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ResearchBID

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open access.nl



INNOVATSION TALABALAR AXBOROTNOMASI

3-JILD, 1-TO'PLAM
2026

Jurnal quyidagi xalqaro bazalarda indekslanadi:



Ilmiy jurnalning rasmiy sayti:

www.innoworld.net

O'ZBEKISTON-2026

3-JILD, 1-TO'PLAM | 2026 |

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Protruziya: Etiologiyasi, Klinik Belgilar Va Statistik Tahlillar Ergashev Bekzod¹

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Annotatsiya: Protruziya umurtqalararo diskning degenerativ o'zgarishlari natijasida fibroz halqa butunligi saqlangan holda markaziy yadroning tashqi tomonga bo'rtib chiqishi bilan tavsiflanadi. Ushbu holat intervertebral disk kasalliklarining dastlabki anatomik bosqichi hisoblanadi. Statistik tahlillar shuni ko'rsatadiki, protruziya asosan mehnatga layoqatli yoshdagi aholi orasida keng tarqalgan bo'lib, ayniqsa bel umurtqasining pastki segmentlarida ko'proq uchraydi. Global miqyosda olib borilgan tasviriy diagnostika tadqiqotlarida protruziya holatlari populyatsiyaning katta qismida aniqlangan. Bu holatning keng tarqalganligi yoshi ortishi, statik yuklanish, kamharakatlilik va metabolik omillar bilan bog'liq. Turli davlatlar statistikasi protruziya ko'rsatkichlarining iqtisodiy rivojlanish darajasi, turmush tarzi va mehnat sharoitlariga bog'liq holda farqlanishini ko'rsatadi. Profilaktik yondashuvlar orasida ergonomik mehnat muhitini yaratish, jismoniy faollikni oshirish va ortiqcha yuklanishni kamaytirish muhim ahamiyatga ega.

Kalit so'zlar: protruziya, umurtqalararo disk, degeneratsiya, epidemiologiya, statistika, etiologiya, anatomik o'zgarish.

Kirish: Protruziya umurtqalararo disk patologiyalarining keng tarqalgan anatomik ko'rinishlaridan biri bo'lib, u degenerativ jarayonlarning boshlang'ich bosqichini ifodalaydi. Anatomik jihatdan umurtqalararo disk **fibroz halqa va pulpoz (markaziy) yadroning** murakkab tuzilmasidan iborat bo'lib, umurtqa pog'onasiga tushadigan mexanik yuklamalarni yutish va harakatni ta'minlash vazifasini bajaradi. Disk to'qimalarida sodir bo'ladigan degenerativ o'zgarishlar natijasida fibroz halqa elastikligi pasayadi va pulpoz yadro disk chegarasidan tashqariga bo'rtib chiqadi. Aynan shu holat **protruziya** deb ataladi.

Zamonaviy statistik ma'lumotlar protruziya holatlari klinik belgilar mavjud yoki mavjud emasligidan qat'i nazar, aholi orasida keng tarqalganligini ko'rsatadi. Tasviriy diagnostika usullariga asoslangan tekshiruvlar protruziyani ko'plab hollarda tasodifiy anatomik topilma sifatida aniqlaydi. Bu holat protruziyaning epidemiologik baholanishini murakkablashtiradi, chunki u har doim ham funksional buzilishlar bilan namoyon bo'lmaydi.

Global miqyosdagi statistik tahlillar protruziya va disk degeneratsiyasi yoshi oshishi bilan ortib borishini ko'rsatadi. Ayniqsa **30-55 yosh** oralig'idagi aholi guruhida ushbu holat eng yuqori uchrash chastotasiga ega. Bu yosh oralig'i

faol mehnat davriga to‘g‘ri kelgani sababli, umurtqa pog‘onasiga tushadigan statik va dinamik yuklar protruziya rivojlanishida muhim rol o‘ynaydi. Statistik jihatdan eng ko‘p zararlanuvchi segmentlar bel umurtqasining L4-L5 va L5-S1 qismlari hisoblanadi, chunki ushbu sohalar biomexanik yuklanma bosimi nuqtai nazaridan eng faol hisoblanadi.

Turli mintaqalarda umurtqalararo disk protruziyasining statistik tarqalishi

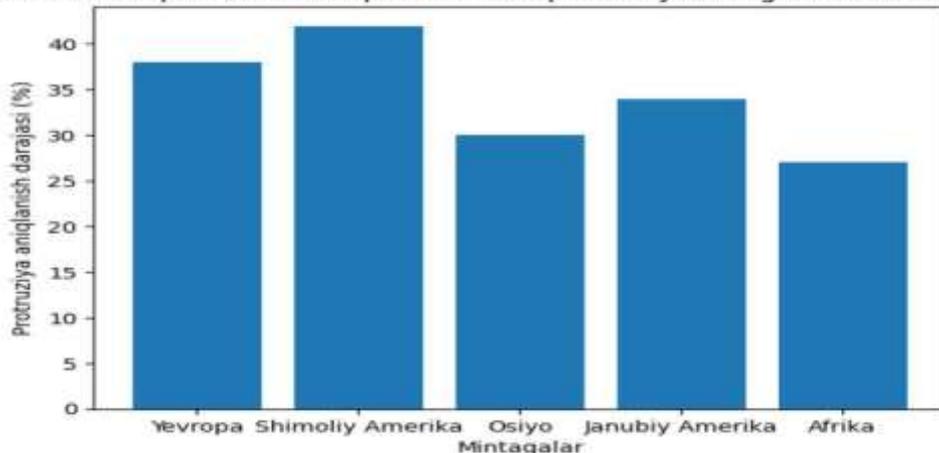


Figura-1: Ushbu diagrammada umurtqalararo disk protruziyasining turli geografik mintaqalarda aniqlanish darajasi (%) nazariy-statistik model asosida ko‘rsatilgan. Eng yuqori ko‘rsatkich Shimoliy Amerikada qayd etilgan bo‘lib, bu holat tasviriy diagnostika usullarining keng qo‘llanilishi, kamharakatli turmush tarzi va ortiqcha tana vazni bilan izohlanadi. Yevropa mamlakatlarida ham protruziya ko‘rsatkichlari yuqori bo‘lib, asosan mehnat faoliyati va yosh strukturasi bog‘liq. Osiyo va Janubiy Amerikada o‘rtacha darajadagi ko‘rsatkichlar kuzatiladi, Afrika mintaqasida esa nisbatan past aniqlanish darajasi qayd etiladi, bu esa diagnostika imkoniyatlarining cheklanganligi bilan izohlanadi.

Turli davlatlar kesimida olib borilgan epidemiologik kuzatuvlar protruziya tarqalishining ijtimoiy va iqtisodiy omillarga bog‘liqligini ko‘rsatadi. Rivojlangan davlatlarda protruziya ko‘rsatkichlari ko‘proq kamharakatli turmush tarzi, uzoq muddatli o‘tirib ishlash va ortiqcha tana vazni bilan bog‘liq bo‘lsa, rivojlanayotgan mamlakatlarda esa **og‘ir jismoniy mehnat, noto‘g‘ri ish holati va profilaktika choralarining yetarli emasligi** muhim omil hisoblanadi.

Etiologik nuqtai - nazardan protruziya multifaktorial jarayon bo‘lib, genetik moyillik, metabolik o‘zgarishlar, yoshga bog‘liq to‘qima trofikasi pasayishi, chekish va jismoniy faollik darajasi bilan chambarchas bog‘liq. Statistik modellar shuni ko‘rsatadiki, ortiqcha vaznga ega shaxslarda disk degeneratsiyasi va protruziya rivojlanish ehtimoli sezilarli darajada yuqori bo‘ladi.

Bu holat umurtqalararo diskka tushadigan mexanik bosimning ortishi bilan izohlanadi.

Shu sababli protruziya faqat **individual anatomik** o'zgarish sifatida emas, balki global sog'liqni saqlash muammosi sifatida ko'rib chiqilishi lozim. Uning keng tarqalganligi va mehnatga layoqatli aholi orasida uchrashi profilaktik strategiyalarni ilmiy asosda ishlab chiqishni talab etadi.

Mazkur maqola ilmiy-nazariy xarakterga ega bo'lib, unda protruziya ksalligi muammosi bo'yicha mavjud **statistik va epidemiologik** ma'lumotlar tizimli tahlil qilindi. **Tadqiqot metodikasi** sifatida ochiq ilmiy bazalarda chop etilgan ilmiy maqolalar, **meta-tahlillar va keng ko'lamli populyatsion tadqiqotlar o'rganildi**. Tanlangan manbalar umurtqalararo disk degeneratsiyasi va protruziya tarqalishini tasviriy diagnostika usullari asosida baholagan bo'lishi asosiy mezon sifatida qabul qilindi.

Ilmiy ma'lumotlarni saralash jarayonida faqat statistik va anatomik tahlillarga asoslangan ishlarga ustuvorlik berildi. Klinik kuzatuvlar, individual bemor holatlari va davolash natijalariga oid ma'lumotlar tahlildan chiqarib tashlandi. Bu yondashuv protruziya masalasini umumiy **populyatsion darajada baholash** imkonini berdi.

Statistik ma'lumotlar turli mintaqalar bo'yicha solishtirildi. **Yevropa va Shimoliy Amerika** davlatlarida o'tkazilgan tadqiqotlarda protruziya ko'rsatkichlari yuqori aniqlanish darajasi bilan ajralib turadi, bu esa **diagnostika texnologiyalarining** rivojlanganligi bilan izohlanadi. Osiyo mamlakatlarida esa aholi sonining katta bo'lishi umumiy holatlar sonining yuqoriligiga olib keladi.

Tahlil jarayonida yosh, jins, tana vazni, jismoniy faollik darajasi va mehnat sharoitlari kabi omillar asosiy statistik ko'rsatkichlar sifatida baholandi. Shuningdek, profilaktika choralarining samaradorligi haqida mavjud umumlashtirilgan ma'lumotlar ham tahlil qilindi. Ushbu metodika protruziya masalasini klinik emas, balki anatomik va epidemiologik muammo sifatida yoritishga xizmat qildi.

Xulosa: O'tkazilgan nazariy va statistik tahlillar shuni ko'rsatadiki, protruziya umurtqalararo disk degeneratsiyasining eng keng tarqalgan anatomik shakllaridan biridir. U ko'plab hollarda klinik belgilarisiz kechsa-da, tasviriy diagnostika tekshiruvlarida yuqori chastotada aniqlanadi. Yosh omili protruziya rivojlanishida asosiy **determinantlardan** biri bo'lib, **30 yoshdan** keyin uning uchrash ehtimoli sezilarli darajada ortadi. Turli davlatlar statistikasi protruziya tarqalishining turmush tarzi va mehnat sharoitlariga bog'liqligini ko'rsatadi. Kamharakatli hayot tarzi ustun bo'lgan hududlarda degenerativ disk o'zgarishlari ko'proq aniqlansa, jismoniy mehnat ustun bo'lgan hududlarda mexanik yuklanish bilan bog'liq o'zgarishlar yetakchi o'rinda turadi. Profilaktika nuqtai nazaridan ergonomik mehnat muhitini yaratish, muntazam jismoniy mashqlar, tana vaznini nazorat qilish va umurtqa pog'onasiga ortiqcha yuk tushishining oldini olish eng samarali choralar hisoblanadi. Xulosa qilib aytganda, protruziya global miqyosda

muhim anatomik-statistik muammo bo'lib, uning oldini olish strategiyalari keng jamoatchilik darajasida olib borilishi zarur.

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Dental fluorosis and fluoride: etiology, clinical pathogenesis, diagnosis and contemporary management**Ergashev Bekzod¹**

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Abstract: Dental fluorosis is a systemic condition resulting from chronic ingestion of excessive fluoride during enamel mineralization, leading to hypomineralized, porous enamel with characteristic discolorations and structural changes. Fluoride is ubiquitous in the environment, primarily entering the human body through drinking water, foods, and dental products. While optimal fluoride levels reduce dental caries, concentrations above 1.5 mg/L in water are strongly associated with an increased prevalence of fluorosis globally. The condition exhibits endemic patterns in regions with high geological fluoride concentrations, particularly in groundwater. The pathogenesis involves disruption of ameloblast function, altered protein processing in the enamel matrix, and defective fluorapatite deposition, resulting in dose-dependent enamel changes. Diagnosis relies on standardized clinical indices and assessment of fluoride exposure history. Contemporary approaches emphasize prevention through controlled fluoride exposure, regular monitoring of water sources, and public health measures in endemic regions. Management focuses on minimally invasive aesthetic enhancement for moderate or severe cases. Given the balance between caries prevention and fluorosis risk, understanding the etiological and pathophysiological mechanisms is crucial for effective public health strategies and clinical protocols.

Keywords: fluoride, dental fluorosis, enamel hypomineralization, groundwater fluoride, pathogenesis, diagnosis, epidemiology, prevention, ameloblasts, enamel porosity, public health.

Intradaction: Dental fluorosis is a developmental enamel defect caused by excessive systemic fluoride intake during tooth development. The disorder manifests as qualitative and quantitative changes in enamel mineralization, varying from mild white opacities to severe brown discoloration and pitting.

Fluoride (F) exists naturally in the environment and is a highly reactive halogen, readily dissolving into water, soil, and air. Groundwater fluoride concentrations vary widely depending on the underlying geology; in some regions, concentrations exceed globally recommended limits, contributing to endemic fluorosis phenomena.

Fluoride's role in dental biology is dichotomous. At low concentrations, fluoride enhances enamel resistance to caries through the formation of fluorapatite crystals and promotion of remineralization. Systemic sources include drinking water, foods, and inhalation of fluoride particulates; topical sources include toothpaste and professional fluoride applications. The World Health Organization (WHO) recommends an upper limit of 1.5 mg/L of fluoride in drinking water to prevent fluorosis while maintaining caries control benefits. However, areas with naturally high fluoride in groundwater often surpass this threshold, leading to endemic fluorosis affecting both teeth and skeletons.

Dental fluorosis occurs exclusively during enamel formation, particularly during the amelogenesis phase, a process involving enamel matrix secretion and mineralization by ameloblasts. During this critical period, excessive fluoride interferes with protein degradation in the developing enamel, leading to hypomineralization, increased porosity, and structural defects. The severity of fluorosis is proportional to fluoride dose, duration, and timing relative to tooth development stages.

Mild fluorosis may present as scattered opaque white patches covering less than half of the tooth surface; moderate to severe forms include brown stains and enamel pitting with compromised physical integrity.

Globally, the prevalence of dental fluorosis has increased in recent decades due to widespread fluoride use and environmental exposure. In some populations, up to two-thirds of adolescents exhibit signs of fluorosis, with a significant proportion classified as moderate to severe. Geographical distribution highlights regions with high geological fluoride content in soil and rocks, often correlating with elevated fluoride in aquifers and public water supplies. Endemic fluorosis is particularly documented in parts of Asia, Africa, and Latin America, where limited water treatment capacity and reliance on groundwater contribute to prolonged high fluoride exposure.

Understanding the etiological and epidemiological aspects of fluorosis is critical for public health policy. Surveillance of fluoride levels in water and dietary sources informs preventive strategies to balance caries prevention against fluorosis risk. Beyond environmental monitoring, research on genetic susceptibility suggests that individual biological responses contribute to the variability of fluorosis outcomes, although fluoride exposure remains the primary risk factor.

Diagnostic assessment of fluorosis uses standardized clinical indices that categorize enamel changes based on severity and distribution patterns. Recognizing fluorosis distinct from other enamel defects such as hypoplasia or intrinsic staining is essential for accurate epidemiological reporting and management planning. Contemporary strategies for managing fluorosis emphasize prevention, risk assessment, and aesthetic rehabilitation for moderate and severe cases. Given the permanent nature of enamel changes once established, public health measures focusing on environmental and systemic fluoride control are paramount.



Dental Fluorosis Causes

Materials and Methods: This narrative review synthesizes current scientific knowledge on the etiology, clinical pathogenesis, diagnosis, and management of dental fluorosis based on published literature from peer-reviewed journals, systematic reviews, and epidemiological studies. Articles were identified through academic databases and scientific search engines, including PubMed, MDPI, WHO regional literature repositories, and indexed dental science sources, using terms related to fluoride exposure, dental fluorosis, enamel development, groundwater fluoride concentrations, clinical indices, and management.

Global water fluorosis research indicates that drinking water remains the principal source of systemic fluoride intake influencing fluorosis prevalence. Systematic analyses of water fluoride levels and dental outcomes demonstrate a positive correlation between fluoride concentrations above 1.5 mg/L and increased risk of fluorosis. These studies apply PRISMA methodologies to collect and appraise research from multiple regions, providing a comparative understanding of fluoride exposure and health effects across diverse geological environments.

Understanding pathogenesis draws on biochemical and cellular investigations into ameloblast behavior under fluoride stress. Experimental research characterizes how excessive fluoride disrupts enamel protein processing, alters matrix degradation, and affects mineral deposition. Analytical methods in these studies include molecular assays of ameloblast function, enamel

matrix composition analyses, and quantitative assessment of mineral content changes in experimental models. These approaches elucidate the cellular mechanisms underlying enamel hypomineralization, providing foundational insights into fluorosis development.

Hydrological and geological assessments form an integral part of fluorosis research, as fluoride concentrations in aquifers depend on rock composition, soil interactions, and groundwater flow dynamics.

Dental Fluorosis Symptoms



Water quality surveys and geochemical sampling provide statistical data on fluoride distribution in environmental water sources. Such surveys often include ionic analysis using fluoride-selective electrodes, geographic mapping of high-fluoride zones, and comparison with epidemiological data on dental fluorosis prevalence rates.

Diagnostic research focuses on the development and validation of clinical indices that reliably categorize fluorosis severity. Standardized scales, such as Dean’s Index and the Thylstrup-Fejerskov Index, facilitate consistent assessment across populations and time. These indices are based on visual criteria of enamel appearance, enabling quantitative reporting of fluorosis distribution within cohorts.

Contemporary management research emphasizes preventive dental public health strategies. This includes evaluating the impact of controlled fluoride exposure in water and dental products, community-based water defluoridation technologies, and public education initiatives for fluorosis risk mitigation. Although clinical treatment modalities for aesthetic improvement exist, such as microabrasion and resin infiltration, the focus remains on systemic prevention and environmental control due to the irreversible nature of enamel changes.

Results:

Etiology and Environmental Exposure

Dental fluorosis arises from the systemic intake of fluoride during enamel formation, predominantly through drinking water with elevated fluoride concentrations. Groundwater in specific geological regions often encounters

high levels of fluoride due to the dissolution of fluoride-bearing minerals. Studies indicate that fluoride concentrations above 1.5 mg/L are associated with a marked increase in fluorosis prevalence, aligning with WHO guideline thresholds established for safe drinking water.

Environmental fluoride arises from natural geological formations containing fluorite and related minerals. As groundwater percolates through fluoride-rich rocks and sediments, fluoride ions dissolve and accumulate in aquifers. Climatic and hydrological conditions influence fluoride mobilization, with alkaline groundwater exhibiting higher fluoride solubility. Agricultural practices and industrial emissions may further contribute to environmental fluoride levels in soil, water, and air. In certain endemic regions, reliance on untreated groundwater sources results in chronic fluoride exposure across communities, particularly where surface water alternatives are limited.



Dental Fluorosis Treatment

Dietary fluoride intake supplements water exposure. Foods and beverages prepared with high-fluoride water contribute to systemic fluoride load. Tea, shellfish, and certain vegetables naturally accumulate fluoride. Additionally, fluoride toothpaste and dietary supplements contribute to total fluoride ingestion, particularly in children, where inadvertent ingestion is more common. However, compared to groundwater exposure, these sources typically contribute less to systemic fluoride levels.

Clinical Pathogenesis

Fluorosis pathogenesis centers on disrupted enamel formation, a complex process governed by ameloblast activity. Under normal conditions, ameloblasts orchestrate enamel matrix secretion, protein degradation, and subsequent mineral deposition to form highly organized hydroxyapatite crystals. Excessive fluoride interferes with these processes at multiple biochemical and cellular levels. Fluoride ions influence ameloblast protein synthesis and regulation, leading to altered matrix degradation and delayed mineralization. Increased enamel porosity results from defective fluorapatite formation and failed matrix protein clearance.

At the molecular level, fluoride exposure induces endoplasmic reticulum stress in ameloblasts, altering protein folding and enzymatic activities essential for matrix maturation. The imbalance between mineral deposition and organic matrix removal results in hypomineralized enamel with enlarged intercrystalline spaces.

Fluorosed enamel contains immature enamel proteins and increased fluorapatite with differing crystallographic properties compared with normally mineralized enamel. The resultant enamel is more porous, less mineralized, and structurally compromised, which is observable clinically as white opaque areas or, in severe cases, brown stains and pits.

The severity of fluorosis is dose-dependent, influenced by fluoride concentration, duration, and age during exposure. The critical window of susceptibility aligns with early childhood, particularly during the first eight years of life when permanent anterior tooth enamel is forming. Genetic factors and nutritional status may modulate individual susceptibility, though fluoride exposure remains the primary determinant.

Epidemiological Patterns. Epidemiological data reveal endemic patterns of fluorosis in regions with high environmental fluoride. Global estimates suggest that millions of individuals, particularly in Asia and Africa, exhibit varying degrees of fluorosis. Large-scale systematic reviews indicate that populations consuming groundwater with elevated fluoride levels show prevalence rates far exceeding global averages. In some areas, over half of school-aged children demonstrate signs of mild to severe fluorosis. Groundwater surveys document variable fluoride distribution, with high-fluoride aquifers corresponding to increased fluorosis prevalence within local populations.

Statistical analysis of water quality and oral health outcomes demonstrates a strong positive correlation between fluoride concentrations and fluorosis severity. These findings highlight the need for regular monitoring of drinking water fluoride and implementation of mitigation strategies in high-risk zones. Geographic information systems and hydrological mapping contribute to identifying endemic areas and allocating public health resources efficiently.

Diagnosis. Diagnosis of dental fluorosis relies on standardized clinical examination and severity classification using validated indices. Clinically, fluorosis presents as symmetrical enamel changes across corresponding teeth, distinguishing it from localized enamel defects. Visual assessment categorizes fluorosis severity based on enamel opacity, surface irregularities, and discoloration patterns. Standard indices quantify severity for epidemiological reporting and research comparability.

Differential diagnosis considers other developmental enamel defects such as amelogenesis imperfecta and hypoplasia, which may mimic fluorosis appearances but differ in etiology and distribution patterns. A thorough

environmental fluoride exposure history and hydrological data enhance diagnostic specificity.

Management and Contemporary Approaches

Prevention remains the cornerstone of managing dental fluorosis at the population level. Controlled fluoride levels in drinking water through water treatment and public health policies aim to balance caries reduction benefits with fluorosis risk. In endemic areas, community water defluoridation techniques and alternative safe water sources are essential. Public education campaigns communicate safe fluoride intake levels and encourage appropriate use of fluoride-containing dental products to minimize excessive ingestion in early childhood.

Clinical management of established fluorosis focuses on aesthetic improvement for moderate and severe cases. Minimally invasive techniques such as microabrasion, bleaching, and resin infiltration address discolorations and surface irregularities. More extensive restorative procedures may be appropriate for severe enamel defects, though they are not preventive.

Overall, contemporary approaches underscore the importance of interdisciplinary strategies combining environmental health, epidemiology, and clinical dentistry to reduce the burden of fluorosis while preserving fluoride's protective effects against caries.

Discussion: Dental fluorosis remains a significant public health concern in regions where environmental fluoride concentrations exceed recommended levels. The balance between fluoride's cariostatic benefits and its potential to cause enamel hypomineralization underscores a complex health dilemma. Historically, fluoride was introduced into community water supplies in the mid-20th century to reduce caries rates, yielding substantial declines in tooth decay. However, prolonged exposure to fluoride at higher environmental concentrations, especially in groundwater, has led to a rise in fluorosis prevalence, necessitating careful evaluation of fluoride delivery systems at the population level.

From an etiological perspective, fluoride's systemic absorption and incorporation during enamel formation are central to fluorosis development. Fluoride ions readily dissolve in water and bind with developing enamel crystals, altering the kinetics of mineral deposition and matrix protein degradation. These biochemical disruptions underlie the characteristic hypomineralization seen in fluorosed teeth, which range in severity based on dose and timing of exposure. The correlation between water fluoride concentrations and fluorosis prevalence underscores the importance of geological and hydrological factors in disease distribution. Endemic fluorosis regions often align with aquifers containing naturally high fluoride levels, driven by rock composition and groundwater chemistry.

Epidemiological patterns reinforce these associations, showing variable global prevalence tied to environmental fluoride distribution. Systematic water quality assessments and oral health surveys provide robust statistical evidence that regions with elevated fluoride in drinking water report higher rates of dental fluorosis. These patterns reflect environmental health challenges where water treatment infrastructure is limited, and populations rely on untreated groundwater sources. The documented geographic clusters of fluorosis emphasize the need for targeted surveillance, water quality monitoring, and public health infrastructure improvements.

Clinically, fluorosis presents diagnostic challenges due to its phenotypic overlap with other enamel defects. Standardized clinical indices facilitate consistent severity scoring, which is crucial for epidemiological comparability and research. Symmetrical enamel changes across dentition distinguish fluorosis from localized enamel abnormalities. Accurate diagnosis requires integration of environmental exposure history, hydrological data, and clinical examination. Differential diagnosis includes conditions such as amelogenesis imperfecta, enamel hypoplasia, an intrinsic staining from systemic factors, requiring careful clinical judgment.

Pathophysiologically, fluorosis reflects a disruption in ameloblast function during a critical period of enamel development. Laboratory investigations demonstrate that excessive fluoride induces cellular stress, alters protein processing pathways, and modifies mineral deposition dynamics. These cellular mechanisms explain the increased enamel porosity, altered crystal structure, and resultant clinical manifestations. Understanding these pathways informs preventive strategies by identifying critical windows of susceptibility and reinforcing the importance of controlled fluoride exposure, particularly during early childhood when permanent anterior teeth are forming.

Public health strategies focusing on environmental control of fluoride exposure remain the most effective means to reduce fluorosis prevalence. Water defluoridation programs, alternative safe water sourcing, and continuous water quality evaluation are essential interventions in endemic regions. Moreover, education on appropriate fluoride use, especially in dental products, helps manage total fluoride intake among children. The dual role of fluoride — as a caries preventive agent and a potential cause of fluorosis — necessitates policies that optimize protective benefits while minimizing risk. Management of established fluorosis centers on aesthetic restoration, as enamel changes are permanent once mineralization is complete. Minimally invasive techniques such as microabrasion and resin infiltration can improve cosmetic outcomes for moderate to severe cases. However, these interventions do not reverse the underlying hypomineralization and are

primarily cosmetic. Therefore, emphasis on early prevention and environmental management remains paramount.

Broader implications of fluorosis research extend beyond dental health, encompassing environmental geology, water resources management, and community health planning. Integrating hydrological data with oral health surveillance allows for predictive mapping of high-risk areas and prioritization of resources. Collaboration between dental researchers, environmental scientists, and public policy experts enhances the development of comprehensive strategies to manage fluoride exposure at the population level.

In summary, dental fluorosis exemplifies a multifaceted health issue where environmental exposure, biological mechanisms, clinical diagnosis, and public health interventions intersect. Continued research into fluoride's effects, advanced diagnostic tools, and community-based prevention programs will support efforts to mitigate fluorosis while preserving fluoride's role in caries prevention.

Conclusion: Dental fluorosis remains a prevalent condition in regions with elevated environmental fluoride, reflecting the systemic impact of fluoride during enamel formation. Etiologically linked to excessive fluoride ingestion from high-fluoride groundwater and supplemented by dietary and topical sources, fluorosis represents a dose-dependent disruption of enamel mineralization. The pathogenesis involves altered ameloblast activity, resulting in hypomineralized and porous enamel with clinical manifestations ranging from mild opacity to severe discoloration and pitting. Accurate diagnosis relies on standardized clinical indices and environmental exposure data. Managing fluorosis emphasizes preventive public health measures aimed at controlling fluoride levels in water supplies and minimizing excess intake, especially among children. While clinical aesthetic treatments improve appearance, prevention through environmental control and community education remains paramount. Integrating hydrological monitoring with dental surveillance supports balanced strategies that maintain fluoride's cariostatic benefits while reducing fluorosis risk.

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**Muzrabot tumanida issiqxona xo'jaligining samarali jihatlari
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Annotatsiya: Ushbu maqola Muzrabot tumanida issiqxona xo'jaligining samarali jihatlari tahlil qiladi. Hududning tabiiy-iqlimiy sharoiti, suv va yer resurslaridan samarali foydalanish, innovatsion texnologiyalar, iqtisodiy va ijtimoiy foyda, ekologik jihatlar batafsil ko'rib chiqilgan. Maqolada issiqxona xo'jaligi hududiy rivojlanish va eksport salohiyatini oshirishdagi o'rni ta'kidlangan.

Аннотация: В статье анализируются эффективные стороны тепличного хозяйства в Музrabotском районе. Рассматриваются природно-климатические условия, рациональное использование водных и земельных ресурсов, инновационные технологии, экономическая и социальная эффективность, экологические аспекты. Подчеркивается роль тепличного хозяйства в региональном развитии и повышении экспортного потенциала.

Annotation: This article analyzes the effective aspects of greenhouse farming in Muzrabot district. It examines natural and climatic conditions, efficient use of water and land resources, innovative technologies, economic and social benefits, and ecological aspects. The role of greenhouse farming in regional development and enhancing export potential is emphasized.

Kalit so'zlar: issiqxona, hosildorlik, suv resurslari, agrotexnologiya, iqtisodiy samaradorlik

Ключевые слова: теплица, урожайность, водные ресурсы, агротехнология, экономическая эффективность

Keywords: greenhouse, productivity, water resources, agrotechnology, economic efficiency

Kirish: So'nggi yillarda O'zbekiston qishloq xo'jaligida amalga oshirilayotgan islohotlar natijasida issiqxona xo'jaligi ahamiyati ortib bormoqda. Janubiy hududlar, xususan Muzrabot tumani agroiqtisodiy va tabiiy-geografik imkoniyatlari bilan ajralib turadi. Issiqxona xo'jaligi nafaqat yil davomida sabzavot va boshqa mahsulotlar yetishtirishni ta'minlaydi, balki aholi bandligini oshiradi, eksport salohiyatini kuchaytiradi va oziq-ovqat xavfsizligini mustahkamlaydi.

Muzrabot tumani Surxondaryo viloyatining iqlim sharoitlari bilan ajralib turadi. Bu hududda issiqxona xo'jaliklarini tashkil etish bir qator **afzalliklarni** beradi. Avvalo, issiqxonalar orqali yil davomida sabzavot va poliz mahsulotlarini yetishtirish imkoniyati mavjud. Bu esa bozorda mahsulot taqchilligining oldini olib, narxlarning barqaror bo'lishiga xizmat qiladi. Shuningdek, issiqxonalar hududda **qishloq xo'jaligi yerlaridan samarali foydalanish** imkonini beradi, chunki bo'sh turgan yoki unumdorligi past yerlar issiqxona qurish orqali foydali maydonga aylantiriladi.

Issiqxona xo‘jaligi Muzrabot tumanida **aholi bandligini ta‘minlashda muhim rol o‘ynaydi**. Ko‘plab mahalliy aholiga ish o‘rinlari yaratiladi, bu esa ijtimoiy-iqtisodiy rivojlanishga hissa qo‘shadi. Shu bilan birga, issiqxonalar orqali yetishtirilgan mahsulotlar nafaqat ichki bozor, balki eksport uchun ham yo‘naltirilishi mumkin. Bu hududning iqtisodiy salohiyatini oshiradi va valyuta tushumlarini ko‘paytiradi. Issiqxona xo‘jaligining yana bir samarali jihat — **zamonaviy agrotexnologiyalarni joriy etish imkoniyati**. Muzrabot tumanida issiqxonalar qurilishi bilan tomchilatib sug‘orish, energiya tejankor isitish tizimlari va sifatli urug‘lardan foydalanish kengaymoqda. Bu esa hosildorlikni oshirish va resurslarni tejashga yordam beradi.

Bundan tashqari, issiqxonalar hududda **agrosanoat klasterlarini shakllantirish** uchun asos bo‘lib xizmat qiladi. Ya‘ni, issiqxonalar atrofida qayta ishlash korxonalari, saqlash omborlari va logistika markazlari tashkil etilishi mumkin. Bu tizim mahsulotni tezkor yetkazib berish va sifatini saqlash imkonini beradi.

Muzrabot tumani: tabiiy va ijtimoiy-iqtisodiy sharoitlar

Muzrabot tumanining geografik joylashuvi issiqxona xo‘jaligi uchun qulay. Hududning iqlimi yumshoq, quyoshli kunlar ko‘p, vegetatsiya davri uzun. Shu sababli issiqxonalar yil davomida samarali ishlash imkoniga ega. Tumanda yer resurslari yetarli bo‘lib, tomchilatib sug‘orish texnologiyasi orqali suvdan oqilona foydalanish amaliyoti keng tatbiq etilmoqda. Bu holat hosildorlikni oshirish va energiya xarajatlarini kamaytirishga yordam beradi.

Ijtimoiy jihatdan, issiqxona xo‘jaligi aholi bandligini oshiradi. Ish o‘rinlari yil davomida mavjudligi sababli mavsumiy ishsizlik kamayadi, ayniqsa yoshlar va ayollar bandligi oshadi.

Iqtisodiy samaradorlik jihatidan, issiqxonalar yuqori daromad keltiradi. Hududda pomidor, bodring, qalampir, ko‘katlar va boshqa sabzavotlar yetishtiriladi. Mahsulotning bir qismi ichki bozorda, bir qismi esa eksportga yo‘naltiriladi.

Jadval 1.

Muzrabot tumanidagi issiqxona hosildorligi (2025 yilda, o‘rtacha)

T/r	Mahsulot	Hosildorlik (t)	Qisqa izoh
1	Pomidor	80-100	Yil davomida bir necha marta hosil berish
2	Bodring	50-70	Tomchilatib sug'orish orqali hosildorlik oshadi
3	Qalampir	60-85	Innovatsion texnologiya qo'llanadi
4	Ko'katlar	20-35	Mahsulot sifati yuqori

Issiqxona xo‘jaligining samarali jihatlari

1. Tabiiy-iqlimiy ustunliklar:

- Quyoshli kunlar ko‘pligi energiya sarfini kamaytiradi;
- Vegetatsiya davri uzunligi hosildorlikni oshiradi;

- Qish mavsumining yumshoqligi issiqxonalarda minimal isitish xarajatini ta'minlaydi.
- 2. Suv va yer resurslaridan samarali foydalanish:
 - Tomchilatib sug'orish texnologiyasi suv sarfini kamaytiradi;
 - Yerdan intensiv foydalanish hosildorlikni oshiradi.Mineral o'g'itlar va pestitsidlar me'yorida qo'llanadi.
- 3. Innovatsion texnologiyalar:
 - Zamonaviy polietilen va shisha issiqxonalar;
 - Avtomatlashtirilgan isitish va shamollatish tizimlari;
 - Agrotexnik nazorat va monitoring tizimlari;
 - Biologik himoya vositalaridan foydalanish;
- 4. Iqtisodiy va ijtimoiy samaradorlik:
 - Yil davomida hosil olish orqali daromad barqarorligi;
 - Eksportbop mahsulot yetishtirish imkoniyati;
 - Bandlikni oshirish va mavsumiy ishsizlikni kamaytirish;
- 5. Ekologik jihatlar:
 - Resurslarni tejoychi texnologiyalar;
 - Pestitsid va o'g'itlar me'yorida qo'llanadi;
 - Mahsulot ekologik toza bo'lib, aholiga foydali;

Xulosa

Muzrabot tumanida issiqxona xo'jaligining rivojlanishi hududning tabiiy-iqlimiy sharoiti, resurslar samaradorligi, innovatsion texnologiyalar, iqtisodiy foyda va ekologik barqarorlikning uyg'unlashuvi natijasidir. Ushbu soha nafaqat qishloq xo'jaligini intensivlashtiradi, balki hududiy iqtisodiyot va eksport salohiyatini oshirishda muhim omil hisoblanadi. Kelajakda issiqxona xo'jaligi rivojlanishining yanada samarali bo'lishi uchun innovatsion va ekologik yondashuvlarni keng joriy etish zarur.

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Surxondaryo viloyatida agroturizmning nazariy va metodologik jihatlarini**Nurmamatov Xidir Jumanazar o'g'li**

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Annotatsiya. Surxondaryo viloyati hududida agroturizmni rivojlantirishning nazariy va metodologik jihatlarini kompleks tarzda tahlil etilgan. Agroturizm tushunchasining ilmiy mazmuni, uning qishloq hududlarini barqaror rivojlantirishdagi roli hamda ijtimoiy-iqtisodiy jarayonlarga ta'siri ochib berilgan. Tadqiqot jarayonida tizimli yondashuv, hududiy tahlil, taqqoslama va statistik metodlardan foydalanilgan. Viloyatning tabiiy-iqlim sharoiti, agrolesurslari va an'anaviy xo'jalik yuritish shakllari agroturizmni rivojlantirish uchun muhim omil sifatida asoslangan. Tadqiqot natijalari hududiy turizm siyosatini takomillashtirishda amaliy ahamiyatga ega.

Kalit so'zlar: agroturizm, qishloq turizmi, hududiy rivojlanish, barqaror turizm, Surxondaryo viloyati.

Abstract. This article analyzes the theoretical and methodological aspects of agro-tourism development in the Surkhandarya region. The scientific essence of agro-tourism, its role in sustainable rural development, and its impact on socio-economic processes are examined. Systematic, territorial, comparative, and statistical research methods were applied. The natural and agricultural potential of the region is substantiated as a key factor for agro-tourism development. The results of the study can be used to improve regional tourism policy.

Keywords: agro-tourism, rural tourism, regional development, sustainable tourism, Surkhandarya region.

Аннотация. В статье рассматриваются теоретические и методологические аспекты развития агротуризма в Сурхандарьинской области. Раскрывается научная сущность агротуризма, его роль в устойчивом развитии сельских территорий и социально-экономических процессах. Используются системный, территориальный и статистический методы исследования. Результаты работы имеют практическое значение для развития региональной туристической политики.

Ключевые слова: агротуризм, сельский туризм, региональное развитие, устойчивый туризм.

Asosiy matn. Agroturizm zamonaviy turizm industriasining eng istiqbolli yo'nalishlaridan biri bo'lib, u qishloq hududlarini ijtimoiy-iqtisodiy rivojlantirishda muhim ahamiyat kasb etadi. Ilmiy adabiyotlarda agroturizm qishloq xo'jaligi faoliyati bilan bevosita bog'liq holda tashkil etiladigan turizm turi sifatida talqin qilinadi. Ushbu turizm shakli turistlarning fermer xo'jaliklari, bog'dorchilik, chorvachilik va an'anaviy dehqonchilik jarayonlarida bevosita ishtirok etishini nazarda tutadi.

Nazariy jihatdan agroturizm barqaror rivojlanish konsepsiyasiga asoslanadi. Barqaror turizm tabiiy resurslardan oqilona foydalanish, ekologik muvozanatni saqlash va mahalliy aholining manfaatlarini ta’minlashni o‘z ichiga oladi. Agroturizm qishloq landshaftlarini saqlab qolish, milliy urf-odat va an’analarni asrash, ekologik madaniyatni shakllantirishga xizmat qiladi. Shu bois, u nafaqat iqtisodiy, balki ijtimoiy va madaniy ahamiyatga ham ega.

Surxondaryo viloyati O‘zbekiston Respublikasining janubida joylashgan bo‘lib, o‘ziga xos tabiiy-geografik va iqlimiy sharoitlarga ega. Hududda subtropik iqlim hukmron bo‘lib, yil davomida qishloq xo‘jaligi mahsulotlarini yetishtirish imkoniyati mavjud. Bog‘dorchilik, uzumchilik, sabzavotchilik va chorvachilik tarmoqlari viloyat iqtisodiyotining yetakchi yo‘nalishlari hisoblanadi. Mazkur agroresurslar agroturizmni rivojlantirish uchun mustahkam asos yaratadi.

Metodologik jihatdan agroturizmni tadqiq etishda tizimli va hududiy yondashuv muhim o‘rin tutadi. Tizimli yondashuv agroturizmni yagona ijtimoiy-iqtisodiy tizim sifatida ko‘rib, uning tarkibiy elementlari – tabiiy resurslar, infratuzilma, mehnat resurslari va bozor munosabatlarini o‘zaro bog‘liqlikda tahlil qilishni taqozo etadi.

Hududiy yondashuv esa ma’lum bir mintaqaning o‘ziga xos xususiyatlarini hisobga olgan holda rivojlanish yo‘nalishlarini belgilash imkonini beradi.

Agroturizmni baholashda statistik tahlil, taqqoslama metodlar, iqtisodiy-geografik modellashtirish usullaridan foydalanish maqsadga muvofiqdir. Ushbu metodlar orqali hududning agroturistik salohiyati, mavjud muammolar va rivojlanish istiqbollari aniqlanadi. Surxondaryo viloyatida agroturizmni rivojlantirishda transport va xizmat ko‘rsatish infratuzilmasini takomillashtirish, fermer xo‘jaliklarining turizm faoliyatiga tayyorgarlik darajasini oshirish muhim ahamiyat kasb etadi.

Jadval-1

Surxondaryo viloyatida agroturizmni rivojlantirishga ta’sir etuvchi omillar ulushi (%)

T/r	Omillar	Ulushi (% da)
1	Agroresurslar (bog‘dorchilik, chorvachilik)	30
2	Tabiiy-iqlim sharoiti	25
3	Infratuzilma (yo‘l, xizmatlar)	20
4	Ijtimoiy omillar (aholi bandligi, an’analar)	15
5	Institutsional omillar (davlat qo‘llovi)	10
6	Jami	100

Agroturizmni rejalashtirish jarayonida ekologik barqarorlik masalasi alohida e’tiborga olinishi lozim. Turistik faoliyat qishloq xo‘jaligi yerlariga va tabiiy muhitga salbiy ta’sir ko‘rsatmasligi kerak. Shu bois, ekologik monitoring, resurslardan oqilona foydalanish va mahalliy aholining ishtirokini ta’minlash metodologik asos sifatida qaraladi.

Innovatsion yondashuvlar ham agroturizm rivojida muhim o‘rin tutadi. Raqamli texnologiyalar, onlayn bronlash tizimlari, hududiy brendlarni shakllantirish va gastronomik agroturizmni rivojlantirish Surxondaryo viloyati uchun istiqbolli yo‘nalishlar hisoblanadi. Mahalliy qishloq xo‘jaligi mahsulotlari asosida tashkil etilgan agroturistik marshrutlar hududning raqobatbardoshligini oshiradi.

Xulosa qilib aytganda, Surxondaryo viloyatida agroturizmni rivojlantirishning nazariy va metodologik asoslari yetarli darajada shakllangan bo‘lib, ularni amaliyotga joriy etish hududning barqaror ijtimoiy-iqtisodiy rivojlanishiga xizmat qiladi. Agroturizm qishloq aholisining daromad manbalarini diversifikatsiya qilish, bandlikni oshirish va turizm sohasini rivojlantirishda muhim omil hisoblanadi.

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“Axborot texnologiyalari” fanini o‘qitishda interaktiv texnologiyalardan foydalanish**Tolibov Yaxyojon G‘olib o‘g‘li**

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Annotatsiya: Ushbu maqolada “Axborot texnologiyalari” fanini o‘qitishda eski an‘anaviy metodlarning o‘rniga zamonaviy metod va texnologiyalardan foydalanish, elektron platformalarning ta‘lim jarayonida qo‘llanishi va uning foydasi haqida so‘z yuritilgan. Google classroomni foydaliligi, Coursera platformasining talabalarning darsdan tashqari vaqtini samarali o‘tkazishi haqida so‘z yuritilgan. Ushbu maqolada darsning metodlariga yangi va zamonaviy texnologiyalari integratsiya qilinishi va uning samaraliligi haqida so‘z yuritilgan.

Kalit so‘zlar: *Google Classroom, Coursera, “Axborot texnologiyalari”, elektron platformalar, sun‘iy intellekt, gamifikatsiya, interaktiv texnologiyalar, Khan academy*

Abstract: This article discusses the use of modern methods and technologies in teaching the subject of "Information Technologies" instead of old traditional methods, the use of electronic platforms in the educational process and their benefits. The usefulness of Google Classroom, the Coursera platform for students to spend their extracurricular time effectively are discussed. This article discusses the integration of new and modern technologies into teaching methods and their effectiveness.

Keywords: *Google Classroom, Coursera, "Information Technologies", electronic platforms, artificial intelligence, gamification, interactive technologies, Khan academy.*

Аннотация: В данной статье рассматривается использование современных методов и технологий в преподавании предмета «Информационные технологии» вместо старых традиционных методов, применение электронных платформ в образовательном процессе и их преимущества. Обсуждается полезность платформы Google Classroom и Coursera для эффективного использования студентами внеучебного времени. В статье рассматривается интеграция новых и современных технологий в методы обучения и их эффективность.

Ключевые слова: *Google Classroom, Coursera, «Информационные технологии», электронные платформы, искусственный интеллект, геймификация, интерактивные технологии, Khan Academy.*

KIRISH. Axborot texnologiyalarining jadal rivojlanishi va ularning jamiyat hayotining barcha sohalariga chuqur kirib borishi ta‘lim tizimi oldiga yangi talab

va vazifalarni qo‘ymoqda. Bugungi kunda ta‘lim jarayonida faqat tayyor bilimlarni yetkazib berish emas, balki mustaqil fikrlay oladigan, muammolarni tahlil qilish va zamonaviy texnologiyalar yordamida samarali yechimlar topa oladigan mutaxassislarni tayyorlash muhim ahamiyat kasb etmoqda. Ayniqsa, "Axborot texnologiyalari" fanini o‘qitishda talabalarni faol o‘quv jarayoniga jalb etish, ularning amaliy ko‘nikma va kompetensiyalarini rivojlantirish dolzarb masalaga aylanmoqda.

An‘anaviy o‘qitish usullarida bilim asosan o‘qituvchi tomonidan tayyor holda berilib, talabalar esa ko‘proq tinglovchi rolida ishtirok etadi. Dars jarayonlari an‘anaviy tarzda ya‘ni ma‘ruza va smenar shaklida o‘tmoqda. Bunday yondashuv axborot texnologiyalari kabi tez o‘zgaruvchan va amaliy yo‘naltirilgan fanlar uchun yetarli samaradorlikni ta‘minlay olmaydi. Shu sababli ta‘lim jarayonida interaktiv metodlardan foydalanish zarurati tobora ortib bormoqda. Interaktiv metodlar o‘quv jarayonining subyektlari o‘rtasidagi faol hamkorlikka asoslanib, talabalarning mustaqil izlanish olib borishiga, muloqot qilishiga va bilimlarni amaliy faoliyat jarayonida egallashiga imkon yaratadi.

Axborot texnologiyalari fanini o‘qitishda interaktiv metodlarning qo‘llanilishi talabalarning fanga bo‘lgan qiziqishini oshirish, nazariy bilimlarni amaliy mashg‘ulotlar bilan uyg‘unlashtirish hamda ularning kasbiy tayyorgarlik darajasini yuksaltirishga xizmat qiladi. Bunda muammoli vaziyatlar asosida o‘qitish, guruhli ishlash, loyiha faoliyati va raqamli ta‘lim platformalaridan foydalanish kabi metodlar alohida ahamiyat kasb etadi. Ushbu yondashuvlar orqali talabalar nafaqat bilim oladi, balki axborotni tahlil qilish, jamoada ishlash va texnologik muammolarni hal etish ko‘nikmalarini ham shakllantiradi.

Mazkur maqolaning maqsadi axborot texnologiyalari fanini o‘qitishda interaktiv metodlardan foydalanishning nazariy va amaliy jihatlarini tahlil qilish, ularning ta‘lim samaradorligiga ta‘sirini asoslash hamda o‘quv jarayoniga joriy etish bo‘yicha ilmiy-amaliy tavsiyalar ishlab chiqishdan iborat. Tadqiqot jarayonida zamonaviy pedagogik yondashuvlar, ta‘lim amaliyotida qo‘llanilayotgan interaktiv metodlar va ularning natijalari tahlil qilinib, mazkur fan doirasida interaktiv o‘qitishning ahamiyati ilmiy asosda yoritib beriladi.

Asosiy qism. Bizni o‘rab turgan borliq haqidagi bilimlar yoki har qanday ma‘lumotlar axborot deb ataladi.

Axborot texnologiyasi – bu bir zanjirga birlashgan, axborotni yig‘ish, qayta ishlash, saqlash, tarqatish va aks etish, shu bilan birga axborotning ishonchliligi va tezkorligini oshirish jarayonlari, mehnat unumdorligini orttirish maqsadida informatsion resursdan foydalanishni ta‘minlovchi uslublarni ishlab chiqish jarayonlari va dasturni texnik vositalarining yig‘indisidir.

Axborot texnologiyalari fanini o‘qitishning nazariy asoslari zamonaviy pedagogika, didaktika hamda axborot-kommunikatsiya texnologiyalarining rivojlanish qonuniyatlariga tayanadi. Ushbu fan ta‘lim jarayonida nafaqat texnik bilimlarni berishga, balki talabalarda algoritmik tafakkur, mantiqiy fikrlash, axborotni tahlil qilish va uni amaliy faoliyatda qo‘llash kompetensiyalarini

shakllantirishga yo‘naltirilganligi bilan ajralib turadi. Shuning uchun axborot texnologiyalari fanini o‘qitishda bilim mazmunini tanlash, uni tizimlashtirish va o‘zlashtirish jarayonini tashkil etishda ilmiylik, izchillik, uzviylik va amaliy yo‘naltirilganlik tamoyillariga qat’iy amal qilinishi zarur.

Mazkur fan o‘qitishning nazariy asoslarida shaxsga yo‘naltirilgan ta’lim konsepsiyasi muhim o‘rin egallaydi. Bu yondashuvda talaba o‘quv jarayonining markaziy subyekti sifatida qaralib, uning individual imkoniyatlari, qiziqishlari va tayyorgarlik darajasi hisobga olinadi. Axborot texnologiyalari fanining mazmuni murakkab va tez yangilanib boruvchi bilimlardan iborat bo‘lganligi sababli, o‘qitish jarayonida konstruktivizm nazariyasiga asoslangan metodlardan foydalanish samarali hisoblanadi. Ushbu nazariyaga ko‘ra, bilimlar tayyor holda berilmaydi, balki talabalar tomonidan mustaqil izlanish, tajriba va muloqot jarayonida shakllantiriladi.

Axborot texnologiyalari fanining o‘qitish jarayonida didaktik tamoyillar bilan bir qatorda pedagogik texnologiyalar nazariyasi ham muhim ahamiyat kasb etadi. O‘quv jarayonini loyihalash, rejalashtirish va boshqarishda ta’limning maqsadi, mazmuni, shakl va metodlarining o‘zaro uyg‘unligi ta’minlanishi lozim. Bu esa fan bo‘yicha bilimlarni bosqichma-bosqich o‘zlashtirish, nazariy tushunchalarni amaliy mashg‘ulotlar orqali mustahkamlash hamda talabalarning mustaqil faoliyatini tashkil etish imkonini beradi. Natijada axborot texnologiyalari fanini o‘qitish jarayoni ilmiy asoslangan, samarali va zamonaviy ta’lim talabalariga mos holda amalga oshiriladi.

Biz fanning asosiy mazmuni haqida gapiradigan bo‘lsak, u quyidagilardan iborat;

- axborotlarni to‘plash, uzatish va qayta ishlash
- zamonaviy axborot texnologiyalari
- zamonaviy axborot texnologiyalarini ta’lim jarayoniga qo‘llash va uning ahamiyati
- o‘quv va nazorat qiluvchi dasturlar va ular bilan ishlash
- matnli va grafikli axborotlarni qayta ishlash texnologiyalari
- multimediali texnologiyalar bilan ishlash
- masofaviy ta’limni yo‘lga qo‘yish va boshqalar.

Biz fanning asosiy mazmunlarini yozdik, ammo asosiy vazifalari ko‘p.

Interaktiv metodlar ta’lim jarayonida o‘qituvchi va talabalar o‘rtasidagi faol muloqot, hamkorlik va birgalikdagi intellektual faoliyatga asoslangan o‘qitish usullari majmuini anglatadi. Ushbu metodlar zamonaviy pedagogik yondashuvlarning muhim tarkibiy qismi bo‘lib, ularning asosiy maqsadi ta’lim oluvchilarning faolligini oshirish, mustaqil fikrlashini rivojlantirish hamda bilimlarni chuqur va barqaror o‘zlashtirishga erishishdan iborat. An’anaviy ta’limda bilimlar asosan bir yo‘nalishda uzatilgan bo‘lsa, interaktiv metodlar ta’lim jarayonini ikki tomonlama va ko‘p tomonlama muloqot asosida tashkil etishni

taqozo etadi, bu esa bilimlarni o'zlashtirish samaradorligini sezilarli darajada oshiradi.

Zamonaviy ta'lim muhitida interaktiv metodlarning ahamiyati raqamli texnologiyalar bilan uzviy bog'liq holda yanada ortib bormoqda. Xususan, Google Classroom platformasi ta'lim jarayonini interaktiv tashkil etish uchun qulay imkoniyatlarni taqdim etib, o'qituvchi va talabalar o'rtasida doimiy aloqani ta'minlaydi. Ushbu platforma orqali topshiriqlarni berish va qabul qilish, baholash, fikr almashish hamda o'quv materiallarini tizimli joylashtirish mumkin bo'lib, bu jarayon talabalarning mustaqil ishlash ko'nikmalarini rivojlantirishga xizmat qiladi. Qulay tomoni ham shundagi talabalarning mustaqil ta'lim jarayonini qabul qilishda Google Classroom orqali qabul qilish juda ham qulay, inson omilini kamaytiradi va vaqt tejamkorligiga olib keladi, Coursera kabi ochiq onlayn ta'lim platformalari esa interaktiv videodarslar, testlar, loyihaviy topshiriqlar va muhokama forumlari orqali ta'lim oluvchilarning o'quv jarayonidagi faolligini oshiradi hamda global miqyosda bilim almashish imkonini yaratadi.

Sun'iy intellekt texnologiyalarining ta'lim jarayoniga kirib kelishi interaktiv metodlarning yangi bosqichini shakllantirmoqda. Sun'iy intellekt asosida ishlovchi ta'lim tizimlari talabalarning bilim darajasini tahlil qilish, individual o'quv yo'nalishlarini shakllantirish va moslashtirilgan o'quv materiallarini taklif etish imkonini beradi. Bunday yondashuv ta'lim jarayonini shaxsga yo'naltirilgan holda tashkil etishga xizmat qilib, har bir talabani o'z imkoniyatlariga mos tarzda bilim olishini ta'minlaydi. Shuningdek, sun'iy intellekt asosidagi avtomatik baholash tizimari va virtual yordamchilar o'qituvchining yuklamasini kamaytirib, ta'lim sifatini oshirishga ko'maklashadi.

Raqamli texnologiyalarning rivojlanishi bu ta'limga ham sezilarli darajada ta'sir ko'rsatmoqda. Buning natijasida xalqaro ta'lim standartlari ham rivojlanib bormoqda. Xalqaro ta'lim standartlari rivojlanib borayotgan bir paytda bizda ham ta'lim berish metodikasini rivojlantirishga ehtiyoj sezilmoqda. An'anaviy metod talabalarni darsga e'tiborini jalb qila olmayabdi, shu sababli dars jarayonlarida zamonaviy va interaktiv metodlardan foydalanish lozimdir. Axborot texnologiyalari fanini o'qitishda interaktiv metodlardan foydalanish tajribasi so'nggi yillarda nafaqat nazariy, balki amaliy jihatdan ham keng tatbiq etilmoqda. Amaliyot ko'rsatadiki, interaktiv metodlarni qo'llash o'quv jarayonining samaradorligini oshirish, talabalar faolligini rag'batlantirish va nazariy bilimlarni amaliy ko'nikmalar bilan uzviy bog'lash imkonini beradi. Dars jarayonlarini elektron platformalarda tatbiq etish talabalarni mavzuni sifatli o'rganishiga yordam beradi. Elektron ta'lim platformalarni turlari ko'p bo'lib ularga quyidagi asosiy turlarini misol qilishimiz mumkin:

1. Coursera;
2. Khan Academy;
3. Codecademy;
4. Google classroom;
5. LinkEdIn Learning.

Bular asosiylari bo'lib, elektron ta'lim platformalarining turlari ko'p.

Google Classroom – o'qituvchi yoki talabalar o'quv jarayonida yoki undan tashqarida bo'lganlarida foydali vosita bo'lib ular dars berishda davom etishlari va o'tkazib yuborilgan darslarni o'zlashtirishlari mumkin. Google Classroom murakkab bo'lmagan platforma bo'lib, ishlash oson va dizayni qulay. Yuklangan topshiriqlar va barcha materiallar avtomatik ravishda Google Drivedagi papkalarga joylashtiriladi va kurslarning o'chib ketmasligiga va doimiy saqlanishiga olib keladi.

Google Classroomning eng asosiy samaradorligi shundaki, qulay va samarali aloqani tashkil etadi va vaqt samaradorligiga olib keladi. Ya'ni o'qituvchi tashkil etgan kursdagi vazifalarni bajaradi va unga qaytadan joylaydi. Classroomning yana bir qulayligi shundaki u ochiq, xavfsiz va bepuldir. Unda reklamar mavjud emas va talabalar uchun materiallar va ma'lumotlar marketing maqsadlarida ishlatilmaydi.

Coursera – bu universitet darajasidagi va sertifikatlashtirish dasturlari bo'yicha onlayn ta'lim uchun platforma. Unda 300 dan ortiq sun'iy intellekt va kompyuter bilimlariga oid kurslar mavjud bo'lib, talabalar darsdan tashqari muhitda platformadagi kurslarni o'rganishi va kurs yakunida berilgan testlarni bajarish natijasida kursni puxta o'rganadi, natijada talabaga sertifikat beriladi.

Dars jarayonlarni boyitish uchun sun'iy intellekt bilan zamonaviy tarzda o'tkazish talabalarning darsga e'tiborini jalb etadi. Elektron darsliklar va interaktiv dasturlar ta'lim jarayonida katta ahamiyatga ega. Ular nafaqat ma'lumotni o'qitish, balki talabailarning amaliy ko'nikmalarini rivojlantirishga yordam beradi. Masalan, dasturlash tillari bo'yicha interaktiv darsliklar talabailarga real vaqtda kod yozish, xatoliklarni aniqlash va to'g'rilashim koniyatini yaratadi. Bunday resurslar orqal talabailar o'zlarining o'rganish uslubiga mosravishda ta'lim oladilar. Boshqa bir misol sifatida, virtual laboratoriyalarni keltirish mumkin. Ular orqali talabailar dasturlash, ma'lumotlar bazasini yaratish, tarmoq texnologiyalari va boshqa sohalarida amaliy mashqlarni bajarishlari mumkin.

Gamifikatsiya – bu ta'lim jarayonini o'yin elementlari bilan boyitish usulidir. Bu usul yordamida talabailar darslarga yanada qiziqish bilan yondashadilar. O'yinlar va interaktiv ta'lim vositalari yordamida talabailar nafaqat bilim olishadi, balki o'z ko'nikmalarini va kreativ fikrlash qobiliyatlarini ham rivojlantiradilar. Masalan, algoritmlar yaratish yoki kod yozish o'yinlari orqali talabailar nafaqat nazariy bilimlarga ega bo'ladilar, balki amaliy tajriba ham orttiradilar. O'yinlar va simulyatsiyalar orqali talabailar murakkab mavzularni osonroq tushunadilar va ularni real hayotda qanday qo'llashni o'rganadilar.

XULOSA. Ushbu maqolada axborot texnologiyalari fanini o'qitishda interaktiv metodlardan foydalanish masalasi nazariy va amaliy jihatdan tahlil qilindi. Tadqiqot davomida interaktiv metodlarning ta'lim jarayonidagi o'rni, ularning talabalarning faolligi va bilimlarni o'zlashtirish darajasiga ta'siri o'rganildi. O'rganishlar shuni ko'rsatdiki, Google Classroom, Coursera kabi raqamli ta'lim platformalari hamda sun'iy intellekt texnologiyalaridan foydalanish o'quv jarayonini yanada samarali, tizimli va qulay tashkil etishga imkon beradi. Bunday

yondashuvlar orqali talabalarning mustaqil ishlash, axborotni tahlil qilish va amaliy vazifalarni bajarish ko'nikmalari sezilarli darajada rivojlanadi.

Maqola natijalari asosida aytish mumkinki, interaktiv texnologiyalar axborot texnologiyalari fanining mazmuniga mos bo'lib, ularni qo'llash talabalarning fanga bo'lgan qiziqishini oshiradi hamda nazariy bilimlarni amaliy faoliyat bilan uyg'unlashtirishga xizmat qiladi. Shu bilan birga, interaktiv metodlarni samarali qo'llash o'qituvchidan zamonaviy pedagogik va raqamli kompetensiyalarga ega bo'lishni, ta'lim oluvchilardan esa faol ishtirok va mas'uliyatni talab etadi.

Yuqoridagilardan kelib chiqib, quyidagi takliflarni bildirish mumkin: axborot texnologiyalari fanini o'qitishda interaktiv metodlardan muntazam va tizimli foydalanish lozim; dars jarayonida Google Classroom va boshqa onlayn platformalar imkoniyatlaridan kengroq foydalanish maqsadga muvofiq; sun'iy intellekt asosidagi ta'lim vositalarini bosqichma-bosqich joriy etish orqali shaxsga yo'naltirilgan ta'limni rivojlantirish mumkin. Shuningdek, o'qituvchilarning malakasini oshirish kurslarida interaktiv metodlar va raqamli texnologiyalarni qo'llash bo'yicha amaliy mashg'ulotlarga alohida e'tibor qaratish tavsiya etiladi. Ushbu takliflar amaliyotga tatbiq etilgan taqdirda, axborot texnologiyalari fanini o'qitish samaradorligi yanada oshadi va zamonaviy raqamli jamiyat talablariga mos mutaxassislar tayyorlashga xizmat qiladi.

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O'quvchilarda ijodiy salohiyatni shakllantirishda qo'llaniladigan musiqiy interfaol usullar

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Annotatsiya: Mazkur maqolada umumta'lim maktablarida musiqa madaniyati darslari jarayonida o'quvchilarning ijodiy salohiyatini shakllantirishda qo'llaniladigan interfaol musiqiy usullar tahlil qilinadi. Tadqiqotda musiqiy faoliyatning psixologik-pedagogik imkoniyatlari, o'yin texnologiyalari, ijodiy topshiriqlar, improvizatsiya va jamoaviy musiqiy faoliyatning o'quvchilar kreativ tafakkuriga ta'siri yoritilgan. Shuningdek, interfaol yondashuvlar orqali o'quvchilarning mustaqil fikrlashi, estetik didi va ijodiy faolligini rivojlantirish imkoniyatlari asoslab beriladi. Maqola musiqa ta'limi samaradorligini oshirishga qaratilgan bo'lib, amaliy tavsiyalar bilan boyitilgan.

Kalit so'zlar: musiqa madaniyati, ijodiy salohiyat, interfaol usullar, kreativ tafakkur, musiqiy ta'lim, improvizatsiya, o'yin texnologiyalari.

Аннотация: В данной статье анализируются интерактивные музыкальные методы, применяемые в процессе формирования творческого потенциала учащихся на уроках музыкальной культуры в общеобразовательных школах. Рассматриваются психолого-педагогические возможности музыкальной деятельности, роль игровых технологий, импровизации, коллективного музицирования и творческих заданий в развитии креативного мышления обучающихся. Обосновывается эффективность интерактивного подхода в повышении учебной активности, самостоятельности и эстетического восприятия учащихся. Статья направлена на повышение результативности музыкального образования и содержит практические педагогические выводы.

Ключевые слова: музыкальная культура, творческий потенциал, интерактивные методы, креативное мышление, музыкальное образование, импровизация, игровые технологии.

Abstract: This article examines interactive musical methods used to develop students' creative potential in music education classes at general secondary schools. The study highlights the psychological and pedagogical possibilities of musical activities, focusing on the role of game-based learning, improvisation, collaborative music-making, and creative tasks in fostering students' creative thinking. The effectiveness of interactive approaches in enhancing learners' engagement, independence, and aesthetic perception is substantiated. The article aims to improve the quality of music education and provides practical pedagogical insights.

Keywords: music education, creative potential, interactive methods, creative thinking, musical culture, improvisation, game-based learning.

Kirish: Bugungi ta'lim tizimida o'quvchilarni faqat bilim bilan qurollantirish emas, balki ularning ijodiy fikrlashini, tashabbuskorligini va mustaqil qaror qabul qilish qobiliyatini rivojlantirish muhim vazifalardan biri hisoblanadi. Ayniqsa,

musiqa madaniyati fani o'quvchilarning ichki dunyosiga bevosita ta'sir ko'rsatib, ularning his-tuyg'ulari, tasavvuri va ijodiy tafakkurini shakllantirishda alohida o'rin tutadi. Shu jihatdan qaraganda, musiqa darslarida interfaol usullardan foydalanish o'quvchilarning ijodiy salohiyatini yuzaga chiqarishda samarali vosita bo'lib xizmat qiladi.

Musiqiy interfaol usullarni darslarda qo'llashning mazmuni va ahamiyati juda katta. Interfaol usullar – bu o'quvchi va o'qituvchi o'rtasidagi faol hamkorlikka asoslangan, o'quvchini ta'lim jarayonining markaziga qo'yadigan metodlar majmuidir. Musiqa darslarida bunday usullar o'quvchilarning faolligini oshiradi, ularni musiqiy jarayonga bevosita jalb etadi hamda ijodiy yondashuvni rag'batlantiradi.

Musiqiy interfaol usullar orqali o'quvchilar nafaqat tayyor bilimlarni o'zlashtiradilar, balki musiqiy obrazlar yaratish, kuy va ritmlarni his qilish, o'z fikr va his-tuyg'ularini musiqiy vositalar orqali ifodalash imkoniyatiga ega bo'ladilar. Bu esa ularning kreativ tafakkurini rivojlantirishga xizmat qiladi.

Ijodiy salohiyatni rivojlantiruvchi asosiy interfaol usullarga quyidagi usullarni kirita olamiz:

1. Musiqiy improvizatsiya, bunda improvizatsiya o'quvchilarning erkin ijod qilishiga imkon beradigan eng samarali usullardan biridir. Oddiy ritmik urishlar, ovoz bilan tajriba qilish yoki tanish kuyga yangi ohang qo'shish orqali bolalar o'z ichki dunyosini erkin namoyon etadilar. Bu jarayonda o'quvchilarda o'ziga ishonch va ijodiy jasorat shakllanadi.

2. Musiqiy o'yinlar. O'yin faoliyati ayniqsa boshlang'ich sinf o'quvchilari uchun muhim hisoblanadi. Musiqiy rolli o'yinlar, ritmik harakatlar va musiqaga mos sahnalashtirishlar orqali o'quvchilar musiqani chuqurroq his etadilar. Shu bilan birga, ularning tasavvuri, diqqat-e'tibori va ijodiy faolligi rivojlanadi.

3. Jamoaviy musiqiy faoliyat Ansamblda kuylash, guruh bo'lib qo'shiq ijro etish yoki musiqiy kompozitsiya yaratish o'quvchilarda hamkorlik, muloqot va bir-birini tinglash madaniyatini shakllantiradi. Bunday faoliyat jarayonida o'quvchilar o'z g'oyalarini erkin bildiradilar va umumiy ijodiy natijaga hissa qo'shadilar.

4. Muammoli va ijodiy topshiriqlar Musiqa darslarida beriladigan ochiq savollar, masalan, "Bu kuy sizda qanday tasavvur uyg'otadi?" yoki "Agar bu musiqa rang bo'lsa, qaysi rang bo'lardi?" kabi topshiriqlar o'quvchilarning kreativ fikrlashini faollashtiradi. Ular musiqani shaxsiy tajribasi va hissiyotlari asosida talqin qilishni o'rganadilar.

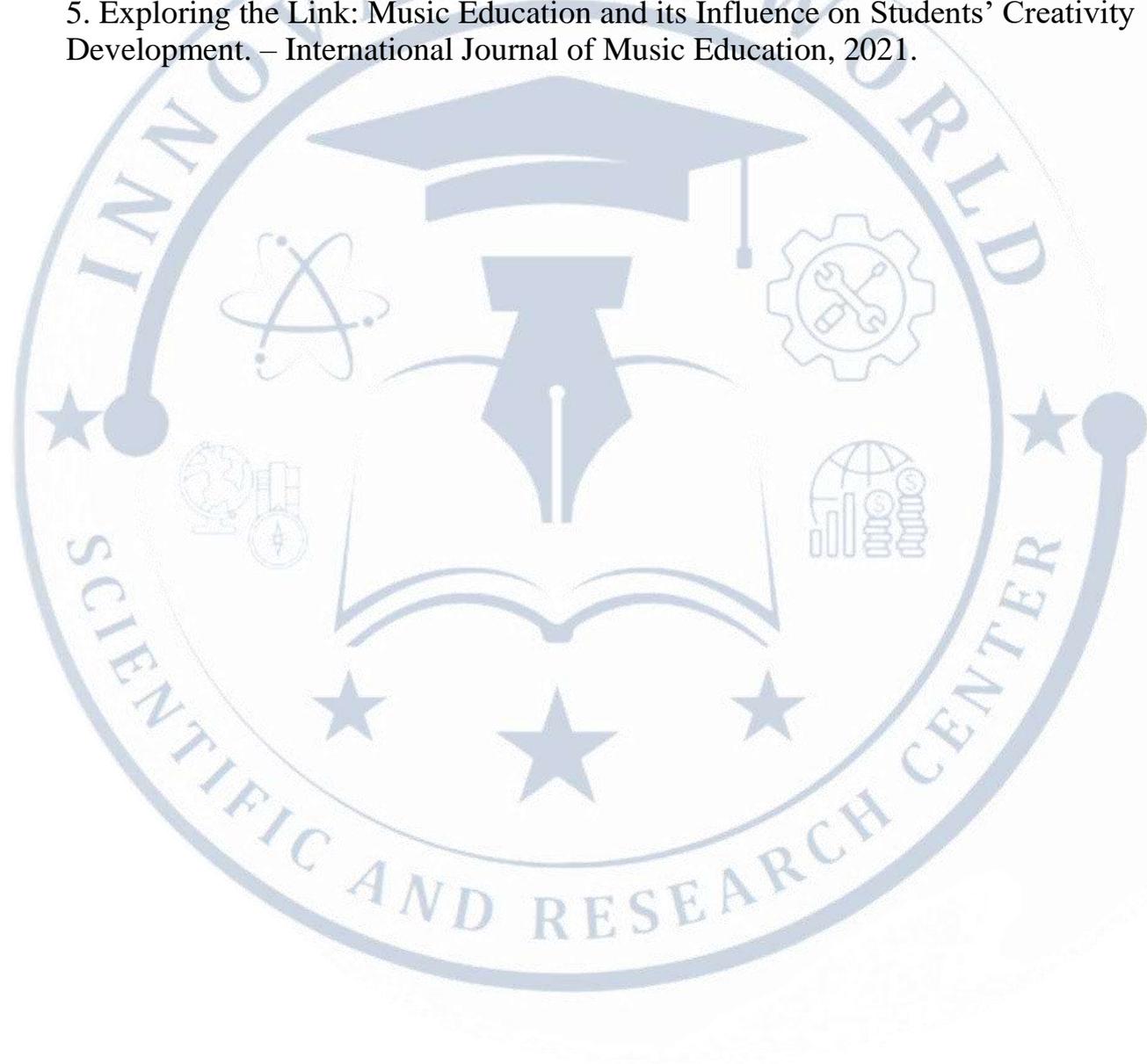
Musiqiy interfaol usullarning tarbiyaviy ahamiyati ham ta'kidlab o'tishga molik ahamiyat hisoblanib, interfaol musiqiy usullar nafaqat ijodiy salohiyatni, balki o'quvchilarning ma'naviy-axloqiy fazilatlarini ham rivojlantiradi. Musiqa orqali bolalarda estetik did, milliy qadriyatlarga hurmat va san'atga mehr shakllanadi. Shu sababli, musiqa madaniyati darslarida interfaol yondashuvlardan foydalanish ta'limning samaradorligini sezilarli darajada oshiradi.

Xulosa qilib aytganda, o'quvchilarda ijodiy salohiyatni shakllantirishda musiqiy interfaol usullar muhim pedagogik vosita hisoblanadi. Ushbu usullar

o‘quvchilarning erkin fikrlashi, ijodiy tashabbuskorligi va musiqiy qobiliyatlarini rivojlantirishga xizmat qiladi. Musiqa madaniyati darslarida interfaol metodlardan samarali foydalanish orqali o‘quvchilar nafaqat musiqiy bilimlarga ega bo‘ladilar, balki hayotning turli jabhalarida kreativ yondasha oladigan barkamol shaxs sifatida shakllanadilar.

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Realism and its primary characteristics in english literature**Fazliddinova Durдона Husniddin qizi,**

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Abstract: The following article informs about the period of realism in English literature and its primary features. The data is supported with the literary works of prominent English realist authors.

Keywords: English literature, realism, literary movement, nineteenth-century literature, social realism, critical realism, depiction of real life, social issues, character psychology, artistic detail, objectivity, relationship between society and the individual.

Аннотация: Следующая статья информирует о периоде реализма в английской литературе и его основных особенностях. Приведённые сведения подтверждаются литературными произведениями известных английских писателей реалистов.

Ключевые слова: Английская литература, реализм, литературное направление, литература XIX века, социальный реализм, критический реализм, изображение реальной жизни, социальные проблемы, психология персонажа, художественная деталь, объективность, взаимоотношения общества и личности.

Annotatsiya: Quyidagi maqola ingliz adabiyotida realizm davri va uning asosiy xususiyatlari haqida ma'lumot beradi. Keltirilgan ma'lumotlar mashhur ingliz realist yozuvchilarining adabiy asarlari bilan tasdiqlanadi.

Kalit so'zlar: Ingliz adabiyoti, realizm, adabiy oqim, XIX asr adabiyoti, ijtimoiy realizm, tanqidiy realizm, real hayot tasviri, ijtimoiy muammolar, qahramon psixologiyasi, badiiy tafsilot, obyektivlik, jamiyat va shaxs munosabati.

Introduction. Realism is a literary movement that shows life as it really is. In literature and art realism focuses on ordinary people, everyday events and real social conditions. It developed strongly in the 19th century as a reaction against romanticism, which emphasized emotion and imagination. Realist writers and artists show both positive and negative aspects of life, including struggles, work and social issues. The goal of realism is to create an honest, believable picture of the world so audiences can better understand real human experiences.

Realism in English literature has its own distinct features, such as the usage of simple and straightforward language, description of ordinary people and others.

Ordinary characters: Realist writers focus on common people such as shopkeepers, farmers, workers, students and middle-class families instead of kings, heroes or mythical figures. These characters live normal lives and face realistic problems like poverty, family conflicts, work pressure and social inequality. By using ordinary characters realism shows true human behavior and real emotions. The characters are not perfect they have strengths, weaknesses and flaws. This

helps readers relate to them easily and understand real society and everyday life more clearly. Examples of realistic novels include *Pride and Prejudice* by Jane Austen, *Oliver Twist* by Charles Dickens, *Madame Bovary* by Gustave Flaubert, *The Old Man and the Sea* by Ernest Hemingway.

Main part. Real life situation: Realist writers present events that can actually happen in everyday life, avoiding fantasy, magic or supernatural elements. The stories often include common experiences such as family relationship, work life, social conflicts and moral struggles. These situations are shown in a natural and believable way, just as they occur in society. By using real-life situations, realism helps readers understand true human behavior and social conditions. This feature makes realist works relatable, meaningful and reflective of real society and human experiences.

Example: George Eliot "Silas Marner" (He lived alone and his life, deprived of human affection, gradually narrowed until it became centered on one thing-his gold).

Simple and clear language: Realist writers avoid overly poetic or exaggerated expressions. Instead, they write in a way that is easy to understand, reflecting how ordinary people speak and think. This helps readers relate to the story and the characters. The focus is on clarity and precision so events and emotions are presented truthfully. Simple language also allows the social and moral messages of the story to come through naturally. Examples of this can be seen in novels like "Oliver Twist" by Charles Dickens.

Focus on social problems and challenges: Realist writers often depict issues such as poverty, child labor, corruption and the struggles of ordinary people. By showing these problems honestly, writers encourage readers to understand and reflect on the social environment around them. Example can be "Oliver Twist" by Charles Dickens. It explores poverty and child labor, while "Germinal" by Emile Zola focuses on the harsh conditions of miners.

Charles Dickens was a famous English novelist, widely recognized as a realist writer. He focused on portraying everyday life and social issues in 19th century England. Charles Dickens wrote about ordinary people, including children and the poor, showing their struggles and moral challenges. Charles Dickens uses simple, clear language and realistic characters to depict life truthfully, which are key features of realism in literature. The novel "Oliver Twist" depicts the harsh life of poor children in 19th – century England and highlights the social problems of that time, such as poverty, crime and injustice. The main character Oliver Twist despite all hardships, remains kind, honest and steadfast. Through Oliver's story, Dickens emphasizes the importance of compassion, justice and helping the vulnerable. The work teaches that a person, even in difficult circumstances can maintain moral values and that society must fight poverty and injustice. Overall, the novel serves as a social and moral lesson, showing the need for humanity and support for the poor.

George Eliot was a prominent English novelist and one of the leading realist writers of the 19th century. She focused on portraying everyday life and human nature with honesty and psychological depth. The main character in "Silas Marner" highlights the struggles, virtues and flaws of common people, showing how personal choices interact with social conditions, which is a key feature of realism. The novel "Silas Marner" tells the story of a man who, due to betrayal and loneliness, withdraws into himself and devotes his life entirely to accumulating wealth. Having lost his sense of purpose, he becomes cut off from society. Everything changes when a little girl Eppie enters his life and he raises her as his own daughter. Through this story, George Eliot shows that true happiness and the meaning of life are found in love, family and human relationships, not in material wealth. The novel emphasizes the value of humanity, caring for others and spiritual richness over material possessions.

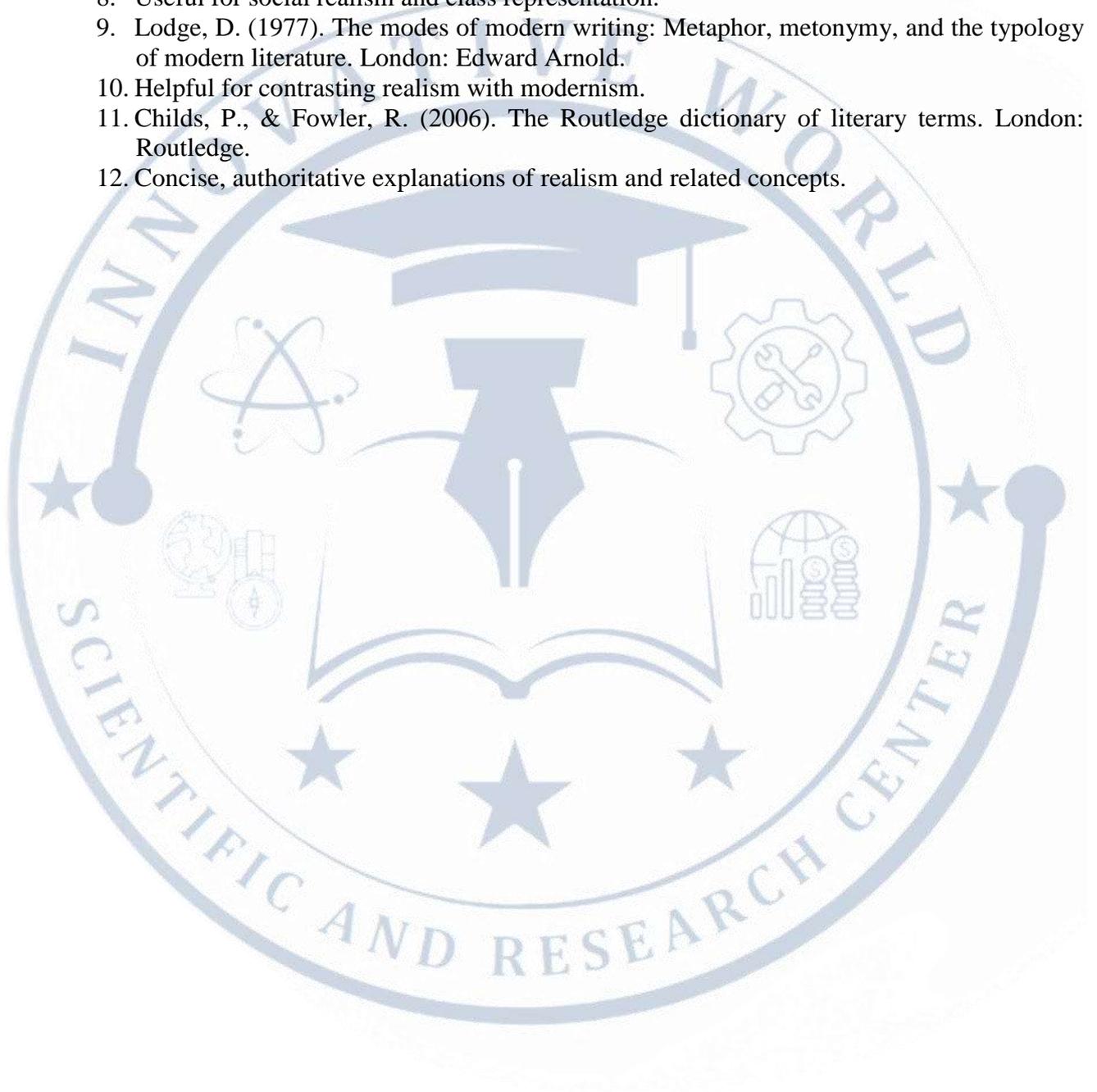
Elizabeth Gaskell was an England novelist of the Victorian age and a well-known realism writer. Wrote about real social conditions of 19th century England. Elizabeth Gaskell showed problems such as, poverty, industrialization, class conflict and injustice in a realistic way. The main character in "North and South" the work depicts the clash of two worlds the calm, traditional South of England and the industrial, rapidly developing North. The main heroine, Margaret Hale faces problems of social injustice, the harsh conditions of workers and tense relations between laborers and factory owners. Through her experiences, the author shows that understanding, tolerance and human compassion can overcome conflicts and prejudices. An important theme of the novel is not only social inequality but also the personal growth of the characters and the ability to see people as they truly are, without bias. Elizabeth Gaskell realistically portrays life in an industrial city, showing both the difficulties and hopes of people from different social classes. "North and South" teaches compassion, responsibility and respect for labor, making it relevant even today.

Realism in English literature emerged in the 19th century as a response to the idealized and emotional focus of Realism. Its main goal was to depict the truthfully and accurately, showing ordinary people and everyday situations rather than heroes, royalty or fantastical events. Realist writers emphasized plausible plots, believable characters and social environments, presenting both the positive and negative aspects of life. They often highlighted social issues such as poverty, inequality, crime and moral dilemmas, encouraging readers to reflect on society.

The language used in realist works is typically simple and clear, making the stories relatable and accessible. Authors like Charles Dickens and George Eliot created characters whose struggles, choices and emotions mirrored real human experiences, allowing readers to empathize and understand social realities. Overall, realism made literature socially relevant, morally instructive and psychologically insightful, shaping English literature into a medium for both reflection and social critique.

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