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VOLUME 3, ISSUE 1



«Conference on Universal Science Research 2023» ilmiy konferensiyasi:

31.01.2025-yil.

Ushbu to'plamda «Conference on Universal Science Research 2023» ilmiy konferensiyasi 2025-yil 3-soni 1-qismiga qabul qilingan maqolalar nashr etilgan.

Jurnal tarkibidagi barcha maqolalarga DOI unikal raqami biriktirilib, **Zenodo**, **Open Aire**, **Google Scholar** xalqaro ilmiy bazalarida indekslandi.

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Asos: O'zbekiston Respublikasi Oliy attestatsiyasi komissiyasining dissertatsiyalar asosiy ilmiy natijalarini chop etish tavsiya etilgan ilmiy nashrlar ro'yxati 3-sahifasi. – Toshkent: 2019. – 160 b.

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IR SPECTROSCOPIC ANALYSIS OF BENZENE-1,4-DICARBOXYLIC ACID

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Abstract. In this scientific work, we will get acquainted with the results of comparing the theoretical and practical results of the infrared spectroscopic analysis of benzene dicarboxylic acids belonging to the carboxyl group.

Key words. Aromatic dicarboxylic acids, benzene, correction, phthalic acid, electrophilic, substitution, isophthalic acid, (IR), absorption.

INTRODUCTION Infrared (IR) spectroscopy is an analytical technique that studies the absorption of infrared light by substances and helps determine their molecular structure. The basic principle of IR spectroscopy is that molecules are exposed to infrared light and absorb their chemical bonds (vibrations) partially or completely as indicators of energy. This method is very useful in obtaining information about molecules and their functional groups.

The basic principle of IR spectroscopy is that when a molecule absorbs infrared light, its atoms and bonds perform different vibrations. These vibrations are divided into types such as Stretching (changing length) and Bending (bending).

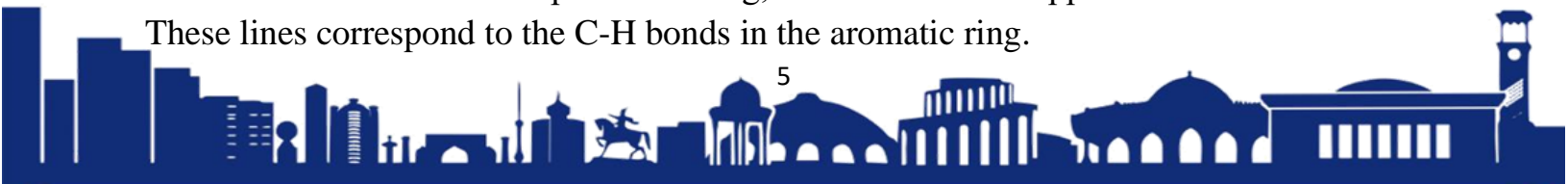
Each chemical bond and functional group (for example -OH, -NH₂, -COOH) is characterized by its own absorption lines.

The main features of IR spectroscopy are vibrations and spectral lines: In IR spectroscopy, each absorption line in the spectrum reflects the vibrations of different bonds in the molecule. The spectrum contains information that indicates which line absorbs which amount of energy.

Benzene-1,4-dicarboxylic acid (C₆H₄(CO₂H)₂) molecule consists of an aromatic ring with both carboxyl (-COOH) groups in positions 1 and 4 of the benzene ring. IR spectroscopy helps in analyzing the structure and functional groups of this molecule.

Aromatic Ring Absorptions The C-H bonds in the benzene ring produce broad and detectable absorptions visible in the infrared spectrum. These are usually:

- Aromatic C-H absorptions: Strong, indistinct bands appear around 3000 cm⁻¹. These lines correspond to the C-H bonds in the aromatic ring.



- Aromatic C=C absorptions: There are weak and strong absorptions between 1450 cm^{-1} and 1600 cm^{-1} . These lines arise from the vibrations of the C=C bonds in the aromatic system.

In the absorption of the carboxyl (-COOH) group, the absorption of two carboxyl groups in the molecule of benzene-1,4-dicarboxylic acid plays an important role in the IR spectrum:

- C=O absorption: a strong and defined line appears around 1700 cm^{-1} . This indicates that the carboxyl group is a carbonyl (C=O) bond. The strength of absorption can depend on the crystalline state of the acid or its liquid state.

- O-H absorption: broad and weak absorption lines appear between $2500\text{--}3300\text{ cm}^{-1}$. These lines arise from hydrogen bonds and are characteristic of the carboxyl group. This absorption may be stronger if the molecule is hydrogenated.

Additional spectral features, in turn, are divided into two types:

1). Narrow and broad absorptions of the aromatic ring- The spectrum of benzene-1,4-dicarboxylic acid shows a small and strong C=C absorption around 1600 cm^{-1} and a narrow absorption around 1500 cm^{-1} . These absorptions reflect the chemical environment of the aromatic system in the molecule.

2). Cross-bonds and transformations - hydrogen bonding of the O-H group and absorption of the C=O group can create different energy states in the molecule. This can vary in spectrum depending on whether the molecule is in a crystalline or liquid state.

CONCLUSION

IR spectroscopic analysis of benzene-1,4-dicarboxylic acid helps to determine the presence of functional groups of the molecule and interactions between them. Key features such as aromatic C-H absorption (3000 cm^{-1}), carboxyl group C=O absorption (1700 cm^{-1}) and O-H absorption ($2500\text{--}3300\text{ cm}^{-1}$) play an important role in identifying and characterizing this molecule. These lines in the IR spectrum help to fully understand the chemical structure and physical state of the molecule

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SYNTHESIS, STRUCTURE AND PROPERTIES OF BENZENE-1,4-DICARBOXYLIC ACID

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Abstract: Benzene-1,4-dicarboxylic acid (phthalic acid) is a strong acid and an important raw material for many industrial products, widely used in plastics, paints, pharmaceuticals and many other industries. There are many methods available for its synthesis and properties, further increasing the industrial importance of this compound.

Key words: Benzene-1,4-dicarboxylic acid, phthalic acid, industry, plastics, paints, raw materials.

Phthalic acid was discovered by chemists at the beginning of the 19th century. Its detection was mainly carried out through oxidation reactions of benzene. French chemist Michel Eugène Chevreul reacted benzene with oxidizing agents in the 1820s and found the initial traces of phthalic acid. When he analyzed the new compounds formed from the oxidation of benzene, they were unique in terms of their structure and chemical properties. He also called this compound "carboxylic acid".

The name phthalic is derived from the Greek word "phthalos", which means "blue" or "yellow" colored compounds. It refers to the color properties of the compound. The chemical structure and functional groups of phthalic acid caused such reactions. At the beginning of the 19th century, a method of obtaining phthalic acid was developed by reacting benzene with oxidizing substances. Thus, the synthesis and identification of phthalic acid began, and later it was used in the chemical industry.

Phthalic acid is attached to the benzene ring (C_6H_6) in the 1,4-position of two carboxyl (CO_2H) groups. Its molecular formula is $C_6H_4(CO_2H)_2$.

The structure of phthalic acid is symmetrical, and both $COOH$ groups are located in the 1st and 4th positions of the benzene ring.

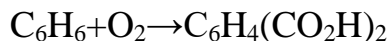
Phthalic acid is a white or transparent crystalline substance. Phthalic acid is sparingly soluble in water, but soluble in many organic solvents (eg, ethanol, ether). It boils around $298\text{ }^\circ\text{C}$. Melts between $150\text{-}155\text{ }^\circ\text{C}$.



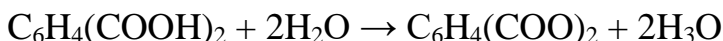
Phthalic acid is a strong acid that readily donates a proton (H^+) through its carboxyl groups.

Phthalic acid reacts with esters to form phthalate esters. Phthalate esters are widely used in the production of plastics and other materials.

Phthalic acid can be obtained by oxidizing benzene. In this case, benzene reacts with oxygen or other oxidizing agents to form carboxyl groups at the 1,4-positions of benzene.



Phthalic acid can be obtained by reacting phthalic anhydride with water.



Phthalic acid is often used to produce phthalate esters, which are used to soften and make materials such as PVC (polyvinyl chloride) more elastic.

Phthalic acid is used in the production of paints and varnishes due to its structure and chemical properties.

Phthalic acid is used in some pharmaceutical and cosmetic products. For example, in the production of some medical preparations and antiseptic substances.

Phthalic acid is used as a starting material in organic synthesis. It is used in the synthesis of various other compounds, for example, phenol and anhydrides.

CONCLUSION

Benzene-1,4-dicarboxylic acid (phthalic acid) is one of the important industrial materials due to its chemical structure, synthesis and properties. It is used in the plastic industry, paint production and many other chemical processes.

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MASS SPECTROSCOPIC ANALYSIS OF BENZENE-1,4-DICARBONIC
ACID

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Abstract. In this scientific work, we will get acquainted with the results of comparing the theoretical and practical results of the mass-spectroscopic analysis of benzene dicarboxylic acids belonging to the carboxyl group.

Key words. Aromatic dicarboxylic acids, substance, benzene, correction, phthalic acid, electrophilic, substitution, isophthalic acid, (IR), absorption mass-spektroskopik.

INTRODUCTION Mass spectrometry is a method of checking the mass of atoms and molecules in a substance based on their spectrum. Each substance whose atoms and molecules are ionized differs from each other in the t/y ratio, which is measured by mass spectrometers. According to the obtained spectrum, the mass of the substance and the amount of other substances in the body are found. Mass spectroscopy is one of the main analytical methods in applied physics, chemistry, biology, medicine, geology and technology. There are different ways to determine the mass of matter in a body archive. Mass, the distance between the dispersion lines is determined by the doublet method, and the mass difference is found based on this distance. The mass of substances is determined by the method of measuring the ion current.

Mass spectroscopy is also used to determine gas composition. Gases are tested by total evaporation, isotope separation, vacuum sparking, and ion bombardment. A certain amount of substance is examined by mass spectroscopy, the amount of elements in it - the amount of components in gas mixtures is controlled and determined, and isotopes are obtained. In the chemical industry, technological processes are managed with mass spectroscopy, the structure of the upper atomic layer is studied, the processes of the collision of charged particles are observed, and the kinetics of chemical reactions are checked. Mass spectroscopy is the only method in many fields. The neutral and ionic composition of the Earth's upper atmosphere has been measured using mass spectroscopy, and the composition of other planets' atmospheres can also be measured in this way.

In the process of mass spectroscopic analysis of benzene-1,4-dicarboxylic acid, based on its molecular structure, a number of important mass spectrometric signals can be observed. Benzene-1,4-dicarboxylic acid ($C_8H_6O_4$) is a compound in the form of a benzene ring with two carboxyl groups.

Theoretical basis of molecular ion (M^+) and molecular mass point:

- Since its molecular formula is $C_8H_6O_4$, its molecular mass is approximately 166 g/mol.

- In the mass-spectroscopic spectrum, the peak of the molecular ion (M^+) can be seen around 166 amu (atomic mass units).

Benzene-1,4-dicarboxylic acid can be separated into different fragments during mass spectrometric analysis. The main fragmentations include:

- In the process of decarboxylation of the carboxyl group in the carbonic acid fragment, the CO_2 molecule can be separated. This reaction is visible in mass spectroscopy as $166 \rightarrow 146$ amu ($M^+ \rightarrow M^+ - CO_2$).

- In the phenyl fragment, the benzene ring remains almost intact, and the fragment can appear in the form of 120 amu ($C_6H_6^+$). This fragmentation is related to the separation of the carboxyl group.

The main pixels that can be seen in the mass spectroscopic spectrum:

M^+ (166 amu)

$M^+ - CO_2$ (146 amu)

$M^+ - C_6H_6$ (120 amu)

$M^+ - CO$ (28 amu)

Isotopic peaks (167, 168 amu)

CONCLUSION

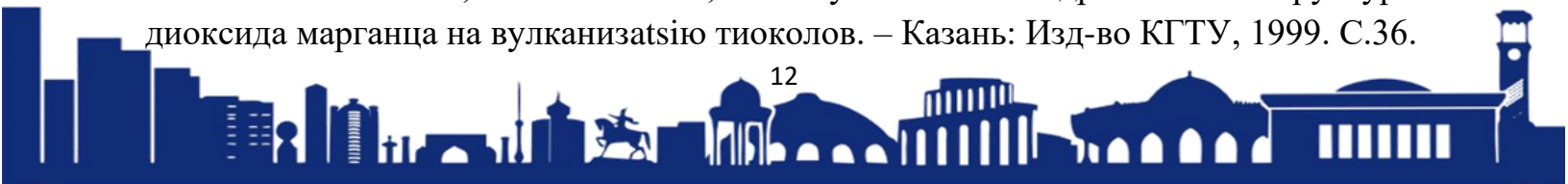
Mass spectroscopic analysis of benzene-1,4-dicarboxylic acid helps to confirm the presence of the benzene ring and carboxyl group through its molecular mass and fragmentation. The indicated fragments and masses are useful in determining the structural properties of this compound.

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CLASSIFICATION, STRUCTURE, PREPARATION, COMPLEX
PROPERTIES AND AREAS OF APPLICATION OF CARBOXYLIC ACIDS

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Abstract. We all know that carboxylic acids are found in many compounds and in the free state. They are produced in industry in many ways and are used in many fields. The most common types of them are essential oils and fats.

Key words. Aromatic dicarboxylic acids, correction, phthalic acid, electrophilic, substitution, isophthalic acid.

INTRODUCTION

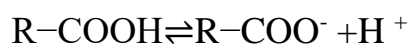
Carboxylic acids are organic acids that contain one or more carboxyl groups (-COOH) in their molecules. The carboxyl group contains the groups -OH , where one oxygen atom is attached to a carbon atom, and =O , where one oxygen atom is attached to a carbon atom. There are many types of carboxylic acids, and they are used in many chemical reactions and in various fields. The general structure of carboxylic acids: R-COOH : Where R can be a carbon chain or an aryl group.

There are several types of carboxylic acids, for example:

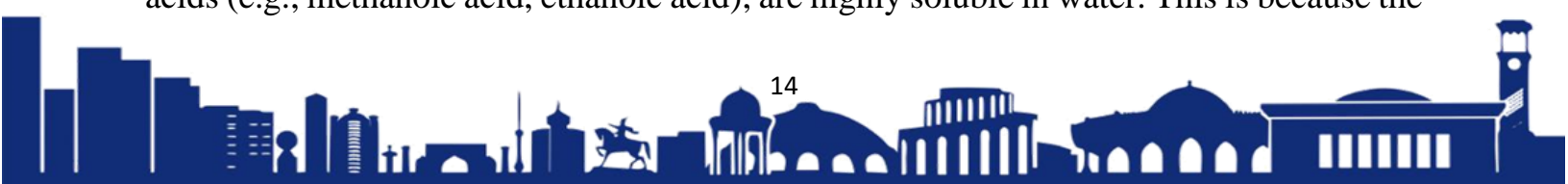
- monocarboxylic acids
- dicarboxylic acids
- aromatic carboxylic acids

The properties of carboxylic acids are based on their chemical structure and molecular structure, and they have different physicochemical properties. The main properties of carboxylic acids are:

- Acidic properties: these, in turn, are divided into 2 types: Proton (H^+) separation and acidity level.



- Solubility; good solubility: Carboxylic acids, especially simple aliphatic carboxylic acids (e.g., methanoic acid, ethanoic acid), are highly soluble in water. This is because the



hydroxyl (-OH) and carbonyl (=O) groups in their carboxyl group readily bind to water, making the molecule water-soluble.

Many polycarboxylic acids: Some carboxylic acids with many carboxyl groups, such as succinic acid, malonic acid, may be highly soluble, but their solubility differs from that of aliphatic acids.

- The carboxyl group is highly reactive, and they can undergo many chemical reactions

Heat resistance. Carboxylic acids vary in their heat resistance. Simple carboxylic acids often have low melting points and evaporate easily. For example, ethanoic acid (acetic acid) boils at 118°C. However, some polycarboxylic acids may have higher melting points.

As for their areas of use, they are mainly used as disinfectants and preservatives, in the food industry, and in a number of other areas due to their corrosive properties. Carboxylic acids are widely distributed in nature, both free and in combination. They are part of oils, essential oils, and fresh fruits. Carboxylic acids are obtained from natural compounds (higher fatty acids, citric acid, etc.) or synthetically, for example, by oxidizing alcohols and aldehydes. Carboxylic acids are also widely obtained by fermentation (butyric acid, lactic acid, acetic acid fermentation). Carboxylic acids and their derivatives are widely used in the national economy. For example, various soaps are made based on distilled fatty acids obtained from cottonseed oil. The production of varnishes and enamels has been established based on highly branched fatty acids (HFA) obtained by telomerization.

CONCLUSION

Carboxylic acids have a variety of physical and chemical properties, and their acidic nature, solubility, reactivity, role in biochemical processes, and industrial applications make them of widespread practical importance. Their properties ensure their use in chemistry, biochemistry, pharmaceuticals, the food industry, and other fields.

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OBTAINING AND PRACTICAL USE OF MODIFIED THIOL
OLIGOMERS

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Abstract: Synthesis and practical application of modified thiol oligomers are of great importance in many fields such as chemistry, materials science, electronics and medicine. By changing their various physical and chemical properties, it is possible to create new materials, technologies and production processes. Such algorithms provide innovative solutions in many industries and create new opportunities for us.

Key words: Modified thiol algorithms, synthetic, material science, electronics, technology, innovative solution.

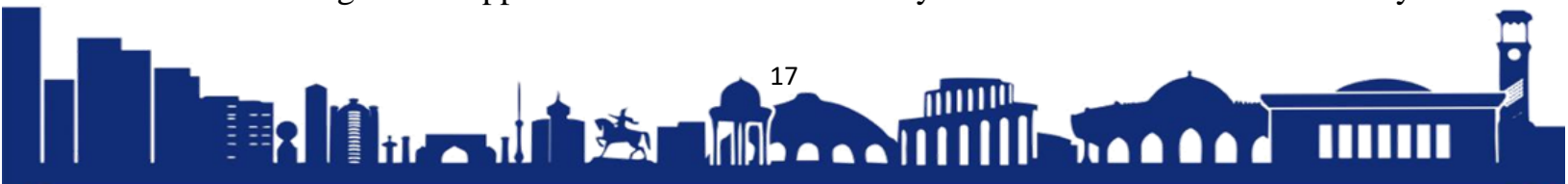
Modified thiol polymers are polymers modified mainly with thiol groups (-SH) and other chemical groups. They are distinguished by their high reactivity and changed physical and chemical properties. Thiol oligomers are usually obtained by polymerization reactions or cross-linking methods in the field of organic chemistry. They are used in various industries, in particular, in materials science, medicine, electronics and chemical industry.

The initial discovery of Thiol oligomers and related scientific developments generally took place in the late 19th and early 20th centuries. The main discoveries and researches were as follows:

Thiol groups (-SH) were first discovered by Karl Wilhelm Scheele in 1777. These groups became important in the study and synthesis of organic compounds. They play a key role in the production of many organic and polymer products.

The study of thiol compounds and their polymerization also began in the 19th century. In the 1900s, polymers played an important role in the study and modification of polymers. Initially, these oligomers were sulphide compounds containing thiol groups, which were used in many industrial processes.

Modified thiol oligomers with their wide capabilities were further developed with new technologies that appeared in science and industry in the middle of the 20th century.



These polymers are mainly modified by polymerization, cross-linking and redox reactions.

In the 1950s and 1960s, new methods and technologies were developed in polymer synthesis. During this period, thiogol polymers began to be used in the polymer industry, materials science, and elastomers.

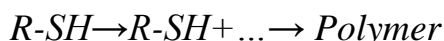
In the 1980s and 1990s, they began to be developed as bioactive materials and biomaterials. During this period, their use was expanding, especially in medicine and the electronics industry.

Thiogol oligomers, especially in medicine, are used as implants, drug delivery systems and bioactive materials due to their biocompatibility.

Elasticity: Modified thiogol polymers are used in elastomers because they have high elastic and mechanical properties.

Thiol oligomers are synthesized through polymerization reactions with thiol groups. These processes may include:

Radical polymerization: Thiol groups can participate in radical polymerization reactions due to their high reactivity. In this process, during the polymerization of thiol oligomers, radicals are interconnected and long chains are formed.



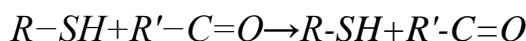
The structure of modified thiol oligomers can be changed through cross-linking processes between thiol groups. Cross-linking reactions help to improve the mechanical and chemical properties of polymers.

Disulfide bonds are formed between thiol groups through oxidation processes. This reaction usually takes place in the presence of oxidizing agents or oxygen.

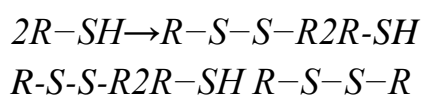


Disulfide bonds help strengthen the structure of polymers and improve their mechanical properties.

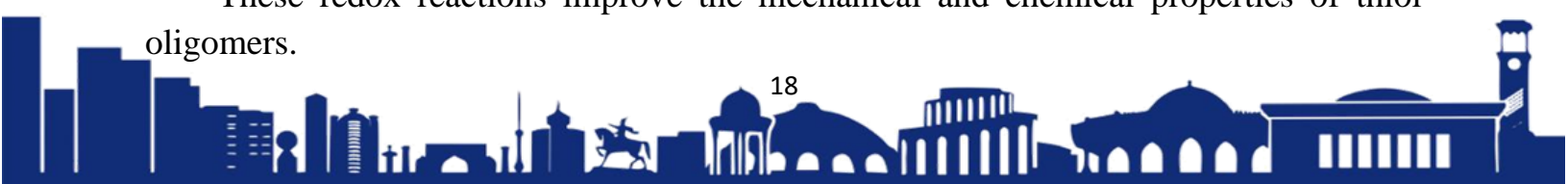
Thiol groups enter into a condensation reaction with aldehyde or ketone groups, and new modified thiol oligomers are formed.



Thiol groups participate in redox reactions to convert their -SH group into -S-S bonds. These reactions are used to control the reactivity of thiol groups and to create new materials.



These redox reactions improve the mechanical and chemical properties of thiol oligomers.



Thiogol oligomers are used in the production of high-polymeric materials, especially in the creation of elastomers and high-strength materials. They are used to create new polymeric materials using bridging reactions.

Thiogol oligomers are used for drug delivery systems, i.e. nanocapsules and other pharmaceutical preparations, due to their biocompatibility and reactivity properties.

Thiogol oligomers bind to proteins or other biomolecules and are used in biotechnological applications, for example, in the creation of biosensors. They can also be used in in vitro diagnostics.

Thiogol oligomers are used as auxiliary reagents in chemical reactions due to their reactive and catalytic properties. They are used in the development of catalysts for microapplications, that is, in organic synthesis.

Thiogol polymers are used in nano-technology and electronic components. They are used in the production of new materials, for example, as modified electrodes or supercapacitors.

CONCLUSION

Modified thiogol oligomers are widely used in various fields such as chemistry, biotechnology, electronics, pharmaceuticals and materials science. Through their acquisition and modification, new functional materials and technologies are created, which is of great importance in the development of science and industry.

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SOLIQ SIYOSATI – IQTISODIY BARQARORLIK VA DAVLAT BYUDJETINI
SHAKLLANTIRISH OMILI

Bo`ronov Shavkat Xudoyshukurovich – mustaqil tadqiqotchi

Annotatsiya: O‘zbekistonda soliq siyosati iqtisodiy barqarorlik va davlat byudjetini shakllantirishda muhim omil hisoblanadi. Ushbu maqola mamlakatdagi soliq tizimining asosiy tamoyillari, islohotlar, soliq yukini yengillashtirish bo‘yicha chora-tadbirlar va iqtisodiy rivojlanish uchun soliq siyosatining roli haqida tahlilni o‘z ichiga oladi. Shuningdek mazkur maqola O‘zbekistondagi soliq siyosatining asosiy tamoyillari, mavjud yutuqlar va mavjud muammolarni tahlil qilishga, shuningdek, soliq tizimining iqtisodiy o‘sish va barqarorlikka ta‘sirini baholashga ham qaratilgan. Ushbu tahlil orqali mamlakatning soliq siyosatini yanada takomillashtirish bo‘yicha amaliy tavsiyalar ishlab chiqish ko‘zda tutilgan.

Kalit so‘zlar: soliq siyosati, soliq tizimi, iqtisodiy rivojlanish, soliq islohotlari, davlat byudjeti, soliq yuki, fiskal siyosat, moliyaviy barqarorlik, investitsiyalar.

Kirish. Soliq siyosati har bir davlat iqtisodiyotining muhim tarkibiy qismi hisoblanadi, chunki u davlat byudjetini shakllantirish, ijtimoiy-iqtisodiy barqarorlikni ta‘minlash va iqtisodiy rivojlanishni rag‘batlantirishda markaziy o‘rin tutadi. O‘zbekistonda so‘nggi yillarda soliq siyosatini takomillashtirish va uning iqtisodiyotga ta‘sirini kuchaytirishga qaratilgan keng ko‘lamli islohotlar amalga oshirilmoqda. Ushbu islohotlar soliq yukini yengillashtirish, soliq to‘lovchilarning huquqlarini himoya qilish va iqtisodiyotni diversifikatsiya qilishga qaratilgan. O‘zbekiston Respublikasi mustaqillikka erishgandan so‘ng, milliy soliq tizimini shakllantirishga kirishdi¹.

Dastlabki yillarda soliqlar iqtisodiyotni boshqarish vositasi sifatida xizmat qildi. Keyinchalik, mamlakat iqtisodiyotni modernizatsiya qilish va bozor mexanizmlariga o‘tish jarayonida fiskal siyosatni yanada takomillashtirishga ehtiyoj sezdi. Soliq siyosati orqali davlat iqtisodiyotning turli sohalarida strategik yo‘nalishlarni qo‘llab-quvvatlaydi, investitsiyalarni rag‘batlantiradi va tadbirkorlik muhitini yaxshilashga qaratilgan chora-tadbirlarni amalga oshiradi².

¹ Yunusov, A. Soliq tizimining rivojlanishi va innovatsion yondashuvlar. Toshkent: Innovatsion tadqiqotlar markazi. 2023. 23-b.

² Toshmatov F. O‘zbekistonda soliq ma‘muriyatchiligini raqamlashtirishning ahamiyati. Toshkent: Milliy universitet nashri. 2021. 46-b.



Bugungi kunda O‘zbekistonning soliq siyosati davlat byudjetining asosiy daromad manbai sifatida nafaqat iqtisodiyotni boshqarish, balki ijtimoiy tenglikni ta’minlash, xususiy sektorni rivojlantirish va xorijiy investitsiyalarni jalb qilishda ham muhim ahamiyat kasb etadi. Mamlakatdagi soliq tizimi hozirgi kunda soddalashtirilgan va biznes muhitini yaxshilashga yo‘naltirilgan bo‘lib, bu jarayon xalqaro tajriba asosida takomillashtirilmoqda.

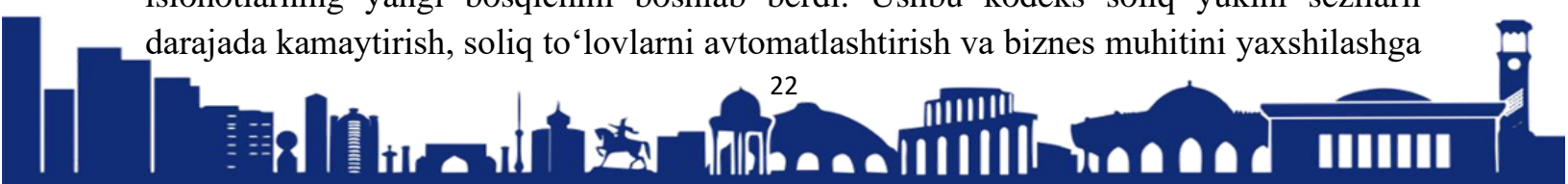
O‘zbekiston Respublikasi Prezidenti tomonidan ilgari surilgan 2019-yilgi “Soliq kodeksi” islohoti mamlakatda soliq siyosatini modernizatsiya qilishda yangi bosqichni boshlab berdi. Ushbu islohotlar soliq ma’muriyatchiligini soddalashtirish, soliqlarni avtomatlashtirish va soliq yukini kamaytirish orqali tadbirkorlar va soliq to‘lovchilarning manfaatlarini himoya qilishga qaratilgan. Xususan, soliq stavkalarini pasaytirish, daromadlar ustidan ikki karra soliqqa tortishni bartaraf etish va elektron hisob-kitob tizimini joriy qilish kabi yondashuvlar iqtisodiy samaradorlikni oshirishda muhim qadam bo‘ldi.

O‘zbekiston Respublikasi mustaqillikka erishgan dastlabki yillardan boshlab milliy soliq tizimini shakllantirish va uni mamlakat iqtisodiy taraqqiyotiga moslashtirish bo‘yicha keng ko‘lamli islohotlar amalga oshirdi. Ushbu jarayon davomida soliqlarning iqtisodiyotga ta’siri va ularning samaradorligi doimiy e’tibor markazida bo‘lib kelgan. Mamlakat iqtisodiy siyosatida soliq tizimi ikki asosiy yo‘nalishda rivojlanib kelmoqda: davlat byudjeti uchun barqaror daromad manbai yaratish va xususiy sektor uchun qulay ishbiarmonlik muhitini shakllantirish.

Soliqlar, xususan, kichik va o‘rta biznes subyektlarini qo‘llab-quvvatlashda muhim omil bo‘lib, davlat iqtisodiyotining turli sektorlarida o‘sish va barqarorlikni ta’minlashga xizmat qilmoqda. Shu bilan birga, soliqlar orqali davlat iqtisodiy strategiyalarni amalga oshiradi, jumladan, eksportni qo‘llab-quvvatlash, investitsiyalarni jalb qilish va tadbirkorlik faoliyatini kengaytirish.

O‘zbekistonda soliq siyosatini isloh qilish jarayoni so‘nggi yillarda sezilarli tezlashdi. Xususan, 2017-yildan boshlab mamlakat rahbariyati tomonidan iqtisodiyotni liberallashtirish va soliqlarni soddalashtirishga qaratilgan chora-tadbirlar amalga oshirila boshlandi. Soliq siyosatining modernizatsiyasi natijasida soliqlarni boshqarish tizimi takomillashtirilib, "raqamli boshqaruv" yondashuvi keng joriy qilindi. Bu o‘z navbatida davlatning fiskal siyosatini shaffof qilish va soliq to‘lovchilarning manfaatlarini himoya qilish imkonini yaratdi.

O‘zbekistonning yangi “Soliq kodeksi” (2019-yil) mamlakatda iqtisodiy islohotlarning yangi bosqichini boshlab berdi. Ushbu kodeks soliq yukini sezilarli darajada kamaytirish, soliq to‘lovlarni avtomatlashtirish va biznes muhitini yaxshilashga



qaratilgan edi. Xususan, daromad solig‘i stavkalarining pasaytirilishi, kichik biznes uchun yengillashtirilgan soliqlar va elektron soliq tizimining joriy etilishi iqtisodiy faollikni oshirishda muhim rol o‘ynadi. Ushbu yondashuvlar mamlakat iqtisodiyotini yanada barqarorlashtirish va yangi investitsiyalar uchun qulay muhit yaratishga xizmat qildi. Soliq siyosatining mamlakat iqtisodiy o‘shishiga ta’siri xalqaro hamkorlik va global iqtisodiy tendensiyalar bilan ham bog‘liq³.

O‘zbekiston ikki tomonlama soliqqa tortishning oldini olish bo‘yicha qator davlatlar bilan bitimlar imzoladi. Bu esa xorijiy investorlar uchun qulay sharoitlar yaratish bilan birga, investitsiya hajmini oshirishga xizmat qilmoqda. Shu bilan birga, soliq tizimining raqamlashtirilishi va avtomatlashtirilishi soliqlarni yig‘ish samaradorligini oshirish, soliq huquqbuzarliklarini kamaytirish va iqtisodiyotni “soyalashuv”dan chiqarishga imkon beradi. Soliq siyosatining ijtimoiy-iqtisodiy ahamiyati ham katta⁴.

Davlatning fiskal siyosati nafaqat iqtisodiy samaradorlikni oshirish, balki ijtimoiy tenglikni ta’minlash uchun ham vosita bo‘lib xizmat qiladi. Soliq daromadlari orqali ta’lim, sog‘liqni saqlash va ijtimoiy infratuzilma loyihalarini moliyalashtirish imkoniyati yaratiladi. Shu bilan birga, soliq siyosati xususiy sektor bilan davlat o‘rtasida muvozanatni ta’minlashda vosita sifatida ishlatiladi, bu esa iqtisodiyotni yanada diversifikatsiya qilishga xizmat qiladi.

Tadqiqot natijalari mamlakat iqtisodiy siyosatini yanada rivojlantirish va iqtisodiy barqarorlikni mustahkamlash bo‘yicha amaliy tavsiyalar ishlab chiqishga asos bo‘lib xizmat qiladi.

Empirik ma’lumotlarni yig‘ish jarayonida xalqaro tajribalarning O‘zbekiston sharoitiga moslashuvi alohida e’tiborga olindi. Misol sifatida, OECD tomonidan ishlab chiqilgan soliq ma’muriyatchiligini avtomatlashtirish va raqamli boshqaruv tizimlari O‘zbekistonda joriy qilingan va bu jarayonning samaradorligini baholashda foydalanilgan.

Jahon Banki va IMFning fiskal barqarorlikni ta’minlash bo‘yicha tavsiyalari O‘zbekistonning iqtisodiy siyosatida qanday amalga oshirilganini kuzatish uchun manba sifatida ishlatildi. Komparativ tahlil usuli yordamida O‘zbekistonning soliq siyosati boshqa davlatlarning tajribalari bilan solishtirildi. Misol sifatida, OECD⁵ a’zolari bo‘lgan rivojlangan davlatlar va rivojlanayotgan mamlakatlarning soliq siyosati va islohotlari

³ Yunusov, A. Soliq tizimining rivojlanishi va innovatsion yondashuvlar. Toshkent: Innovatsion tadqiqotlar markazi. 2023. 19-b.

⁴ Toshmatov F. O‘zbekistonda soliq ma’muriyatchiligini raqamlashtirishning ahamiyati. Toshkent: Milliy universitet Nashri. 2021. 43-b.

⁵ OECD. (2023). Tax Policy and Economic Growth: Best Practices for Developing Countries. Paris: OECD Publishing



o'rganildi. Bu soliq ma'muriyatchiligidagi samarali yondashuvlarni aniqlash va ularni O'zbekiston sharoitida tatbiq etish imkoniyatlarini baholashga yordam berdi.

Xususan, Koreya Respublikasi va Polshaning soliq ma'muriyatchiligidagi raqamli boshqaruv tizimlari O'zbekistonning elektron soliq tizimini rivojlantirishda namunali model sifatida o'rganildi.

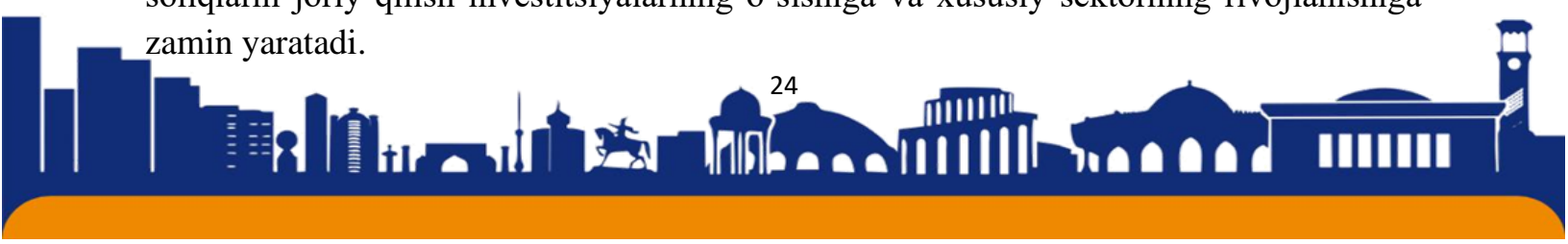
Tadqiqotning yana bir muhim jihati sifatida sifatli ma'lumotlar yig'ishga qaratilgan anketalar va intervyular o'tkazildi. Intervyular davomida O'zbekistonning Davlat soliq qo'mitasi vakillari, iqtisodchilar va biznes sektori vakillari bilan muloqot olib borildi. Ushbu jarayonda soliqlarni boshqarishdagi amaliy muammolar va soliq to'lovchilar duch kelayotgan qiyinchiliklar haqida batafsil ma'lumotlar olindi. Shuningdek, xalqaro tashkilotlarning vakillari bilan olib borilgan intervyular orqali O'zbekistonning soliq tizimini takomillashtirish bo'yicha xalqaro tajribalarga oid tavsiyalar o'rganildi.

O'zbekistonda soliq siyosati davlatning iqtisodiy rivojlanish strategiyasining ajralmas qismi bo'lib, uning iqtisodiyotga ta'siri nafaqat davlat byudjetini shakllantirishda, balki tadbirkorlikni qo'llab-quvvatlash, investitsiyalarni jalb qilish va ijtimoiy barqarorlikni ta'minlashda ham namoyon bo'ladi. Ushbu tadqiqot O'zbekiston soliq siyosatining asosiy tamoyillari, mavjud yutuqlari va muammolarini tahlil qilishga hamda iqtisodiy samaradorlikni oshirish bo'yicha tavsiyalar ishlab chiqishga qaratilgan.

Avvalo, mamlakatda so'nggi yillarda amalga oshirilgan soliq islohotlari soliq tizimining samaradorligini oshirishga, soliq ma'muriyatchiligini soddalashtirishga va tadbirkorlik uchun qulay muhit yaratishga qaratilgan. 2019-yilda qabul qilingan yangi Soliq kodeksi ushbu islohotlarning muhim bosqichiga aylangan bo'lib, u daromad solig'ini pasaytirish, elektron hisob-kitob tizimlarini joriy qilish va soliq yukini kamaytirish kabi yondashuvlarni o'z ichiga oladi. Bu esa iqtisodiy faollikni oshirish, xorijiy investitsiyalarni jalb qilish va biznes muhitini yaxshilashda sezilarli natijalarga olib keldi.

Tahlillar shuni ko'rsatdiki, soliq siyosatining muvaffaqiyati bir nechta omillarga bog'liq. Xususan, soliq tizimini modernizatsiya qilish, raqamlashtirish va xalqaro tajribalarni integratsiya qilish O'zbekiston soliq siyosatining samaradorligini oshirgan. Elektron soliq tizimining joriy etilishi nafaqat soliq yig'imlarini oshirdi, balki soliq to'lovchilarning huquq va majburiyatlarini aniqroq belgilashga yordam berdi.

Bu esa davlatning fiskal siyosatini shaffof qilish va iqtisodiyotni "soyolashuv"dan chiqarishga xizmat qildi. Soliq siyosati iqtisodiy o'sishga bevosita ta'sir ko'rsatadi. Ushbu tadqiqot davomida aniqlanganidek, soliq stavkalarini pasaytirish va yengillashtirilgan soliqlarni joriy qilish investitsiyalarning o'sishiga va xususiy sektorning rivojlanishiga zamin yaratadi.



Shuningdek, kichik va o'rta biznes uchun maxsus soliq rejimlari tadbirkorlikni rivojlantirishda muhim omil bo'ldi. Bu yondashuv O'zbekiston iqtisodiyotining barqarorligini oshirish va yangi ish o'rinlarini yaratishda asosiy vositalardan biri bo'lib xizmat qilmoqda. Biroq, tadqiqot davomida soliq siyosatining ayrim kamchiliklari ham qayd etildi. Xususan, ayrim tarmoqlarda soliq ma'muriyatchiligidagi murakkabliklar, soliqlarni yig'ishda norasmiy iqtisodiyotning ulushi va tadbirkorlar uchun mavjud bo'lgan moliyaviy yuk muammolari mavjud. Ushbu kamchiliklarni bartaraf etish uchun soliqlarni boshqarish tizimini yanada takomillashtirish, soliq to'lovchilarga nisbatan yengillashtirilgan yondashuvlarni kengaytirish va xalqaro moliyaviy tashkilotlarning tajribasidan foydalanish zarur.

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Anotatsiya: Nitro birikmalarining tarkibi va xususiyatlari ularning kimyoviy va sanoatdagi o'rnini belgilaydi. Ular keng spektrdagi qo'llanilishi va xususiyatlari bilan kimyo va sanoat sohalarida muhim ahamiyatga ega.

Abstract: The composition and properties of nitro compounds determine their place in chemistry and industry. They are important in chemical and industrial fields with a wide range of applications and properties.

Аннотация: Состав и свойства нитросоединений определяют их место в химии и промышленности. Они важны в химической и промышленной областях с широким спектром применений и свойств.

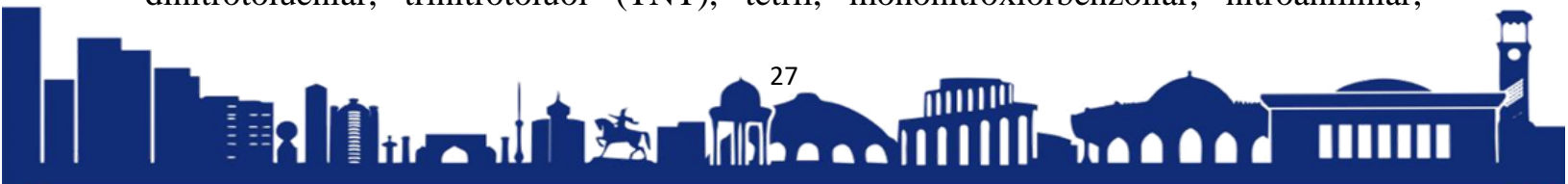
Kalit so'zlari: Sanoatda, spektr tahlili, portlovchi moddalar, o'g'itlar, xo'jalikda, kimyo sanoati.

Keywords: In industry, spectrum analysis, explosives, fertilizers, agriculture, chemical industry.

Ключевые слова: В промышленности, спектральном анализе, взрывчатых веществах, удобрениях, сельском хозяйстве, химической промышленности.

Nitro birikmalar, azot (N) elementini o'z ichiga olgan kimyoviy birikmalardir. Ular odatda azot va boshqa elementlar, masalan, uglerod (C), vodorod (H) yoki kislorod (O) bilan bog'lanish orqali tashkil topadi. Nitro birikmalarining ko'plab turlari mavjud va ular turli sohalarda qo'llaniladi, masalan, sanoatda, qishloq xo'jaligida, va o'g'it sifatida.

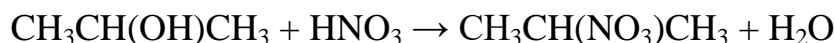
Asosiy sanoat ahamiyatiga ega bo'lgan nitrobirlashmalarga nitrobenzol, mono- va dinitrotoluenlar, trinitrotoluol (TNT), tetril, mononitroxlorbenzollar, nitroanilinlar,



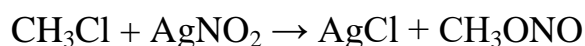
nitroxlorotoluenlar, nitronaftalin, dinitrofenol, pikrik kislota (trinitrofenol) va diniytrofenol kiradi. Ushbu birikmalar bo'yicha ularning toksik xususiyatlari va odamlarga shikast etkazmaslik uchun zarur bo'lgan ta'sirni nazorat qilish choralari haqida ma'lumot berish uchun etarli tajriba hujjatlashtirilgan.

Ushbu guruhdagi birikmalarning ancha ko'p miqdori xavfni to'liq baholash uchun hech qanday holatda yetarli miqdorda ishlab chiqarilmagan hosilalar hisobiga to'g'ri keladi; bu hosilalar dinitroxlorbenzollar, dikloronitrobenzollar, nitroksilenlar, nitrotoluidinlar, nitroxloroanilinlar, nitroanizollar, nitrofenetollar va nitroanisidinlarni o'z ichiga oladi. Nitro birikmalarining ko'plab kimyoviy reaksiyalar orqali boshqa birikmalarni hosil qilish imkoniyati mavjud. Ular kislotalar, alkollar, yoki boshqa organik moddalarga nisbatan juda reaktiv bo'lishi mumkin. Masalan, nitro birikmalarining azotli kislorod bilan reaksiyaga kirishishi portlovchi va o'zgarimas moddalar hosil qiladi.

Olinish usullari. Organik moddalar tarkibiga nitrogruppani kiritish nitrolash deyiladi. Nitrolash konsentrlangan HNO₃ bilan H₂SO₄ dan (birinchisi nitrolovchi reagent, ikkinchisi suvni tortib oluvchi vosita) iborat nitrolovchi aralashma vositasida amalga oshiriladi. To'yingan uglevodorodlarni nitrolash. Bu usulni birinchi marta 1888 yilda M.I.Konovalov topgan bo'lib, hozirgi vaqtda sanoatda nitrobirikmalar ana shu usul bilan olinadi. Buning uchun to'yingan uglevodorodlarga 150-475 °C da suyultirilgan HNO₃ ta'sir ettiriladi:



To'yingan uglevodorodlarning galogenli hosilalariga nitrit kislota tuzlari ta'sir ettirib olish. To'yingan uglevodorodlarning nitrobirikmalari nitroparafinlar deb ataladi. Nitroparafinlarni birinchi marta galoidalkillarga AgNO₂ ta'sir ettirib olingan:



Bu reaksiyani V.Meyer taklif etgan.

Fizik xossalari. Nitrobirikmalarning quyi gomologlari rangsiz, qo'lansa hidli suyuqlik bo'lib, suvda erimaydi, efir va spirtida yaxshi eriydi. Uglerod soni oshishi bilan ularning suvda eruvchanligi va zichligi kamayadi, qaynash temperaturasi esa ko'tariladi. Ular elektr tokini o'tkazmaydi. Nitrobirikmalar haydaladi, ularning buglari zaharli. Nitrobirikmalar yoqimli hidga ega bo'lgan, suvda kam eriydigan suyuqliklardir. Zaharli, parchalanmasdan haydaladi. Tuzilishida to'rttagacha uglerod bo'lgan nitrobirikmalarning zichligi birdan kichik.

Xulosa: Nitro birikmalar olinishi sanoatni va ishlab chiqarishni yangi sohalarni ishga tushishiga katta ta'sir o'tkaza oldi. Shu bilan birga, nitro birikmalarining samarali va xavfsiz foydalanilishi uchun ehtiyotkorlik zarur. Ular kimyo, harbiy va tibbiyot sohalarida katta ahamiyatga ega bo'lishi mumkin, ammo ular bilan ishlashda xavfsizlikni ta'minlash uchun maxsus usullarni qo'llash kerak.

Conclusion: The production of nitro compounds was able to have a great impact on the start of new areas of industry and production. However, caution is necessary for effective and safe use of nitro compounds. They can be of great value in the fields of chemistry, military and medicine, but special methods must be used to ensure safety when working with them.

Вывод: Производство нитросоединений смогло оказать большое влияние на возникновение новых направлений промышленности и производства. Однако для эффективного и безопасного применения нитросоединений необходима осторожность. Они могут иметь большую ценность в области химии, военного дела и медицины, но для обеспечения безопасности при работе с ними необходимо использовать специальные методы.

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Annotatsiya: Ushbu maqola yozuvchi va shoir G'afur G'ulom hayoti va ijodi borasida ma'lumot beradi. Shunindek, akademik shoirning asarlari va ularning bugungi kundagi ahamiyati borasidagi fikrlar bilan boyitilgan.

Kalit so'zlar: akademik shoir, she'riyat, o'zbek adabiyoti, „Yodgor“ qissasi, doston, nasr.

O'zining butun hayoti va ijodi bilan o'z xalqining minnatdorchiligiga va hurmatiga sazovor bo'lgan baxtiyor adiblardan biri zamonasining otashnafas kuychisi G'afur G'ulomdir. Darhaqiqat, G'afur G'ulomning hayot va ijod yo'li o'zbek xalqining o'sish, ravnaq topish, taraqqiyot va takonil yo'lidir. Shuning uchun ham to'la ishonch bilan ayta olamizki, shoir chindan ham o'zini o'z xalqining sadosi, tilmoqchi, deb faxrlanishga tamomila haqlidir.

Basharti shoirning hayot yo'lini eslatib o'tmoq zarurati tug'ilib qolar ekan, buning o'zbek ziyolilarining birinchi bo'g'ini uchun xarakterli bir yo'l bo'lganini ko'ramiz.

Shoirning tug'ilish sanasi – 1903-yil 10-may. Joyi – Toshkent shahri, Qo'rg'ontegi mahallasi. Eski usuldagi mahalla maktabi, 1916-yil. Rus-tuzem maktabi 1919-yilda komsomol. O'qituvchilar kursi – muallimlik 1923-yil. Boqimsiz bolalar uyiga murabbiy va keyinchalik mudir. Yana shu yilda shoirning birinchi she'ri matbuotda bosilib chiqadi. Bundan keyin u ijodkor sifatida o'z taqdirini matbuot bilan bog'lab, “Sharq haqiqati”, “Qizil O'zbekiston”, “Yer yuzi” gazeta va jurnallarida adabiy xodim bo'lib ishlaydi.

Bir shoir sifatida G'afur G'ulom yaratgan ilk to'plamlar “Dinamo” (1931) va “Tirik qo'shiqlar” (1932)dayoq biz jangovar kuychining paydo bo'lganini ko'ramiz. Albatta, bu o'sish jarayonida uning bevosiya adabiyot ustozlari bo'lgan. Bular bir tomondan, o'zbek klassik she'riyatining otaxoni – Alisher Navoiy, o'zbek realist va demokrat adabiyotining peshvosi – Muhammad Amin Muqimiy bo'lsa, ikkinchi tomondan, Sharqning zabardast so'z ustalari – Sa'diy, Hofiz, Fuzuliy edilar. Shoir 1930-1943-yillar mobaynida o'zbek adabiyoti tarixi fondiga kirgan qator dostonlar yaratdiki, bulardan har qaysisi o'z

davrining aktual, keskin ijtimoiy-siyosiy, hayotiy, axloqiy muammolarini hal qilishga qaratilgan edi. "Ko'kan" (1930-1933), "Egalari egallaganda" (1931) kabi dostonlar va "To'y" (1934), "Ikki vasiqa" (1935) kabi manzumalar bu intilishning samaralaridir. Dotonchilik va manzumachilik chizig'ini davom ettirib shoir keyinchalik urush yillarida o'zbek xalqining qahramonlarcha himmati soyasida qurilgan Farhod GES ga bag'ishlab "Suv va nur" (1943) manzumasini yaratdi¹.

G'afur G'ulom ijodi haqida so'z yuritganda adibning nasriy asarlari to'g'risida gapirmasdan bo'lmaydi. Uning asarlarini haqiqiy milliy nasr deya olamiz. "Shum bola" (1932-1965), "Netay" (1930), "Yodgor" (1936), "Tirilgan murda" (1934), "Mening o'g'rigina bolam" kabi qissa-yu hangomalarni hech ikkilanmasdan adabiyotimizning durdonalari deb atasa bo'ladi².

1941-1945-yillarda, Vatanimiz boshiga qonli kulfatlar tushgan chog'larda, yozuvchi yuksak vatanparvarlik hislari bilan otashin she'lar yozib, xalqimizni qahramonlikka, jasoratga, mehnatga, sadoqatga, do'stlikka, birlikka chaqirdi. Bular qatorida "Kuzatish", "Men yahudiy", "Sen yetim emassan", "Salom va tabrik", "Sog'inish", "Qish" kabilar mavjud.

G'afur G'ulom mumtoz adabiyotimiz va xalq ijodidan o'rganish bilan chegaralanib qolmadi, u jahon xalqlari, ayniqsa, rus adabiyoti maktabi bilan ham bahramand bo'ldi. V.Sheksperning "Otello", "Qirol Lir" Lope de Veganing "Qo'zibuloq qishlog'i", F.Shimirning "Vilgelm Tell", Nizomiy, Jomiy, A.Pushkin, L.Tolstoy, A.To'qay. T.Shevchenko, Prem Chand haqida maqolalar yozdi. Nozim Hikmat, Antol Gidash, Xodi Toqtosh, A.Lohutiy, M.Tursunzodadan tortib. A.S.Pushkin, M.Yu.Lermontov, N.A.Nekrasov, V.V.Mayakovskiygacha bo'lgan ijodkorlar asarlarini o'zbekchaga tarjima qilib o'zbek kitobxonlarini jahon adabiyotining noyob durdonalari bilan tanishtirishda o'z hissasini qo'shdi³.

Xulosa qilib aytganda, O'zbekiston Fanlar akademiyasi tashkil etilganida, birinchilardan bo'lib akademiklikka saylangan ulkan iste'dod egasi, mohir yozuvchi va shoir G'afur G'ulom avlodlarga ulkan ma'naviy me'ros qoldirdi, deya olamiz. Negaki, o'z asarlari bilan kitobxonga vatanparvarlik, sadoqat, birlik, sabr kabi tuyg'ularni

¹ G'afur G'ulom . Tanlangan asarlar. Nazm va nasr. G'afur G'ulom nomidagi nashriyot-matbaa ijodiy uyi- 2016.

² G'afur G'ulom . Tanlangan asarlar. Nazm va nasr. G'afur G'ulom nomidagi nashriyot-matbaa ijodiy uyi- 2016.

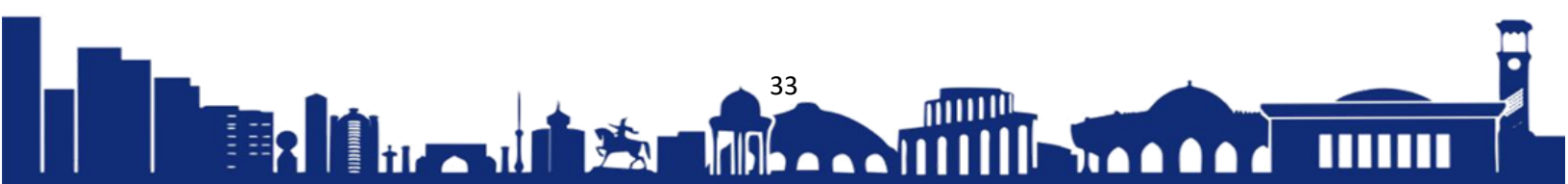
³ . G'G'ulom. Asarlar (10 tomlik).-T.: "Adabiyot va san'at", 1-3-tomlar, 1972.



singdirishga harakat qilganiga asarlari bilan tashish orqali guvoh bo‘lamiz. Goho yozuvchining kichik bir hajvijasini o‘qib ham muallifning dunyo qarashi, e’tiqodini adashmay aniqlab olsa bo‘ladi. Balki, shu sababli ham yozuvchining nasrda yozilgan asarlari hali hanuz kitobxonlar qo‘lidan tushmaydi va ularni mutoola qilish barchaga birdek unutilmas hajviyalar guvohi bo‘lishi uchun imkoniyat yaratadi.

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ИНТЕРВЕНЦИОННАЯ ПРАКТИКА У БОЛЬНЫХ ПЕРЕНЕСШИХ
АОРТОКОРОНАРНОЕ ШУНТИРОВАНИЕ

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Методом реваскуляризации при многососудистой ишемической болезни сердца (МВБ) традиционно является аортокоронарное шунтирование (АКШ), однако благодаря последним достижениям в области чрескожного коронарного вмешательства (ЧКВ) этот последний метод приобрел популярность и повысилась его роль в руководящих принципах. Сравнительное влияние этих двух методов реваскуляризации на отдаленную смертность до сих пор неясно. В отсутствие убедительных доказательств разницы в смертности у этих пациентов часто предпочтительнее ЧКВ, чем АКШ, учитывая его менее инвазивный характер.

Цели: Определить сравнительное влияние АКШ и ЧКВ на долгосрочную смертность и заболеваемость в которых сравнивались 2 метода лечения у пациентов с многососудистым поражением.

Материал и методы исследования.

В исследование были включены 60 больных (30 женщин и 30 мужчин, средний возраст $59,3 \pm 4,2$ года). Мы выбрали пациентов с 1 или более артериальными трансплантатами, использованными как минимум в 90%, и с 1 или более стентами, использованными как минимум в 70% случаев, в которых сообщалось о результатах у пациентов с многососудистым поражением.

Результат.

Наблюдалось значительное снижение общей смертности при АКШ по сравнению с ЧКВ ($P < 0,001$). Также наблюдалось значительное снижение частоты инфаркта миокарда ($P < 0,001$) и повторной реваскуляризации ($0,21-0,41$) ($P < 0,001$) при АКШ. При АКШ наблюдалась тенденция к увеличению числа инсультов ($0,99-1,86$), но это не было статистически значимым ($P = 0,06$). Что касается снижения общей смертности, не было выявлено гетерогенности между исследованиями, которые ограничивались и не ограничивались пациентами с диабетом или независимо от того, были ли стенты с лекарственным покрытием или нет. Из-за отсутствия данных на уровне отдельных пациентов дополнительный анализ подгрупп провести не удалось.

Вывод.

У больных с многососудистым поражением коронарных артерий по сравнению с ЧКВ АКШ приводит к однозначному снижению отдаленной смертности и инфарктов миокарда, а также к уменьшению повторных реваскуляризации независимо от того, страдают ли пациенты диабетом или нет. Эти результаты имеют значение для ведения таких пациентов.

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Annotatsiya. Alimentar distrofiya – (lotincha – ovqatga aloqador) – shish kasalligi-me'yorida ovqat yemaslik oqibatida kelib chiqadigan kasallik. Umumiy ozib ketishlik, modda almashinuvi barcha turlarining rivojlanib borayotgan buzilishi va to'qimalar hamda organlarning funksiyasi buzilishi bilan bog'liq distrofiya bilan tavsiflanadi. Kasallikning o'tish shakli Alimentar distrofiyaning dastlabki sababi hisoblangan sharoit (ekinlarning bitmasligi, suv toshqini, epidemiya, urush, qamal va hokazolar) bilan bog'liq bo'ladi.

Kirish: Alimentar distrofiyaning asosiy sababi – iste'mol qilinayotgan ovqat kaloriyasi yetishmasligining davomiyligi (haftalab, oylab davom etishi). Ovqat tanqislik darajasi turlicha bo'lishi mumkin. Alimentar distrofiyaning rivojlanishida faqat umumiy kaloriyaning pasayishigina emas, balki ovqat turning sifat jihatdan o'zgarishi ham ahamiyatga ega hisoblanadi: hayvonlar oqsillarning yetishmasligi yoki ovqat tarkibida o'simliklarga xos oqsillarning miqdori ko'p bo'lishligi. Oqsillar va yog'lar taqchilligida kaloriyaning umumiy pasayishidan tashqari, o'rnini to'ldirib bo'lmaydigan aminokislotalar, yog' kislotalari va vitaminlar yetishmasligi ham uchraydi. Aholining qashshoq holatidan kelib chiquvchi boshqa omillar (asabiy-emotsional zo'riqish, sovuq, og'ir jismoniy mehnat) ham odatda asosiy sabablar qatoriga kiradi. Infektsiya, ayniqsa ichak yuqumli kasalliklari Alimentar distrofiyaning rivojlanishi va og'irlashishini kuchaytiradi. Alimentar distrofiya kasalliklari klinik kasallik qatoriga kiradi, organizmga kerakli miqdorda ko'plab oziq moddalarning tushmasligi oqibatida gomeostaz buzilish tarzida namoyon bo'ladi. Kasallikning klinik ko'rinishi og'irligiga bog'liq holda Alimentar distrofiya uch bosqichi farqalanadi:

I bosqich-ovqatlanishda kaloriyaning sezilarli pasayganligi, ishtahaning ortganligi, tashnalik, osh tuzini ortiqcha iste'mol qilish. Kasallar nisbatan mehnatga layoqatli, serzarda, dag'al bo'lishi mumkin.

II bosqich-bo'yin, ko'krak, qorin va dumg'aza qismidagi yog' to'qimalarining to'liq yo'qolishi bilan bog'liq vaznning keskin pasayishi. Terining salqib qolishi seziladi

. Umumiy holat yomonlashadi, toliqqanlik seziladi, mehnatga layoqat pasayadi yoki yo'qoladi. Ishtaha kuchayadi, chanqoq zo'rayadi, tana harorati 34 gradusga pasayadi. Ruhiyat ham o'zgaradi.

III bosqich-yog' mutlaqo yo'qoladi. Toliqqanlik yaqqol namoyon bo'ladi, muskul mushakli chuqur atrofini o'raydi, xalta-xalta bo'lib osilib qoladi, ruhiyat keskin o'zgaradi, shaxs tanazzulga uchraydi. Barcha a'zolarining asta-sekin shikastlanishi yuz beradi, ya'ni ichki sekretsiya bezlari, yurak-qon tomir tizimi, markaziy asab tizimi va boshqalar izdan chiqadi.

. Umumiy holat yomonlashadi, toliqqanlik seziladi, mehnatga layoqat pasayadi yoki yo'qoladi. Ishtaha kuchayadi, chanqoq zo'rayadi, tana harorati 34 gradusga pasayadi. Ruhiyat ham o'zgaradi.

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Alimentar distrofiyaning umumiy istiqboli ovqatlanishdagi taqchillikka sabab bo'lgan vaziyatning og'irligi hamda davomiyligi bilan belgilanadi. Ochlikdan o'sal holga yetish tezkor choralarni talab qiluvchi Alimentar distrofiya o'tishidagi eng og'ir holat hisoblanadi, bunda kasalni maxsus davolash (bemorni isitish, tez-tez oz-ozdan ovqatlantirish, to'liq ham jismoniy, ham ruhiy tinchlikka rioya qilish va hokazolar) zarur. Alimentar distrofiyaning oldini olsih yakka tartibda (ruhiy bemorlarda, onkologik kasalliklarda) va ijtimoiy (davlat tomonidan ofatlarni bartaraf etish qaratilgan) tartibda amalga oshiriladigan bo'lishi mumkin. Keyingi holda, ya'ni tabiiy ofatlar aholining ovqatlanishida uzoq vaqt davom etadigan og'ir ahvolga, taqchillikka sabab bo'lishi mumkin.

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ОСОБЕННОСТИ ИЗМЕНЕНИЙ ЛИПИДНОГО И УГЛЕВОДНОГО ОБМЕНА У БОЛЬНЫХ ИШЕМИЧЕСКОЙ БОЛЕЗНЬЮ СЕРДЦА НА ФОНЕ САХАРНОГО ДИАБЕТА

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Аннотация. Несколько исследований, а также перспективные исследования показали значительную корреляцию между метаболизмом глюкозы и атеросклерозом у пациентов без диабета, но различия в параметрах метаболизма глюкозы среди различных степеней ишемической болезни сердца у таких пациентов специально не оценивались.

Цель. Корреляция факторов метаболизма глюкозы и степени атеросклероза, определяемой коронарной ангиографией. Факторы включали уровни глюкозы натощак и после нагрузки, инсулина, гликозилированного гемоглобина (HbA1c) и липидов, а также резистентность к инсулину, измеренную с помощью оценки модели гомеостаза (НОМА-IR).

Материалы и методы. Всего было обследовано 234 50 пациента, сгруппированных по следующим критериям: с однососудистым заболеванием (группа 1, n = 15), с двухсосудистым заболеванием (группа 2, n = 14) и с трехсосудистым заболеванием (группа 3, n = 13). Схемы лечения, включая препараты, потенциально влияющие на метаболизм глюкозы, а также семейный анамнез ИБС и других сердечно-сосудистых заболеваний статистически не различались среди 3 групп.

Результаты. Метаболический синдром был диагностирован у 19,7% пациентов и был статистически более распространен в группе 3 (30,4% [n = 3]), группе 1 и группе 2 (19% [n = 2]; 8,3% [n = 1]; и 18,7% [n = 2] соответственно; $P < 0,001$). У 3 групп пациентов были схожие уровни глюкозы в плазме натощак. Все группы показали статистически разные концентрации постнагрузочной глюкозы, общего холестерина и ЛПНП-Х ($P < .001$ для всех). Значительно разные концентрации ЛПВП-Х наблюдались между группами ($P < .001$ для всех), за исключением группы 1 против группы 2.

Выводы: Данное исследование было разработано как исследование распространенности и, следовательно, не ставит целью предложить патогенетическое объяснение связи между метаболизмом глюкозы и ИБС. Параметры глюкозы, особенно постнагрузочная гликемия и уровень HbA1c, у пациентов с НГТ и с различным атеросклеротическим поражением распределены неравномерно, но значительно выше у лиц с более тяжелым течением заболевания.

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THE ROLE OF THE LINGUOCULTURAL APPROACH IN ENHANCING
WRITING COMPETENCE: A SCHOLARLY ANALYSIS

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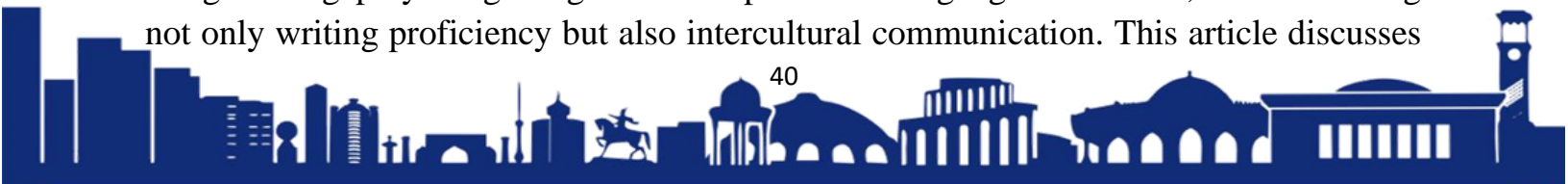
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Annotation: *The linguocultural approach has emerged as a vital paradigm in the development of writing competence, especially in the context of second language acquisition and academic discourse. This approach postulates that language is not only a vehicle for communication but a reflection of the underlying cultural constructs that shape societal norms, values, and cognitive processes. This article critically examines the theoretical foundations of the linguocultural approach, explores its integration into writing pedagogy, and evaluates its impact on enhancing writing competence. Drawing on empirical research, the study argues that this approach provides learners with the necessary tools to navigate the complex interplay between language and culture in written communication, fostering both linguistic and intercultural proficiency.*

Keywords: linguocultural approach, writing competence, cultural context, intercultural communication, language acquisition, cognitive linguistics, sociocultural theory, writing pedagogy, academic writing, discourse analysis.

The role of writing competence in language learning is indisputable, particularly in academic and professional contexts. While traditional models of writing instruction have predominantly emphasized syntactic and lexical accuracy, a growing body of research underscores the importance of cultural context in shaping effective communication. This realization has led to the emergence of the linguocultural approach, which positions language as a dynamic and culturally embedded phenomenon. By focusing on the intersection of language and culture, this approach provides learners with the tools necessary to master not only the formal structures of writing but also the subtleties that govern the appropriateness and effectiveness of written communication in diverse cultural settings. Writing competence is a fundamental skill in language acquisition, especially in academic and professional settings. Traditionally, language instruction has focused on grammar, vocabulary, and syntax. However, recent research has highlighted the importance of cultural knowledge in language learning. The linguocultural approach bridges this gap by integrating cultural aspects into language instruction, thus enhancing not only writing proficiency but also intercultural communication. This article discusses



how incorporating the linguocultural approach can elevate students' ability to write effectively across different cultural contexts. Writing competence, defined as the ability to compose texts that are both linguistically accurate and culturally relevant, cannot be fully realized without a deep understanding of the cultural frameworks that inform written discourse. Consequently, integrating the linguocultural approach into language instruction enriches students' writing skills by fostering a more profound awareness of how cultural values and cognitive schemas shape both language use and communication strategies.

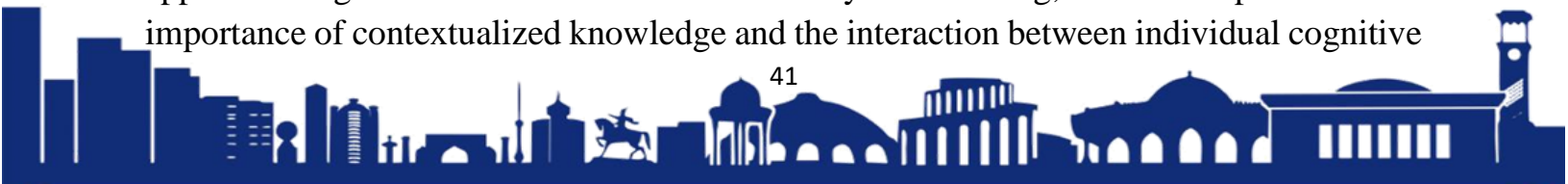
Integrating the linguocultural approach into writing instruction has profound effects on writing competence. Writing is not just about conveying ideas clearly and logically, but also about adapting to the cultural expectations of the audience. This approach helps learners:

1. **Enhance Language Proficiency.** The integration of cultural context helps students understand the subtleties of language, such as idiomatic expressions, tone, and structure. These elements are critical for producing fluent and contextually appropriate writing.

2. **Develop Cultural Sensitivity.** Students learn to recognize and respect cultural differences in writing. This sensitivity leads to more polished and effective communication in cross-cultural settings, where a failure to understand cultural nuances can lead to miscommunication.

3. **Foster Critical Thinking.** The linguocultural approach encourages learners to think critically about their own culture and language, as well as those of others. This fosters a deeper understanding of how language functions as a cultural tool and enhances the ability to convey complex ideas in diverse cultural contexts. The theoretical underpinnings of the linguocultural approach are informed by interdisciplinary perspectives from linguistics, anthropology, and cognitive science. The approach draws heavily on the concept of linguistic relativity, which posits that language shapes thought and cognition [8]. Recent developments in sociocultural theory [7] and cognitive linguistics [4] further illuminate the intricate relationship between language and culture. These theoretical frameworks suggest that the meanings encoded in linguistic structures are inextricably linked to the cultural contexts in which they are used.

One of the central tenets of the linguocultural approach is that language is a cultural tool that reflects the cognitive patterns, social practices, and historical narratives of its speakers [5]. As a result, writing competence extends beyond mastering the technical aspects of language to include an awareness of how cultural values and communicative norms influence writing styles, rhetorical strategies, and audience expectations. This approach aligns with the constructivist theory of learning, which emphasizes the importance of contextualized knowledge and the interaction between individual cognitive



processes and social-cultural contexts. The linguocultural approach further aligns with the notion of intercultural competence, which Byram defines as the ability to communicate effectively and appropriately across cultural boundaries. The incorporation of cultural context into writing instruction allows learners to develop this competence, enabling them to adapt their writing style to meet the expectations of culturally diverse audiences [1].

The integration of the linguocultural approach into writing pedagogy significantly enhances learners' writing competence in several key areas:

1. **Cognitive Flexibility in Language Use.** The linguocultural approach encourages cognitive flexibility by prompting learners to consider the cultural and contextual appropriateness of language choices in their writing. This process involves adapting one's language use based on the target audience's cultural background, social norms, and expectations. Research has shown that this flexibility leads to more effective and engaging writing, particularly in intercultural and academic settings [3].

2. **Intercultural Awareness and Sensitivity.** By exposing students to a range of cultural perspectives, the linguocultural approach promotes intercultural awareness and sensitivity. In academic writing, for instance, understanding the cultural expectations of evidence presentation, argumentation strategies, and tone is crucial for ensuring that the writing resonates with the target audience. Failure to adapt writing to these expectations can result in miscommunication or a lack of engagement. For example, Western academic writing often emphasizes directness and clarity, while writing in other cultures may prioritize indirectness and politeness [2]. Developing an understanding of these differences enables students to produce more culturally attuned texts.

3. **Sociolinguistic Competence.** The linguocultural approach also enhances sociolinguistic competence, which is the ability to use language appropriately in social contexts [6]. In writing, this competence manifests in the ability to navigate various registers, adapt tone according to the formality of the context, and recognize the nuances of politeness and respect in different cultures. Such skills are vital in formal academic writing, professional communication, and intercultural dialogue.

4. **Increased engagement with writing processes.** A deeper understanding of cultural influences on writing enhances students' engagement with the writing process itself. They begin to see writing not merely as a mechanical task of producing sentences, but as a dynamic act of communication. This shift in perspective fosters greater motivation to engage with the intricacies of language and culture, leading to improved writing outcomes. In practice, the linguocultural approach can be seamlessly integrated into writing instruction through various pedagogical strategies. Firstly, a critical component of writing instruction within the linguocultural framework involves the analysis of culturally

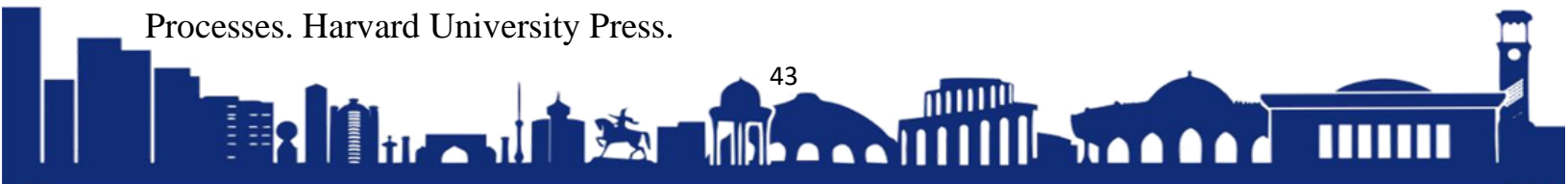


diverse texts. This allows students to explore how language is used differently across cultural contexts. Texts can range from literature to academic papers, business communications, and media articles. By deconstructing these texts, students gain insight into how cultural values are encoded in language and how these values shape writing styles. Secondly, assigning projects that require students to write for different cultural audiences helps reinforce the principles of the linguocultural approach. For example, students could write a persuasive essay for an American audience and then adapt the same essay for an audience in Japan, taking into account cultural expectations around argumentation, tone, and indirectness. Thirdly, encouraging students to engage in cultural immersion experiences or writing exchanges with peers from different linguistic backgrounds provides them with authentic opportunities to apply their intercultural writing skills. Such exchanges could take the form of collaborative writing projects or peer review sessions, where students provide feedback on each other's writing while considering cultural differences in language use.

The linguocultural approach offers a profound enhancement to writing competence by bridging the gap between linguistic proficiency and cultural awareness. By emphasizing the inseparability of language and culture, this approach equips students with the tools necessary to communicate effectively across cultural boundaries. In an era of globalization, where cross-cultural communication is increasingly central to academic and professional success, the linguocultural approach provides a holistic framework for developing writing competence that is both linguistically sophisticated and culturally informed. This framework not only improves students' ability to write but also cultivates their capacity for intercultural understanding, a critical skill in today's interconnected world.

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**АКТУАЛЬНЫЕ ВОПРОСЫ СОВЕРШЕНСТВОВАНИЯ ПРАКТИКИ
ИПОТЕЧНОГО КРЕДИТОВАНИЯ**

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Аннотация

В данной статье рассматриваются актуальные вопросы совершенствования практики ипотечного кредитования. Анализируются существующие проблемы и предлагаются пути их решения. Особое внимание уделяется вопросам доступности ипотечных кредитов, снижению процентных ставок и оптимизации нормативно-правовой базы.

Ключевые слова: Ипотечное кредитование, доступность жилья, процентные ставки, финансовые риски, законодательное регулирование.

Abstract

This article examines current issues of improving mortgage lending practices. Existing problems are analyzed and solutions are proposed. Particular attention is paid to the issues of availability of mortgage loans, reduction of interest rates and optimization of the regulatory framework.

Keywords: Mortgage lending, housing affordability, interest rates, financial risks, legislative regulation.

Введение. Ипотечное кредитование играет ключевую роль в обеспечении населения жильем и развитии строительного сектора. Однако на современном этапе существуют значительные барьеры, связанные с высокой стоимостью кредитов, сложностью получения займов и недостаточным уровнем финансовой грамотности заемщиков. В данной статье рассматриваются актуальные вопросы и перспективы развития ипотечного кредитования, а также предлагаются возможные пути его совершенствования.

Основная часть. Ипотечное кредитование играет ключевую роль в обеспечении населения доступным жильем и развитии строительного сектора. Однако в этом сегменте существуют ряд проблем, требующих совершенствования.



1. Ограниченность финансовых ресурсов и высокая стоимость кредитов

- **Высокие процентные ставки** – ипотечные кредиты часто недоступны для большинства населения из-за высокой стоимости заимствования.
- **Отсутствие долгосрочных финансовых ресурсов** – банки ограничены в возможности предоставления долгосрочных кредитов из-за нехватки стабильных источников фондирования.
- **Инфляционные и валютные риски** – нестабильность национальной валюты и высокая инфляция делают долгосрочное кредитование рискованным.

2. Ограниченный доступ к ипотеке для населения

- **Высокий первоначальный взнос** – многие заемщики не могут накопить достаточную сумму для первого взноса, что делает ипотеку недоступной.
- **Проблемы с подтверждением доходов** – значительная часть населения имеет неофициальные или нестабильные доходы, из-за чего банки отказывают в кредитовании.
- **Низкий уровень финансовой грамотности** – многие граждане не понимают условий кредитных договоров и рисков, связанных с ипотекой.

3. Проблемы правового и институционального характера

- **Сложность оформления ипотечных сделок** – процесс получения ипотеки связан с бюрократическими процедурами и высокой стоимостью сопутствующих услуг.
- **Длительные судебные разбирательства** – при невыполнении заемщиком обязательств процесс изъятия и продажи залогового имущества может затягиваться на долгие сроки.
- **Низкая ликвидность залогового жилья** – в случае невыплаты кредита реализация залогового имущества может быть сложной из-за низкого спроса.

4. Проблемы развития рынка недвижимости

- **Рост цен на жилье** – стоимость недвижимости часто растет быстрее, чем доходы населения, делая покупку жилья недоступной.
- **Низкое качество строительства** – некоторые новостройки, приобретаемые в ипотеку, имеют недостатки в инженерных системах и конструкциях.



• **Неравномерное развитие регионов** – ипотечное кредитование сосредоточено в крупных городах, в то время как в сельской местности выбор жилья ограничен.

Пути совершенствования ипотечного кредитования

1. **Снижение процентных ставок и расширение доступа к долгосрочным ресурсам**

○ Привлечение иностранных инвесторов для финансирования ипотечных программ.

○ Введение государственных субсидий для снижения процентных ставок.

2. **Облегчение доступа к ипотеке для населения**

○ Уменьшение размера первоначального взноса за счет государственных гарантий.

○ Разработка механизмов учета неофициальных доходов заемщиков.

3. **Совершенствование правовой базы**

○ Упрощение процедур оформления ипотеки и цифровизация процесса.

○ Создание более эффективных механизмов разрешения споров между заемщиками и банками.

4. **Развитие рынка недвижимости**

○ Контроль за качеством строительства жилья.

○ Стимулирование строительства доступного жилья в регионах.

Проблемы ипотечного кредитования:

• Высокие процентные ставки и их влияние на доступность кредитов.

• Неравномерное развитие ипотечных программ в разных регионах.

• Высокие требования к заемщикам и сложность оформления документов.

Пути совершенствования ипотечного кредитования:

• Снижение процентных ставок за счет государственной поддержки и субсидирования.

• Развитие гибких ипотечных программ, включая аренду с выкупом и ипотеку без первоначального взноса.

• Внедрение цифровых технологий для упрощения оформления и управления ипотечными кредитами.

• Совершенствование законодательной базы для повышения прозрачности и защиты прав заемщиков.



Перспективы развития:

- Влияние макроэкономической ситуации на рынок ипотечного кредитования.
- Развитие ипотечного страхования как механизма снижения рисков.
- Возможности международного опыта в совершенствовании ипотечных программ.

Заключение. Совершенствование ипотечного кредитования является важной задачей для устойчивого развития жилищного рынка и экономики в целом. Необходимы комплексные меры, включающие государственную поддержку, модернизацию нормативно-правовой базы и внедрение инновационных финансовых инструментов. Улучшение условий ипотечного кредитования позволит сделать жилье более доступным для населения и повысить уровень жизни граждан. Совершенствование ипотечного кредитования требует комплексного подхода, включающего финансовые, правовые и институциональные реформы. Создание доступных ипотечных программ и улучшение условий кредитования поможет увеличить уровень обеспеченности населения жильем и поддержать развитие экономики.

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БУГУНГИ КУН ЎҚИТУВЧИСИНИНГ КАСБИЙ ВА АХЛОҚИЙ
СИФАТЛАРИ

Нормуродова Муниса Нуриддин қизи

Термиз иқтисодиёт ва сервис университети Педагогика ва психология йўналиши
талабаси

Шодиева Нодири Нормаматовна

Илмий раҳбар: Педагогика ва психология кафедраси ўқитувчиси

Аннотация: Мақолада бугунги кун ўқитувчисининг касбий ва ахлоқий сифатлари, уларда касбий компетенцияларни, инсонийлик сифатларини юқори даражада шакилланган бўлиши лозмлиги таъкидланган. Буюк аломалар ва педагог олимлар фикрлари келтириб ўтилган.

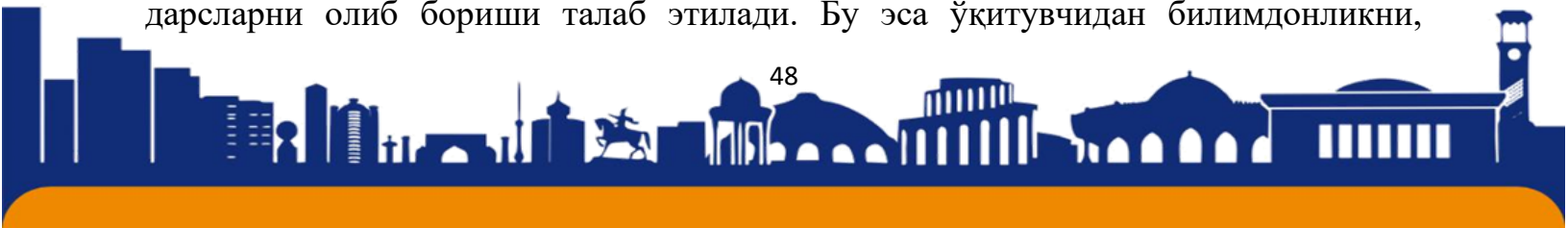
Калит сўзлар: компетентлик, креативлик, касбий сифатлар, ахлоқий фазилат, мотивация, акмеология, аксиология.

Мавзунинг долзарблиги: Ўзининг ноёб истеъдоди ва маҳоратини халқимиз маънавиятини юксалтиришга бағишлаган, инсон қалбининг муҳандислари бўлган ижоткор зиёлиларга доимий ғамхўрлик масаласи бизнинг дастуримизда алоҳида ўрин эгаллайди[1].

Ўқитувчилик касби ўз моҳиятига кўра ахлоқий характерга эга. Шунинг учун ҳам аввало, муаллимнинг ўзи умуминсоний ва миллий кадриятларни пухта ўзлаштириб олишива амалий ишда, таълим-тарбия жараёнида ахлоқий камолот бобида шахсан ибрат бўлиши зарур[2].

Маълумки ўқитувчилик касби асосан жамиятимиз пойдевори бўлмиш ёшларимизнинг таълим-тарбия жараёнига қаратилганлиги билан аҳамиятлидир. Педагог ўзининг бурчини юксак даражада англаши ва уни зўрлик туфайли юклатилган мажбурият эмас, балки виждонан, ўз хаётининг маъноси сифатида адо этмоғи лозим.

Бугунги кунда айниқса ҳозирги пандемия даврида ҳар бир педагог таълим жараёнини ташкил етишда маҳорат билан креативлик асосида, аксиологик, акмеологик тарзда ёндашиши билан бир қаторда ўқувчиларни руҳий ҳолатларини ҳам доимо англаган ҳолда психологик билимлар билан қуролланган ҳолда дарсларни олиб бориши талаб этилади. Бу эса ўқитувчидан билимдонликни,



ижодкорликни, инсонийлик ва самимийлик каби сифатлани талаб этади. Ўқитувчида муомила одобини шакилланлиги ўқувчилар билан ишлаш жараёнини енгиллаштиради ва уларда шу фанни ўзлаштиришга мотивация уйғотади.

Компетентлик (ингл. "competence"-қобилият) фаолиятда назарий билимлардан самарали фойдаланиш, юқори даражадаги касбий малака, маҳорат ва иқтидорни намоён эта олиш.

Креативлик (ингл. "create" яратиш, "creative" ижодкор) индивиднинг янги гояларнинг ишлаб чиқаришга тайёрликни тавсифловчи ҳамда мустақил омил сифатида иқтидорлиликнинг таркибига кирувчи ижодий қобилияти.

Акмеология (грек. "акме" ниманингдир олий даражаси) алоҳида инсон ва инсонлар жамоаси ривожланиши чўққилари ҳамда уларга эришиш шартларини ўрганувчи фан.

Ўқувчи шахсига доимо ижобий-ахлоқий таъсир кўрсата оладиган кишигина ҳақиқий тарбиячидир. Бунга эришиш учун педагог ўзининг ахлоқий сифатларини доимо такомиллаштириб бориши зарур[3].

Европа мамлакатларида яшаган (XVI-XX аср) педагоглар ҳам ўқитувчининг касбий ва ахлоқий фазилатлари ҳақида ўз фикрларини билдирганлар, бу ҳақда кўплаб асарлар ва педагогик таълимотлар яратганлар. Чех педагоги Ян Амос Коменский ўқитувчи кенг маълумотли, меҳнатсевар, ишчан, саботли, ўқувчиларга ўзи сингдириши лозим бўлган фазилатларнинг жонли намунаси бўлиши лозим эканлигини ўз асарларида баён этган. Немис педагоги Адольф Дистервег таълимнинг муваффақиятли бўлиши дарслик ёки ўқитиш усулига эмас балки ўқитувчининг ўзига боғлиқ деб таъкидлайди. Унинг фикрича яхши ўқитувчи доимо тетиклик ва ғайрат билан дарс бериши, ўқувчиларни ақлий кучини уйғота билиши даркор.

Мавзунинг мақсади: бугунги кунда ҳар бир педагогнинг касбий компетентликка эга бўлиши, креативлик асосида дарсларни ташкил этиши, юксак малака ва ахлоқий фазилатларни ўзида таркиб топтириб боришига ундаш.

Хулоса: ўрнида шуни таъкидлаш лозимки бугунги даврида ҳар бир педагог замон билан "ҳамнафас" ҳолда "ўз устида" тинмау меҳнат қилиши, ўздаги бор бўлган касбий ва ахлоқий сифатларни янада такомиллаштириб бориши лозим. Демак бугунги кун ўқитувчиси ўз фанини фанлараро интеграция масалалари билан боғлаган ҳолда олиб борса кўзланган натижага эришилади.

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**COGNITIVE LOAD THEORY AND ITS APPLICATION IN ASSESSING
PRODUCTIVE SPEECH SKILLS IN ENGLISH LANGUAGE LEARNERS**

Nodira Khodjayeva – English teacher

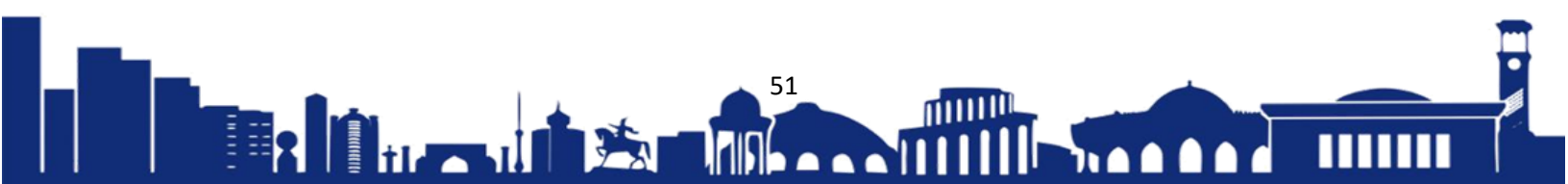
School №42

Khorezm region, Gurlan district

Annotation. This article examines the application of Cognitive Load Theory (CLT) in assessing productive speech skills among English language learners. CLT, which focuses on the limitations of working memory during learning tasks, provides a framework for understanding how cognitive demands influence language production. The study highlights the challenges learners face when managing intrinsic, extraneous, and germane cognitive loads during speech tasks, such as formulating sentences, retrieving vocabulary, and applying grammar rules. By aligning assessment methodologies with learners' cognitive capacities, educators can design more effective and equitable evaluations. The article proposes strategies to reduce extraneous load, such as simplifying task instructions, and to optimize intrinsic load by scaffolding tasks based on proficiency levels. Additionally, it emphasizes the importance of fostering germane load through meaningful practice and feedback. This approach not only improves the accuracy of speech skill assessments but also supports learners' cognitive development, ultimately enhancing their overall language proficiency.

Keywords: Cognitive Load Theory, productive speech skills, English learners, working memory, assessment methodology, intrinsic load, extraneous load, germane load.

Introduction. The assessment of productive speech skills in English language learners (ELLs) is a critical component of language education, as it provides insights into learners' ability to communicate effectively in real-world contexts. However, traditional assessment methodologies often fail to account for the cognitive complexities involved in speech production, leading to evaluations that may not accurately reflect learners' true capabilities. Cognitive Load Theory (CLT), a well-established framework in educational psychology, offers a promising lens through which to refine these assessment practices. By understanding how cognitive load the mental effort required to process information impacts speech production, educators can design assessments that are both fair and effective, ultimately fostering better language learning outcomes.



Cognitive Load Theory, first introduced by John Sweller in the late 1980s, posits that working memory has a limited capacity for processing information¹. When this capacity is exceeded, learning and performance suffer. CLT identifies three types of cognitive load: intrinsic, extraneous, and germane. Intrinsic load refers to the inherent difficulty of the task itself, such as the complexity of constructing grammatically correct sentences in a foreign language. Extraneous load arises from the way information is presented, such as unclear instructions or poorly designed assessment tasks. Germane load, on the other hand, is the mental effort devoted to creating schemas mental structures that help organize and store information which is essential for long-term learning. In the context of assessing productive speech skills, these cognitive loads play a significant role. For instance, an ELL tasked with delivering a spontaneous speech in English must simultaneously manage multiple cognitive processes: retrieving vocabulary, applying grammatical rules, organizing ideas coherently, and monitoring pronunciation.

These demands can easily overwhelm working memory, particularly for learners at lower proficiency levels. Traditional assessments often exacerbate this issue by imposing additional extraneous load, such as time pressure or ambiguous prompts, which can hinder performance and lead to inaccurate evaluations². To address these challenges, this article proposes the application of CLT to the design and implementation of speech skill assessments. By aligning assessment tasks with learners' cognitive capacities, educators can reduce unnecessary cognitive load and create a more supportive evaluation environment. For example, simplifying task instructions, providing visual aids, or allowing additional preparation time can help minimize extraneous load, enabling learners to focus their mental resources on the intrinsic demands of the task. Similarly, scaffolding assessments gradually increasing task complexity as learners' proficiency improves can ensure that intrinsic load remains within manageable limits. Moreover, fostering germane load is crucial for promoting meaningful learning.

Assessments that encourage learners to engage deeply with the material, such as through reflective tasks or opportunities for self-assessment, can help them develop robust language schemas³. These schemas not only enhance performance in the short term but also contribute to long-term language acquisition. For instance, a learner who reflects on their speech patterns and identifies areas for improvement is more likely to internalize

¹ Sweller, J. (1988). Cognitive load during problem-solving: Effects on learning. *Cognitive Science*, 12(2), 257-285.

² Paas, F., Renkl, A., & Sweller, J. (2003). Cognitive load theory and instructional design: Recent developments. *Educational Psychologist*, 38(1), 1-4.

³ Kirschner, P. A., Ayres, P., & Chandler, P. (2011). Contemporary cognitive load theory research: The good, the bad, and the ugly. *Computers in Human Behavior*, 27(1), 99-105.

corrective feedback and apply it in future communication. The integration of CLT into speech skill assessments also has broader implications for language education. By acknowledging the cognitive demands of language production, educators can adopt a more learner-centered approach that prioritizes the needs and abilities of individual students⁴. This is particularly important in diverse classrooms, where learners may vary widely in their cognitive and linguistic backgrounds. Tailoring assessments to accommodate these differences can help ensure that all students have an equal opportunity to demonstrate their skills and achieve their learning goals.

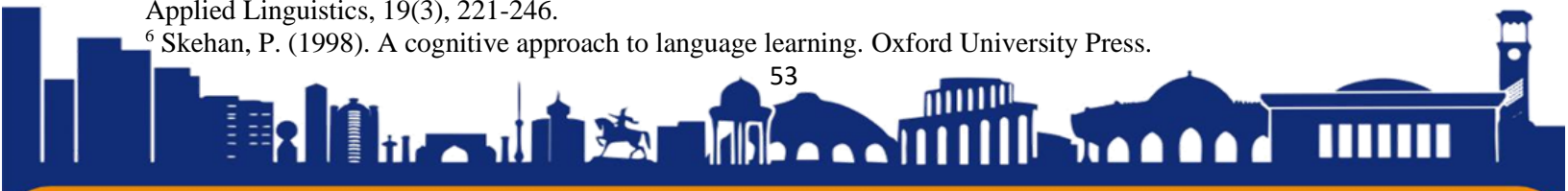
Furthermore, the application of CLT to speech assessments aligns with contemporary trends in language teaching, such as task-based language teaching (TBLT) and communicative language teaching (CLT). These approaches emphasize the importance of authentic, meaningful communication and view language learning as a dynamic, interactive process. By incorporating cognitive principles into assessments, educators can create tasks that not only evaluate learners' abilities but also provide valuable opportunities for language practice and development. Despite its potential, the application of CLT to speech skill assessments is not without challenges. One key issue is the need for educators to have a deep understanding of both cognitive theory and language pedagogy⁵. Designing assessments that effectively balance intrinsic, extraneous, and germane load requires careful planning and expertise. Additionally, there is a need for empirical research to validate the effectiveness of CLT-based assessments in real-world educational settings. Future studies could explore how different types of cognitive load interact during speech production and how assessments can be optimized to support learners at various proficiency levels⁶.

Conclusion. In conclusion, the assessment of productive speech skills in English language learners is a complex and multifaceted process that requires careful consideration of cognitive factors. Cognitive Load Theory provides a valuable framework for understanding these factors and offers practical strategies for improving assessment methodologies. By reducing extraneous load, managing intrinsic load, and fostering germane load, educators can create assessments that are not only more accurate but also more supportive of learners' cognitive and linguistic development. As language education

⁴ Van Merriënboer, J. J. G., & Sweller, J. (2005). Cognitive load theory and complex learning: Recent developments and future directions. *Educational Psychology Review*, 17(2), 147-177.

⁵ Ellis, R. (2009). Task-based language teaching: Sorting out the misunderstandings. *International Journal of Applied Linguistics*, 19(3), 221-246.

⁶ Skehan, P. (1998). *A cognitive approach to language learning*. Oxford University Press.

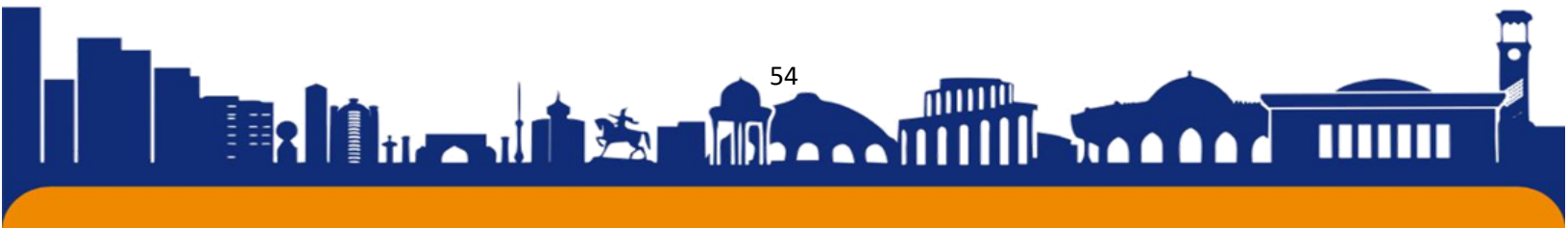


continues to evolve, the integration of cognitive principles into assessment practices represents a promising avenue for enhancing both teaching and learning outcomes.

This article seeks to contribute to this evolving field by exploring the theoretical foundations of CLT, examining its implications for speech skill assessments, and proposing practical strategies for implementation. Through this discussion, it aims to provide educators with the tools and insights needed to design assessments that are both cognitively informed and pedagogically effective, ultimately supporting the success of English language learners in their language learning journeys.

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