loss pressure: by friction on length, in local resistances, on the division of the stream in the parts, on the fusion of the streams. In system fluid perhaps approach to feeder with three side, therefore to give direction movement fluid and speed fluid. Calculation makes of method successive approaching before receipt of a tasked size difference between tasked and calculated meaning speed movement fluid. Considering the previously investigated GS, the possibility of using Bernoulli's equation (BE) to the stream sections with different flow may be regarded as proven, i. e. for calculations of gating systems with many feeders. But BE is derived for the stream with constantly consumption, i. e. for calculations of GS with one feeder.*

Introduction

Previously, theoretical single and multi-nutrient gating systems were theoretically and experimentally studied: L-shaped, P-shaped, branched, cross-shaped, single and double-ring, L-shaped system with a collector of variable cross-section, a system with two risers of the same and different heights. We studied vertical GS with different numbers of feeders in tiers. The joint operation of a horizontal ring system with a tiered *(1)* and branched *(2)* systems was also investigated. In the calculations of multi-nutrient GS, the Bernoulli equation was used, although it was derived for a flow with a constant flow rate (mass) *(3, p. 10)*; *(4, p. 205)*, that is, for GS with one feeder. Consequently, BE also works in a flow with a variable flow rate, although it is not clear why it works. And the possibility of using BE in the calculations of GS with a flow rate varying from maximum to zero in the collector (slag trap)

has not been theoretically proven. Therefore, it seems appropriate to experimentally and by calculations to investigate, apparently, the most complex multi-nutrient GS - a vertical two-ring one.

Method and Materials

The system (Fig. 1) consists of a sprue bowl, a riser, an adapter, collectors and six identical feeders I – VI. The inner diameter of the bowl is 272 mm, the height of the water in the bowl is 103.5 mm. The liquid level H — the vertical distance from section *1–1* in the bowl to section *0–0* in the adapter and riser — was maintained constant by continuously adding water to the bowl and draining its excess through a special slot in the bowl: $H = 0{,}6135$ m. Liquid is poured from the feeders into forms. The time of fluid outflow from each feeder was 30–215 s, depending on the number of simultaneously working feeders, and the volume of water poured from each feeder was about 8 liters. These time and volume constraints provided a deviation from the average velocity $\pm 0{,}005$ m/s. The fluid flow rate from each feeder was determined at least 6 times.

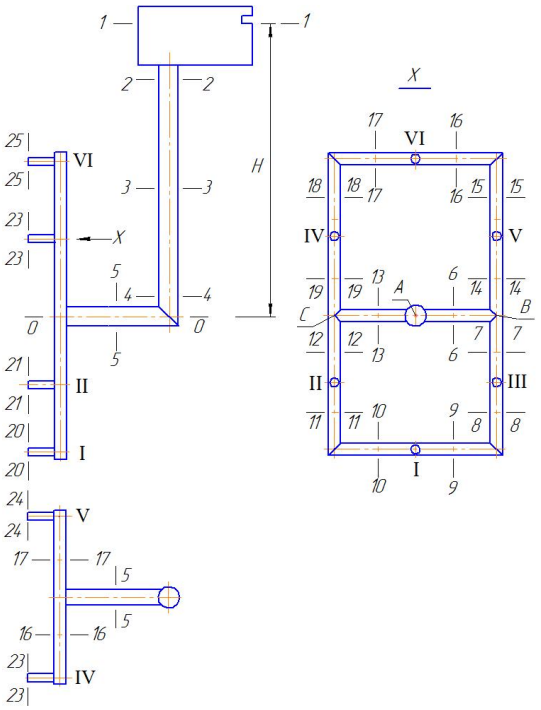

Fig. 1. Gating system

Main Base

First, we calculate the characteristics of GS when only one feeder I is used for the case when the hydraulic system is open in section *10–10* (there is no ring). We compose BE for sections *1–1* and *20–20* GS:

$$H + H_{0\text{–I}} = \alpha \frac{v_{20}^2}{2g} + h_{1\text{–}20}, \qquad (1)$$

where $H_{0\text{–I}}$ - vertical distance from section *0–0* to the horizontal axis of the feeder I, m; $H_{0\text{–I}} = 0{,}258$ m; α - coefficient of uneven distribution of velocity over the flow cross section (Coriolis coefficient); accept $\alpha = 1{,}1$ *(4, p. 108)*; v_{20} - metal velocity in the section *20–20*, m/s; g - acceleration of gravity;

m/s^2; h_{1-20} - pressure losses during fluid movement from section *1–1* to section *20–20*, m. These pressure losses

$$h_{1-20}=\left(\zeta_{cm}+\lambda\frac{l_{cm}}{d_{cm}}+\zeta_{nep}+\lambda\frac{l_{nep}}{d_{nep}}\right)\alpha\frac{v_{cm}^2}{2g}+\left(\zeta_{\kappa}+\lambda\frac{l_{A-1}}{d_{\kappa}}+2\zeta\right)\alpha\frac{v_6^2}{2g}+\left(\zeta_n+\lambda\frac{l_n}{d_n}\right)\alpha\frac{v_{20}^2}{2g}, \quad (2)$$

where ζ_{cm}, ζ_{nep}, ζ_{κ}, ζ_n - coefficients of local resistances of metal input from the bowl to the riser, rotation from the riser to the adapter, rotation from the adapter to the collector, rotation from the collector to feeder I; ζ - coefficient of local resistance to rotation by 90º from section *6–6* to section *7–7* or from section *8–8* to section *9–9* (without changing the collector cross-sectional areas); λ - coefficient of friction losses; l_{cm} - length (height) of the riser, m; $l_{cm}=0{,}518$ m; d_{cm}, d_{nep}, d_{κ}, d_n - hydraulic diameters of the riser, adapter, collector and feeder I, m; v_{cm} - fluid velocity in the riser and in the adapter, m/s; v_6 - fluid velocity in section *6–6* of the collector, m; l_{A-1} - distance from point *A* to feeder I, m; $l_{A-1}=0{,}504$ m; l_n - feeder length, m; $l_n=0{,}0495$ m. The consumption in GS during discharge from above is determined by the speed of the metal v_{20} in the outlet section *20–20* of feeder I and its cross-sectional area: $Q=v_{20}S_n$. The remaining fluid velocities in GS channels are determined from the flow continuity equation:

$$Q=v_{cm}S_{cm}=v_{nep}S_{nep}=v_6S_{\kappa}=v_{20}S_n, \quad (3)$$

where S_{cm}, S_{nep}, S_{κ} - cross-sectional areas of the riser, adapter and collector, m^2. $S_{cm}=S_{nep}$, but $v_{cm}=v_{nep}$. We express all metal speeds in (2) in terms of speed v_{20} using the flow continuity equation (3):

$$h_{1-20(20)}=\alpha\frac{v_{20}^2}{2g}\left[\left(\zeta_{cm}+\lambda\frac{l_{cm}+l_{nep}}{d_{cm}}+\zeta_{nep}\right)\left(\frac{S_n}{S_{cm}}\right)^2+\left(\zeta_{\kappa}+\lambda\frac{l_{A-1}}{d_{\kappa}}+2\zeta\right)\left(\frac{S_n}{S_{\kappa}}\right)^2+\zeta_n+\lambda\frac{l_n}{d_n}\right]. \quad (4)$$

The expression in square brackets is denoted as $\zeta_{1-20(20)}$ - this is the coefficient of resistance of the system from section *1–1* to section *20–20*, reduced to the fluid velocity in section *20–20*:

$$\zeta_{1-20(20)}=\left(\zeta_{cm}+\lambda\frac{l_{cm}+l_{nep}}{d_{cm}}+\zeta_{nep}\right)\left(\frac{S_n}{S_{cm}}\right)^2+\left(\zeta_{\kappa}+\lambda\frac{l_{A-1}}{d_{\kappa}}+2\zeta\right)\left(\frac{S_n}{S_{\kappa}}\right)^2+\zeta_n+\lambda\frac{l_n}{d_n}. \quad (5)$$

Now (1) can be written like this:

$$H+H_{0-1}=\alpha v_{20}^2(1+\zeta_{1-20(20)})/2g. \quad (6)$$

And the flow rate of the system from section 1–1 to section 20–20, reduced to velocity v_{20}:

$$\mu_{1-20(20)}=\left(1+\zeta_{1-20(20)}\right)^{-1/2}. \quad (7)$$

Velocity:

$$v_{20}=\mu_{1-20(20)}\sqrt{2g\left(H+H_{0-1}\right)/\alpha}. \quad (8)$$

The flow rate Q is found by the expression (3). The diameters of the feeder, collector, adapter and riser: $d_n=0{,}00903$ m, $d_{\kappa}=d_6=\ldots=d_{19}=0{,}01603$ m, $d_{nep}=d_{cm}=0{,}02408$ m. We accept, as in *(5, 6)*, that the coefficient of friction loss $\lambda=0{,}03$. The coefficient of local resistance of the entrance from the bowl to the riser, depending on the radius of rounding of the input edge is determined by the

reference *(7, p. 126)*: $\zeta_{cm} = 0{,}12$.. The coefficients of local resistance *(8)*: $\zeta_{пер} = 0{,}885$, $\zeta = 0{,}885$, $\zeta_{к} = 0{,}396$, $\zeta_{п} = 0{,}334$.

The results of calculations by the relations (5), (7), (8) and (3): $\zeta_{1-20(20)} = 0{,}847258$, $\mu_{1-20(20)} = 0{,}735760$, $v_{20} = 2{,}900835$ м/с, $Q_{20} = 185{,}775493 \cdot 10^{-6}$ м^3/с.

To calculate the discharge from feeder II, $l_{A-\text{I}} = 0{,}504$ m must be replaced by $l_{A-\text{II}} = 0{,}251$ m, and $H_{0-\text{I}} = 0{,}258$ m - by $H_{0-\text{II}} = 0{,}134$ m $H_{0-\text{II}} = H_{0-\text{III}}$. For feeder IV $l_{A-\text{IV}} = 0{,}241$ m, for VI $l_{A-\text{VI}} = 0{,}494$ m. In the formula (8), $H + H_{0-\text{I}}$ instead of should be $H - H_{0-\text{IV}}$ for feeder IV and $H - H_{0-\text{VI}}$ - for feeder VI. $H_{0-\text{IV}} = H_{0-\text{V}} = 0{,}124$ m, $H_{0-\text{VI}} = 0{,}248$ m. The results of calculations and experiments (in the denominator) are in the table 1.

Table 1. Characteristics of GS during the operation of one feeder

Feeder	ζ	μ	v	Q
I*	0,847	0,736	2,901 / 2,82	185,78 / 180,60
I	0,544	0,805	3,173 / 3,20	203,20 / 204,93
II*	0,710	0,765	2,792 / 2,70	178,80 / 172,91
II	0,517	0,812	2,964 / 2,96	189,83 / 189,56
IV*	0,709	0,765	2,261 / 2,21	144,77 / 141,53
IV	0,588	0,794	2,345 / 2,36	150,16 / 151,14
VI*	0,845	0,736	1,880 / 1,81	120,37 / 115,92
VI	0,544	0,805	2,055 / 2,04	131,61 / 130,65

*) The hydraulic system is open in sections *6–6, 9–9*, and *16–16.*

When feeder I is in the ring, then the pressure loss in the collector along the path with sections 6–6, 7–7, 8–8, and *9–9* is equal to the pressure loss in the collector along the path with sections *13–13*, *12–12, 11– 11* and *10–10* are parallel pipelines. $v_{14} = v_{19} = 0$, $v_6 = v_7 = v_8 = v_9 = v_{13} = v_{12} = v_{11} = v_{10}$. BE for sections *1–1* and *20–20* (on the way through sections *2–2, 5–5, 6–6, 7–7, 8–8* and *9–9*)

$$H + H_{0-\text{I}} = \left(\zeta_{cm} + \lambda\frac{l_{cm} + l_{пер}}{d_{cm}} + \zeta_{пер}\right)\alpha\frac{v_{cm}^2}{2g} + \left(\zeta^{\partial}_{5-6(6)} + \lambda\frac{l_{A-\text{I}}}{d_{к}} + 2\zeta\right)\alpha\frac{v_6^2}{2g} + \left(\zeta_{пс} + \lambda\frac{l_n}{d_n} + 1\right)\alpha\frac{v_{20}^2}{2g}, \quad (9)$$

where ζ_{nc} - coefficient of local resistance to rotation from the collector to the feeder I when supplying liquid to the feeder from two sides; $\zeta_{nc} = 0{,}218$ *(9)*; $\zeta^{\partial}_{5-6(6)}$ - GS coefficient for dividing the flow in section *5–5* between sections *6–6* and *13–13*, reduced to the metal velocity in section 6–6. $\zeta^{\partial}_{5-13(13)}$ - GS coefficient for the division of the flow in section 5–5 between sections *6–6* and *13–13*, reduced to the fluid velocity in section *13–13*. These coefficients are determined by the following expression *(7, p. 277)*:

$$\zeta^{\partial} = \left[1 + \varphi(v_{\partial} / v)^2\right] / (v_{\partial} / v)^2, \qquad (10)$$

where φ - coefficient depending on the rounding of the edges of the place of division of the flow; with a large fillet radius $\varphi = 0{,}3$; at a zero fillet radius $\varphi = 1{,}5$; for our GS $\varphi = 1{,}5$; v - fluid velocity before dividing the flow, m/s; v_{∂} - fluid velocity in one of the channels after dividing the flow, m/s.

$Q = v_{cm}S_{cm} = v_5 S_{cm} = v_6 \cdot S_{к} + v_{13}S_{к} = 2v_6 S_{к} = 2v_{13}S_{к} = v_{20}S_n$. $v_6 / v_5 = v_{13} / v_5 = S_{cm} / 2S_{к} = 1{,}128277$. By (10) we find: $\zeta^{\partial}_{5-6(6)} = \zeta^{\partial}_{5-13(13)} = 2{,}285540$. $v_6 = v_{20}S_n / 2S_{к}$. GS resistance coefficient from section *1–1* to section *20–20*, reduced to speed in feeder I,

$$\zeta_{1-20(20)} = \left(\zeta_{cm} + \lambda\frac{l_{cm} + l_{nep}}{d_{cm}} + \zeta_{nep}\right)\left(\frac{S_n}{S_{cm}}\right)^2 + \left(\zeta^{\partial}_{5-6(6)} + \lambda\frac{l_{A-I}}{d_{к}} + 2\zeta\right)\left(\frac{S_n}{2S_{к}}\right)^2 + \zeta_{nc} + \lambda\frac{l_n}{d_n}. \qquad (11)$$

Substituting the known quantities, we have: $\zeta_{1-20(20)} = 0{,}544008$, $\mu_{1-20(20)} = 0{,}804776$, $v_{20} = 3{,}172941$ m/s, $Q_{20} = 203{,}201747 \cdot 10^{-6}$ m^3/s.

As can be seen, the closure of the liquid ring around the feeder I led to a decrease in the resistance coefficient from $\zeta_{1-20(20)}$ c 0,847 to 0,544. The appearance of a parallel collector led to a decrease in fluid velocities in each of the lines, to a decrease in friction losses and in local resistances, which caused a decrease $\zeta_{1-20(20)}$, growth $\mu_{1-20(20)}$, v_{20} and Q_{20} compared with the case when feeder I worked when the fluid ring broke in a section of *10–10*.

When feeder VI is operating in the ring, its resistance coefficient is found by formula (11) with the replacement of $l_{A-I} = 0{,}504$ m by $l_{A-VI} = 0{,}494$ m, and in formula (8) we correct $H + H_{0-I}$ by $H - H_{0-VI}$.

When working feeders II and III $v_{21} = v_{22}$, $v_{14} = v_{19} = 0$, $v_6 = v_7 = v_{13} = v_{12}$, $v_{cm} = 2v_{21}S_n / S_{cm} = 2v_{22}S_n / S_{cm}$, $v_{13} = v_{12} = v_{21}S_n / S_{к}$. $v_6 = v_7 = v_{22}S_n / S_{к}$. $\zeta^{\partial}_{5-6(6)} = \zeta^{\partial}_{5-13(13)} = 2{,}285540$. System consumption $Q = 2Q_{21} = 2Q_{22}$. The GS resistance coefficient from section *1–1* to section *21–21*, reduced to speed v_{21} in feeder II (takes into account the joint work of feeders II and III),

$$\zeta_{1-21(21)} = \left(\zeta_{cm} + \lambda\frac{l_{cm} + l_{nep}}{d_{cm}} + \zeta_{nep}\right)\left(\frac{2S_n}{S_{cm}}\right)^2 + \left(\zeta^{\partial}_{5-13(13)} + \lambda\frac{l_{A-II}}{d_{к}} + \zeta\right)\left(\frac{S_n}{S_{к}}\right)^2 + \zeta_n + \lambda\frac{l_n}{d_n}. \qquad (12)$$

Substituting the known quantities, we have $\zeta_{1-21(21)} = 1{,}008$, $\mu_{1-21(21)} = 0{,}706$, $v_{21} = 2{,}577$ m/s, $Q_{21} = 165{,}03 \cdot 10^{-6}$ m^3/s. System consumption $Q = 2Q_{21} = 330{,}06 \cdot 10^{-6}$ m^3/s. As you can see, when two identical feeders were working, the drag coefficient $\zeta_{1-21(21)}$ increased from 0.710 to 1.008, the speed dropped from 2.792 to 2.577 m/s. And the flow rate in the system did not increase by 2 times (due to doubling the number of feeders), but by 1.85 times. This is the result of the work of two identical feeders in parallel GS lines.

To calculate the system of feeders IV and V in formula (12), it is necessary to replace $l_{A-\text{III}} = 0{,}126$ m with $l_{A-\text{V}} = 0{,}116$ m, and in relation (8) we correct $H + H_{0-\text{I}}$ to $H - H_{0-\text{V}}$. $v_6 = v_{14} = v_{13} = v_{19}$. $v_{cm} = 2v_{23}S_n / S_{cm} = 2v_{24}S_n / S_{cm}$, $v_{13} = v_{19} = v_{23}S_n / S_к$. $v_6 = v_{14} = v_{24}S_n / S_к$. $\zeta^{\partial}_{5-6(6)} = \zeta^{\partial}_{5-13(13)} = 2{,}285540$. System consumption $Q = 2Q_{23} = 267{,}21 \cdot 10^{-6}$ m^3/s.

We calculate the joint work of feeders I and VI. Bernoulli equation for sections *1–1* and *20–20* along the path of fluid motion through sections *2–2, 5–5, 6–6, 7–7, 8–8* and *9–9*:

$$H + H_{0-\text{I}} = \left(\zeta_{cm} + \lambda\frac{l_{cm} + l_{nep}}{d_{cm}} + \zeta\right)\alpha\frac{v_{cm}^2}{2g} + \left(\zeta^{\partial}_{5-6(6)} + \lambda\frac{l_{A-B}}{d_к}\right)\alpha\frac{v_6^2}{2g} + \left(\zeta^{\partial}_{6-7(7)} + \lambda\frac{l_{B-\text{I}}}{d_к} + \zeta\right)\alpha\frac{v_7^2}{2g} + \left(\zeta_{nc} + \lambda\frac{l_n}{d_n} + 1\right)\alpha\frac{v_{20}^2}{2g}. \quad (13)$$

Bernoulli equation for sections *1–1* and *25–25* along the path of fluid flow through sections *2–2, 5–5, 6–6, 14–14, 15–15* and *16–16*:

$$H - H_{0-\text{VI}} = \left(\zeta_{cm} + \lambda\frac{l_{cm} + l_{nep}}{d_{cm}} + \zeta\right)\alpha\frac{v_{cm}^2}{2g} + \left(\zeta^{\partial}_{5-6(6)} + \lambda\frac{l_{A-B}}{d_к}\right)\alpha\frac{v_6^2}{2g} + \left(\zeta^{\partial}_{6-14(14)} + \lambda\frac{l_{B-\text{VI}}}{d_к} + \zeta\right)\alpha\frac{v_{14}^2}{2g} + \left(\zeta_{nc} + \lambda\frac{l_n}{d_n} + 1\right)\alpha\frac{v_{25}^2}{2g}. \quad (14)$$

$l_{A-B} = l_{A-C} = 0{,}125$ m, $l_{B-\text{I}} = l_{C-\text{I}} = 0{,}379$ m, $l_{B-\text{VI}} = l_{C-\text{VI}} = 0{,}369$ m. $v_6 = v_{13}$, $Q_6 = Q_{13} = 0{,}5v_{cm}S_{cm}$, $v_{25} < v_{20}$, $v_7 = v_9 = v_{12} = v_{10}$, $v_{14} = v_{16} = v_{19} = v_{17}$. $\zeta^{\partial}_{5-6(6)} = \zeta^{\partial}_{5-13(13)} = 2{,}285540$. We introduce the following notation: $x = v_{25} / v_{20}$, $y = v_{14} / v_7$. In this GS $x = y$. Cross section consumption *6–6* $Q_6 = v_6S_к = (v_7 + v_{14})S_к = (v_7 + yv_7)S_к = v_7(1 + y)S_к$. Or $Q_6 = (v_7 + v_{14})S_к = (v_{14} / y + v_{14})S_к = v_{14}(1/y + 1)S_к$. $v_7 / v_6 = 1/(1 + y)$, a $v_{14} / v_6 = 1/(1/y + 1)$. With $y = 1$ $v_7 / v_6 = v_{14} / v_6 = 0{,}5$, a $\zeta^{\partial}_{6-7(7)} = \zeta^{\partial}_{6-14(14)} = 5{,}5$ – in relation (10).

System consumption $Q = v_{cm}S_{cm} = (v_{20} + v_{25})S_n = (v_{20} + xv_{20})S_n = v_{20}(1 + x)S_n = v_{20}S_{np(20)}$ where $S_{np(20)} = (1 + x)S_n$ - the area of the feeders reduced to the velocity. $v_{cm} = v_{20}S_{np(20)} / S_{cm} = v_{25}S_{np(25)} / S_{cm}$. $v_6 = 0{,}5v_{cm}S_{cm} / S_к = 0{,}5v_{20}S_{np(20)} / S_к = 0{,}5v_{25}S_{np(25)} / S_к$.

After converting formulas (13) and (14), we obtain the following expressions for the resistance coefficients:

$$\zeta_{1-20(20)} = \left(\zeta_{cm} + \lambda\frac{l_{cm}+l_{nep}}{d_{cm}} + \zeta\right)\left(\frac{S_{np(20)}}{S_{cm}}\right)^2 + \left(\zeta^{\partial}_{5-6(6)} + \lambda\frac{l_{A-B}}{d_к}\right)\left(\frac{S_{np(20)}}{2S_к}\right)^2 + \left(\zeta^{\partial}_{6-7(7)} + \lambda\frac{l_{B-I}}{d_к} + \zeta\right)\left(\frac{S_n}{2S_к}\right)^2 +$$

$$\zeta_{nc} + \lambda\frac{l_n}{d_n} + 1;$$

$$\zeta_{1-25(25)} = \left(\zeta_{cm} + \lambda\frac{l_{cm}+l_{nep}}{d_{cm}} + \zeta\right)\left(\frac{S_{np(25)}}{S_{cm}}\right)^2 + \left(\zeta^{\partial}_{5-6(6)} + \lambda\frac{l_{A-B}}{d_к}\right)\left(\frac{S_{np(25)}}{2S_к}\right)^2 + \left(\zeta^{\partial}_{6-14(14)} + \lambda\frac{l_{B-VI}}{d_к} + \zeta\right)\left(\frac{S_n}{2S_к}\right)^2 +$$

$$\zeta_{nc} + \lambda\frac{l_n}{d_n} + 1.$$

Substituting the known quantities, we have: $\zeta_{1-20(20)} = 0{,}957613$, $\mu_{1-20(20)} = 0{,}714721$, $v_{20} = 2{,}817886$ m/s, $\zeta_{1-25(25)} = 0{,}957142$, $\mu_{1-25(25)} = 0{,}714807$, $v_{25} = 1{,}825096$ m/s. Velocity equation $x = v_{25}/v_{20} = 0{,}647683$. But it was set $x = 1$. Repeat the calculation when $x = y = 0{,}647683$ And get $x = y = 0{,}577043$. After a series of approximations for a given $x = 0{,}5485966$, we get the calculation $x = 0{,}548596605$. The calculation of this relationship can be completed, since the difference between the given and calculated values x is only 0.000000005. We accept $x = v_{25}/v_{20} = 0{,}548597$. Wherein $\zeta_{1-20(20)} = 0{,}758477$, $\zeta_{1-25(25)} = 1{,}450477$. The results are in the Table 2.

We calculate the joint work of feeders II, III, IV and V. In the system $v_6 = v_{13}$, $v_7 = v_{12}$, $v_{14} = v_{19}$, $v_{21} = v_{22} > v_{23} = v_{24}$. Since $v_{21} = v_{22}$, and $v_{23} = v_{24}$, it is possible to compose the Bernoulli equation only for feeders III and V. BE for sections *1–1* in the bowl and *22–22* in feeder III:

$$H + H_{0-III} = \left(\zeta_{cm} + \lambda\frac{l_{cm}+l_{nep}}{d_{cm}} + \zeta\right)\alpha\frac{v^2_{cm}}{2g} + \left(\zeta^{\partial}_{5-6(6)} + \lambda\frac{l_{A-B}}{d_к}\right)\alpha\frac{v_6^2}{2g} + \left(\zeta^{\partial}_{6-7(7)} + \lambda\frac{l_{B-III}}{d_к}\right)\alpha\frac{v_7^2}{2g} + \left(\zeta_n + \lambda\frac{l_n}{d_n} + 1\right)\alpha\frac{v_{22}^2}{2g}. \quad (15)$$

Table 2. Characteristics of GS during the work of two feeders

System	Feeder	ζ	μ	v	Q	$Q_{ЛС}$
I, II	I	0,993	0,708	2,793 / 2,85	178,88 / 182,52	337,96 / 340,70
	II	1,161	0,680	2,484 / 2,47	159,08 / 158,18	
I, IV	I	0,812	0,743	2,929 / 3,02	187,56 / 191,41	315,58 / 315,01
	IV	1,185	0,676	1,999 / 1,93	128,02 / 123,60	
I, VI	I	0,758	0,754	2,973 / 3,05	190,41 / 195,33	

	VI	1,450	0,639	1,631 1,65	104,46 105,67	294,09 301,00
II, IV	II	0,836	0,738	2,695 2,73	172,58 174,83	301,78 299,71
	IV	1,145	0,683	2,017 1,95	129,20 124,88	
II, V	II	0,848	0,736	2,686 2,75	172,00 176,19	304,79 305,48
	V	1,031	0,702	2,073 2,02	139,79 129,36	
II, VI	II	0,774	0,751	2,741 2,76	175,55 176,76	280,28 285,63
	VI	1,438	0,640	1,635 1,70	104,73 108,87	
II, III	II	1,008	0,706	2,577 2,60	165,03 166,51	330,05 333,02
IV, V	IV	1,006	0,706	2,086 2,11	133,61 135,13	267,21 270,26

BE for sections *1–1* in the bowl and *24–24* in feeder V:

$$H - H_{0-\text{V}} = \left(\zeta_{cm} + \lambda\frac{l_{cm}+l_{nep}}{d_{cm}} + \zeta\right)\alpha\frac{v_{cm}^2}{2g} + \left(\zeta^{\partial}_{5-6(6)} + \lambda\frac{l_{A-B}}{d_к}\right)\alpha\frac{v_6^2}{2g} + \left(\zeta^{\partial}_{6-14(14)} + \lambda\frac{l_{B-\text{V}}}{d_к}\right)\alpha\frac{v_{14}^2}{2g} + \left(\zeta_n + \lambda\frac{l_n}{d_n} + 1\right)\alpha\frac{v_{24}^2}{2g}. \quad (16)$$

$l_{B-\text{III}} = l_{C-\text{II}} = 0{,}126$ m, $l_{B-\text{V}} = l_{C-\text{IV}} = 0{,}116$ m. We introduce the following notation: $x = v_{23}/v_{21} = v_{24}/v_{22}$, $y = v_{14}/v_7 = v_{19}/v_{12}$. System consumption $Q = v_{cm}S_{cm} = (v_{21}+v_{22}+v_{23}+v_{24})S_n = (2v_{22}+2v_{24})S_n = (2v_{22}+2xv_{22})S_n = 2v_{22}(1+x)S_n = v_{22}S_{np(22)}$, where $S_{np(22)} = 2(1+x)S_n$ – reduced to the velocity v_{22} the area of the feeders (takes into account the work of all four feeders). Write similarly: $Q = (2v_{22}+2v_{24})S_n = (2v_{24}/x + 2v_{24})S_n = 2v_{24}(1/x+1)S_n = v_{24}S_{np(24)}$, где $S_{np(24)} = 2(1/x+1)S_n$ – reduced to the velocity v_{24} the area of the feeders. $v_{cm} = v_{22}S_{np(22)}/S_к = v_{24}S_{np(24)}/S$. $v_6 = 0{,}5v_{cm}S_{cm}/S_к = 0{,}5v_{22}S_{np(22)}/S_к = 0{,}5v_{24}S_{np(24)}/S_к$.

Substituting these relations into equations in (15) and (16), we calculate GS from feeders II – V. The results are in the Table 2.

At work of all 6 feeders $v_6 = v_{13}$, $v_{21} = v_{22}$, $v_{23} = v_{24}$. BE for sections *1–1* and *20–20*:

$$H + H_{0-\text{I}} = \left(\zeta_{cm} + \lambda\frac{l_{cm}+l_{nep}}{d_{cm}} + \zeta_{nep}\right)\alpha\frac{v_{cm}^2}{2g} + \left(\zeta^{\partial}_{5-6(6)} + \lambda\frac{l_{A-B}}{d_к}\right)\alpha\frac{v_6^2}{2g} + \left(\zeta^{\partial}_{6-7(7)} + \lambda\frac{l_{B-\text{III}}}{d}\right)\alpha\frac{v_7^2}{2g} + \left(\zeta_8 + \lambda\frac{l_{\text{I}-\text{III}}}{d} + \zeta\right)\alpha\frac{v_8^2}{2g} + \left(\zeta_{nc} + \lambda\frac{l_n}{d_n} + 1\right)\alpha\frac{v_{20}^2}{2g}. \quad (17)$$

BE for sections *1–1* and *22–22*:

$$H + H_{0\text{–II}} = \left(\zeta_{cm} + \lambda\frac{l_{cm}+l_{nep}}{d_{cm}} + \zeta_{nep}\right)\alpha\frac{v_{cm}^2}{2g} + \left(\zeta^{\partial}_{5\text{–}6(6)} + \lambda\frac{l_{A-B}}{d_к}\right)\alpha\frac{v_6^2}{2g} + \left(\zeta^{\partial}_{6\text{–}7(7)} + \lambda\frac{l_{B\text{–III}}}{d}\right)\alpha\frac{v_7^2}{2g} + \left(\zeta_{22} + \lambda\frac{l_n}{d_n} + 1\right)\alpha\frac{v_{22}^2}{2g}. \quad (18)$$

BE for sections *1–1* and *24–24*:

$$H - H_{0\text{–V}} = \left(\zeta_{cm} + \lambda\frac{l_{cm}+l_{nep}}{d_{cm}} + \zeta_{nep}\right)\alpha\frac{v_{cm}^2}{2g} + \left(\zeta^{\partial}_{5\text{–}6(6)} + \lambda\frac{l_{A-B}}{d_к}\right)\alpha\frac{v_6^2}{2g} + \left(\zeta^{\partial}_{6\text{–}14(14)} + \lambda\frac{l_{B\text{–V}}}{d}\right)\alpha\frac{v_{14}^2}{2g} + \left(\zeta_{24} + \lambda\frac{l_n}{d_n} + 1\right)\alpha\frac{v_{24}^2}{2g}. \quad (19)$$

BE for sections *1–1* and *25–25*:

$$H - H_{0\text{–VI}} = \left(\zeta_{cm} + \lambda\frac{l_{cm}+l_{nep}}{d_{cm}} + \zeta_{nep}\right)\alpha\frac{v_{cm}^2}{2g} + \left(\zeta^{\partial}_{5\text{–}6(6)} + \lambda\frac{l_{A-B}}{d_к}\right)\alpha\frac{v_6^2}{2g} + \left(\zeta^{\partial}_{6\text{–}14(14)} + \lambda\frac{l_{B\text{–V}}}{d}\right)\alpha\frac{v_{14}^2}{2g} + \left(\zeta_{15} + \lambda\frac{l_{\text{V-VI}}}{d} + \zeta\right)\alpha\frac{v_{15}^2}{2g} + \left(\zeta_{nc} + \lambda\frac{l_n}{d_n} + 1\right)\alpha\frac{v_{25}^2}{2g}. \quad (20)$$

Here $l_{\text{I–III}}$, $l_{\text{V–VI}}$ – distance between feeders I and III, V and VI, m; $l_{\text{I–II}} = l_{\text{I–III}} = 0{,}253$ m, $l_{\text{IV–VI}} = l_{\text{V-VI}} = 0{,}253$ m.

In relation (17), ζ_8 - the coefficient of resistance to the passage of fluid from section *7–7* of the collector to section *8–8* of the collector when a part of the flow from the collector is branched into feeder III. In relation (20), ζ_{15} - the coefficient of resistance to the passage of fluid from section *14–14* of the collector to section *15–15* of the collector when a part of the flow from the collector is branched into feeder V. $\zeta_8 = \zeta_{11}$, $\zeta_{15} = \zeta_{18}$. The resistance coefficients due to the separation of the flow from the collector into the feeder will be calculated according to the formulas for tees *(3, p. 112-115)*. The resistance coefficient to the passage in the collector when branching part of the flow into the feeder

$$\zeta_{np} = 0{,}4\left(1 - v_{np}/v_к\right)^2 / \left(v_{np}/v_к\right)^2, \quad (21)$$

and the coefficient of resistance to branch part of stream

$$\zeta_{omв} = \left[1 + \tau\left(v_n/v_к\right)^2\right] / \left(v_n/v_к\right)^2, \quad (22)$$

where $v_к$ and v_{np} – metal velocity in the collector before and after branching off part of the flow into the feeder, m/s; v_n - fluid velocity in the feeder, m/s; τ - coefficient. For our case, with $S_n/S_к = 0{,}317$ $\tau = 0{,}15$ *(8)*. The coefficient ζ_{np} is obtained reduced to the speed of the passing stream v_{np}, and $\zeta_{omв}$, - to the velocity in the feeder v_n. As can be seen, the coefficients ζ_{np} and $\zeta_{omв}$ depend on the unknowns $v_{np}/v_к$ and $v_n/v_к$.

We introduce the following notation: $x_1 = v_{21}/v_{20} = v_{22}/v_{20}$, $x_2 = v_{23}/v_{20} = v_{24}/v_{20}$, $x_3 = v_{25}/v_{20}$, $y = v_{14}/v_7 = v_{19}/v_{12}$, $z_1 = v_8/v_7 = v_{11}/v_{12}$, $z_2 = v_{15}/v_{14} = v_{18}/v_{19}$. System consumption $Q = v_{cm}S_{cm} = \left(v_{20} + v_{21} + v_{22} + v_{23} + v_{24} + v_{25}\right)S_n = \left(v_{20} + 2v_{21} + 2v_{23} + v_{25}\right)S_n = v_{20}\left(1 + 2x_1 + 2x_2 + x_3\right)S_n = v_{20}S_{np(20)}$,

where $S_{np(20)} = (1 + 2x_1 + 2x_2 + x_3)S_n$ – reduced to velocity v_{20} area of the feeders (takes into account the work of all six feeders). Similarly, we obtain $S_{np(21)} = S_{np(22)} = (1 + 2x_1 + 2x_2 + x_3)S_n / x_1$ $S_{np(23)} = S_{np(24)} = (1 + 2x_1 + 2x_2 + x_3)S_n / x_2$, $S_{np(25)} = (1 + 2x_1 + 2x_2 + x_3)S_n / x_3$.

$v_{cm} = v_{20}S_{np(20)} / S_{cm} = v_{21}S_{np(21)} / S_{cm} = v_{23}S_{np(23)} / S_{cm} = v_{25}S_{np(25)} / S_{cm}$.

$v_7 = v_6 / (1 + y) = 0{,}5v_{cm}S_{cm} / S_к / (1 + y) = 0{,}5v_{20}S_{np(20)} / S_к / (1 + y) = 0{,}5v_{21}S_{np(21)} / S_к (1 + y) =$
$0{,}5v_{23}S_{np(23)} / S_к / (1 + y) = 0{,}5v_{25}S_{np(25)} / S_к / (1 + y)$.

$v_8 = 0{,}5v_{20}S_n / S_к$, $v_{15} = 0{,}5v_{25}S_n / S_к$.

Accept (optional): $x_1 = x_2 = x_3 = 1$, $y = 1$, $z_1 = 0{,}5$, $z_2 = 0{,}5$. When $z_1 = z_2 = 0{,}5$ $\zeta_8 = \zeta_{15} = 0{,}4$, $\zeta_{22} = \zeta_{24} = 0{,}552788$ – by relations (21) and (22). Coefficients $\zeta^{\partial}_{5-6(6)}$, $\zeta^{\partial}_{5-6(6)}$, $\zeta^{\partial}_{6-7(7)}$, $\zeta^{\partial}_{6-14(14)}$ are already determined. Substituting these relations into equations in (17) - (20), we obtain: $x_1 = 0{,}905473$, $x_2 = 0{,}732970$, $x_3 = 0{,}647823$, $y = 0{,}751976$, $z_1 = 0{,}355752$, $z_2 = 0{,}306479$. Using these quantities for a new calculation, we have: $x_1 = 0{,}854092$, $x_2 = 0{,}600370$, $x_3 = 0{,}470500$, $y = 0{,}617108$, $z_1 = 0{,}369251$, $z_2 = 0{,}281528$. Further calculations showed that $z_2 \to 0$, $v_{15} \to 0$ and $v_{25} \to 0$. That is, water does not flow from feeder VI. In the experiment, there was no water in feeder VI. Which, apparently, indicates the correctness of the proposed methodology for calculating drugs.

We calculate the characteristics of GS during the operation of feeder IV. Bernoulli equation for sections *1–1* and *23–23* along the path through sections *2–2, 5–5, 13–13, 19–19*:

$$H - H_{0-\text{IV}} = \left(\zeta_{cm} + \lambda\frac{l_{cm} + l_{nep}}{d_{cm}} + \zeta\right)\alpha\frac{v_{cm}^2}{2g} + \left(\zeta^{\partial}_{5-13(13)} + \lambda\frac{l_{A-C}}{d_к}\right)\alpha\frac{v_{13}^2}{2g} + \left(\zeta^{\partial}_{13-19(19)} + \lambda\frac{l_{C-\text{IV}}}{d_к}\right)\alpha\frac{v_{19}^2}{2g} + \left(\zeta_{nc} + \lambda\frac{l_n}{d_n} + 1\right)\alpha\frac{v_{23}^2}{2g}. \quad (23)$$

BE for sections *1–1* and *23–23* along the path through sections *2–2, 5–5 6–6, 14–14, 18–18*:

$$H - H_{0-\text{IV}} = \left(\zeta_{cm} + \lambda\frac{l_{cm} + l_{nep}}{d_{cm}} + \zeta\right)\alpha\frac{v_{cm}^2}{2g} + \left(\zeta^{\partial}_{5-6(6)} + \lambda\frac{l_{A-B}}{d_к}\right)\alpha\frac{v_6^2}{2g} + \left(\zeta^{б}_{6-14(14)} + \lambda\frac{l_{B-\text{IV}}}{d_к} + 2\zeta\right)\alpha\frac{v_{14}^2}{2g} + \left(\zeta_{nc} + \lambda\frac{l_n}{d_n} + 1\right)\alpha\frac{v_{23}^2}{2g}. \quad (24)$$

Here $l_{B-\text{IV}}$ - the distance from point B to feeder IV along the path through sections *14–14, 18–18*, m; $l_{B-\text{IV}} = 0{,}622$ m.

In relation (23), $\zeta^{б}_{13-19(19)}$ – the drag coefficient in the lateral branch when the flow from section *13–13* merges with the stream from section *12–12* in section *19–19*. The resistance coefficients due to the merging of flows in the collector will be calculated by the formulas for the collecting tee *(3, p. 114-115)*. The resistance coefficient to the passage in the collector when the flow from section *12–12* merges with the flow from section *13–13* in section *19–19*.

$$\zeta_{np(сл)} = 1{,}55v_б / v_к - (v_б / v_к)^2, \quad (25)$$

and the drag coefficient in the side branch

$$\zeta_{отв(сл)} = \omega\left[1+\left(v_б / v_к\right)^2 - 2\left(1 - v_б / v_к\right)^2\right], \qquad (26)$$

where $v_к$ – velocity of the metal in the reservoir after the confluence of flows, m/s; $v_б$ - fluid velocity in the lateral branch, m/s. The coefficient $\omega = 0{,}75$ when $v_б > 0{,}4v_к$ and $\omega = 0{,}55$ when $v_б \le 0{,}4v_к$. The coefficients $\zeta_{пр(сл)}$ and $\zeta_{отв(сл)}$ are related to the flow velocity after the confluence of flows.

It is clear that $v_6 \ne v_{13}$. $y = v_{19}/v_{12}$. When $y = 1$ $\zeta^{\partial}_{13-12(12)} = \zeta^{\partial}_{19-12(12)} = 5{,}5$. We introduce the following notation: $z = v_6 / v_{13}$. System consumption $Q = Q_{23} = v_{cm}S_{cm} = \left(v_6 + v_{13}\right)S_к = \left(v_6 + v_6/z\right)S_к = v_6\left(1+1/z\right)S_к$. $v_6 / v_{cm} = S_{cm}/S_к / \left(1+1/z\right)$. Similarly: $Q = v_{cm}S_{cm} = \left(zv_{13} + v_{13}\right)S_к = v_{13}\left(z+1\right)S_к$. $v_6 / v_{cm} = S_{cm}/S_к / \left(1+1/z\right)$. Suppose that $z = 1{,}1$. In this case $\zeta^{\partial}_{5-6(6)} = 2{,}215750$, $\zeta^{\partial}_{5-13(13)} = 2{,}366058$ – by relation (10). Velocity v_6 / v_{14} and v_7 / v_{14} relation are also unknown. $v_{cm} = v_{23}S_n / S_{cm}$, $v_{13} = \dfrac{v_{cm}S_{cm}}{\left(1+z\right)S_к} = \dfrac{v_{23}S_n}{\left(1+z\right)S_к}$, $v_{12} = v_7 = \dfrac{v_{13}}{1+y} = \dfrac{v_{23}S_n}{\left(1+y\right)\left(1+z\right)S_к}$,

$$v_6 = \frac{v_{cm}S_{cm}}{\left(1+1/z\right)S_к} = \frac{v_{23}S_n}{\left(1+1/z\right)S_к}.$$

$$v_{14} = v_6 + v_7 = \frac{v_{23}S_n}{S_к}\left(\frac{1}{1+1/z} + \frac{1}{\left(1+y\right)\left(1+z\right)}\right).$$

$$v_6 / v_{14} = \frac{1}{1+1/z} \Big/ \left(\frac{1}{1+1/z} + \frac{1}{\left(1+y\right)\left(1+z\right)}\right),\ v_7 / v_{14} = \frac{1}{\left(1+y\right)\left(1+z\right)} \Big/ \left(\frac{1}{1+1/z} + \frac{1}{\left(1+y\right)\left(1+z\right)}\right).$$

$$v_{19} = \frac{v_{13}}{1+1/y} = \frac{v_{23}S_n}{\left(1+1/y\right)\left(1+z\right)S_к}.$$

Now, relation (23) can be written as

$$H - H_{0-IV} = \alpha\frac{v_{23}^2}{2g}\left[\begin{array}{l}\left(\zeta_{cm} + \lambda\dfrac{l_{cm}+l_{nep}}{d_{cm}} + \zeta\right)\left(\dfrac{S_n}{S_{cm}}\right)^2 + \left(\zeta^{\partial}_{5-13(13)} + \lambda\dfrac{l_{A-C}}{d_к}\right)\left(\dfrac{S_n}{\left(1+z\right)S_к}\right)^2 + \\ \left(\zeta^{\partial}_{13-19(19)} + \lambda\dfrac{l_{C-IV}}{d_к}\right)\left(\dfrac{S_n}{S_к\left(1+1/y\right)\left(1+z\right)}\right)^2 + \zeta_{nc} + \lambda\dfrac{l_n}{d_n} + 1\end{array}\right].$$

The ratio in square brackets (with the exception of "1") is designated as $\zeta_{1-23(13-19)}$ – this is the coefficient of resistance of the system from section *1–1* to section *23–23*, reduced to the fluid velocity in section *23–23*.

Similarly, we obtain from relation (24):

$$\zeta_{1-23(6-14-18)} = \left(\zeta_{cm} + \lambda\frac{l_{cm}}{d_{cm}}\right)\left(\frac{S_n}{S_{cm}}\right)^2 + \left(\zeta^{\partial}_{5-6(6)} + \lambda\frac{l_{A-B}}{d_к}\right)\left(\frac{S_n}{\left(1+1/z\right)S_к}\right)^2 +$$

$$\left(\zeta^{б}_{6-14(14)} + \lambda\frac{l_{B-IV}}{d_к} + 2\zeta\right)\left(\frac{S_n}{S_к}\right)^2\left(\frac{1}{1+1/z} + \frac{1}{\left(1+y\right)\left(1+z\right)}\right)^2 + \zeta_n + \lambda\frac{l_n}{d_n}.$$

When $y = v_{19}/v_{12} = 1$ and $z = v_6/v_5 = 1{,}1$ $v_7/v_{14} = 0{,}3125$, $\zeta^{пр}_{7-14(14)} = 0{,}592969$, $v_6/v_{14} = 0{,}6875$, $\zeta^{б}_{6-14(14)} = 0{,}958008$. Calculation results: $\zeta_{1-23(13-19)} = 0{,}510171$, $\mu_{1-23(13-19)} = 0{,}813742$, $v_{23(13-19)} = 2{,}404454$ м/с, $\zeta_{1-23(6-14-18)} = 0{,}713359$, $\mu_{1-23(6-14-18)} = 0{,}763969$, $v_{23(6-14-18)} = 2{,}257383$ m/s.

As we can see, the resulting indicators for different paths of fluid movement differ from each other. The values of the relations and were taken arbitrarily. WE need to find them by calculation. This GS has a ring for fluid movement, consisting of two half rings, left and right. The left half-ring is from point A through sections *13–13* and *19–19* to feeder IV, the right half-ring is from point A through sections *6–6, 14–14*, and *18–18* to feeder IV. The pressure loss in these half rings should be equal. Loss of pressure in the left semicircle $h_{A-\text{IV}(13-19)} = \left(\zeta^{\partial}_{5-13(13)} + \lambda\frac{l_{A-C}}{d_к}\right)\alpha\frac{v_{13}^2}{2g} + \left(\zeta^{\partial}_{13-19(19)} + \lambda\frac{l_{C-\text{IV}}}{d_к}\right)\alpha\frac{v_{19}^2}{2g}$. Loss of pressure in the right semicircle $h_{A-\text{IV}(6-14-18)} = \left(\zeta^{\partial}_{5-6(6)} + \lambda\frac{l_{A-B}}{d_к}\right)\alpha\frac{v_6^2}{2g} + \left(\zeta_{6-14} + \lambda\frac{l_{B-\text{IV}}}{d_к} + 2\zeta\right)\alpha\frac{v_{14}^2}{2g}$.

$v_6 = 0{,}399667$ m/s, $v_{13} = 0{,}363334$ m/s, $v_{14} = 0{,}581334$ m/s, $v_{19} = 0{,}181667$ m/s. We get by calculation: $h_{A-\text{IV}(13-19)} = 0{,}029822$ m, $h_{A-\text{IV}(6-14-18)} = 0{,}095682$ m, $h_{\text{IV}} = h_{A-\text{I}(13-19)} - h_{A-\text{IV}(6-14-18)} = -0{,}065860$ m. Loss of pressure $h_{A-\text{IV}(13-19)}$ less losses $h_{A-\text{IV}(6-14-18)}$. To equalize them, we need to increase velocity v_6 and reduce velocity v_{13}.

$y = 1$. Accept $z = 0{,}8$, repeat the calculation and get: $h_{\text{IV}} = -0{,}042360$. Changing z and y, we change the speed and pressure loss in different parts of the hydraulic system. When $z = v_6 / v_{13} = 0{,}5001$ and $y = v_{19} / v_{12} = 1{,}5111$ $h_{\text{IV}} = 1{,}90 \cdot 10^{-6}$ m.

The BE record in the form of (23) and (24) is doubtful. But here are the characteristics obtained by feeder IV as a result of calculation: $\zeta_{1-23(13-19)} = 0{,}588125$, $\zeta_{1-23(6-14-18)} = 0{,}588119$. The difference is the sixth decimal place. But the calculation of the pressure loss for the same feeder was carried out on two different hydraulic lines. That is, the Bernoulli equation is suitable for calculating flows with a variable flow rate with such features of GS.

In accordance with the above examples, we are calculating other options for GS. The results are in Tables 1-3.

Results and Discussion

The experimental values of expenses in GS differ from the calculated ones by several percent. The difference between the experimental and theoretical data is small and even casts doubt on the results of the work. Although this was noted in studies of GS listed at the beginning of the article. But no errors were found either in the calculations, in the design of the experiments, or in the processing of the experimental data.

In the system, the feeders are at four different levels, with one feeder located at the upper and lower levels, and two feeders at the two middle levels. For feeders I, II, IV, and VI, the effective pressures are 871.5, 747.5, 489.5, and 365.5 mm, respectively. The pressure in the feeder I is 2.4 times higher than in the feeder VI. But this did not affect the calculation results.

The most interesting GS is IV. In this system, in sections *5–5*, the flow is divided into 2 unequal parts between sections *6–6* and *13–13*, in section *13–13*, the flow is divided into 2 unequal parts between

sections *12–12* and *19–19*, then the flows from sections *6–6* and *7–7* are combined in section *14–14* and move to feeder IV. That is, divisions and mergers of flows occur in the system. And this system can be calculated. Although the BE was derived theoretically for GS with a single feeder, with a constant flow rate, without any divisions and merging flows. Why this happens is not clear.

As can be seen from tables 2 and 3, in GS there are as many flow coefficients as there are feeders in it. Moreover, they can be all the same, different, pairwise identical, etc.

Note that the feeders "know" about each other, since switching on or off at least one feeder leads to a restructuring of the entire hydraulic system. Moreover, experimentally, the process of fluid outflow is established very quickly, in 5–10 s, even with a sharp "skew" in the system, when, for example, only feeders I and IV work.

So what is it all about? For example, in the case of all six feeders, we write BE for each of them for sections *1–1* and *Z – Z*. Or, we can write BE for section *1–1* and any section of GS, or any two sections, although fluid flow rates in these sections can differ many times. That is, *we use Bernoulli equation for flow cross sections with different flows*, and, surprisingly, experiments confirm this seemingly absurd assumption. And due to this, the calculation of GS became possible. Without any additional principles. Only obvious: $Q = \sum_{i=1}^{n} Q_i$, where Q_i – fluid flow rate in the i feeder. In any section of the hydraulic system, H acts as the sum of the velocity and piezometric pressure and pressure loss - taking into account the difference in height distances between the compared sections.

Table 3. GS characteristics during the work of three to six feeders

System	Feeder	ζ	μ	v	Q	$Q_{ЛС}$
I – III	I	1,360	0,651	2,566 / 2,61	164,35 / 167,15	440,58 / 442,53
	II	1,867	0,591	2,157 / 2,15	138,12 / 137,69	
IV – VI	IV	1,481	0,635	1,876 / 1,85	120,14 / 118,48	332,74 / 331,10
	VI	2,128	0,565	1,444 / 1,47	92,45 / 94,14	
II – V	II	1,980	0,579	2,115 / 2,234	135,46 / 143,07	439,19 / 461,62
	V	4,059	0,445	1,314 / 1,37	84,13 / 87,74	
I – VI	I	2,227	0,557	2,195 / 2,33	140,56 / 149,22	
	II	3,462	0,473	1,729 / 1,87	110,71 / 119,76	

	IV	8,078	0,332	0,981 / 0,99	62,81 / 63,40	487,58 / 515,54
	VI	∞	0	0 / 0	0 / 0	
I, II, IV	I	1,371	0,649	2,560 / 2,63	163,97 / 168,43	
	II	1,742	0,604	2,205 / 2,28	141,22 / 146,02	408,17 / 408,59
	IV	2,376	0,544	1,608 / 1,47	102,99 / 94,14	
I, II, V	I	1,357	0,651	2,568 / 2,69	164,46 / 172,27	
	II	1,704	0,608	2,220 / 2,27	142,20 / 145,38	403,52 / 418,84
	V	2,816	0,512	1,513 / 1,58	96,87 / 101,19	
I, II, VI	I	1,327	0,656	2,585 / 2,74	165,53 / 175,48	
	II	1,720	0,606	2,214 / 2,36	141,78 / 151,14	382,79 / 404,75
	VI	3,694	0,462	1,178 / 1,22	75,47 / 78,13	

The calculations take into account, in addition to 2 usual hydraulic losses - for friction along the length and in local resistances - losses for the change in pressure (for dividing the flow and for merging flows), calculated by the relations (10), (21), (22), (25) and (26). The summation of the pressure loss with the friction loss along the length and in local resistances is not theoretically justified. However, no experimental data have been obtained that contradict this assumption.

The BE was derived for an elementary stream of an ideal ("dry") liquid with steady motion strictly theoretically, without involving experimental data *(2, p. 95–97)*: $h + p/\gamma + v^2/2g = \text{const}$ (along the trickle), where h – the excess of the section over the comparison plane.

However, for a flow of a real (viscous) fluid with steady motion, it is necessary to introduce friction head losses in local resistances and the coefficient of uneven distribution of velocity over the flow cross section α *(2, p. 108–111)*. Moreover, to determine the friction losses, experimentally find the loss coefficient λ, and for losses in local resistances, the coefficients of local resistances ζ. The coefficients λ and ζ depend on the speed of the flow, the roughness of the pipe surface, etc. That is, the BE becomes a calculation-experimental one. And the expansion of the field of his work into

flows with a variable flow rate using the experimental formulas (10), (21), (22), (25) and (26) should not cause protest.

And Bernoulli equation, deduced for a special case - for a system with one feeder, also works in the most complex multi-nutrient one - a vertical two-ring one with feeders located at different levels.

Taking into account the previously studied GS listed in the introduction, it is possible to consider the possibility of using Bernoulli equation to flow cross sections with different flow rates, that is, for calculating multi-nutrient gate systems. Although theoretically this is not justified.

Conclusion

Thus, for the first time theoretically and experimentally, the most complex multi-nutrient sprue system was studied - a vertical double-ring system with feeders located at different levels. A technique has been developed for calculating the velocities and flow rates of a fluid in each feeder and in the entire system. When calculating such a hydraulic system with a variable fluid flow rate, Bernoulli equation was used, although it was derived theoretically and verified practically for a fluid flow with a constant flow rate, that is, for drugs with one feeder. Good agreement between theoretical and experimental data is obtained.

References:

1. *Vasenin VI, Bogomyagkov AV, Sharov KV. Study of the combined operation of the ring-shaped gating system and the step gating system: Austrian Journal of Technical and Natural Sciences. 2019, № 1–2; 10–19.*
2. *Vasenin VI, Bogomyagkov AV, Sharov KV. Research of the ring and branched gating systems joint operation: Eastern European Scientific Journal, 2019, № 3; 5–20.*
3. *Meerovich IG, Muchnik GF. Hydrodynamics of collector systems. Moscow, 1986; 144.*
4. *Chugaev PP. Hydraulics. Moscow, 2008; 672.*
5. *Tokarev ZhV. On the issue of hydraulic resistance of individual elements of open gate systems: Improving the technology of manufacturing castings, Sverdlovsk, 1966; 32–40.*
6. *Jonekura Koji (et al.) Calculation of amount of flow in gating systems for some automotive castings: The Journal of the Japan Foundrymen's Society, 1988; Vol. 60. № 8; 326–331.*
7. *Idelich IE. Handbook of hydraulic resistance. Moscow, 1992; 672.*
8. *Vasenin VI, Vasenin DV, Bogomyagkov AB, Balls KV. Investigation of local gating system resistances: Bulletin of Perm National Research Polytechnic University. Engineering, materials science, 2012: T. 14. No. 2; 46-53.*
9. *Vasenin VI, Bogomyagkov AV, Sharov KV. Definition of the resistance to liquid flow during confluence and rotation of the streams: Austrian Journal of Technical and Natural Sciences, 2018, № 5–6; 11–15.*
10. *Vasenin VI, Bogomyagkov AB, Balls KV. Studies of L-shaped gate systems: Bulletin of Perm National Research Polytechnic University. Engineering, materials science, 2012; Vol. 14, No. 4; 108–122.*

Antropology

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Conceptual Model of Development Professional Competence of Educational Institution's Head as Major Factor Increasing Manager Culture Level

Key words: *professional competence, head of general education institution, formula for calculating competence, manager's rating, requirements for manager.*

Annotation: *the article reflects the requirements and principles on the basis of which the activity of the head of the general educational institution is organized according to the conceptual model of professional development. Summarizing domestic and foreign experience, it is proposed to create a practical formula for determining the value of the potential of professional competence of a manager. On the basis of the hypothesis put forward, methods for processing the results of test studies on the digitization of the level of managerial activity are determined, the analysis of which revealed significant dynamic changes in the activity of executives.*

A modern educational process in a general education institution cannot be imagined without the competence-based technologization of education. Since this process affects all elements of the content of educational activities, including the human factor, the innovative approach dictates a thorough changing in the managerial aspect (3, 4).

Effective implementation of the task of developing professional competence of the head of a general education institution requires the development of a conceptual model that will allow various forms and types of managerial skills to interact on a psychological and pedagogical basis, adhering to the principles of systemic, as well as to the principle of ongoing diagnosis and continuous development of this process.

To derive the formula of this model, it is necessary to identify the requirements for the effective activity of the head of the educational institution. Today, taking into account the experience of foreign countries, as well as the peculiarities of the national-cultural achievements of the republic, the following requirements are made to the head of the school:
- analysis, planning and forecasting of the implementation process of training and education in the school;
- prompt response to problematic issues (psychological, didactic, methodical, social, economic, etc.);
- a positive approach to resolving conflict situations;
- creative approach in solving various professional tasks;
- unification of the teaching staff in order to achieve high results in their professional activities;
- continuous striving for self-improvement and self-development;
- introduction of various innovations (social, psychological, didactic, methodical, etc.) into the educational process;

- psychological stability in the interaction with different levels of participants in the educational process and their targeted involvement in solving current and future school development problems;
- introduction of the results of psychological and pedagogical research into educational practice with its preliminary analysis;
- possession of information and communication and media technologies at the modern level;
- the use of modern methods of diagnosis and stimulation of the creative development of gifted and talented students and teachers;
- a high level of development of moral-patriotic personal qualities;
- active citizenship and initiative in the implementation of pedagogical innovations, etc. (5).

The quality activity of the head of the educational institution undoubtedly depends on the above requirements. However, the development of a system to improve the level of professional competence should be based on basic principles, without which it is impossible to organize integrated actions regarding the development of these abilities. We list the main ones: systematic, the principal of the functional modeling, structurization, pedagogical efficiency, tolerance, patriotism and spirituality, diagnostics, transparency (openness).

The principle of **systematic** takes into account external and internal factors affecting the development of the professional competence of a manager, on the basis of which a complex of measures is taken to improve the level of professionalism.

The principle of **functional modeling** operates on the basis of an analysis of interrelated and interacting functions performed by a manager in an innovative educational environment.

The principle of **structurization** reflects the consistency and integrativeness of the activities of a manager.

The principle of **pedagogical efficiency** is aimed at organizing a set of activities to improve the level of professional competence of a leader in order to obtain high pedagogical results.

The principle of **tolerance** is characterized by the psychological aspect of the professional competence of the leader, associated with the admitting and understanding of the mentality of other individuals.

The principle of **patriotism and morality** is manifested in the development of high feelings and love for the motherland, for its history, and is aimed at solving bringing up problems in teaching.

The principle of **diagnostics** is based on quantity, reflecting the growth or decrease in the professional competence of a manager.

The principle of **transparency** reflects the transparency and openness of the professional activities of the head of general education institutions

The concept of “professional competence” of the head of the educational institution becomes more open and deep when considering the above principles and requirements. Any head of a general education institution has a certain set (level) of professional competencies. This potential is characterized by dynamic changes in the growth or reduction of its magnitude.

Based on these considerations, let us imagine that the process of developing professional competence should be viewed from the perspective of the dynamic growth of the potential of this competence. Consequently, the magnitude of the potential is a quantitative indicator of the dynamic changes in the professional competence of the head of the educational institution. To create a practical formula for determining the value of the potential of professional competence of a manager, it is necessary to single out interconnected and interacting groups of competences in it (potential):

scientific-methodological;
innovative-creative;
socio-economic;
psychological-pedagogical;
worldview-ideological;
moral-ethical;
organizational-managerial;
social-communicative;
ethical-aesthetic.

It is this set of groups of competencies that reflects the multifaceted and multi-vector activity of the head of the educational institution. The success of this interaction is determined by the value of the competence potential [2]. We offer the calculation of the level of professionalism according to the following formula:

$$P_{hpc} = \frac{\sum_{i=1}^{n} P_{smc} + P_{icc} + P_{\text{sec}} + P_{ppc} + P_{wic} + P_{mec} + P_{omc} + P_{scc} + P_{eac}}{n*100}$$

where:
P*hpc* – the size of the potential of the head's professional competence (%);
P_{smc} – indicator (potential) of scientific and methodological competences (%);
P_{icc} – indicator (potential) of innovative-creative competences (%);
P_{sec} – indicator (potential) of socio-economic competences (%);
P_{ppc} – indicator (potential) of psychological-pedagogical competences (%);
P_{wic} – indicator (potential) of worldview-ideological competences (%);
P_{mec} – indicator (potential) of moral-ethical competences (%);
P_{omc} – indicator (potential) of organizational-managerial competences (%);
P_{scc} – indicator (potential) of social-communicative competences (%);
P_{eac} – indicator (potential) of ethical-aesthetic competences (%);
n is the number of structural indicators;
100 - the maximum number of points.

Based on the size of the P*hpc* potential, it is possible to track the rating (level) of professional competence at a particular stage of its activity on the scale given (table 1).

Table 1.

Scale for determining the rating of professional competence of the head of educational institution

Phpc	<15%	15%-25%	26%-35%	36%-45%	46%-55%	56%-65%	66%-75%	76%-86%	>86%
Level	Very low	Low	Below average	Quite average	Average	Above the average	Quite High	High	Very High
Rating	1	2	3	4	5	6	7	8	9

The value of the potential of professional competence of the head varies from 0-1 (in percentage from 1 to 100%). The values of 0 and 1 (0-100%) are ideal values and practically do not occur in real activity of a manager (there is no leader with 0 potential, as well as a leader with 100% potential).

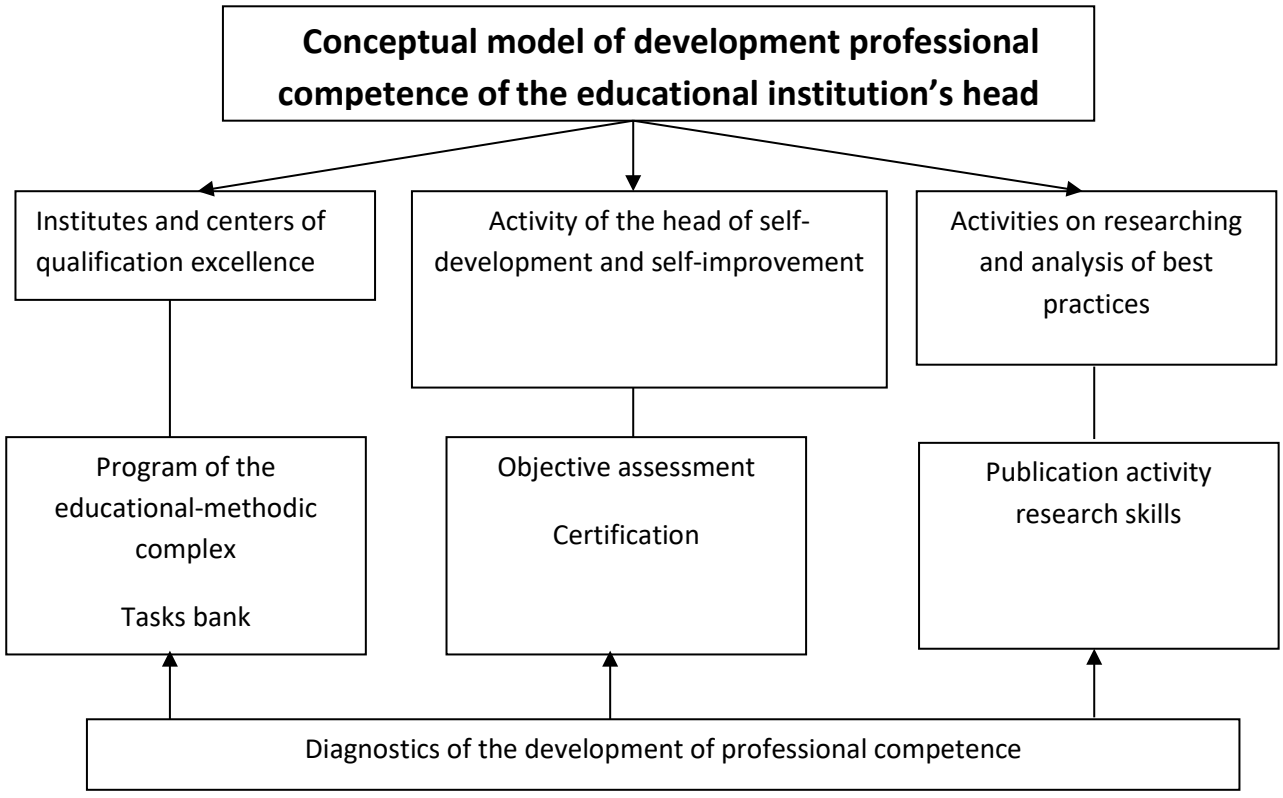
The proposed digitization makes it possible to objectively and reliably assess the potential of professional competence of a manager at various stages of his activity.

On the basis of the proposed method, the results of test studies to determine the initial level of professional competence of the head of the educational institution were processed. The average rating was 5.3 points. However, in the implementation of management activities based on the proposed model for the development of professional competence of a manager, significant dynamic changes were found. In particular, the objective assessment of head's certification increased, and high publication activity was noted, which in general was 6.8 points on the proposed scale.

Due to the fact that this experiment includes three forms of development of professional competence: institutes and centers of qualification excellence; the activity of the head of self-development and self-improvement; activities on researching and analysis of best practices, tracking the growth of leadership abilities are conducted consistently, but they also reflect positive results (table 2).

Table 2.

Conceptual model of increasing the potential of professional competence of a manager



We assume that refresher courses for managers in education will make a huge contribution to the development of professional competence of a school manager, provided they have the following programs: “Creative personality and creative activity of the leader”, “Diagnostic methods for evaluating the results of the educational and creative process”, “Cultural studies aspects of the activity of the head”, “Innovative methods of management of general education institution”, “Competent pedagogy” (1).

The process of developing professional competence in institutions and advanced training centers is characterized by intensive study of the modern theory and practice of the activities of the head of a general education institution in advanced countries. The expected result of this period is the level of increase in the potential of professional competence, which is determined by the results of input and output diagnostics.

Thus, it can be concluded that the conceptual model, which includes three forms of increasing professionalism, reflects the scientific and methodological aspects of the development of competence of the head of the educational institution, as well as the differential diagnosis of the school manager’s potential, focusing on the psychological and pedagogical features of the practical implementation of these forms.

References:

1. *Andreev VI. Pedagogy. Training course for creative self-development. Kazan, 2006; 608.*
2. *Balancing Competences: On the Way to the European Accounting Competences: J. Herpenbeck, B. Hasler, Schnitger M. and others. Munster, 2006; 294.*
3. *Decree of the President of the Republic of Uzbekistan dated February 7, 2017 No. UTP -4947 “Strategy for action in the five priority areas of development of the country in 2017-2021”: Collection of legislation of the Republic of Uzbekistan.*
4. *Decree of the President of the Republic of Uzbekistan dated January 25, 2018, No. UP 5313 “On measures to fundamentally improve the system of general secondary, secondary specialized and vocational education”. Collection of legislation of the Republic of Uzbekistan. Tashkent, 2018; 39.*
5. *Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated August 20, 2015 No. 242 “On measures to organize retraining and advanced training for managers and teachers of higher educational institutions”. Tashkent, Legislative Assembly of the Republic of Uzbekistan, 2015, No. 33, Art. 442, No. 52, Art. 646.*

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Using Modern Information Technologies and Effective Methods in Teaching Speaking Foreign Language at Professional Colleges in Uzbekistan

Key words: *modern information technologies, formation of language competence, developing speaking skills.*

Annotation: *in this article we tried to investigate and give information about the use of modern information technologies, effective pedagogical methods, activities and how to use them during the lessons of foreign language and self-studying at professional colleges in Uzbekistan. The article includes the short list of methods which will be useful for developing vocabulary, grammar, oral skills and etc.*

On July 11, 2019, the President of the Republic of Uzbekistan Shavkat Mirziyoyev signed a Decree on measures to reform management in the sphere of higher and secondary special education (7). It defines in particular the tasks for perfecting the system of vocational education.

The challenge is to establish – on the basis of colleges – a new network of professional education.

B2 level on foreign language for teaching includes: linguistic competence; speaking competence; sociolinguistic competence; lexical competence; grammatical competence; pragmatic competence. From the knowledge, experience and skills' standpoint student's listening, speaking, reading and writing comprehension levels are defined. Within the framework of education's essence: topics on Internet and information technologies; social-cultural topics; comparison of Uzbekistan's culture with countries the language of which are studied; topics related to specialty (history of specialty, related areas); social topics (social relationships with environment) are considered. Decree presents in. formation about requirements related to comprehension in every language. For instance, speaking comprehension –dialogue and monologue are separated. Dialogue includes the ability of communicating on specific task or purpose, social communication or informal conversation, the ability of participating in formal or informal debates on student's major, presiding at such debates and leading it, conducting interviews, negotiations, and phone conversations. Monologue includes the ability of preparing lectures.

Reading comprehension includes exchange of letters, information or electronic letters; also, it includes the ability to understand authentic texts related to one's major, texts' vocabulary and terminology: for example, extracts from texts, lectures, reports and textbooks, scientific and specialty literature (periodical, electronic literature). Additionally, reading comprehension implies the ability to be able to have developing skills: to understand general idea in foreign language, to get some information, to comprehend details and signs to identify direction (signs, indicators and others). All requirements are elaborated wider and deeper for those whose specialty is foreign languages. For example, reading comprehension for them implies the ability of understanding social, specialty-related or other long, complex texts; belles-lettres and scientific-popular books, magazines, periodical materials, instructions, advertisement materials, various information sheets, documents, school record

book, questionnaires, informal or electronic letters; memoranda, lectures, critical analyses, and working with working documentation. Therefore, college graduate is required to read and understand above mentioned type of materials and form his own ideas about them.

Teaching speaking skills is a very important and one of the main parts of second language learning process. The ability to communicate and explaining thoughts clearly and efficiently in a second language, contributes to the success of the learner at school, college and later in every phase of her/his life. Therefore, it is essential that foreign language teachers must pay great attention to teaching speaking, rather than leading learners/students to pure memorization, providing a rich environment where meaningful communication takes place is desired.

All around the world, learners/students of all ages are learning to speak English or other foreign languages. They do it for many reasons and they use various information technologies and modern techniques, manuals, audio and visual materials, etc. for mastering a foreign language.

At schools and colleges, we teach English and other foreign languages to our learners/students according to four main learning skills: listening, reading, writing and speaking. We explain grammar rules, make them learn new words and write essays, give lots of tests and play different games. But, in my opinion, speaking is a crucial part of second language learning and teaching. For many years, it has been continued to teach speaking just as a repetition of drills or memorization of dialogues. However, today's world requires that the goal of teaching speaking should improve learners'/students' communicative skills, because, only in that way, students can express themselves and learn how to follow the social and cultural rules appropriate in each communicative circumstance.

But what do we mean by "teaching speaking" or "learning speaking"? First of all, we should teach our learners/students to organize their thoughts, ideas, emotions in a meaningful and logical sequence in foreign language. Certainly, we must pay attention to teaching speech sounds and sound patterns, help the students to select appropriate words and sentences according to the proper social settings, audience, situation and subject matter. Beside this, our learners/students have to use the language quickly and confidently with few unnatural pauses – that's what we call "fluency". So, when we say "s/he speaks English fluently" it means that s/he can use the language to express her/his values and judgments in different situations.

During our investigations at colleges in Tashkent, Samarqand and Karshi, we learnt up that unfortunately, many learners/students who learn English have such a problem as they understand it, and at the same time don't feel confident enough to join a conversation/ dialogue. There are a number of reasons for this and most of them happen in their thoughts.

First of all, we should remember that English is not a native language to our learners/students, and what they often do during the lessons/classes, is translate from one language into another. That's why we have at our lessons not the British English but mixed one.

Secondly, we should mention such process as "freezing" or 'blocking". When learners/students are aware of the topic, vocabulary, grammar and etc. rules, and suddenly they stop their speaking. It occurs due to their emotions, nervousness, lack of self-confidence and fear of making mistakes.

Learning to speak is an important educational goal and a different process because it involves learning to convey thoughts, ideas to describe things, objects, anything around us as a form of speech. The practical applications are based on general learning principles, as well as on research.

While teaching foreign language to college students or different age groups we should take into consideration all moments as: age, level and even gender. So, let's look through an example of a lesson /class:

Teacher starts a lesson asking the students/learners what they are going to learn in that unit. For example, they are going to learn about "Future profession". Teacher should create a foreign language unit based on the various aspects of students' future profession. So, it's important to take students'/learners' suggestions about the different vocabulary they think would also let them do a lot of the planning how they want to learn in the unit (if they want to be responsible for presenting information, for example, or if they want to take a field trip to a place connected with their future profession). Within the unit, teacher will also be sure to incorporate all of the material that s/he must cover according to state and district standards. Learners in this unit will be learning the material they need to know in a way that is relevant to their own interests. Even more, they are motivated to learn because they have a stake in designing and planning their own learning. In this way Communicative language teaching will be fruitful for them.

Communicative language teaching (CLT) is generally regarded as an approach to language teaching (10). As such, CLT reflects a certain model or research paradigm, or a theory (3). It is based on the theory that the primary function of language use is communication.

In addition, there are a number of factors relating skills to be considered for effective English speaking performance. Pronunciation, vocabulary, and collocations are singled out as important factors to be emphasized in building fluency for EFL speakers. Providing students with a variety of situations and frequent speaking tasks plays a significant role in the in the improvement of students' fluency when speaking (13). Confidence and competence usually reinforce English speaking skills. Patil asserted that building up the learner's confidence to eliminate their fear of making errors was a priority that a teacher should consider in order to make learners feel comfortable with their language use (9). Confidence and competence in speaking could be developed from appropriate syllabus design, methods of teaching, and adequate tasks and materials (1, 12).

Regarding speaking effectiveness, Shumin paid attention to a number of elements involved, including listening skills, sociocultural factors, affective factors, and other linguistic and sociolinguistic competences such as grammatical, discourse, sociolinguistic, and strategic competence (11). Grammatical competence enables speakers to use and understand English language structures accurately and unhesitatingly, which contributes to their fluency, which in turn, develops confidence in communication.

In general, the problems of our learners/students related to speak can be divided into four main groups:

1. Learners/ students feel shy speaking English because they are afraid of making mistakes. It is usually seen at the initial level, as they are afraid of being criticized by teachers and other students.
2. Working in pairs (or groups), students often begin to use their native language.
3. Students do not have enough information on the topics discussed even in their native language.

4. Students feel a lack of linguistic and verbal resources for solving the given task. In that case the teacher should create a friendly atmosphere of collaboration so that students will not be afraid of admitting their mistakes and will accept criticism.

In ELT, every teacher chooses a definite set of methods of enhancing student's speaking skills. Nowadays it is possible to use traditional and modern technologies either separately or in integration. Internet communication tools have begun to be used in education, especially in English language teaching. New technologies are supplementing traditional English teaching methods. Students learn faster and easier than before because of the use of technology in schools. If they are trained during their school years, they learn language and technology simultaneously. Learning English through the Web and using new trends in education in schools and colleges make learners/students willing to learn the language. Web – based technologies and useful internet sites provide new possibilities and latest trends for teachers and learners/students.

Everything depends on teacher's ability to be creative and to use modern teaching methods. The following is a suggested list of such activities:

- reading aloud
- learners/students give their thoughts on topic assigned by teacher
- learners/students listen to classmates' thoughts and respond
- oral diary; oral weekly report
- group presentations on a completed project
- oral book report
- picture description
- storytelling
- chained storytelling
- creating riddles
- role play
- debates
- dramatic monologues
- radio drama
- jazz chants.

Teacher can choose any methods in ELT because all of them help to develop speaking skills. It is possible to use them in integration to get positive results.

Classroom interaction is also necessary and useful as an educational strategy to enhance speaking skills. The role of interaction in a classroom context in enhancing speaking skills comes from the understanding of its main types: teacher- learner interaction and learner – learner interaction, where negotiation of meaning and the provision of feedback are highlighted. Classroom interaction involves verbal exchanges between leaners/students and teachers should know that the learners need to do most of the talk to activate their speaking, since speaking skills require practice and exposure.

Analyzing all the existing methods of enhancing speaking of today's learners/students it became clear that those methods are not as difficult as they seem to be and every teacher can choose those that s/he considers more appropriate for her/his learners/students according to their level of knowledge of English. In Uzbekistan like in many other countries we try to use modern technologies in ELT, including internet – based techniques, listening to audio and video, creative tasks like role - playing,

storytelling, describing pictures and etc. all these together with learners'/students' interest in learning and their WTC, help teachers enhance speaking skills and make progress in ELT.
Besides this, we should mention some activities which are effective in teaching speaking. For instance, Brainstorming is also a type of warm – up activity used to generate ideas in a small groups and helps learners to express their thoughts and speak confidently. This activity recalls the existing knowledge of the learners/students concerning the theme, characterization or the plot through questions, important words or phrases, and titles or even some paragraphs or sentences from the text. The learners/students enjoy brainstorming because their ideas are not criticized.

One of the popular methods in teaching foreign language, especially in teaching speaking is Jigsaw method. In Jigsaw reading, each member has one or a few pieces of the "puzzle" or story and all the members should cooperate to fit all the pieces of the story into a whole. Learners/ students have to do a presentation on a concise version of the story they had read or studied beforehand. This enhances learners'/students' creative thinking. Teacher provides learners/students with the part of the story. Then, each student narrates from the point where previous one stopped.

Retelling story should be in a form of telling a story in one's own words rather than reading it aloud a text or from memory. Learners/students work in pairs to interpret the text. Then, they retell the story to other groups. It's enjoyable when another member in the group mime while his/her partner retells the story.

In reading aloud the text, students are told to read either as an individual or as a chain reader. It is used at the beginning of the course where some of the learners/students are not able to speak the target language. It helps to practice pronunciation not only on individual sounds but also on linking words or contractions; intonation and rhythm. As the activities are easy, they are helpful for the shy learners/students to overcome their fears.

The other main effective speaking activities in teaching speaking are retelling, miming and discussion.

At the beginning of the course, the college learners/students might have little confidence to share their ideas and participate in the activities. As the course goes on, more and more learners/students will participate in the activities and they become curious of what other learners'/students' points of views are. Finally, there is no doubt that all the learners/students will be friendly to each other and every student will want to talk and involve in the activity.

It is admitted that learners/students are different between score of role – play and individual performance. The possible explanation for that is the type of activity that might influence learners'/students' performance in speaking. For instance, learners/students feel anxious if they speak alone so they make few errors. However, it doesn't appear when they are in role-play.

Types of activity, numbers of students who get involved in the activity influence the performance so far. It might be concluded that their speaking is not stable yet as it is still up and down.

Learners/students have confident to speak and not worried about making mistakes and errors, then give them good model how to speak naturally in daily context and formal situations as well. In the future, their abilities will be factor that can be used in the upper level of study, university level.

Sometimes, there aren't enough conversation opportunities in or outside of the classroom. Several students may not know the subject discussed because they don't encounter it in real life.

Finally, learners/students aren't able to talk in foreign language to their peers, friends, especially teenagers or classes with different level of knowledge. Learners/students are often afraid of their groupmates', friends' judgment, so they usually prefer to keep silence. They become reluctant to talk by saying that they "do not know what to speak about".

So, what exactly can teachers do with all that problems? Here are we worked out some speaking strategies that can be used in any classroom:

- **Let learners/students use minimal responses.** In any group or class, we may find students that tend to be silent during the whole lesson. One of the ways to encourage them to participate in conversation or discussions is to help them to build up a stock of minimal responses that they can use in different types of exchanges. These minimal responses are often predictable and it might be idiomatic phrases which help to express students' thoughts, agreement or disagreement, doubt, understanding, etc.
- **Determining and recognizing scripts**. A script - a predictable set of spoken exchanges which are associated with some communication situations. For instance, it might be greetings, apologies, compliments, invitations and other functions that are influenced by social and cultural norms which often follow patterns or scripts. Teachers can help their learners/students to develop their speaking skills by making them to learn the scripts for different situations so that they can predict and be ready what they will hear and what to say in response for different situations.
- **Using foreign language to talk about language**. Language learners are often shy to say anything when they do not understand another speaker or when they realize that they aren't understood either. The teachers' task is to convince their students that such misunderstanding is usual in everyday situations and to show them other ways of expressing the same ideas. Hence, we encourage our students to use clarification phrases and strategies inside the classroom and they will gain confidence in their ability to manage the various communication situations outside of it.

Speaking is a way of expressing ourselves in whatever language we use. The most motivating language to learn therefore enables us to talk in a way that is true to our personality. Even the best course book cannot provide this resource for every individual in every class. So, we have to keep English as a language medium which will help our students to show their best and be true to their values and options.

One more aspect that should be mentioned here is that students need words, phrases, sentence patterns and grammatical forms and structures stored in their memory ready to be used in speaking situations. Therefore, teachers should stimulate their students' speech by supplying them with the subject and by teaching them the words, terms and grammar they need to speak about the suggested topic which are connected with their future profession or just situation. So, the teacher must lead his learners to unprepared speaking through prepared speaking, from reception to reproduction, as psychologists say because language is not a substance, it's a process; the language doesn't exist, it happens.

Learners/students have confident to speak and not worried about making mistakes and errors, then give them good model how to speak naturally in daily context and formal situations as well. In the future, their abilities will be factor that can be used in the upper level of study, university level.

References:

1. Bailey KM. Practical English Language Teaching: Speaking, New York, 2005.

2. *Brown HD. Teaching by principles: An interactive approach to language pedagogy. New York, 2001.*
3. *Celce Murcia. Teaching English as a Second or Foreign Language. Boston, 2001; 42.*
4. *Corbett J. Intercultural language activities. Cambridge, 2010.*
5. *English teaching forum. Published quarterly by the United States Department of State for teachers of English, Volume 54, number 3, 2016; 5.*
6. *Goh C. Teaching speaking in the language classroom. Singapore, 2007.*
7. *Mirziyoyev ShM. Decree on measures to reform management in the sphere of higher and secondary special education. Tashkent, 2019.*
8. *Passov EI. Communicative methods of teaching a foreign speaking. Moscow, 1985.*
9. *Patil ZN. Rethinking the objectives of teaching English in Asia: Asian EFL Journal, 10 (4),2008; 227-240.*
10. *Richards JC, Rodgers TS. Approaches and Methods in Language Teaching. Cambridge, 2001. [Internet] Available from: http://en.wikipedia.org/wiki/Language_education - cite_ref-Diller_1-2.*
11. *Shumin K. Factors to consider: Developing adult EFL students' speaking abilities: English Teaching Forum, 35 (3), 8, 1997.*
12. *Songsiri M. An action research study of promoting students' confidence in speaking English: Dissertation of Doctor Education Degree, School of Arts, Education and Human Development, Australia, 2007.*
13. *Tam M. Building fluency: a course for non – native speakers of English: English Teaching Forum, 35(1), 26, 1997.*
14. *Khoshimov U, Yakubov IY. Methods of teaching English. Tashkent, 2003.*

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Using Integrated Technologies in Teaching "Organic Chemistry" at Academic Lyceums

***Key words**: information technology, educational technology, communication, integration, integrated education, switching, animations.*

***Annotation:** the article explains the importance of using integrated technologies in teaching "Organic Chemistry" in academic lyceums. The article covers the educational and information technologies, integration, the meaning of integrated education and their content.*

All over the world, science and technology have become the main foundations of global development. Both continue to improve the quality of life, as these new discoveries emerge based on science and technology. Although the subject of chemistry plays an important role in the world of science, technology and natural sciences, students of secondary and vocational education, as well as teachers faced difficulties in mastering it. Tremendous work has been carried out on the development of material and technical base for the development of "Organic Chemistry" by students of secondary and vocational education, to further strengthen the higher education by equipping educational and scientific laboratories with modern tools and equipment on the priority areas of science. It reveals the

need to develop the technology of execution for chemical experiments on the basis of virtual laboratories and the need to improve the methodological foundations of teaching.

Today, in our republic, political, social and economic changes are taking place. These changes also affect the natural process of vocational education, which is conducted in accordance with the demand of the society for highly qualified, solid and deeply educated, self-employed, capable personnel. At present, the introduction of advanced educational technologies into the process of teaching the younger generation is rapidly developing. The results of the pedagogical experiment suggest that, students can master 80% of the experiments they conducted, the reaction equations they wrote to them, and other information they learned. Up until now, the mechanism of organic chemistry reactions, the methods of organization of practical and laboratory classes of in spatial structures, transfer of Information Communication and educational technologies, for teaching "Organic Chemistry" at academic lyceums has not been developed, but scientific research work is being carried out on the creation of new software.

The Decree of the President of the Republic of Uzbekistan on February 7, 2017 No. PR-4947 "On Action Strategy for the further development of Uzbekistan" (1) , The Resolution of the Cabinet of Ministers of the Republic of Uzbekistan on April 6, 2017 No. CM-187 "On Approval of State Educational Standards of Secondary, Secondary Specialized and Vocational Education" (2) , The Resolution of the President of the Republic of Uzbekistan on April 20, 2017 No. PR-2909 "On Measures for Further Development of the Higher Education System" (3), The Resolution of the President of the Republic of Uzbekistan on August 29, 2017 No. PR-3245 "On Measures for Further Improvement of Project Control Systems of Information and Communication Technologies", The Decree of the President of the Republic of Uzbekistan on February 19, 2018 No. PD-5349 "On Measures for Further Improvement of Information and Communication Technologies Systems", the Decree of the President of the Republic of Uzbekistan on June 5, 2018, No. PD-3775 "On Additional Measures to Improve The Quality of Education in Higher Education Institutions and to Ensure Their Active Participation in The Implementation of Large-scale Reforms in the Country" (4). This dissertation serves a certain extent for the implementation of the tasks set out in other regulatory legal acts. At a time when information technology has the opportunity to show "live" chemical reactions in "Organic Chemistry", the computer can greatly influence the increase of efficiency of the lesson by creating an animation on the topic and introducing it to the lesson. Therefore, for academic lyceums, explaining the topics in the curriculum of "Organic Chemistry" in traditional ways cannot increase the level of students' acquisition. To solve this problem, it is necessary to create a methodology of revealing the selected topic materials based on information and educational technology.

The purpose of the study is to improve the teaching methodology of the subject "Organic Chemistry" in the integration of Information Communication and educational technologies, also, to develop the principles, essence and use of methodological system of integrated technologies.

The study focuses on the issues of integrated technologies in the educational system and creating the basics of their use, their content and methodological system. The study uses the methods of observation, scientific and methodological analysis and generalization.

A number of practical research works are carried out to develop the educational system in our country and increase its effectiveness. The main content of such research is as follows:

- to raise educational content to the new level in the light of international experiences and to create new generation educational literature based on them;
- improvement of teaching subjects and learning process using computer technology;
- introduction of new generation information and communication technologies into the educational process;
- the introduction of modern, educational, innovative and integrated technologies into the educational process, etc.

In providing quality and guaranteed education in the educational process, the methods and tools of education are of particular importance. In the organization of the educational process at the current demanded level, it is important to use integration, i.e integrated technologies.

Integration refers to the Latin word “integratio”, and in Uzbek language, it means restoration, resumption, replenishment. It is a concept that expresses the connected state and addition of some parts and elements.

The word integration is also used in the expression of convergence and interrelation of sciences. The concept of integration is one of the important scientific terms, which is a methodological tool for summarizing and drawing conclusions. In science and technology, with the help of this methodological tool, general harmony models and algorithms are created between the process and the contents of phenomenon (6).

Integration is of particular importance in ensuring consistency in the educational content that is provided in the system of continuing education and in solving its problems. The basic concepts of teaching subjects are summarized through integration. The concept of integration is also used in establishing the relationship between the research object and information related to its methodology.

Integrated technologies are the technologies that are formed by combining, summarizing and establishing interrelationships between two or more technologies.

The use of integrated technology in the educational process is the activity of combining, generalizing educational, information and communication technologies and establishing the relationship between them.

The level of acquisition of knowledge of students in terms of educational subjects is one of the main factors determining the quality and effectiveness of the lesson. When improving the quality of education, it is important to plan the lesson correctly and set the goals correctly and accurately. When setting a goal, it is of particular importance to determine the time it takes to achieve the result, the needs and capabilities of the learner, the methods by which the learner is directed to achieve the goal, and the types of control systems that determine the result. In order to achieve such goals, it is necessary to introduce modern educational technologies into the educational process.

Educational technology is the product of the integration of pedagogical and technological approaches used in the educational process. Different pedagogical scientists approached the concept of educational technology and described it in different ways. UNESCO has described educational technology as follows: “Educational technology is a systematic way of designing, carrying out and

evaluating the total process of learning and teaching in terms of specific objectives and employing a combination of human and technical resources to bring about more effective instruction".

Educational technology is a combination of educational methods and tools, and it is the set of organizational and methodological tools of the pedagogical process. Educational technology which aims to optimize the forms of education is a systematic method of creating, applying and determining the entire process of teaching and acquisition of knowledge taking into account the interaction of technical resources and people. Educational technology is a process that guarantees to teach the learner to study independently, acquire knowledge and think (5). In the process of educational technology, under the guidance of the teacher, the student independently receives knowledge, studies and assimilates. Thus, educational technology is the activity of influencing a person on a predetermined goal.

Information technology is the set of techniques, devices, methods and processes used to collect, store, search, process and distribute information. Information technology is the ways, methods and techniques of using the computer during data collection, processing, storing, transmission and utilization. Information technology refers to the process by which information is processed, from which the user of this information is connected with the use of a modern computer in order to reduce the work of the processes and increase their reliability and speed. Thus, information technology is a collection of methods and tools for collecting, storing, transmitting, modifying and processing information (8).

Modern information technology is a technology that can provide an opportunity to raise education to a new level of quality by enabling young people to study in educational institutions, on the basis of new approaches and by organizing the educational process associated with the formation of knowledge, qualifications and skills.

The word "communication" in English, is used in the Uzbek language in the sense of communication, message, means of communication, means of information, circuit, dialogue, connection, methods and means of information transmission. Communication system, among other systems is a system that performs auxiliary functions related to information transmission.

Communication technologies - are the technologies that perform the task of routing (characterization) for the transmission of information and switching connections between computers in the network.

Information and communication technologies of the educational system fulfill the following basic functions and requirements:
- recording the activities of learners and their use of information environment;
- taking into account the support of the activities of educators and learners through counseling;
- to recommend learners necessary instructional materials for studying independently;
- organization of control of knowledge and skills acquired by the learners, using the test, as well as oral and written methods in the educational process;
- to create an opportunity for remote access to the information resources of the educational institution for the use of educational materials, additional literature and other tools in the information base recommended to the learners;
- remotely organize the consultation and other assistance to the staff of the educational institution in the performance of virtual laboratory exercises and practical tasks and etc.

In the educational process, which is organized on the basis of integrated technologies, the main content of educational subjects will consist of the following educational and methodological materials:

- electronic educational and methodical complexes;
- a test programs and set of questions for self-control;
- virtual laboratory work and their description;
- independent work and control works;
- calculation programs, electronic reference books, electronic applications;
- additional software.

As a result of the application of integrated technologies, the training session will be organized remotely using the capabilities of network technologies. This is the basis of the organization of distance learning (6).

The main task of network technologies in distance learning is to provide communication between the teacher and the student in the learning process. The educational process organized without constant communication between the teacher and the students does not give the intended results. In the daytime form of the educational system, communication between the teacher and the students is carried out at one time, at a certain educational audience. In distance learning, this process is carried out on the basis of telecommunication tools through the use of computer network technologies (8).

The integrated state of the three technologies considered above can be viewed as the most optimal technology for teaching and learning. The main task of the integrated technologies is the processes of creating an information and educational environment for learners using educational and information technology opportunities and delivering them on the basis of communication technologies.

At the moment, our country's educational system is undergoing major changes. This is a common feature that is the characteristic of all countries with the trend of educational development. At this stage, the nation’s economy needs specialists that are knowledgeable in their chosen profession, able to independently find a solution to problems, freethinkers, entrepreneurial and mature. For the training of such specialists, the application of the acquired theoretical knowledge in practice and the ability to independently master new scientific problems in science is required. Because today, the large scale reforms carried out in the field of education, the state decisions taken to improve the content of education require the connection between education and life, the increase in the effectiveness of teaching, fostering and educating a comprehensively formed, competent generation for a rapidly developing society.

The use of internet resources in the lessons of “Organic Chemistry” teaches the students to express their thoughts in the group, to think and work independently, to be resourceful and witty. It increases their interest in the subject of “Organic Chemistry” and motivates students to be active. Therefore, the issue of the introduction and perfection of innovative technologies for the subject of “Organic Chemistry” in the process of teaching has been targeted for analysis in all respects.

The changes that are taking place in the field of education, the penetration of a large flow of information, the emergence of the need for rapid acquisition of knowledge require the introduction of integrations in the field of education. In addition, the use of modern information technology assistance in teaching is also becoming of particular importance.

When we had examined the current situation regarding the introduction of the use of Information Communication Technology and the Internet in "Organic Chemistry" subject, most teachers emphasized that the lessons were interesting and effective. There is a lack of scientifically-based template and guidelines in the continuous education for the introduction of information technologies into the educational process.

The application of Information Communication Technology (ICT) opens up new perspectives and effective teaching opportunities for the teaching of "Organic Chemistry". At the same time, the development of the ability to study independently directs to the certain level of literacy in working with information technology, which itself is a necessary condition for the intellectual development of students. In the lessons of "Organic Chemistry" Information Communication Technologies can be used, through the use of internet resources home tasks can be remotely given by the teacher and the tasks performed by the student can be checked. ICT is the most convenient way to control the assimilation of instructional materials (8).

In conclusion, in the organization of the educational process at the required modern level and in the generalization and filling the educational content, the integrated technologies are of particular importance and help to guarantee the achievement of the intended goal.

References:

1. *Decree of the President of the Republic of Uzbekistan on February 7, 2017 No. PR-4947 "On Action Strategy for the further development of Uzbekistan"/ collection of the legislation of the Republic of Uzbekistan, 2017, Vol. 6, Article 70.*
2. *Resolution of the Cabinet of Ministers of the Republic of Uzbekistan on April 6, 2017, No. CM-187 "On Approval of State Educational Standards of Secondary, Secondary Specialized and Vocational Education".*
3. *Resolution of the President of the Republic of Uzbekistan on April 20, 2017, No. PR-2909 "On Measures for Further Development of the Higher Education System" /collection of the legislation of the Republic of Uzbekistan.*
4. *Decree of the President of the Republic of Uzbekistan on June 5, 2018, No. PD-3775 "On Additional Measures to Improve Quality of Education in Higher Education Institutions and to Ensure Their Active Participation in The Implementation of Large-scale Reforms in the Country", QHMMB: 07/18/3775/Vol. 1313, 06.06.2018.*
5. *Avliyoqulov NX. Modern teaching technologies: Methodical guide. Tashkent, 2001; 164.*
6. *Abdukodirov A, Pardaev A. The technique of education and training, the use of modern educational technologies. Tashkent, 2014; 5-105.*
7. *Begimkulov USh. The scientific-theoretical principles of the introduction of modern information technologies in pedagogical education. Tashkent, 2007; 164.*
8. *Borovskikh TA. Individualization of teaching chemistry on the basis of modern technologies. Moscow, 2011; 217.*
9. *Zashivalova EYu. The methodology of computer education of chemistry at primary school: Thesis PhD. St. Petersburg, 2000; 167.*

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Studying Erkin Vakhidov's Creativity at Academic Liceuses and Professional Colleges

Key words: *informational and innovation technology, metodological outcomes, educational technology, spirtual education.*

Annotation: *this article outlines the queations relaked to the creative work of famous poet Erkin Vahidov in secondary special and proffessional educational system. Shortcomings in organisation of leaning his creative works are hinglighted, concrete methodological recommendations are suggusted about obtaining the presened material on creative work of Erkin Vahidov.*

В современном мире глобализации и бурного развития информационных и инновационных технологий важное в процессе подготовки высококвалифицированных, конкурентоспособных и отвечающих мировым стандартам национальных кадров занимают оправдавшие себя полностью академические лицеи и профессиональные колледжи.

Анализ программ, действующих для указанных звеньев образования, показывает, что определенное внимание в них уделено изучению творчества Эркина Вахидова, так как его творчество может служить примером высокой духовности, служения Отечеству. Творчество Эркина Вахидова в огромной степени будет способствовать формированию высоких морально-этических качеств, воспитанию всесторонне и гарминично развитой личности учащихся (1).

По этой причине в программах «Литература» (2), «Родной язык и литература» (3) изучению образцов из творчества Эркина Вахидова, отрывков их высокоидейных и высокохудожественных произведений выделено достаточное количество учебных часов,

В программах для академических лицеев изучение творчества Эркина Вахидова предусмотрено в обзорно-монографическом плане и для лицеев естсетвенных, точных и экономических наук отведено два часа, а для общественно гуманитарного направления три часа (5).

В действующих программах определены содержание и последовательность изучения творчества Эркина Вохидова: «Общие сведения о творчестве поэта. Своеобразие и красота внутреннего мира в его стихотворениях, взаимосвязь и органическое сочетание особенностей классического и современного стихотворчества в его творчестве. Новшества традиции газелетворчества. Эркин Вахидов - драматург и профессиональный переводчик.

«Олтин девор» («Золотая стена») – пример современной узбекской комедии изображение трагической судьбы алчного человека. Влияние переводов стихотворений Сергея Есенина и произведения Гёте «Фауст» на совершенствование творчества поэта.

Эркин Вахидов – автор дастанов (поэм). «Дастан на плакате». Нидо» («бращение»). Раскрытие в них духовно-нравственного мира современника. Художественно - философская трактовка проблемы свободы поэта и нации в поэме «Бунт духов». Значение произведения в творчестве поэта» (4). Такой подход к изучению творчества поэта представлен и усовершенствованной программе для лицеев общественно - гуманитарного направления и направления зарубежной филологии» (5).

Как видно, предусмотрено всестороннее изучение материала по творчеству Эркина Вахидова. При это изучение не ограничивается только с ознакомлением биографических фактов и анализом отрывков из произведений, но и представлен материал позволяющий глубже ознакомить учащихся с его деятельность в качестве переводчика и литературоведа. Вместе с тем представлена также касида «Узбегим», изученная в начальных классах общеобразовательной школы. В целом во всесторонне совершенной программе бросается в глаза и такая неувязка: количество отведённых для изучения предложенного материала учебных часов не соответствует его объёму. Неопределенность количества часов для изучения стихотворений и комедии

«Золотая стена» («Олтин девор») не считая времени, необходимого для ознакомления с биографией поэта и его литературно-переводческой деятельностью, естественно, создаёт определенные трудности методического характера.

В связи с этим необходимо добиваться синхронного соответствия между представляемым учебно - теоретическим материалом и количеством часов, выделяемых для его усвоения. Поэтому нам представляется, что данную учебную программу необходимо скорректировать с точки зрения её приведения в соответствие со спецификой направления обучения. Считаем целесообразным в «Объяснительной записке» программ по литературе для лицеев естественного, точного и экономического направления дать конкретные методические указания по поводу необходимости изучения того или иного произведения.

Анализ учебника-хрестоматии по литературе для академических лицеев показывает, что в нем представлен качественный, добротный материал из поэтической жемчужины Эркина Вахидова. Особенно, представленный хронологический материал позволяет следить за творческим ростом профессионального поэта. Вместе с тем было бы целесообразно включить в хрестоматию вопросы и задания по содержанию изучаемых произведений с целью облегчения их восприятия.

Представляется, что путём сокращения времени, отведённого для ознакомления с переводами из творчества известного поэта Сергея Есенина можно включить в хрестоматию такие произведения Эркина Вахидова, как «Бонг уринг» (Бейте в колокол»), «Инсон» (Человек»), «Ватандин яхши ёр булмас» (Нет возлюбленной лучше Родины»), «Рубобим тори иккидур» (Две струны моего рубаба»), «Рухлар исёни» («Бунт духов»), «Истанбул фожеаси» (Трагедия Истанбула»), сопроводив их соответствующими заданиями.

В хрестоматии по литературе для 2-х курсов лицеев представлены две касиды Эркина Вахидова: «Узбегим» и «Инсон». С некоторой долей сожаления приходится констатировать, что в хрестоматии из творческого наследия Эркина Вахидова как и некоторых литераторов,

представлены только отрывки- образцы. Более того, в нем нет вопросов заданий, нацеливающих учащихся на глубокий анализ. Это обстоятельство, а также отсутствие методических рекомендаций для учителей в значительной степени затрудняют достижение конечной цели обучения и воспитания. Недостатки подобного характера наблюдались и на нашей опытной площадке. Болшинство учителей оргинизовало урок по традиционной методике. После ознакомления с представленным материалом, были заданы 2-3 вопроса по его содержанию, на основе текста учащиеся прокомментировали содержание. На уроке, проведенном по репродуктивному методу, как и следовало ожидать. Учащиеся выполняли роль пассивного слушателя.

В связи с этим мы подготовили и раздали учителям опытных классов разработки, основанные на интерактивных методах обучения. После этого произвели сравнительный анализ результатов усвоения материала в контрольных и опытных классах. Отмечалось улучшение степени усвоения в опытных классах. Нами были подготовлены и розданы учителям экспериментальных классов методические разработки:» Изучение творчества Эркина Вахидова на основе образовательных технологий». Был организован цикл лекций для всех учителей литературы на тему: «Использование образовательных технологий на уроках литературы», где учителя были ознакомлены в первую очередь со структурой образовательных технологий.

Организация изучения творчества определенного поэта или писателя, к примеру Эркина Вахидова, с опорой на современную философию образования

в значительной степени будет способствовать возрождению духовности учащихся, повышению эффективности обучения и воспитания подрастающего поколения

Изучение творчества не только Эркина Вахидова, но других литераторов на основе взаимосвязи между звеньями образования и непрерывности, конструктивно - когнитивного подхода гарантирует положительный конечный результат.

Преставление материала из жизни и творчества Эркина Вахидова в качестве фактора, определяющего творческого феномена. Позволяет превратить этот материал в мощное средство духовно-нравственного воспитания.

References:

1. *Karimov IA. High spirituality is an invincible force. Tashkent, 2008.*
2. *Literature. The program for academic lyceums. Tashkent, 2000.*
3. *The state educational standard and general education programs of secondary specialized and vocational education. Native language and literature. Tashkent, 2001, 76-91.*
4. *Literature. The curriculum for academic lyceums. Tashkent, 2000.*
5. *The state educational standard and the program of in-depth study of subjects for academic lyceums of the social and humanitarian direction and the direction of foreign philology. Tashkent, 2005; 86.*

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Foreign Experience Role in Developing Primary Class Students' Reading Skills

Key Words: *elementary grade, book, foreigner, parents, students, reading, reading, literature, education, literacy, personality, reading culture.*

Annotation: *in this article, foreign experiments show that elementary school pupils are interested in books, love for books, readership, parents' role, reading rules, and interest in literature.*

The future of every society is being built by young people who are growing up today. Therefore, the most important social and pedagogical task is to organize the upbringing of the younger generation. It is at the center of society's attention that it is always a positive solution to this task regardless of the time and place.

Under current conditions, the education of the younger generation in Uzbekistan, the moral and ethical requirements associated with the development of universal values, science, technology, production and technology, and social needs are addressed at the state policy level. The development of the younger generation, connected with it, and the development of the society, will be based on their social-life goals, priorities, aspirations and wide horizons. It is important for children and young people to motivate them to read and be interested books.

Based on centuries-old approaches, books can form the personality of young people, creating a basic foundation for their broader worldview, rich intellectual abilities and contemplation. It says: "... Today's children will turn into a nation tomorrow. We need to return young people to the book. In addition to the latest achievements in the field of information and communication, it is important for young people to increase their interest in reading a book, to be friendly to the book, and to increase the readership level" (3), said the President of the Republic of Uzbekistan Sh.M.Mirziyoev.

The results of research into society and individuals show that books have a more positive impact on the intellectual, psychological and physiological development of adults. The information published on AdMe.ru site confirms the validity of this statement. Fpr example, reading books: stimulate the nervousness (according to the University of Sussex University researchers, books are the most effective way to calm the nerves, requiring only 6 minutes a day); (such as praying or reading poems) (the person who reads art works well understands the feelings of others in life); increases the brain activity and increases the number of neurotransmitters in the brain (according to researchers at the University of Emory (USA), the intellectual capacity of a human being is in high status for a few days); (Obafemi Avolau University (USA) teachers have developed creativity in children, and most people who read many books can write poems, stories, essays or scientific articles at a high level, and include literary works, especially poetry reading skills, ability to work skillfully; Increases social activity; artistic taste; facilitates the study of foreign languages (helps to easily understand and memorize new words in learning other languages); children who read a lot of books well master the

lessons; a good storybook (how many books are read, the story's ability to do so), the relationship between parents and children improves (4).

Research from Yale University confirms that 3.5 hours a week, or 30 minutes a day, a reading decrease the risk of death by 17 percent. For those who read books more than 3.5 hours a week, the risk of death would be reduced by 23%. Researchers believe books, along with enhancing "knowledge abilities," promote "compassion, social perception and emotional intelligence" (5).

In the research conducted by the Russian Federation, the activities of the organizers of the study of the readers' culture of the Russian Federation: writers, critics and pedagogues such as V. Belinskiy, A.I. Gertsen, N.A. Dobrolyubov, L.N. Tolstoy, N. Chernishevskiy, K.D. Ushinskiy have expressed their views (6, p. 20).

In 1574 I. Fyodorov's first book of “Azbuka” for children was published. This book provides tips for parents on how to teach children, and examples of creativity for children to read independently. The book, published by L. Zizania in Vilnius in 1596, was of great interest at that time. In this book the author first tried to take into account the interests and abilities of children (6, p. 21).

At the beginning of the 20th century, human beings with advanced perspectives sought to carry out practical work on this path, recognizing that reading books one of the major factors in promoting the development of society. In particular, between 1929 and 1931, a number of scientific studies were conducted in Russia aimed at studying the psychological aspects of reading skills, and developing the skills of reading books in different age groups. "The Spiritualityof the reader and books" by N.R. Rubakin in 1929, by Ya. Shafir's "Reader’s Psychology Chronicle", 1927, by S. Valdgard's " Psychology of reading a book "; 1931), Ya.V. Rivlin's “Reading psychology”; 1929) mentions that not only the spiritual, but also social, pedagogical factors play an important role in the formation of a person as an active reader (7, p. 156).

Researches related to the topic show that the person's attitude toward reading has two different approaches: first, structural (imagining a reading of a complex structure of interrelated elements of reading), and second, practical (individual psychic processes - attention, memory, thought, emotion and their reading in the process (7, p. 156).

S.A. Denisova's research (8, p. 32) examines the family as well as the issues of upbringing as the main environment that shapes the positive attitude towards reading in children. The writer acknowledges that when older members of the family are a reader, the family's attitude toward the book reflects a positive attitude toward adults, and when family relationships are discussed and the behavior of the characters in the family, the actions of the heroes, when the information is shared, and it is recognized that the girl is very attractive, children also have a desire to read books.

The author pays a very positive attitude towards a book that has been shaped from a very young childhood throughout his life. In addition, the creation of a home library will also provide the expected results.

Scientific research by M.M. Bezrukix emphasizes the role of the state in shaping the literacy and culture of children, young people and the general population. It believes that the role of the researching state in this regard is evident in the following two areas: (1) to train future teachers in the process of higher education; 2) raising awareness among parents; thirdly, supporting children's writers' work (9, p. 21-22).

In the course of experimental-research work, the reforms in the field of education, advanced traditions have been studied in the foreign countries to form a positive attitude towards reading books, especially in children. The results show that Russia has developed a number of educational programs for this purpose. They are in Table 1.

Table 1.

Foreign educational programs to improve pupils' reading skills (Russia)

№	Names of the programs	Authors of the programs
1.	"Радуга" ("Rainbow")	Т.Н.Доронова, В.В.Гербова, Т.И.Гризик, Е.В.Соловьева, Е.В.Солошева, С.Г.Якобсон
2.	"Развитие" ("Development")	Е.В.Андреева, В.И.Бардина ва б.; А.И.Булычева
3.	"Истоки" ("Spring")	Т.И.Алиева, Т.В.Антонова, Л.А.Парамонова, Е.П.Арнаутов ва б. М.Н.Лазутов
4.	"Детство" ("Childhood")	Т.И.Бабаева, В.И.Логинова, А.Г.Гогоберидзе, З.А.Михайлова, О.В.Солнцева
5.	"Из детства – в отрочество" ("Fron childhood to adolescence")	Т.Н.Доронова, Л.Г.Голубева, Т.И.Гризик

Z. Gritsenko's methodic guidebooks - "I read about cute things ..." , "Guide your readership" are tutorials on pre-school age, as well as for children aged seven. In these tutorials, children will be provided with educational literature, reading and reciting exercises, as well as providing methodological recommendations for consistent reading skills in children. The practical value of the guidelines is that there is a list of artistic works designed for parents of children (10).

O.V. Akulova, L.M. Gurevich (15), "Studying of literary works", L.M. Gurovich "Children and the book" (for teachers of the nurseries), the teaching and methodological guidebooks and methodological manuals on the issues of forming a positive attitude to books and literary works in children of appropriate age. The authors' approach in this regard is a methodology for parents to select stories for children, to learn stories, games, conversations, read tales, stories and poems, emotional perception, artistic creativity, recommendations.

Based on V.N. Zaytsev and I.T. Fedorenko's methodological recommendations, T.P. Zarutskaya speaks about the experience of teaching techniques to primary school pupils. For example: "If the child is in the initial stages of learning techniques, it cannot be encouraged for a long time. It is best to read rarely (less than a few minutes), but frequently (several times a day). The child should read the text for 5-7 minutes and then explain the paragraph. It is best to read and repeat one or two

paragraphs in an hour. Once again, you need to repeat this step before going to bed. The effectiveness of such exercises is better than once per hour.

The sadistic reading procedure helps the child to do more. The child reads 1-2 lines according to the reading order and then rests shortly. If the child is watching the film, then this procedure happens by itself: reading the two lines of text, watching the picture, and relaxing. This method is ideal for children who do not want to read.

Russian pedagogue M.P. Voyushina believes that in the elementary grades, reading a piece of art can help to capture the results with careful, multilateral and multidimensional learning (12, p. 203).

Australian pedagogue M. Cristin Mergan considers that reading elementary literary works to satisfy the spiritual needs of primary school pupils is one of the simplest ways to "develop literacy abilities in them." (13) The researcher believes that reading a book for enjoyment is not only a kid's pleasure, but also a number of benefits, including the achievement of remarkable results in literacy, and the level of literacy associated with academic and career prospects.

The results of the WASABR's study of youngsters in Western Australia are supported by teachers and parents to help stabilize the positive relationships of young people in this age-appropriate way. Mergan M. Kristin recommends that teachers and parents take the following steps: Carrying students to a school or children's library, offering books that they want to study independently, and taking them home; Do not resist adults laughing (for example, they enjoy reading it); book selection methods (do not think that it should be taught in primary school); Being an example of reading books; Communicating with adolescents by having them read what books they are reading; Talk to teens about books at home and at school, with no restrictions on them; adolescent emotional impressions: encouraging positive heroes of the work, hating negative emotions, abandoning the place where the work is read, and re-writing favorite works (how to deal with a curious reader); to tell the practical value of the book reading experience to enjoy the necessary work (14).

E. Perrin's book “Reading a book – 2016” notes that despite the popularity of electronic books among Americans, printed books have a dominant role over them. According to Pew Research Center's study, Americans' share of reading in 2012 (73%) did not change almost entirely in 2011. In the last year (2012 data), 65% of the US population has printed, 28% (three times more than in 2011), and 14% of audio books. Americans read 12 books a year on average (on average), while American middle class read 4 books in the same month of the year. College graduates have about four times more electronic, twice as many print and audio books than those who completed secondary education. In 2011-2016, the number of readers among Americans increased four times (from 4% to 15%), and smartphone readers doubled (from 5% to 13%).

According to the results of this research, 84% of Americans have specific topics of interest, 82% of which are in the public domain (47% of them are almost daily), 80% are enjoying books (35% 57% are the readers at workplace or in schools (almost 31% of them are almost everyday) (15).

American researcher Moyer E. Jessica's "Today's teenagers are not reading books." Study a variety of interests and concepts on the basis of the attitude toward reading a book: Reasoning and Methodology "in his work entitled" Study and Discipline: a 2004 study by the National Endowment

for the Arts (NEA) found that the study of the causes of the sharp decline in the level of reading of young people's artistic readings indicates a decrease in the interest in reading books in the 18-24 age group (16).

A 2007 study by the National Endowment for the Arts (NEA) notes that young people are increasingly moving away from reading books. It says: "One out of every three 13-year-olds reads books every day. This is 14% lower than the preceding 20 years. The number of students between the ages of 17 years has doubled over the past 20 years, from 1984 to 2004, the percentage of students in this age category has risen to 19 percent in negative. While middle-aged Americans spend about two hours each day watching television, the amount of time spent reading is 7 minutes (16).

The Pew Internet and American Life Project, which focuses on analyzing Pew Research Center research, distributed by the 21st Century Digital Literacy Network ("Writing, technology and adolescents "- the results of the" Writing, Technology and Teens "survey), although young people consider themselves to have Internet literacy, but their reading and writing experience is not at a high level. The reason for this conclusion is that the survey about determining the level of reading "printed books" and the familiarity of young people with electronic and audio books have not been studied (13, p. 211).

It is important for primary school pupils to study foreign experience in developing their reading skills. Thus, the study was conducted by the United States, Great Britain, France, Finland, Norway, Japan, and the Russian Federation, as well as their experiences in developing book-reading skills. The results showed that the research problem was solved in these countries at the level of public policy. The industry has confirmed that research has been consistently carried out by individuals and legal entities. At the same time, global media outlets have developed traditions of reading, electronic, audio books by children and adolescents in leading foreign countries. Nevertheless, children and adolescents' relationships with reading, and writing are of no positive significance. Year by year there is a decline and this is explained by a number of reasons.

In foreign experiments, pupils of elementary classes are taught books, the Method of Kassil, method of Iskra Daunis, methods of ancient nations, "Study of the cover of work", methods of "Oral painting", "Literature geniuses" "Knowledge Tree Maintenance" based on gaming technology. However, global changes are needed to determine the basics of reading, reading and writing, as well as effective factors for primary school pupils, taking into account new socio-cultural needs. Therefore, a special emphasis was placed on the identification of the fundamental principles of reading books, the development of reading skills, as well as effective factors for pupils in elementary classes.

References:

1. *President of the Republic of Uzbekistan Resolution "On the Program of Complex Measures for the Development of the System of Publishing and Distribution of Book Products, Increasing and Promoting the Book Reading and Reading Culture", 2017. [Internet] Available from: www.lex.uz/docs/3338600.*
2. *resident of the Republic of Uzbekistan Decree "On the establishment of a commission for the development of the system of publishing and distribution of book products, raising and promoting the book culture and reading culture". [Internet] Available from: http://uza.uz/oz/documents/ -it-and-tar-system-rivozh-12-01-2017.*

3. *Sayyid S. There is no future without a book. [Internet] Available from: http://uza.uz/oz/society/library-kelazhak-y-16-01-2017.*
4. *21 Benefits of reading a book. [Internet] Available from: https://zamin.uz/life-style/14196-the benefit of reading 21-21.*
5. *Orlova EA. Recommendations for improving the level of reading competence within the framework of the National Program for the Support and Development of Reading. [Internet] Available from: http://ifapcom.ru/files/publications/rekomend_obr_1.pdf.*
6. *Kayumkhodjaeva YO. Opportunities for readers to develop a reading culture. Tashkent, 2007; 12-48.*
7. *Zbarovskaya NV. Information Culture of a Person: J. Library Science, Moscow, 2005, No. 1; 7-8.*
8. *Denisova SA. Parents on children's reading and the role of libraries: J. Parents' meeting on children's reading, 2008; 30-32.*
9. *Mokina M. Reading - the basis of literacy: J. Ethnosphere, Moscow, 2008, No. 12; 21-22.*
10. *From childhood to creativity: program for parents and carers on the formation of health and development of children from 1 year to 7 years: TN. Doronova et al. Moscow, 2007; 303.*
11. *Zarutskaya TP. The development of independent reading activities of younger students. [Internet] Available from: https://nsportal.ru/nachalnaya-shkola/chtenie/2012/03/31/razvitie-samostoyatelnoy-chitatelskoy-deyatelnosti-mladshikh.*
12. *Methods of teaching literature in elementary school: Textbook for students higher educational institutions: ed. MP. Voyushina. Moscow, 2010; 288.*
13. *Amanda Lenhart. Writing, Technology and Teens. Washington, 2008.*
14. *Kristin Merga M. How to get teenagers to read? [Internet] Available from: https: //theconversation.com/how-to-get-teenagers-to-read-42757.*
15. *Perrin A. Book Reading – 2016. [Internet] Available from: https://www.pewinternet.org/ 2016/09/01/book-reading-2016.*
16. *Moyer E. Jessica. Teens Today Don't Read Books Anymore: Study of Differences in Interest and Comprehension Based on Reading Modalities: Part 1, Introduction and Methodology. [Internet] Available from: http://www.yalsa.ala.org/jrlya/2010/11/teens-today-dont-read-books-anymore-a-study-of-differences-in-interest-and-comprehension-based-on-reading-modalities-part-1-introduction-and-methodology*

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Emergence and Development of Jadids' New Methodical Schools in Samarkand

***Key words**: Jadids, new methodical schools, religious principles, followers, educated elite, enlightenment activities.*

***Annotation:** the article is devoted to investigation of philosophical principles and pedagogical tendency of new methodical schools created by Jadids. These schools differed from others by various aspects of sciences and religion taught in them. These schools led to development of culture, science, literature, art, press and printing.*

Introduction

Actuality of the theme of the research. From the first days of the independence of Uzbekistan, scientists and historians of the country were given the task of truthful description of the historical past, which was necessary to form the young generation's correct perception of its origins and its national history. History can depict a real view of the past and prevent the future. It teaches what was good and what led to failure. That's why themes connected with history of society are always actual and necessary to be deeply investigated.

The degree of the learnedness of the theme. Such scientist as B. Kasimov, D. Alimova, G.T. Makhmudova, G. Makhmudov, M. Fattoev, B.H. Ergashev, Sh.O. Goibova devoted their scientific articles and monographs to investigation of Jadids' generation, their moral and religious view, philosophical principles. The present article deals with describing new methodical schools of Jadid's followers and their role in further education of the country.

The aim of the research is to enlighten positive and negative sides of Jadids' new methodical schools, to study their moral and scientific tendencies of teaching and to show the role of these schools in the development of science, literature, art, press and printing.

The main part

Jadidism, which appeared as an educational movement at the turn of the 19th and 20th centuries and went deep into history at the end of the 20s of the last century, still causes great interest not only in Turkestan, but also far beyond its borders. This growing interest is explained by the fact that the ideas proclaimed, but not fully implemented by Jadidism, are relevant, not lost their actuality in present-day Uzbekistan, which has become independent, which the Jadids dreamed about and for the sake of which they carried out their enlightenment activities.

The formation of Jadidism in Turkestan was connected with historical, social-economic, political and cultural changes that occurred in the region in the late 19th and early 20th centuries. The Jadidism movement was formed on the basis of ideas of local progressive intelligence of the region, Muslim reformers of Russia and eastern countries of the second half of the 19th century.

The Arabic word jadid (verbally new), for the first time called those who, under the influence of pedagogical ideas of Ismail Gaspirinsky (1851-1914), an outstanding Crimean Tatar educator who opened new-methodical schools where not only religious, but also secular sciences (1) were taught. The emergence and further development of jadidism in Turkestan is connected with the new methodical school ("usuli jadids"), the founder of which was Ismail Gaspirinsky.

Even in the years of his studies at the Sorbonne, after having familiarized with the new analytical-sound method of teaching alphabet, dreamed to reform the outdated Muslim system of education on the basis of this method. Returning to his homeland in 1884, he opens the school "Usuli Jadids", where in 40 days he had taught 12 students how to read and write. “The result exceeded all my expectations,” he wrote later, “after that this method was implemented in several more schools. The visitors from other regions got acquainted with these schools and also adopted the new method in more than 200 schools” (2).

Gaspirinsky promoted his ideas from the pages of his issued newspaper “Tarjimo” (“Translator”), thanks to which his readers were shown a new world, a world of innovative ideas directed towards the future. Among the first subscribers of the newspaper published in 1883 were our compatriots from Margelan, Tashkent, Bukhara and Samarkand. The glory of the founder of the new method and the newspaper, which swung the whole Turkic world, had reached Turkestan.

Samarkand followers of the educational ideas of Gaspirinsky, having heartfully met him in the ancient capital of Amir Timur, also opened a new methodical school in Samarkand. Unfortunately, the rumor about this school, opened without official permission, reached the head of the regional education department, and it was soon closed. The Bukhara school also did not exist for long (4). Despite this, the ideas of Gaspirinsky penetrated Turkestan along with the new methodical schools, who from the pages of his newspaper addressed the Muslim people of Russia, who made a great contribution to the development of world civilization, and who changed their conditions of backwardness and ignorance, thus encouraging them to become educated and cultured people.

For the sake of fairness, it should be noted that Turkestan Jadidism was influenced not only by Gaspirinsky’s ideas. The editions of “Sarvatifunun” (“Fine craft”, Istanbul), “Khabulul-matin” (“Strong bonds”, Calcutta), “Chekhranamo” (“Mirror”, Iskandaria), “Parvarish” (“Education”, Cairo) also played a great role in the formation and establishment of Turkestan Jadidism, spread in Turkestan after 1905, as well as “Iqbal” (“Happiness”, Baku), “Molla Nasretdin” (Tiflis), “Vaqt” (“Time”, Orenburg), “Shuro” (“Soviet”, Ufa) and others.

At the head of the Jadids’ movement were: in Tashkent – Munavvar kari Abdurashidkhanov, Abdullah Avloni, Ubaidulla Khodjaev, in Samarkand – Makhmudhodja Behbudi, Abdukadir Shakuri, Saidahmad Siddiki-Ajzi, in Bukhara – Fitrat, Fayzulla Khodjaev, Sadriddin Ayni, in Fergana valley – Khamza, Ibrat, Chulpan, and in Khiva – Palvanniyaz Khoja Yunusov and Baba Akhun Salimov.

It should be noted that one of the very first new methodical schools in Turkestan in 1893 was opened in Samarkand, which during that period was considered as more or less culturally developed region. Not limited to the opening of new methodical schools in Turkestan, they also initiated to send young people to study and get higher education in Russia, Turkey, Egypt and Western Europe. After all, young people trained in the best eastern and European universities or madrassas, having mastered

both secular and religious sciences, could faithfully serve the people and the homeland as doctors, engineers, lawyers, agronomists, religious educators and statesmen.

The program of the Jadids, the main carriers of educational ideas in the late 19th and early 20th centuries in Turkestan, was as follows: first, to reform Muslim public education and train highly qualified specialists in the vital branches of culture, science and technology; secondly, with their help, to develop the economy, industry and agriculture of Turkestan, turn it into one of the highly developed culturally, scientifically and technically areas of Russia; thirdly, to raise the living standards of people, to improve their well-being; fourthly, to form national capital, contribute to an increase of the number of rich and wealthy people, and finally, fifthly, with the help of qualified local personnel, change the infrastructure of the society, i.e. carry out a radicalization of the state apparatus, which would be a big and important step in the formation of an independent Uzbek state in Turkestan.

The main areas of activity of Turkestan jadids were the formation of new-methodical schools, the functioning of charitable societies, the creation of publishing institutions, the compilation and publication of teaching and methodological books, the publication of literary and journalistic works, the opening of public libraries and reading halls, theatrical creation and the development of the national press.

The reform in the field of public education undertaken by European-style Jadids at the turn of the 19th – 20th centuries had the most noticeable impact on the social-political and spiritual life of the peoples of Turkestan, the Bukhara emirate and the Khiva khanate. According to the sound method ("Usuli Savtiya"), Jadid schools made a breach in the hardened and petrified medieval Muslim scholasticism.

The significance of the Jadids' movement is determined not only by the fact that they reformed the outdated Muslim education system, but were also the initiators of the development of national press, literature and theater. They were truly great people who were ahead of their era.

The best representatives of Jadidism, and there were many of them, served people and homeland. Their whole life was devoted to a great historical mission – to enlighten the oppressed people, to show them the way to a happy and prosperous life, to emerge in them a sense of dignity, a sense of master of the land in which their ancestors lived and in which they still live. The Jadids were in every way the foremost people of their time. The importance of Jadidism is vivid in the positive content of Jadids' activity, which could serve as a good example for the present. The Jadid movement played an important role in the establishment and development of a modernized system of education, printing, national theater and drama, periodicals and other areas of the intellectual life of the region (5).

As Jadids had many opponents among the clergy, whose monopoly on public education was actually undermined by their schools, they conducted exams like an open court. This method of advertising the quality of education in new-methodical schools is generally characteristic of the school activities of Turkestan Jadids. In the newspapers published by them, one could find information indicating the date and time of final exams and invitation of everyone to attend them.

Jadid ideas were supported mainly by representatives of the national intellectual elite, the progressive part of the Muslim clergy and the leading leaders of the local bourgeoisie. The Jadids tried to solve their tasks with the help of schools, charitable societies, publishing houses, libraries, the press, literature and theatrical art. Despite its sad end, Jadidism contributed to the growth of national identity of peoples of our region.

The analysis and generalization of the scientific literature devoted to the problem under consideration shows that the issues of Turkestan Jadidism were studied at different periods and in various aspects, which allowed us to develop historical, theoretical, general and specific problems. However, the widespread alternative opinions sometimes reveal the groundlessness of certain judgments, based only on emotions, without involving a wide range of archival and literary data. In general, summing up the results of source study and historiographic analysis, it should be noted that Jadids' movement in Turkestan, Bukhara Emirate and Khiva Khanate needs to be rethought and comprehensively analyzed.

Thus, the relevance of the studied problem is due to the following motives and considerations:

Firstly, the school-educational aspects of Jadidism are not only of historical interest, but can be used in a modernized form in the public education system of our region;

Secondly, at one time the Jadids opposed religious fanaticism, which is especially important for our region, which today is threatened by Islamic extremism;

Thirdly, the attraction of Turkestan Jadids to the developed countries of the West and the Muslim world to a certain extent corresponds to the present foreign policy of the Central Asian states;

Fourthly, the problems of the development of book printing and library activity, literature and journalism, drama and theatre, national periodical press, etc., touched by the Jadids, undoubtedly have cognitive and practical significance in solving modern problems of the development of literature, culture and art, which are directly stated in five initiatives of the President of the Republic of Uzbekistan Sh.M. Mirziyoyev;

Fifthly, the development of the experience of charity activities of Jadids is again in demand in our time in the independent states of Central Asia, where such social and spiritual spheres as healthcare, education, science, culture and art sometimes need large-scale charitable projects.

The study showed that Jadidism, as the course of the social-political and cultural life of people of Turkestan, contributed greatly to enrichment of the spiritual life of the people of the region, their way out of the state of superstition, backwardness, stagnation, ignorance and fanaticism at the turn of the 19^{th} -20^{th} centuries. In the forms, structure and character, transformation and evolution of the Jadid movement, there was a seal of the peculiar conditions of Turkestan territory, Bukhara Emirate and Khiva Khanate. The Jadids wanted to see Central Asian society on a higher, intellectually rich and culturally developed level of being.

Conclusion

Important areas of their activities were education reform, publishing, the dissemination of new literature, journalism, theatre and drama, printed press and other aspects of intellectual life. They were passionate supporters of secular education and advocated the introduction of a wide network of new methodical schools. Turkestan Jadidism, like any social movement, had its shortcomings, omissions and sins. Some Jadids were infected with the idea of panturkism of their language and culture. Nevertheless, Jadidism played an important role in the growth of national identity and awakening of the indigenous population of the Turkestan region.

The interest in Jadidism that is being shown now is primarily due to the fact that the representatives of this movement set themselves the goal of enlightening people and raising them to the level of

highly developed peoples of the world, building a society that is progressive in all respects, a state based on the unshakable principles of humanism and democracy. All their activity in this direction is an example for the current young generation. The laws of a market economy, dictating the cultures that the Jadids dedicated their lives to, are relevant right now, when our country has entered the world community, we need cultural, erudite, highly qualified specialists whose dedicated work will turn Uzbekistan into one of the highly developed countries of the world.

References:

1. *Gankevich V. In the service of truth and education: brief biographical sketch of Ismail Gasprinsky. Simferopol, 2000; 238-260.*
2. *Ismail Gasprinsky and Turkestan: Digest of articles. Tashkent, 2005; 230.*
3. *Khojaev Fayzulla. Selected works in 3 volumes, V.1. Tashkent, 1970; 128.*
4. *Bekhbudiy M. Tanlangan asarlar (Selected Works). Tashkent, 1999; 18-19, 146-150.*
5. *Gafarov NU. Jadidism in Central Asia at the end of the 19th century - beginning of the twentieth century: Abstract thesis… doc. historical sciences. [Internet] Available from: http://cheloveknauka.com/dzhadidizm-v-sredney-azii-v-kontse-xix-nachale-xx-vv#ixzz5vShl0Svh*

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Challenges and Difficulties in Creating Unified Labour School in First Soviet Years: Boris P. Esipov Reform Efforts (1918-1922)

Key words: *unified labor school, school personnel, educational courses, student self-government.*

Annotation: *on the basis of archival materials firstly introduced in the scientific circulation, it is analyzed the experience of creating a unified labor school in the provincial district town in the early years of Soviet power under the leadership of BP. Esipov, who later became a prominent scientist-educator.*

Чуть более столетия отделяет нас от известных событий 1917 года, надолго определивших судьбу страны в целом, и народного образования в частности. Первые годы советской власти вызывают непреходящий интерес историков образования (3). Организованный первыми руководителями народного образования страны масштабный эксперимент по созданию Единой трудовой школы сопровождался как инновационными прорывами в будущее, так и одновременно непреодолимыми трудностями. Непростой процесс перехода к новому типу школы в типичном провинциальном городе тесно связан с именем молодого в то время руководителя народного образования Бориса Петровича Есипова (1894-1967).

Наш земляк, известный учёный Б.П. Есипов, занимает достойное место в ряду учёных – педагогов советского периода развития народного образования в стране. Его имя и дело вызывало и продолжает вызывать исследовательский интерес. Российская государственная

библиотека выпустила биобиблиографический сборник трудов Б.П. Есипова и публикаций о нём. В Научном архиве Российской академии образования хранится личный фонд Б.П. Есипова. Анализу его научно-педагогического творчества посвящена кандидатская диссертация Н.А. Адельбановой (1994) (1).

В известной монографии «XX век российского образования» член-корреспондент РАО М.В. Богуславский называет имя Б.П. Есипова среди личностей, в наибольшей мере отражающих ход истории российской школы и педагогики. Очерк о нём начинается словами: «Если бы наряду со званием «народный учитель» существовало звание «народный учёный», то его наверняка удостоился бы доктор педагогических наук, профессор, член-корреспондент АПН РСФСР Борис Петрович Есипов» (2).

Педагоги Удмуртии и Вятской земли тоже внесли свой вклад в изучение педагогического наследия Б.П. Есипова. Одной из первых стала В.Г. Боброва, автор скромной книжки «Педагог-учёный Б.П. Есипов» (4). Среди других просветителей Вятского края профессор из г. Кирова В.Б. Помелов посвятил несколько страниц своей монографии Б.П. Есипову (8). Неоценимый вклад в сохранение памяти об известном земляке внесла доцент кафедры педагогики Л.Б. Шмыгина, которая долгие годы собирала и бережно хранила подлинные материалы, связанные с жизнью и творческой деятельностью Б.П. Есипова и его семьи. Сегодня с этими материалами можно ознакомиться в кабинете памяти Б.П. Есипова в Глазовском государственном педагогическом институте, где проходят занятия по истории педагогики, истории образования в Удмуртской Республике (5,6,7).

Усилиями исследователей предыдущих поколений сделано много, но в основном они пытались оценить деятельность Б.П. Есипова в целом. Мы же решили сосредоточить исследовательский поиск на коротком, но чрезвычайно значимом для нас периоде деятельности Б.П. Есипова в самые первые годы становления советской власти (1918-1922), когда он работал в должности заведующего школьным подотделом при Глазовском Уездном Отделе Народного Образования (УОНО) Вятской губернии.

В автобиографии Б.П. Есипов весьма скромно пишет об этом периоде своей жизни: «В 1917 году после февральской революции я с группой студентов земляков уехал из Петербурга на родину в г. Глазов. Здесь принимал активное участие в организации Советов по всему уезду, работая вместе с большевиками. В 1919 году был эвакуирован из Глазова, занятого на короткое время колчаковцами. После этого продолжал работу в Глазовском УОНО и в школе II ступени г. Глазова».

В Центральном государственном архиве Удмуртской Республики нами найдены документы 1918-1920 годов: протоколы заседаний президиума Глазовского УОНО, отчёты о работе школьного подотдела и школ уезда, статистические сведения о количестве школ и учителей, о состоянии материальной базы школ, либо написанные рукой Б.П. Есипова, либо подписанные им лично.

Документам без малого сотня лет, работа с ними сродни личной встрече с автором. Подобные встречи весьма значимы для исследователя – историка, особенно когда документы «открываются» впервые.

Итак, по данным архива заведующему школьным подотделом Глазовского УОНО товарищу Есипову Б.П. досталось достаточно большое хозяйство. «Школ первой ступени в уезде числится всего 364, из них 20 чисто татарских, 47 чисто вотских (удмуртских), 123 чисто русских, 1 эстонская, 1 чувашская, 172 смешанных»[1]. Не будем удивляться такому большому количеству школ, в основном они были маленькие, совсем не похожие на современные. О крепких связях финно-угорских народов свидетельствует тот факт, что в Удмуртии действовала эстонская школа, первая и единственная в Гординской волости, находилась она в эстонской колонии «Князево Эстония».

Однако в 1919 году работали далеко не все школы. «55 школ первой ступени не функционируют из-за недостатка школьных работников. В городе две школы 1-й ступени и две школы 2-й ступени были закрыты из-за тифозной эпидемии. По этой же причине в уезде были закрыты три школы 1-й ступени», - пишет Б.П. Есипов. Некоторые школы начали поздно свои занятия, потому что задерживался ремонт школьных помещений. Уездным отделом осенью, пока можно ещё было работать на открытом воздухе, предлагалось школьным советам не откладывать занятий из-за ремонта. Не скрывая проблемы, Б.П. Есипов прямо указывает на то, что «почти все не функционирующие школы находятся в невозможных условиях, из-за этого в них никто не желает служить; ещё при земстве в этих школах учителя и учительницы наживали себе чахотку, ревматизм и другие болезни. Для детей тоже, разумеется, вреда в таких условиях немало. Надо все усилия приложить к тому, чтобы улучшить здесь квартирные условия, и тогда, вероятно, скорее найдутся школьные работники и для этих школ[2].

Нормальной работе школ в уезде сильно мешали военные действия как периода Первой мировой, так и Гражданской войн. На территории Глазова и его окрестностях в те годы шла война, город несколько раз занимали то войска Красной Армии, то армии Колчака. «В результате белогвардейского нашествия многие школы лишились письменных принадлежностей, учебных пособий и всякого рода припасов. Школы города с самого начала войны (1914 года) работают в ненормальных условиях: то отнимают их здания и выселяют их, каждая школа ютится в нескольких маленьких тесных и тёмных помещениях, то в них совсем прекращают занятия, то их эвакуируют, то реэвакуируют. Все школьные помещения испорчены войсковыми частями и требуют капитального ремонта», - свидетельствует документ[3].

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1 ЦГА УР, Фонд Р-202, опись 1, Ед. хр. 15. Циркуляры Наркомата просвещения РСФСР о контакте в работе учреждений народного образования, отчёты о работе школьного подотдела и школ уезда, статсведения о количестве школ и учителей, о состоянии материальной базы школы. 1918-1920 гг. Л. 38.

2 ЦГА УР, Фонд Р-202, опись 1, Ед. хр. 15. Циркуляры Наркомата просвещения РСФСР о контакте в работе учреждений народного образования, отчёты о работе школьного подотдела и школ уезда, статсведения о количестве школ и учителей, о состоянии материальной базы школы. 1918-1920 гг. Л. 37-41.

3 ЦГА УР, Фонд Р-202, опись 1, Ед. хр. 15. Циркуляры Наркомата просвещения РСФСР о контакте в работе учреждений народного образования, отчёты о работе школьного подотдела

В первые послереволюционные годы начинается реформирование старой школы. В соответствии с требованиями Наркомпроса РСФСР школа должна стать единой трудовой школой. Процесс был непростым и потребовал прежде всего серьезной работы с учительством. По требованию советской власти школьные работники обязаны были заявить о своём согласии сотрудничать с этой новой властью, либо отказаться работать в новом типе школы. Для этого в 1918 и 1919 годах были организованы перевыборы школьных работников. «В первые дни возникновения Отдела (народного образования) было объявлено о предстоящих перевыборах учащих. С 15 августа по 4 сентября производились самые перевыборы». Очень по-разному отнеслись учителя к этому процессу.

Каждому учителю необходимо было подать заявление о продолжении работы в теперь уже советской школе, либо отказаться от учительской деятельности. Первые перевыборы прошли не совсем удачно. Часть учителей, пожелавших продолжить работу, получили отказы по таким причинам как недостаточный образовательный ценз, душевная болезнь, «слишком консервативен», «имеет духовный сан», «уходил с белыми». Некоторые из причин и сегодня представляются вполне достаточными для отказа от учительской профессии. Анализируя результаты первых перевыборов Б.П. Есипов указывает, что «некоторые из уволенных лиц были отведены правящими тогда партиями, некоторые – союзом учащихся», и честно признаёт: «А можно всё же сказать, что большинство Совета Народного Образования находилось во время выборов под влиянием «ребячествующих сорвиголов», левых эсеров и часто выносило легкомысленные решения»[4].

Почти все школьные работники города и уезда состояли членами Всероссийского учительского союза (ВУСа), а эта организация, как известно, не разделяла новой пролетарской системы ценностей. Однако активных действий тоже не предпринималось, во всяком случае, учительских забастовок в переходный период в уезде не было.

Часть учителей под влиянием и даже давлением Уездного Отделения Всероссийского учительского союза пробовала противодействовать перевыборам. Школьные работники писали заявления с просьбами освободить их от работы в новой школе. Это было массовое явление. Толстая папка заявлений учителей об увольнении на 254 листах с перечислением нажитых за годы работы в школе болезней и иных не менее убедительных причин оставить школу вызывает весьма сложное отношение. С одной стороны, в конкретно-исторических условиях того времени действительно требовался «новый» учитель, с другой – в документально зафиксированных словах учителей явно звучат ноты отчаяния, безысходности, и даже некоторого глухого сопротивления.

и школ уезда, статсведения о количестве школ и учителей, о состоянии материальной базы школы. 1918-1920 гг. Л. 41-45.

4 ЦГА УР, Фонд Р-202, опись 1, Ед. хр. 15. Циркуляры Наркомата просвещения РСФСР о контакте в работе учреждений народного образования, отчёты о работе школьного подотдела и школ уезда, статсведения о количестве школ и учителей, о состоянии материальной базы школы. 1918-1920 гг. Л. 66-71.

Дадим им слово. Привожу лишь несколько примеров. «Убедительно прошу освободить меня от должности учительницы в Единой трудовой школе. Мотивами моей просьбы являются: во-первых, моя совершенная, как оказалось, неподготовленность к занятиям в Трудовой школе; во-вторых, неумение заинтересовать детей своим предметом (математикой и русским языком), и в-третьих, ненормальность отношений между учащими и учащимися в нашей школе, в частности, моё неумение нравственно воздействовать на них».

«Хочу Отдел второй раз просить принять моё заявление об отказе от учительской должности. Почему? Потому что не имею никаких сил, чтобы быть полезной в этом живом деле, где нужна душа, которой у меня нет. Машина же не может воспитывать детей. Учительствовать мне не позволяет совесть».

«Считая себя не достаточно подготовленной, я не могу взяться за работу, которую не надеюсь выполнить, а потому убедительно прошу Отдел народного образования освободить меня от должности учительницы»[5].

Но перевыборы всё же состоялись. И в следующем, 1919 году прошли значительно спокойнее.

Другая часть учителей на первых порах встретила смелый, решительный и революционный проект школы пассивно, но вместе с тем покорно, с готовностью подчиниться. Б.П. Есипов замечает у них недоверие и затаённую надежду на возврат к старому спокойному существованию.

Строительство единой трудовой школы возглавлял Уездный Отдел народного образования. Оценка Б.П. Есиповым своих сотрудников вполне адекватна: «У Отдела совсем не было работников для того, чтобы двигать дело скорее, и мало было средств. Имевшиеся работники были молодые и малоопытные в педагогическом деле, они сами нуждались в инструктировании»[6].

В декабре 1918 года состоялся Губернский съезд по народному образованию. На этом съезде были получены инструкции и разъяснения по самым сложным проблемам реформирования школы. «После этого съезда должна была закипеть работа. Но здесь помешали военные действия. В Глазов переселился штаб 3-й (Красной) армии. Все помещения в городе были заняты военными. Из города школы были эвакуированы. Фронт быстро придвигался. Работа прерывалась. Это было уже на рубеже 1918-19 годов», - пишет Б.П. Есипов в отчёте.

Однако возврат к старому был уже невозможен, нужно было учиться работать в советской школе. Решая эту задачу, Глазовский УОНО летом 1919 года организовал летние курсы для учителей. «Работа шла теоретическая и практическая. Интенсивно работал кружок

5 ЦГА УР, Фонд Р- 202, оп.1, Ед. хр. 85. Выписки из протоколов заседаний президиума Глазовского УОНО, заявлений о назначении на должность учителей, перемещениях и увольнениях. 1919-1920 гг. Л.86, 87, 104.

6 ЦГА УР, Фонд Р- 202, оп.1, Ед. хр. 85. О работе школьного подотдела при Глазовском Уездном Отделе Народного Образования Вятской губернии. Составлено к 1 мая 1920 года.

самообразования, который все свои заседания посвятил вопросам единой трудовой школы. В работах теоретических был принят лекционный метод. Не все лектора оказались удачными. Курсы принесли несомненную пользу и двинули дело реформы школы на несколько шагов вперёд. Курсы проводились с 22 июля по 2 сентября. На них работало 400 учащих»[7]. Доклады работников уездного отдела принимаются сочувственно, но большинство школьных работников «всё ещё дремало, ещё не сдвинулось».

Некоторые учащие самообразованием и саморазвитием занимаются индивидуально, но основная часть учительства остаётся инертной и пассивной, соглашающейся на словах со всем. Для этой массы нужны живые двигатели, нужны курсы, съезды, убеждён Б.П. Есипов.

Педагогические курсы в данный переходный период стали для Глазовских учителей и семинарией, и училищем, и даже педагогическим институтом. Они проводились периодически, по мере необходимости. В документах, протоколах заседаний Совета педагогических курсов зафиксированы списки обучающихся школьных работников, приказы о зачислении на курсы, об их окончании, о неуспевающих слушателях, о замене преподавателей. Б.П. Есипов неизменно присутствует на заседаниях и в качестве руководителя уездным образованием, и в качестве преподавателя, очевидно, что вопросы переподготовки учителей находятся под его постоянным контролем.

Учителей для новой школы катастрофически не хватало. «Чем же объясняется недостаток школьных работников в уезде в нынешнем (1919-20) учебном году?» - задаётся вопросом Б.П. Есипов и находит такое объяснение. «Нужно сказать, что значительная часть школьных работников была взята для культурно-просветительной работы политотделами различных частей Красной Армии; затем некоторая часть школьных работников продолжает своё образование в высших учебных заведениях. Сюда пошёл тот элемент, который раньше не имел возможности по своему социально-экономическому положению вырваться в университетские города. Вся эта категория школьных работников, уехавших учиться в высшие учебные заведения, не потеряна для нас, ибо эти работники вернутся и снова приступят к работе с уже более солидными навыками и познаниями.

Немало было изъято из школ уезда школьных работников ещё национальными меньшинствами: по постановлению съезда национальных меньшинств были командированы школьные работники в центр, в Вятку, в Казань; несколько человек из школьных работников – вотяков (удмуртов) командировано на курсы по дошкольному воспитанию. И все эти командировки, конечно, имеют свой смысл, своё оправдание.

С белыми школьных работников ушло очень мало. Лишь на школах первой ступени города Глазова отразилось в заметной степени это обстоятельство»[8].

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7 ЦГА УР, Фонд Р-202, Оп. 1, Ед. хр. 65. Постановления коллегии Глазовского УОНО, протоколы, совещания по открытию вечерних 2-х месячных курсов подготовки учителей. Октябрь 1919 – апрель 1920. Л.79.

8 ЦГА УР, Фонд Р-202, опись 1, Ед. хр. 15. Циркуляры Наркомата просвещения РСФСР о контакте в работе учреждений народного образования, отчёты о работе школьного подотдела и школ уезда, статсведения о количестве школ и учителей, о состоянии материальной базы

После ухода белых настроение школьных работников изменилось. Все признали необходимым проводить в жизнь «Основные принципы единой трудовой школы».

Весной 1920 года в одном из документов Б.П. Есипов проводит детальный анализ результатов реформы школы во вверенном ему уезде. Со свойственной ему принципиальностью и честностью он обозначает проблемы и недостатки процесса преобразования старой школы в единую трудовую, и не может твёрдо и без всяких оговорок положительно ответить на вопрос о том, стала ли школа новой.

«Теснота, убожество и не благоустроенность школьных помещений часто совершенное отсутствие всякого инвентаря в школе (особенно после того, как в пределах уезда побывал фронт); едва сносные условия существования школьных работников, полнейшая невозможность достать даже самые простейшие инструменты или сырые материалы для работ (картон, металл), полнейшая невозможность оборудования лабораторий, отсутствие реактивов, отсутствие бумаги, перьев, карандашей, красок – всё это мало способствует процветанию школ»,- отмечает Б.П. Есипов.

Нашёл ли всё-таки молодой руководитель признаки новой школы, или ему пришлось признать все усилия напрасными? Новое есть, уверяет он и называет конкретно.

В первую очередь, по-новому организовано управление школой, оно стало государственно-общественным, демократичным: «При всех школах существовали и существуют школьные советы с представительством трудового населения, причём если председателем школьного совета избирается представитель трудового населения, то труд его оплачивается в размере 1/3 учительского оклада». Заметим, что трудовой характер школы пытались удержать и на уровне управления, привлекая «представителя трудового населения», но эта инициатива так и не оправдала себя.

Отличительной чертой советской школы постепенно становилось ученическое самоуправление. И Б.П. Есипов замечает это явление и оценивает его: «Почти везде введены так или иначе начала школьного самоуправления. В некоторых школах самоуправление привилось особенно хорошо и сыграло в жизни этих школ важную роль»[9].

Введение детского самоуправления не могло не отразиться на отношениях между учителями и учащимися. И это отмечено Б.П. Есиповым положительно, «часто отмена старой системы наказаний не осложнялась никакими болезненными явлениями». Правда, видит он и то, что новые демократичные отношения «часто влекут за собой падение дисциплины в школе

школы. 1918-1920 гг. О состоянии школьного дела в Глазовском уезде к 27 ноября 1919 года. Л.37-41.

9 ЦГА УР, Фонд Р-202, опись 1, Ед. хр. 15. Циркуляры Наркомата просвещения РСФСР о контакте в работе учреждений народного образования, отчёты о работе школьного подотдела и школ уезда, статсведения о количестве школ и учителей, о состоянии материальной базы школы. 1918-1920 гг. Л. 37-41.

донельзя. Здесь сказалась русская неумелость не перегибать палку в другую сторону, иногда неумелость педагога подойти к ребёнку по-новому».

Но главное, что необходимо было сделать, - придать школе трудовой характер, соединить обучение с трудом. Школьным подотделом Глазовского УОНО были предприняты серьёзные шаги в данном направлении. Так, школам были выделены земельные участки для сельскохозяйственных работ. «Летом 1919 года шли работы на 58 участках. Но не все участки были возделаны потому, что не на что было их огородить, не было денег», - педагогическому процессу мешали финансовые трудности[10].

В соответствии с новыми требованиями образовательные учреждения Глазовского уезда предприняли попытку, наряду с сельскохозяйственным, организовать и ремесленный труд учеников. «При школах функционировало около 35 разных мастерских (столярные, кузнечные, слесарные, переплётные, гончарные, сапожные), но продуктивность их была крайне слаба, ибо у них не хватало многих инструментов, материалов. Преподаватели труда имели весьма слабый уровень общего развития.

Распространено было в 1919 году в школах плетение изделий из соломы, но и это, в конце концов, не дало удовлетворения ни школьным работникам, ни учащимся, да и со стороны населения вызвало отрицательное отношение. Такое же отношение выявило население и к лепке из глины, но нужно сказать, что лепка эта в школах была слабо поставлена и явилась здесь опять-таки обособленной и никчёмной. Ручной труд преподавался как таковой, он в весьма редких случаях был связан с познавательными процессами», - Б.П. Есипов совершенно правильно в педагогическом отношении понимает проблему детского труда. Важно не просто включить детей в трудовые процессы, важно соединить обучение с трудом.

Был и положительный опыт. Так, Унинская школа второй ступени ввела производительный труд. Она занялась производством мыла, патоки, спичек, причём работа эта была связана с преподаванием химии. Ещё одна школа организовала у себя образцовое молочное хозяйство. Но это были единичные случаи. И всё-таки Б.П. Есипову пришлось признать, что ни индустриальной, ни политехнической школы в уезде создать не удалось.

Кроме того, оказалась нереализованной рекомендация Наркомпроса РСФСР о региональном подходе к определению содержания образования в советской школе. «Печально отметить, - пишет Б.П. Есипов, - что школы почти совсем не делали подхода к изучению местного края, не пробовали базировать планы своей работы на изучении и культивировании местных производств, местных естественных богатств».

В последнем отчёте о работе на посту начальника школьного подотдела Глазовского уездного отдела народного образования 28 мая 1920 года Б.П. Есипов подводит своеобразный итог своей деятельности. Прежде всего он называет конкретные препятствия в деле строительства новой советской школы: «В 1918-19 учебном году нам помешал работать Колчак. В 1919-20 учебном году нам помешал работать тиф. В 1920-21 мешает начать учебный год

10 ЦГА УР, Фонд Р-202, опись 1, Ед. хр. 15. О работе школьного подотдела при Глазовском Уездном Отделе Народного Образования Вятской губернии. Составлено к 1 мая 1920 года.

Всероссийская перепись»[11]. Перепись мешала тем, что большое количество учителей были заняты этим важным государственным делом, что отвлекало их от основных педагогических обязанностей.

Главной заботой Б.П. Есипова в данный период была работа с учителями, которые должны были стать сторонниками единой трудовой школы. «Прежде всего к настоящему моменту мы можем отметить тот отрадный факт, что мы больше не имеем в рядах школьных работников противников реформы школы, за исключением может каких-нибудь единиц, которые скрывают своё недоброжелательство и плетут свои козни где-нибудь за кулисами. Да и есть ли такие – сомнительно», - считает он.

Очень высокую оценку дал Б.П. Есипов проведённым курсам и съездам: «Они были ценны тем, что здесь само учительство через докладчиков, выделенных из рядового учительства, выявляло своё отношение к новой школе, выявляло своё понимание этой новой школы, выявляло положительные и отрицательные стороны, старалось в то же время более или менее конкретно представить себе должное. Съезды были ценны и тем, что они сыграли объединяющую роль, они связали учительство каждого района какой-то общей нитью в работе».

Он с гордостью отмечает, что представление о трудовой школе у учащих начинает складываться с течением времени всё яснее, и то там, то здесь вносится постепенно какое-то оживление в школьную работу. У школьных работников есть стремление к новому, есть искания в области педагогической и методической, подчёркивает Б.П. Есипов с надеждой на положительные результаты.

Эти достижения давали Б.П. Есипову основания для определения перспектив развития образования. «Ближайшей задачей школьного подотдела является открытие опытных школ, предназначенных воплотить в конкретные формы отвлечённые принципы новой школы». Его рукой в отчёте дописано: такие опытные школы открываются уже в Сосновке и Афанасьеве. Но, к сожалению, в архиве нами не найдено сведений о создании опытно-показательных школ в Удмуртии, видимо, эта задача так и осталась нереализованной.

Знакомство с документами, связанными с процессом создания советской школы в провинции, подтверждают выводы о сложной и противоречивой эпохе, высвечивают реальные проблемы образования в уездном городе. Война, эпидемии, материальное неблагополучие – внешние отрицательные факторы; нежелание большого числа учителей работать по-новому, непонимание системы ценностей Единой трудовой школы – отрицательные факторы внутреннего порядка. Однако проблемы и трудности реформирования школы постепенно преодолевались.

11 ЦГА УР, Фонд Р-202, опись 1, Ед.хр. 15. Циркуляры Наркомата просвещения РСФСР о контакте в работе учреждений народного образования, отчёты о работе школьного подотдела и школ уезда, статсведения о количестве школ и учителей, о состоянии материальной базы школы. К характеристике школьного дела в Глазовском уезде (июнь 1918 – октябрь 1920). Л. 111-113

Как видно из архивных материалов короткого, но весьма значимого для строительства новой школы периода, именно в это время формировалась сложная деятельная личность нашего известного земляка. Провожая Б.П. Есипова из Глазова на работу в столицу Удмуртской республики город Ижевск, его коллеги и соратники дали ему такую характеристику: «За время своей службы в Отделе проявил себя как весьма добросовестный и бескорыстный работник, преданный своему делу. Неся весьма ответственную работу, проявляя всюду максимальное количество энергии, Б.П. Есипов обнаружил достаточную способность к инициативе и руководству. Все эти качества позволяют рекомендовать товарища Есипова как весьма ценного работника тем более, что товарищ Есипов всегда неизменно во время своей службы в Отделе активно проводит в жизнь политику советской власти в области народного просвещения и вполне искренне всегда работал в направлении к достижению социалистического идеала»[12]. Его время и его дело объективно потребовали именно таких личностных качеств, таким его запомнили современники, таким он останется и в памяти педагогов XXI столетия.

Из г. Глазова Б.П. Есипов был переведён на работу в столицу Удмуртской автономной республики город Ижевск, впоследствии принимал участие в деятельности Государственного Учёного совета под руководством Н.К. Крупской, стал видным учёным, директором Научно-исследовательского института теории и истории педагогики Академии педагогических наук РСФСР. Вся дальнейшая теоретическая деятельность нашего земляка Б.П. Есипова была крепко связана с практикой советской школы, опыт организации которой он приобретал в родном городе Глазове.

References:

1. *Adelbaev NA. Development of the concept of independent work B.P. Yesipova in the system of modern didactics: abstract thesis…cand. ped sciences. Moscow, 1994; 18.*
2. *Boguslavsky MV. The twentieth century of Russian education. Moscow, 2002; 158-336.*
3. *Boguslavsky MV. Ascetics and reformers of Russian education: historical and biographical essays. Moscow, 2005; 191.*
4. *Bobrova VG. Teacher-scientist B.P. Esipov. Izhevsk, 1965; 23.*
5. *Zakharishcheva MA. Boris Petrovich Esipov - the organizer of a Soviet school in the Glazovsky district of the Vyatka province: Materials of All-Russian scientific-practical conference with international participation "The Ninth Esipov Readings". Glazov, 2015; 6-9.*
6. *Zakharishcheva MA. Reform activities of Boris Petrovich Esipov in 1918-1922: Psychological and pedagogical search, 2016, No3 (39); 125-134.*
7. *Zakharishcheva MA. Studying the creative path of B.P. Esipova at the Glazov Pedagogical Institute: Materials of All-Russian Scientific and Practical Conference with International Participation "Tenth Anniversary Esipov Readings: a school teacher in a multiethnic region - a citizen, subject, mentor". Glazov, 2019; 84-87.*
8. *Pomelov VB. Educators of the Vyatka Territory: Russian cultural figures and local scientists and educators. Kirov, 2007; 149.*

12 Удостоверение Глазовского уездного исполнительного комитета Совета Рабочих и Крестьянских депутатов. Отдел народного образования. 14 марта 1919 года. Копия. Хранится в кабинете памяти Б.П. Есипова. Глазовский государственный педагогический институт им. В.Г. Короленко.

9. *Romanov AA. Experienced pedagogy of the early twentieth century: Bulletin of the Russian Academy of Education, 2013, No4; 63-75.*
10. *Fradkin FA, Plohova MG, Osovsky EG. Lectures on the history of domestic pedagogy. Moscow, 1995; 160.*
11. *Central State Archive of the Udmurt Republic (CSA UR), R-202 Fund, inventory 1, Unit hr 15. Circulars of the People's Commissariat of Education of the RSFSR on contact in the work of public education institutions, reports on the work of the school sub-department and district schools, statistics on the number of schools and teachers, on the state of the school's material base. On 268 sheets. 1918-1920.*
12. *CSA UR, Fund R-202, Op. 1 unit hr 65. Resolutions of the Glazovsky Board of UNO, protocols, meetings on the opening of evening 2-month teacher training courses. October 1919 - April 1920. On 114 sheets.*
13. *CSA UR, Fund R-202, op.1, Unit. hr 85. Extracts from the minutes of the meetings of the presidium of the Glazovsky UONO, applications for the appointment of teachers, movements and dismissals. 1919-1920. On 254 sheets.*

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