ISSN: 3060-4613

MAKTABGACHA VA MAKTAB TA'LIMI VAZIRLIGI

O'zbekiston Milliy Pedagogika Universiteti

№6(7)
2026

13.00.00 Pedagogika fanlari
13.00.01 Pedagogika nazariyasi. Pedagogik ta'limotlar tarixi
13.00.02 Ta'lim va tarbiya nazariyasi va metodikasi (sohalar bo'yicha)
13.00.03 Maxsus pedagogika
13.00.04 Jismoniy tarbiya va sport mashg'ulotlari nazariyasi va metodikasi
13.00.05 Kasb-hunar ta'limi nazariyasi va metodikasi
13.00.06 Elektron ta'lim nazariyasi va metodikasi (ta'lim sohalari va bosqichlari bo'yicha)
13.00.07 Ta'limda menejment
13.00.08 Maktabgacha ta'lim va tarbiya nazariyasi va metodikasi
13.00.09 Ijtimoiy pedagogika
07.00.00 Tarix fanlari
19.00.00 Psixologiya fanlari
01.00.00 Fizika-matematika fanlari
02.00.00 Kimyo fanlari
03.00.00 Biologiya fanlari
09.00.00 Falsafa fanlari
10.00.00 Filologiya fanlari
11.00.00 Geografiya fanlari

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Pedagogika, psixologiya fanlariga ixtisoslashgan ilmiy jurnal

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Elektron nashr. 282 sahifa,
27-iyun, 2026-yil.

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Pedagogika fanlari bo'yicha: OAK Kengashi tavsiyasi (26.08.2024-y., №11-05-4381/01) asosida:
• Ekspert kengashi (29.10.2024-y., №10)
• Rayosat qarori (31.10.2024-y., №363/5)
Psixologiya fanlari bo'yicha: Toshkent davlat pedagogika universiteti murojaatiga asosan OAK tavsiyasi (24.04.2025-y., №11-05-2566/01):
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"Maktabgacha va maktab ta'limi" jurnali

26.09.2023-yildan

O'zbekiston Respublikasi Prezidenti Administratsiyasi huzuridagi Axborot va ommaviy kommunikatsiyalar agentligi tomonidan **№C-5669363** reyestr raqami tartibi bo'yicha ro'yxatdan o'tkazilgan.

Litsenziya raqami: **№136361**

MUNDARIJA CONTENTS СОДЕРЖАНИЕ

MUNDARIJA

Muqobil energiya manbalarida yarimo'tkazgichlar fizikasi: quyosh panellarining foydali ish koeffitsiyentini oshirish muammolari 10
Abdullajonova Bashorat Olim qizi

Xavfsizlik tuyg'usinining psixologik mazmuni 13
Bahodirova Marhaboxon Tohirjon qizi

Maktabgacha yoshdagi bolalarda muloqot madaniyatini rivojlantirishning innovatsion pedagogik texnologiyalari: kompetensiyaviy yondashuv asosida 17
Boybo'riyeva Saodat O'ralovna

Tasviriy san'at fanlarini o'qitishda raqamli texnologiyalardan foydalanishning pedagogik imkoniyatlari 21
Ergasheva Go'zal Ruzimurod qizi

Kurash sportida innovatsion mashg'ulot texnologiyalaridan foydalanishning ilmiy-pedagogik asoslari 26
Madumarov Jahongir Urinbayevich

O'quvchilarning texnik tafakkurini rivojlantirishda steam texnologiyalarining o'rni va roli 29
Yo'ldoshev Mirjalol Qosim o'g'li

Sun'iy intellekt vositalarining bo'lajak o'qituvchilar diagnostik kompetentligini rivojlantirishdagi imkoniyatlari 33
Teshaboyev Akramjon Yuldashevich

O'qituvchi va talabalar o'rtasidagi kommunikativ o'zaro ta'sir 39
Turdibekova Risolat Shermatovna

6–7 yoshli bolalarni savodga tayyorlashda didaktik kartochkalar asosidagi leksik o'yinlarning ahamiyati 42
Tursunova Durdona

Yengil atletika mashg'ulotlarida zamonaviy ilmiy yondashuvlar: maktab o'quvchilarining jismoniy tayyorgarligi va sport natijalari 46
Xalmirzayev Azizillo Nabijonovich

Veb-kvest" va "Til portfeli" texnologiyalarini bir butun integrativ model asosida o'quv mashg'ulotlarida qo'llanilishi 49
Yusupova Muxabbat Anatolevna

Содержание личностно-ориентированного образования и его роль в процессе самостоятельной подготовки студентов 53
Рысова Галия Байбулатовна

Improving the Methodology for Teaching Lexical and Grammatical Transformations in the Translation of Literary Texts 57
Asadova Zebiniso Makhmudovna

Oliy ta'lim muassasalarida pedagogik innovatsiyalarni joriy etish orqali ta'lim sifatini oshirish mexanizmlari 62
Beketov Nurseit Alijan o'g'li

Oliy ta'lim muassasalarida boksni o'qitish metodikasini takomillashtirish 67
Rustamova Zuhro Sanjar qizi

Bo'lajak o'qituvchilarni innovatsion yondashuv asosida o'qish darslari samaradorligini metodik takomillashtirishga tayyorlashning pedagogik imkoniyatlari 71
To'ychiyeva Zulfiyaxon Abdulxoliq qizi

Mehrli maktabda shaxsga yo'naltirilgan ta'lim orqali bolalarning ijtimoiy faolligini oshirish mexanizmlari 76
Tursunova Dildora Ziyadullayevna

Kasbiy fanlar integratsiyasiga asoslangan dasturiy ta'minot vositasida filologiya yo'nalishi talabalarining axborot kompetentliligini rivojlantirish metodikasi 79
Yakubov Baxtiyor Baxriddin o'g'li

Ta'lim klasterlari faoliyatini avtomatlashtirish va monitoring qilish tizimini joriy etish 83
M. Badalova

Нравственное воспитание студентов средствами русской классической литературы: современные педагогические подходы 86
Родина Ирина Витальевна

Bo'lajak tibbiyot xodimlarining kasbiy identikligini shakllantirishda psixologik diagnostika va rivojlantiruvchi yondashuvlar 91
Feruza Tohirova

Tarbiya fanini o'qitish jarayonida xalq pedagogikasidan foydalanishning pedagogik imkoniyatlari 99
Islomova Mushtaribonu Akram qizi

Boshlang'ich sinf matematika darslarida multimedia vositalaridan foydalanishning pedagogik imkoniyatlari 104
Nafisa Tuxtasinova

Shaxsiy kreativ kompetentlikni rivojlantirishning metodik imkoniyatlari 108
To'xtasinov Dadaxon Farxodovich, Nafisa Tuxtasinova

Zamonaviy ta'lim oluvchilarni milliy iftixor ruhida tarbiyalashning yangicha yondashuvi 113
Xudayberdiev Inom Xasanovich

Yoshlar oilalarda ekologik madaniyati rivojlanishida turar joy muhiti va gender yondashuvlarining ahamiyati 117
Yusupova Muhabbatxon Abdulajon qizi

Boshlang'ich sinf o'quvchilariga tabiiy fanlarni o'qitish jarayonida O'simliklar mavzusini o'rgatish metodikasi 122
Normurotova Aziza Karim qizi, Fattoyeva O'g'iloy Ashurqulovna

Inklyuziv ta'lim o'quvchilarining yozuv ko'nikmalarini rivojlantirishda robototexnika asosidagi assistiv texnologiyalar - "Power band" va "Quvvat qo'lqop" samaradorligi 127
Alimardanova Sitora Ikrom qizi, To'rayev Rasul Nortojiyevich

Yoshlarda sog'lom turmush tarzini shakllantirishda sport mashg'ulotlarining innovatsion ahamiyati 133
Aminov Botir Umidovich

Bo'lajak texnologiya fani o'qituvchilarining nutq madaniyatini rivojlantirish 138
Saydanova Dilafruz Sadirdinovna

Ilmiy-tadqiqotchi ayollarda akademik o'zlik shakllanishi: O'zbekiston sharoitida motivatsion omillar va ijtimoiy-pedagogik aralashuv zarurati 142
Egamqulova Iroda Safar qizi

Texnika oliygohlarida nogironligi mavjud talabalarning ilmiy kompetentligini rivojlantirish uchun "Adaptiv tadqiqot" interaktiv metodini ishlab chiqish 148
Gimayeva Liliya Maskurovna

Maktab boshqaruvida raqamli monitoring va tahlil tizimlaridan foydalanishning pedagogik samaradorligi ... 153
Imamaliyev Ulugbek Turapbayevich

Onlayn qimor o'yinlariga tobe bo'lgan harbiy xizmatchilar bilan psixokorreksiya ishlarini olib borish tartibi .. 157
Olimov Azamat Qahramon o'g'li

Rusiyzabon o'quvchilarning o'zbekcha bog'lanishli nutqini o'stirishda mashqlarning o'rni 163
Salisheva Zilola Ismoilovna

Xorijiy mamlakatlar tajribasida raqamli ta'lim va raqamli savodxonlikni rivojlantirishning nazariy asoslari.... 169
Toshpulatova Niyoxon Shavkatjon qizi

Ko'p madaniyatli kompetensiyani rivojlantirish modelini amalga oshirishning tashkiliy va pedagogik mexanizmlari va kutilgan natijalari 174
Vasilyeva Elmira Raisovna

The Specifics of the Formation of Systems Thinking in Technical Education, Methods and Means of Development 178
Yusupova Liliya Fanovna

Individual yondashuv asosida ko'zi ojiz o'quvchilar uchun individual rivojlanish xaritasini ishlab chiqish metodikasi 183
Abdullayev Oybek Alisher o'g'li

MUNDARIJA СОДЕРЖАНИЕ CONTENTS

Yaqin masofalarga yugurishda o‘quvchilarning motivatsiyasini oshirish usullari 190
Abduqahhorov Nuriddin Xabibulloyevich

Darslik yozish mas’uliyati 194
Ahmadova Mahbuba Shavkat qizi

Mobil ta’lim texnologiyalari vositalari yordamida darslarni tashkil etish metodikasini takomillashtirish 198
Mamasoliyev Akmaljon Azizjon o‘g‘li

Yengil atletika qisqa masofaga yugurish turini o‘rgatishda bosqichma-bosqich tayyorlash metodikasi 202
Omonov Shohrux Orzimurot o‘g‘li

Abdulla Avloniyning o‘zbek tamaddunidagi o‘rni xususida ba’zi mulohazalar 206
Tasbolatova Yeliza Yesey qizi

The Relationship Between Students’ Learning Motivation and Academic Procrastination 209
Odilbekov Mansurbek Maxmudjon ugli

“Beg‘uborlik ovozi” va o‘zini namoyon etish makoni 215
Q. M. Ibadullayev

Формирование лингвокультурологи-ческой компетенции иноязычных студентов в цифровой образовательной среде 219
Наталья Николаевна Розикова

Criteria, Indicators, and Levels for Developing Pre-Service EFL Teachers’ Auditive Competence 223
Alibekova Mahzuna Alisher kizi

Summary of the Cell Elements in Dental Science 229
Ruziyeva Kamola Akhtamovna

A Customised Method for Treating Generalised Periodontitis and Predicting Cardiovascular Problems Using Salivary Proteomic Profiling 234
Shodiev O. U., Nazarova N. Sh., Agababyan I. R.

Avtomobilsozlik yo‘nalishi talabalarida kommunikativ kompetensiyani raqamli texnologiyalar orqali rivojlantirish 239
G. Sh. Doniyorova

Imkoniyati cheklangan bolalar uchun jismoniy tarbiya mashg‘ulotlarini tashkil etish xususiyatlari 242
Dusanov Shuxrat Abdiraakovich

Ijro etuvchi funksiyalar buzilishi va diqqat-yetishmasligi giperaktivlik buzilishi (DEHB): Barkli yondashuvi ... 246
Otbasarova Umida Mexmonovna, Inogamova Rano Bahodirovna

Raqamli texnologiyalardan foydalanishda o‘qituvchilarning kasbiy tayyorgarligini takomillashtirish yo‘llari .. 248
Abdullayev Sherzodbek

Maktabgacha yoshdagi bolalarda “Hard Skills” va “Soft Skills” integratsiyasini ta’minlashning pedagogik-psixologik tizimi 251
Xolmatova Dilshoda Sherali qizi

Iqtidorli yoshlarni qo‘llab-quvvatlashning zamonaviy mexanizmlari 258
Djumabayeva Janar Muratbayevna

O‘zini o‘zi tashkil etishni rivojlantirish pedagogik texnologiyasi 262
Jo‘rayeva Gulxayo Sabirovna

Raqamli va kasbiy kompetensiyani shakllantirish tamoyillari: zamonaviy pedagogik modellar qiyosiy tahlili misolida 265
Kulidjanova Yulduzxon Inomjon qizi

Qoraqalpoq prozasining psixologik paradigmasi 269
Dosbergenova Miyrigul Sadiratdinovna

The Relationship Between the Characteristics of Systematic, Logical and Creative Thinking in Students (Based on the Example of 7th–9th Grade Pupils) 273
Samarova Shoxista Rabidjanovna

THE RELATIONSHIP BETWEEN THE CHARACTERISTICS OF SYSTEMATIC, LOGICAL AND CREATIVE THINKING IN STUDENTS (BASED ON THE EXAMPLE OF 7TH–9TH GRADE PUPILS)

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Abstract: This article provides a theoretical and practical analysis of the interrelationship between systematic, logical, and creative thinking among students in Grades 7-9. The study explores the key stages of cognitive development during adolescence, with particular emphasis on the formation of abstract thinking, logical reasoning, and creative problem-solving skills. The findings substantiate the positive contribution of systematic thinking to students' academic performance, as well as the role of logical thinking in enhancing decision-making and analytical abilities.

In addition, the study highlights the importance of creative thinking in fostering imagination, innovation, and independent idea generation. Furthermore, it describes the pedagogical and psychological conditions, together with effective instructional strategies, for integrating these three modes of thinking into the educational process. The findings offer both theoretical insights and practical implications for educators, school psychologists, and educational practitioners.

Key words: systematic thinking, logical thinking, creative thinking, cognitive development, adolescence, problem-solving, critical thinking, independent thinking, academic performance, pedagogical strategies, educational process, Grades 7 - students.

Annotatsiya: Mazkur maqolada 7-9-sinf o'quvchilarida tizimli, mantiqiy va kreativ tafakkur xususiyatlarining o'zaro bog'liqligi nazariy hamda amaliy jihatdan tahlil qilingan. Tadqiqotda o'smirlik davrida kognitiv rivojlanishning muhim bosqichlari, xususan, abstrakt tafakkur, mantiqiy tahlil hamda ijodiy muammolarni hal etish ko'nikmalarining shakllanishi yoritilgan. Tizimli tafakkurning o'quvchilarning o'quv faoliyati samaradorligini oshirishdagi, mantiqiy tafakkurning esa qaror qabul qilish va analitik ko'nikmalarni rivojlantirishdagi ahamiyati asoslab berilgan.

Shuningdek, kreativ tafakkurning tasavvur, innovatsion yondashuv va mustaqil g'oyalar yaratishni rivojlantirishdagi o'rni ochib berilgan. Bundan tashqari, ta'lim jarayonida ushbu uch turdagi tafakkurni integratsiyalashga xizmat qiluvchi pedagogik va psixologik shart-sharoitlar hamda samarali o'qitish strategiyalari tavsiflangan. Tadqiqot natijalari pedagoglar, amaliyotchi psixologlar va umumiy o'rta ta'lim muassasalari mutaxassislari uchun nazariy hamda amaliy ahamiyatga ega.

Kalit so'zlar: tizimli tafakkur, mantiqiy tafakkur, kreativ tafakkur, kognitiv rivojlanish, o'smirlik davri, muammolarni hal etish, tanqidiy tafakkur, mustaqil fikrlash, o'quv faoliyati samaradorligi, pedagogik strategiyalar, ta'lim jarayoni, 7-9-sinf o'quvchilari.

Аннотация: В статье представлен теоретический и практический анализ взаимосвязи системного, логического и креативного мышления учащихся 7-9-х классов. Рассмотрены основные этапы когнитивного развития подростков, включая формирование абстрактного мышления, логического анализа и навыков творческого решения проблем. Обосновано положительное влияние системного мышления на успешность учебной деятельности, а также роль логического мышления в развитии аналитических способностей и навыков принятия решений.

Показано значение креативного мышления в развитии воображения, инновационного подхода и способности к самостоятельному генерированию идей. Кроме того, описаны педагогические и психологические условия, а также эффективные стратегии обучения, обеспечивающие интеграцию данных видов мышления в образовательный процесс. Полученные результаты имеют теоретическую и практическую значимость для педагогов, практических психологов и специалистов системы общего среднего образования.

Ключевые слова: системное мышление, логическое мышление, креативное мышление, когнитивное развитие, подростковый возраст, решение проблем, критическое мышление, самостоятельное мышление, успешность учебной деятельности, педагогические стратегии, образовательный процесс, учащиеся 7-9-х классов.

INTRODUCTION

Understanding the interplay between systematic, logical, and creative thinking is essential for fostering comprehensive educational experiences, particularly among students in Grades 7–9. These cognitive characteristics significantly influence how learners approach problem-solving and engage with various academic disciplines, including mathematics, science, language, and the arts. As educators seek to develop students' higher-order thinking skills, it has become increasingly evident that these cognitive styles have a substantial impact on learning outcomes and academic achievement.

Recent studies indicate that creative thinking, although frequently underemphasized in traditional pedagogical practices, plays a pivotal role in effective learning, innovation, and knowledge construction. This highlights the need for more inclusive teaching approaches that accommodate diverse cognitive characteristics and promote students' intellectual potential (Rahayuningsih S. et al., 2023). The interrelationship among systematic, logical, and creative thinking can be effectively illustrated through conceptual and visual frameworks that demonstrate the connections between different modes of thinking and their implications for educational practice.

LITERATURE REVIEW

Definition and Importance of Systematic, Logical, and Creative Thinking in Education

Within the contemporary educational landscape, fostering systematic, logical, and creative thinking has become a fundamental objective in preparing students with the competencies required for academic and professional success. Systematic thinking enables learners to approach problems in a structured and organized manner, whereas logical thinking develops reasoning, analytical abilities, and evidence-based decision-making skills. Creative thinking, in turn, encourages innovation, originality, and the ability to generate novel solutions to complex problems.

The integration of these cognitive styles is particularly important during middle school education, as students transition toward more advanced cognitive tasks requiring the simultaneous application of analytical, systematic, and creative thinking. Previous research has demonstrated that student-centered instruction, interdisciplinary learning, and the effective integration of educational technologies significantly enhance the development of these cognitive abilities (Xazratovich Q. D., 2024). Such learning environments promote active student engagement, broaden problem-solving strategies, improve academic achievement, and better prepare learners for future educational and professional challenges (Rahayuningsih S. et al., 2023). Conceptual models illustrating the interaction among these thinking styles further emphasize the importance of interdisciplinary approaches in promoting systematic, logical, and creative thinking within educational settings.

Cognitive Development of Students in Grades 7-9

Students in Grades 7-9 experience a critical stage of cognitive development characterized by substantial changes in their thinking processes. During adolescence, learners gradually develop the capacity for abstract thinking, enabling them to engage more effectively in systematic reasoning and logical analysis. This stage of cognitive maturation provides the foundation for higher-order thinking skills, including the abilities to analyze, evaluate, synthesize, and interpret information critically.

As students become increasingly capable of identifying relationships among concepts, their creative thinking skills also develop, allowing them to produce innovative ideas and generate effective solutions to

complex problems. Contemporary theoretical frameworks on creativity emphasize that systematic and creative thinking should be developed simultaneously to maximize students' cognitive potential (Heard J. et al., 2025).

Moreover, learner-centered educational approaches encourage greater student participation in the learning process, enhance motivation, and contribute positively to academic achievement (Rahayuningsih S. et al., 2023). Therefore, understanding the cognitive characteristics of students in Grades 7-9 is essential for designing effective pedagogical strategies that support the balanced development of systematic, logical, and creative thinking.

RESEARCH METHODOLOGY

Cognitive development benchmarks for 7th to 9th grade students

Cognitive ability level	Age range (years)
Concrete Operational	7-11
Formal Operational	12+
Increased Attention Span	9-11
Abstract Thinking	12-15

Characteristics of systematic thinking

Systematic thinking is characterized by a methodical approach to problem-solving, emphasizing organization, critical analysis, and the ability to synthesize information effectively. This cognitive process enables students to dissect complex problems into manageable components, allowing for structured solutions. Such thinking is integral to the learning process, particularly when engaging with subjects such as mathematics and the sciences, where logical sequencing is crucial. For instance, as indicated in recent studies, implementing guided inquiry learning (GIL) and problem-based learning (PBL) models significantly enhances students' systematic thinking abilities, promoting deeper cognitive engagement in learning tasks (Rahayuningsih S et al., 2023). Furthermore, systematic thinkers tend to exhibit greater persistence in navigating challenging queries, demonstrating that their thought processes are not only analytical but also resilient (Palupi BS et al., 2020). This intersection of systematic thought with various learning methodologies underscores its critical role in fostering logical reasoning and creative problem-solving, essential attributes for academic success among 7th to 9th-grade students. The diagram outlining program logic models captures the essence of structured evaluation, thereby reinforcing the significance of systematic thinking in educational contexts.

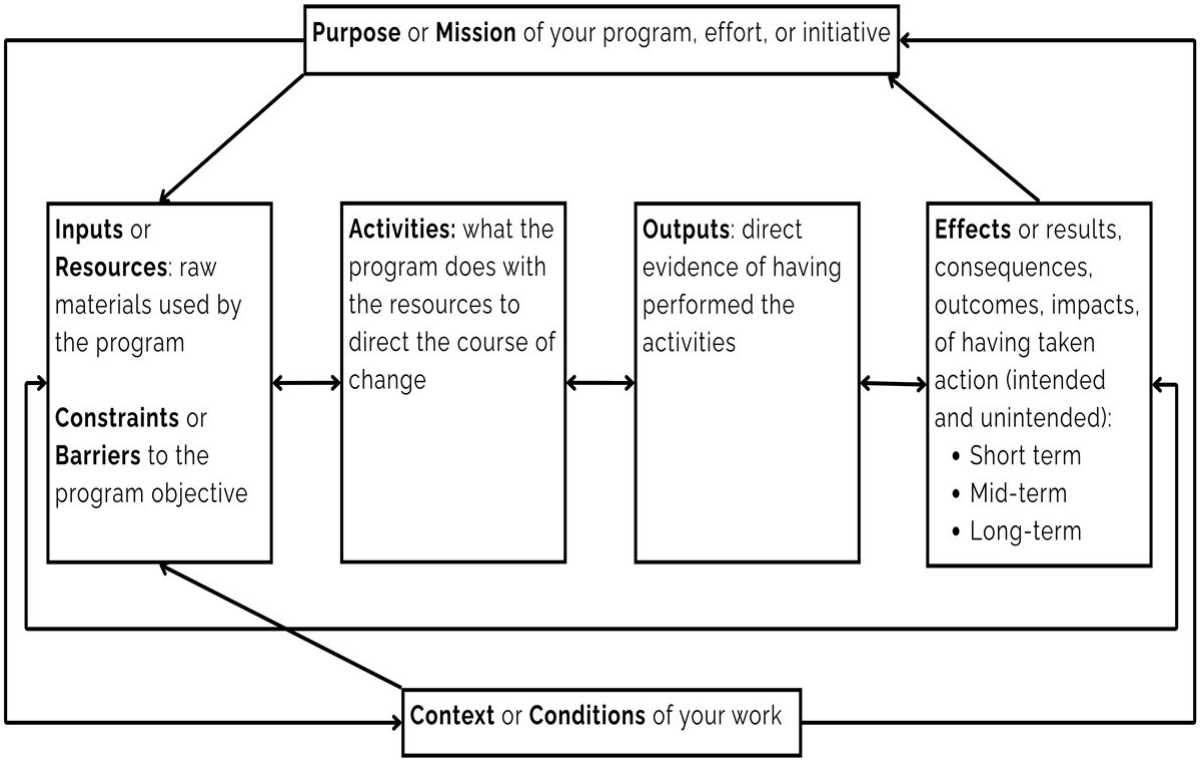


Image1: **Program logic model: components of program evaluation**

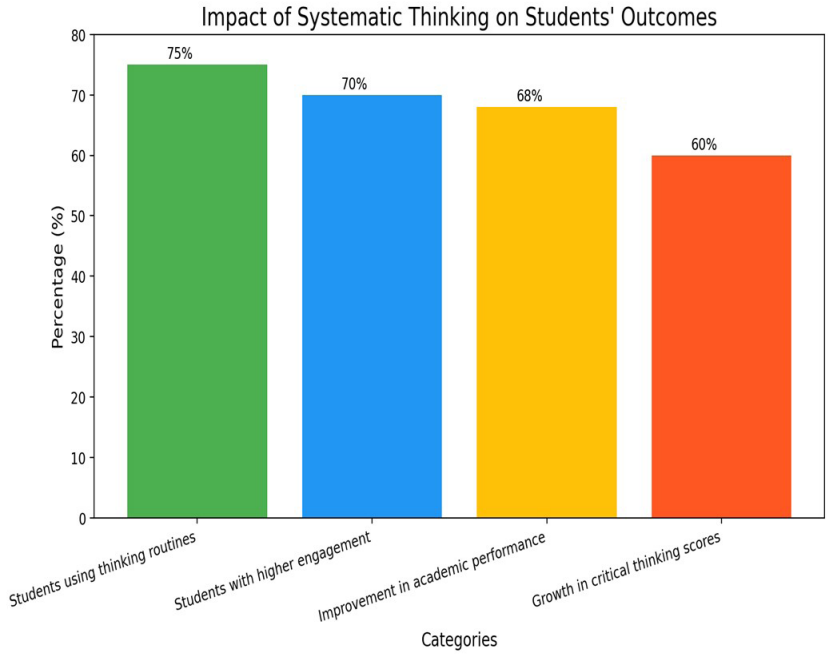
MAKTAB TA'LIMI SCHOOL EDUCATION ШКОЛЬНОЕ ОБРАЗОВАНИЕ

Structure and organization in student thought processes

Establishing a learning environment that promotes experimentation and collaboration enhances students' critical thinking skills, thereby enriching their overall educational experience (Dr. M K Hamza et al., 2006). Such environments not only aid in conceptual understanding but also nurture creative competencies essential for problem-solving across various disciplines. The visual representation of these interconnections can be further elucidated through, as it illustrates the convergence of different thinking methodologies in an educational context.

Role of systematic thinking in academic performance

Systematic thinking plays a crucial role in enhancing academic performance, particularly among middle school students in grades seven to nine. Systematic thinking not only aids in logical reasoning but also complements creative thinking; students with a robust framework for systematic inquiry often exhibit higher levels of engagement and inquiry-based learning behaviors (Palupi BS et al., 2020). Consequently, the interplay between systematic and creative thinking forms a foundation for students to excel academically, emphasizing the necessity of these skills in educational environments.



This bar chart illustrates the positive impact of systematic thinking strategies on students' academic outcomes.

Characteristics of logical thinking

Logical thinking represents a critical cognitive skill that enables students to analyze and synthesize information effectively within the learning process. This characteristic manifests through various attributes such as problem-solving, reasoning, and the ability to discern relationships among concepts. In the context of 7th to 9th grade pupils, logical thinking serves as a foundation for academic success, particularly in subjects like mathematics and science where structured reasoning is essential. The integration of logical thinking with systematic and creative methodologies fosters a comprehensive approach to education, enhancing students' problem-solving capabilities and innovation. To explore how logical thinking is developed, we might consider the findings from studies indicating that creative thinking significantly influences learning outcomes when appropriate pedagogical techniques are employed (Rahayuningsih S et al., 2023). This multifaceted approach is vital for nurturing well-rounded learners. To visually enrich this discussion, effectively illustrates the systematic evaluation of activities and outcomes, emphasizing the importance of structured logical thinking in educational settings.

Reasoning skills and problem-solving abilities

To enhance reasoning skills and problem-solving abilities among students, it is crucial to implement instructional strategies that foster systematic, logical, and creative thinking. Educators must recognize that reasoning encompasses various cognitive processes, which, when honed effectively, can lead to improved problem-solving outcomes. Systematic thinking allows students to approach problems methodically, while

logical thinking helps them analyze data and formulate conclusions. Conversely, creative thinking encourages the exploration of multiple solutions, promoting innovation in problem-solving. Furthermore, mentoring teachers who exhibit exemplary instructional practices can facilitate the development of these essential skills (Dr. M K Hamza et al., 2006). As demonstrated in, structured analysis frameworks-highlighting activities, outputs, and outcomes-can further support students in understanding how their reasoning skills translate to successful problem-solving scenarios. Integrating these approaches comprehensively lays a foundational pathway for effective learning among pupils in grades seven to nine.

Figure 4.3. Monitoring and vertical logic

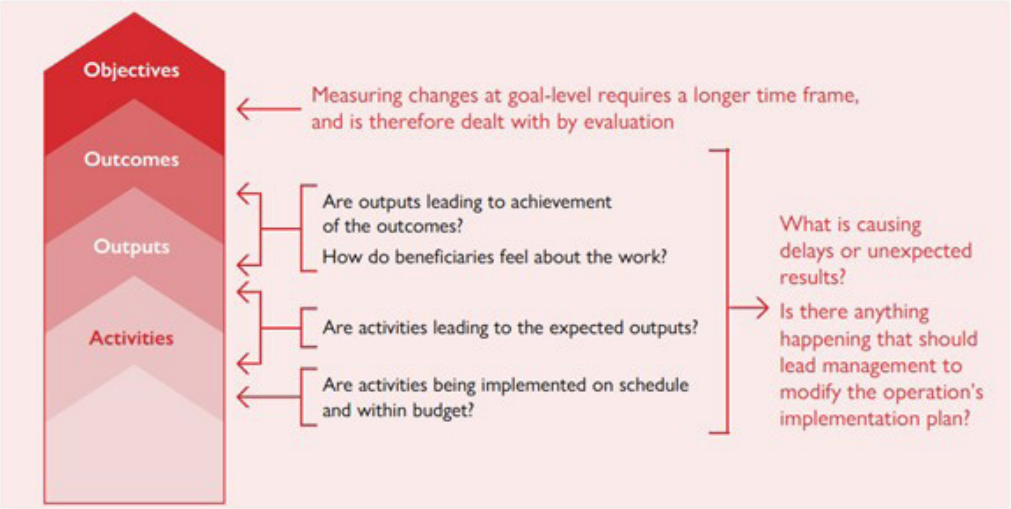
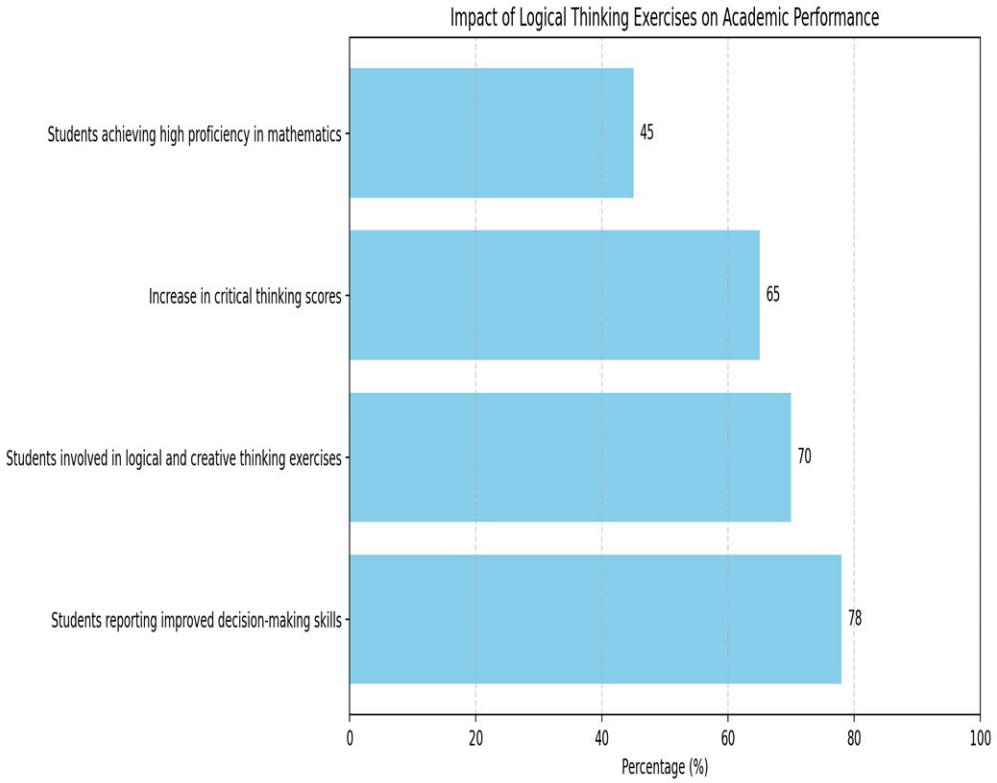


Image2: **Illustration of monitoring and evaluation framework**

ANALYSIS AND RESULTS

Influence of logical thinking on decision making and analysis



This chart illustrates the positive impact of logical thinking exercises on students' decision-making and academic performance.

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Logical thinking plays a pivotal role in decision making and analysis, particularly within the educational context of systematic, logical, and creative thinking among middle school students. This form of thinking allows individuals to evaluate situations critically and draw reasoned conclusions, fostering effective problem-solving capabilities. The development of logical thinking skills can significantly influence students' ability to analyze information, as evidenced by findings that demonstrate how structured learning environments enhance cognitive functions related to decision making (Rahayuningsih S et al., 2023). Consequently, integrating logical thinking into educational practices not only enriches students' analytical abilities but also encourages a holistic approach to problem-solving, paving the way for improved decision-making skills among young learners.

Characteristics of creative thinking

Creative thinking encompasses several distinct characteristics that significantly contribute to educational development, particularly among middle school students. This cognitive process involves generating novel ideas, experimenting with these ideas, and critically evaluating their quality, thereby fostering an environment of curiosity and innovation (Heard J et al., 2025). Students who engage in creative thinking also exhibit resilience and adaptability, qualities essential for navigating complex problem-solving scenarios. As the educational landscape becomes increasingly interconnected, understanding these characteristics enhances not only individual student capabilities but also the collective learning experience within the classroom. Incorporating visual aids, such as diagrams that represent these relationships, can elucidate these dynamics further, offering tangible insights into the interplay of systematic, logical, and creative thinking in educational settings .

Image3: **Interrelationship of computational thinking, design thinking, and game design in research**

Imagination and innovation in student ideas

Imagination serves as a cornerstone for innovation in student ideas, particularly within the context of middle school education. As students in the 7th to 9th grades begin to intertwine systematic and logical thinking with their innate creativity, they are better positioned to propose original solutions to complex problems. This integration fosters an environment where inventive ideas flourish, as evidenced in various educational research frameworks that emphasize creative thinking processes such as idea generation, experimentation, and quality assessment (Heard J et al., 2025). Furthermore, implementation of imaginative teaching methodologies, like the Imagination Suggestion method, has shown to significantly enhance students' creative capabilities and engagement across subjects traditionally seen as rigid, such as mathematics and science (Alfiansyah A, 2024). The dynamic interplay between these cognitive traits not only facilitates individual student growth but also cultivates a collaborative learning atmosphere that champions innovative thought, thereby equipping students with essential skills for their future endeavors. The image presented in effectively encapsulates this relationship by visually demonstrating the components that contribute to the development of creative thinking within educational contexts.

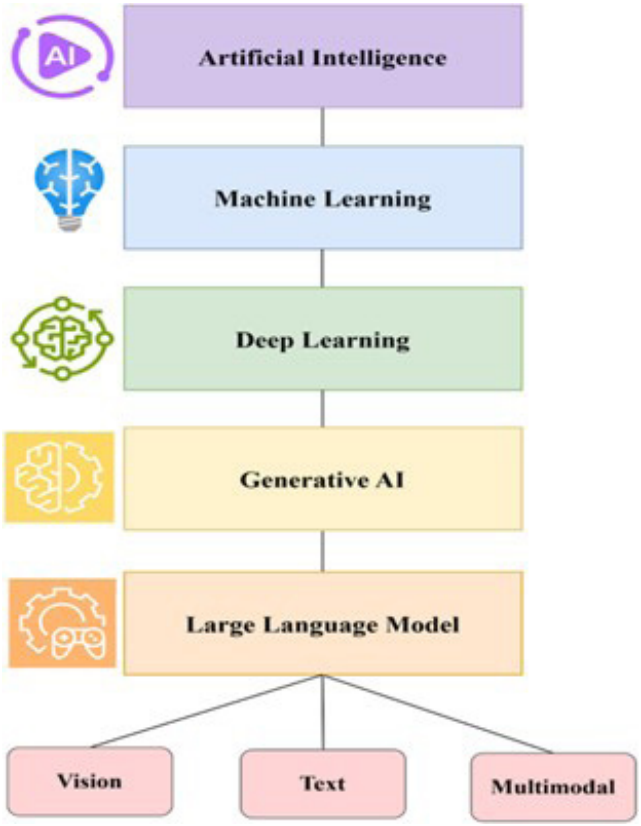

Image4: **Hierarchical structure of artificial intelligence concepts**

CONCLUSION

In conclusion, the exploration of systematic, logical, and creative thinking within the context of 7th to 9th grade students reveals crucial interdependencies that shape their educational experiences. Through the integration of diverse instructional strategies, educators can enhance students' cognitive development and problem-solving abilities. As evidenced by studies, factors such as learning models, teaching materials, and non-cognitive influences significantly affect creative thinking capabilities, underscoring the need for a multi-faceted approach to pedagogy (Rahayuningsih S et al., 2023). Moreover, visual representations, such as the interconnected concepts depicted in, provide a comprehensive understanding of how these thinking styles converge to foster innovation and critical analysis. Recognizing and nurturing these relationships will ultimately support students in becoming adept thinkers, equipped to navigate an increasingly complex world.

Interrelationship between systematic, logical, and creative thinking

The interplay among systematic, logical, and creative thinking constitutes a crucial element in the development of critical cognitive skills among students, particularly those in the 7th to 9th grades. Systematic thinking provides a structured framework that facilitates the logical sequencing of ideas, thereby enabling students to understand complex concepts. This foundation fosters logical reasoning, where students can analyze and evaluate information methodically to reach sound conclusions. Concurrently, creative thinking encourages students to explore unconventional approaches to problem-solving, leading to innovative solutions that transcend rigid frameworks. By harmonizing these cognitive styles, students cultivate a comprehensive skill set that equips them to navigate academic challenges effectively. Underscoring the importance of fostering an education environment that promotes an integrative approach (Dr. M K Hamza et al., 2006). This dynamic cognitive synergy is vital for long-term academic success.

Implications for teaching strategies and student development

Effective teaching strategies that nurture systematic, logical, and creative thinking are essential for promoting holistic student development in middle school classrooms. By implementing pedagogical frameworks that integrate these thinking styles, educators can enhance students' cognitive flexibility and problem-solving skills, preparing them for complex future challenges. For instance, a robust creative thinking skill development framework emphasizes generating, experimenting with, and evaluating ideas underpins essential

learning processes, promoting not only creativity but also logical reasoning (Heard J et al., 2025). Additionally, adopting a mixed-methods approach, as demonstrated in research exploring children's creative processes through coding, illustrates the benefits of active and learner-centered environments (Rahayuningsih S et al., 2023). Thus, the alignment of teaching methods with these cognitive attributes can significantly contribute to the educational success and personal growth of 7th to 9th-grade pupils, fostering a more adaptable and innovative generation. In this context, provides a visual representation of this integrated approach to learning, illustrating the dynamic relationships among computational thinking, design thinking, and game design.

Image 6: **Interconnected framework of computational thinking, design thinking, and game design.**

Teaching strategies for enhancing critical and creative thinking in students

Strategy	Effectiveness (%)
Project-Based Learning	91.90
Collaborative Learning	78.25
Socratic Questioning	70.50
Inquiry-Based Learning	80.00

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13.00.00 Pedagogika fanlari
13.00.01 Pedagogika nazariyasi. Pedagogik ta’limotlar tarixi
13.00.02 Ta’lim va tarbiya nazariyasi va metodikasi (sohalar bo‘yicha)
13.00.03 Maxsus pedagogika
13.00.04 Jismoniy tarbiya va sport mashg‘ulotlari nazariyasi va metodikasi
13.00.05 Kasb-hunar ta’limi nazariyasi va metodikasi
13.00.06 Elektron ta’lim nazariyasi va metodikasi (ta’lim sohalari va bosqichlari bo‘yicha)
13.00.07 Ta’limda menejment
13.00.08 Maktabgacha ta’lim va tarbiya nazariyasi va metodikasi
13.00.09 Ijtimoiy pedagogika
07.00.00 Tarix fanlari
19.00.00 Psixologiya fanlari
01.00.00 Fizika-matematika fanlari
02.00.00 Kimyo fanlari
03.00.00 Biologiya fanlari
09.00.00 Falsafa fanlari
10.00.00 Filologiya fanlari
11.00.00 Geografiya fanlari

MAKTABGACHA VA MAKTAB TA’LIMI

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2026. №6(7)

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