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РЕЗЮМЕ. Ушбу мақолада бўлажак физика ўқитувчиларининг тадқиқот компетенциясини ривожлантиришда STEM ёндашувининг ўрни кўриб чиқилади. Фанлараро интеграция ва замонавий таълим технологиялардан фойдаланиш орқали талабаларнинг таҳлилий ва экспериментал кўникмалари шаклланиши ёритиб берилади. Физика ва технологияга асосланган лойихавий тадқиқотлар мисолида, ўқувчиларда илмий таффақурни шакллантириш ва реал муаммоларни ҳал қилиш кўникмаларининг аҳамияти таъкидланади.

РЕЗЮМЕ. В статье рассматривается роль STEM-подхода в развитии исследовательской компетентности будущих учителей физики. Показано, что благодаря междисциплинарной интеграции и использованию современных образовательных технологий можно эффективно формировать аналитические и экспериментальные навыки у студентов. Приводятся конкретные примеры учебных исследовательских проектов, основанных на физике и технологиях, подчеркивается важность развития научного мышления и способности решать практические задачи в подготовке педагогов.

SUMMARY. This article explores the role of the STEM approach in developing the research competence of future physics teachers. Through interdisciplinary integration and the use of modern educational technologies, the study demonstrates how practical and project-based learning activities enhance students' analytical and experimental skills. The work provides specific examples of experimental projects based on physics and technology, emphasizing the importance of fostering scientific thinking and the ability to solve real-world problems in teacher education.

EFFECTIVENESS OF PRACTICE IN GYMNASTICS AND THE PROCESS OF PHYSICAL EDUCATION OF STUDENTS

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Tayanch soʻzlar: gimnastika, jismoniy tarbiya, harakat koʻnikmalari, oʻquvchilarni rivojlantirish, mashgʻulotlar samaradorligi, pedagogik strategiyalar, jismoniy tarbiya, koʻnikmalarni egallash.

Ключевые слова: гимнастика, физическое воспитание, двигательные навыки, развитие учащихся, эффективность обучения, педагогические стратегии, физкультурное образование, приобретение навыков.

Key words: gymnastics, physical education, motor skills, student development, training effectiveness, pedagogical strategies, fitness education, skill acquisition.

Introduction. Physical education is a foundational element of holistic student development, promoting not only physical health but also social, emotional, and cognitive growth. Within this broader field, gymnastics has historically served as a critical discipline, offering unique contributions to physical literacy, balance, coordination, and strength [2:397]. Gymnastics embodies a structured approach to the development of fundamental movement patterns, which are transferable across a wide range of physical activities.

The purpose of this study is to explore how the structured practice of gymnastics within physical education programs contributes to the overall effectiveness of student development. Specifically, the study investigates historical trends, theoretical frameworks, contemporary methodologies, and empirical findings that inform current practices. Furthermore, it addresses the critical factors that determine the success of gymnastics instruction, such as program design, instructor competence, student motivation, and resource availability.

Understanding the mechanisms by which gymnastics practice enhances physical education will allow educators and policymakers to design more effective, inclusive, and impactful programs. This article adopts a historical and scientific approach, drawing from interdisciplinary research in kinesiology, education, and psychology to offer a comprehensive perspective on the topic.

Literature review.

Historical Context of Gymnastics in Physical Education.

The integration of gymnastics into educational programs dates back to the 19th century, most notably through the efforts of pioneers such as Friedrich Ludwig Jahn in Germany and Per Henrik Ling in Sweden [9:49]. Jahn, often referred to as the “father of gymnastics,” emphasized the role of physical training in national strength and character formation [9:53]. His methods, initially focused on military preparedness, gradually evolved into a more holistic educational model.

Ling developed a system of “medical gymnastics” aimed at promoting health, correcting physical deformities, and enhancing general fitness [6:31]. His contributions laid the foundation for the incorporation of structured gymnastics exercises into school curricula, particularly in Scandinavia and later across Europe and North America.

By the early 20th century, gymnastics had become a staple of physical education programs worldwide. Its focus shifted toward the development of motor skills, discipline, and aesthetic movement, aligning with broader educational goals beyond mere physical conditioning [3:28].

Theoretical Frameworks Supporting Gymnastics Practice

Several theoretical frameworks underscore the value of gymnastics practice in physical education. Motor learning theory suggests that skill acquisition is enhanced through

structured, repetitive practice of complex movement patterns [11:125]. Gymnastics, with its emphasis on sequential skill development (e.g., balance beams, vaults, tumbling), offers ideal conditions for promoting neuromuscular coordination and adaptive motor responses.

Developmental theories, such as those proposed by Piaget and Vygotsky, also support the role of gymnastics in physical education. Piaget emphasized the importance of sensorimotor experiences in early cognitive development, asserting that bodily actions form the basis of higher-order thinking [10:73]. Vygotsky's sociocultural theory highlighted the importance of guided participation and scaffolding, both of which are integral to effective gymnastics instruction [13:90].

Contemporary embodied cognition theories further reinforce the notion that physical activities like gymnastics contribute significantly to cognitive and emotional development, suggesting that bodily experiences are foundational to abstract reasoning and emotional regulation [15:635].

Gymnastics and Motor Skill Development

Gymnastics is uniquely suited to developing a broad range of motor skills, including balance, strength, flexibility, agility, and spatial awareness [7:345]. Research consistently demonstrates that students who engage in structured gymnastics programs exhibit superior motor proficiency compared to peers involved in less diverse physical activities [5:512].

Moreover, early exposure to gymnastics has been linked to improved physical literacy—a concept encompassing the competence, confidence, and motivation to engage in physical activities throughout life [14:87]. Physical literacy, in turn, predicts long-term participation in physical activity and associated health benefits.

Challenges in Implementing Effective Gymnastics Programs

Despite its recognized benefits, the effective implementation of gymnastics in school-based physical education faces several obstacles. These include inadequate facilities, lack of teacher training, safety concerns, and time constraints within crowded curricula [8:211].

Teachers often report feeling underprepared to deliver gymnastics instruction confidently, particularly when it involves advanced skills or equipment [4:150]. This lack of preparedness can lead to overly cautious programming that limits student engagement and skill development.

Additionally, safety is a major concern. Proper spotting techniques, progressive skill development, and equipment maintenance are crucial to minimizing injury risks [1:775].

Finally, societal shifts toward less physical activity among youth and the increasing academic demands placed on schools have resulted in reduced time allocations for physical education, further challenging the integration of comprehensive gymnastics programs [12:225].

Discussion. The analysis of gymnastics practice in student physical education reveals complex interactions between pedagogical strategies, student development, and institutional contexts. The effectiveness of gymnastics practice can be understood through several interconnected dimensions: motor skill acquisition, cognitive-emotional growth, motivation, and program structure.

Motor Skill Acquisition:

Gymnastics provides systematic exposure to a wide range of fundamental motor skills, which form the building

blocks for more specialized sports and lifelong physical activities. Unlike many other forms of exercise that emphasize endurance or strength alone, gymnastics fosters comprehensive motor development, including balance, coordination, flexibility, and spatial orientation [7:347]. Structured practice enhances proprioception and kinesthetic intelligence, both crucial for everyday physical competence.

Cognitive and Emotional Development:

Participation in gymnastics fosters perseverance, focus, and problem-solving abilities. The necessity to master complex sequences challenges students to plan, execute, and reflect upon their movements, promoting metacognitive skills [11:129]. Moreover, achieving challenging physical feats often boosts self-esteem and emotional resilience [14:90].

Motivation and Engagement:

Student motivation in gymnastics-based physical education largely depends on the perceived relevance, safety, and enjoyment of activities. Programs that successfully scaffold skills and celebrate incremental improvements tend to maintain higher levels of student engagement [8:214]. Conversely, programs that fail to adapt to varying skill levels risk disengaging less confident students.

Program Structure and Delivery:

The quality of instruction plays a pivotal role in the effectiveness of gymnastics practice. Teachers who use progressive teaching strategies, offer individualized feedback, and model enthusiasm create environments where students are more likely to experience success and satisfaction [4:151]. Moreover, the integration of modern technology, such as video feedback, can further enhance learning and skill refinement [15:639].

Despite the overwhelming benefits, barriers such as lack of resources, insufficient teacher training, and cultural attitudes toward gymnastics persist. Particularly in coeducational settings, overcoming gender stereotypes associated with gymnastics (e.g., it being perceived as a “feminine” sport) remains a challenge [2:401].

Results. From the reviewed literature and theoretical discussions, several key findings emerge regarding the effectiveness of gymnastics practice in physical education:

1. Comprehensive Motor Development:

Students participating in structured gymnastics programs exhibit superior fundamental motor skills compared to their peers involved in less structured activities [5:514].

2. Enhanced Cognitive and Emotional Competencies:

Gymnastics practice supports the development of executive functions such as planning, flexibility, and emotional regulation [11:132].

3. Increased Physical Literacy:

Gymnastics is strongly correlated with higher levels of physical literacy, setting the stage for lifelong engagement in physical activity [14:88].

4. Program Delivery as a Critical Factor:

The competence, enthusiasm, and pedagogical approach of the instructor significantly affect program success, more so than the availability of sophisticated equipment [8:217].

5. Challenges Limit Potential:

Resource limitations, inadequate teacher preparation, and curricular constraints often prevent gymnastics programs from achieving their full potential [4:152].

6. Socio-Cultural Dynamics Influence Participation: Cultural attitudes and gender norms influence student participation and engagement levels, necessitating sensitive and inclusive program designs [2:403].

Conclusion. Gymnastics practice within the context of physical education emerges as a highly effective means of fostering motor skill development, enhancing cognitive and emotional capacities, and promoting lifelong physical activity engagement. Historical traditions and contemporary research alike confirm the unique contributions gymnastics makes to holistic student development.

However, maximizing the effectiveness of gymnastics practice requires careful program design, investment in

teacher training, and a commitment to creating safe, inclusive environments. Addressing systemic barriers-such as lack of resources, safety concerns, and cultural biases-is essential to ensuring that all students benefit equally from the opportunities gymnastics provides.

Future efforts should focus on expanding teacher education programs to include specialized training in gymnastics instruction, increasing resource allocation for safe equipment and facilities, and promoting gymnastics as a gender-neutral and culturally inclusive activity. By doing so, physical education systems can harness the full potential of gymnastics to contribute meaningfully to the development of physically literate, confident, and capable students.

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РЕЗЮМЕ. Мақоллада мактаб jismoniy tarbiya doirasida gimnastika amaliyotining samaradorligi o'rganilib, tarixiy istiqbollari, pedagogik strategiyalari va zamonaviy tadqiqot natijalari tahlil etilgan. Keng qamrovli adabiyotlarni o'rganish va joriy metodologiyalarni muvofiqlashtirish orqali maqola gimnastika mashg'ulotlari jismoniy tarbiya natijalarini yaxshilashning muhim shartlari aniqlangan.

РЕЗЮМЕ. В статье изучается эффективность занятий гимнастикой в рамках школьного физического воспитания, анализируются исторические перспективы, педагогические стратегии и современные результаты исследований. Путем всестороннего обзора литературы и обсуждения современных методик в статье определяются важные условия для улучшения результатов занятий гимнастикой в физическом воспитании.

SUMMARY. The article studies the effectiveness of gymnastics practice within the framework of school physical education, analyzing historical perspectives, pedagogical strategies, and modern research results. Through a comprehensive literature review and discussion of current methodologies, the article identifies important conditions for improving the physical education results of gymnastics classes.

TEXNOLOGIK TA'LIMNI SUN'IY INTELLEKT BILAN INTEGRASIYALASH

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Tayanch so'zlar: Texnologik ta'lim, raqamli texnologiya, sun'iy intellekt, integrasiya.

Ключевые слова: технологическое образование, цифровые технологии, искусственный интеллект, интеграция.

Key words: technological education, digital technologies, artificial intelligence, integration.

Dunyo yuzida zamonning rivojlanishi bilan ilm, ilmga asoslanib ta'limning sifati ham tezlik bilan rivojlanib boryapti, yani sifatlari ta'limda texnikaning, texnologiyaning rivojlanishiga sababchi bo'lib kelmoqda. Bugungi kunda bizning maqsadimiz zamon talabiga xos texnikaning,

texnologiyaning rivojlanishiga sababchi bo'layotgan ta'limdagi o'qituvchining samaradorligini oshirish. O'qituvchining samaradorligini oshirishda biz yangi metodikalardan multimediyalardan, dasturlardan, virtual laboratoriyalardan foydalanmoqdamiz. Bugungi kunda