

## METHODOLOGY FOR DEVELOPING THE INTELLIGENCE OF FUTURE PRIMARY SCHOOL TEACHERS BASED ON CRITICAL THINKING USING THE 4K MODEL

Pardaboyeva Dilnoza Gaybullakizi, Alimova Dilorom Xudoykulovna, Abdiyeva Koysintosh Azadovna

Tashkent University of Applied Sciences, Uzbekistan

**Article History:** Received 17<sup>th</sup> March 2026; Accepted 14<sup>th</sup> May 2026; Published 30<sup>th</sup> May 2026

### ABSTRACT

This article examines the development of critical thinking in future primary school teachers within the framework of the 4K model, which includes Creativity, Communication, Collaboration, and Critical Thinking. In modern education, the preparation of competent and intellectually active teachers is becoming increasingly important, as primary school educators play a key role in shaping students' cognitive and social abilities. The study focuses on identifying effective pedagogical approaches that enhance intellectual development through critical thinking skills. Methodological strategies and innovative teaching practices were designed and integrated into the educational process to encourage analytical reasoning, problem-solving, independent learning, and cooperative interaction among teacher trainees. The research employed both theoretical and practical methods, including pedagogical observation, questionnaires, comparative analysis, and experimental implementation. Practical experiments were conducted with future primary school teachers to evaluate the effectiveness of the proposed methods. The findings demonstrated that the integration of critical thinking activities within the 4K framework significantly improved students' intellectual abilities, creativity, communication competence, and collaborative skills. Participants showed increased capacity for reflective thinking, decision-making, and active engagement in educational tasks. The article concludes that the systematic application of the 4K model in teacher education contributes to the formation of highly qualified, intellectually developed, and innovative future educators. The study highlights the importance of critical thinking as a central component in modern pedagogical training and provides recommendations for implementing these approaches in higher education institutions preparing primary school teachers.

**Keywords:** 4K model, Critical thinking, Intelligence, Primary education, Creativity, Communication.

### INTRODUCTION

The modern education system aims to develop human capital and form young people as individuals with independent thinking and innovative thinking. In this regard, the development of critical thinking-based intelligence of future primary school teachers is one of the urgent issues. As a result of the growing demands on the intellectual potential of teachers of the future primary education in a high-tech, competitive world, global changes taking place today, the need arises for graduates to form solid systemic knowledge, skills and competencies, develop research technologies, skills to act in science, be ready to form competencies to overcome culture, stereotypes.

Today, the set of skills formed in the teaching of primary education subjects is aimed at the formation of students' intellectual and practical skills, while the skills called 4K (4K) 21st century skills – critical thinking skills, interaction and communication skills, creative approach to work) are said to be the skills that students should master in the educational range of developed countries using modern educational technologies. Thus, the key skills of the future are recommended: 4K (communication; cooperation; critical thinking; creativity). These skills are commonly referred to as Soft Skills (flexible skills, high professional competencies). The formation and assessment of these skills in teaching primary education subjects requires a different approach to primary education, taking into

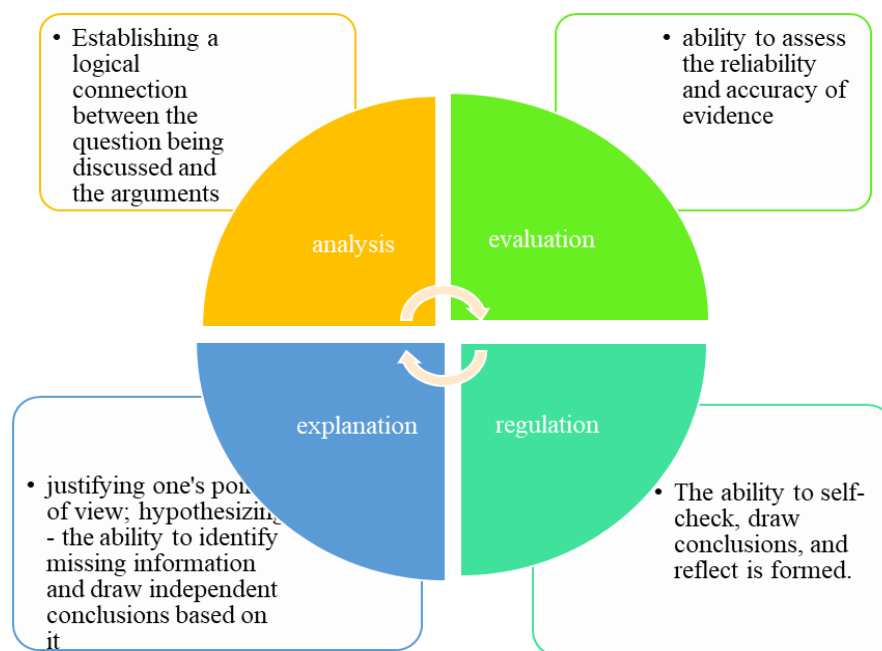
account the different levels of student mastery and the implementation of work movements and labor operations in the process of performing them. The 4K model (Creativity-creativity, Critical thinking-critical thinking, Collaboration-collaboration, Communication-communication) is regarded as a conceptual model that serves to shape a new generation of educational competencies.

The purpose of this study is to develop and test a methodology for developing the critical thinking skills of future primary school teachers based on the 4K model. In recent years, research on the 4K module - critical thinking, communication, collaboration, and creativity - has gained widespread attention in the global education system. The scientific works of many foreign and domestic scientists in this direction are noteworthy. Internationally, R. Ennis (1985); J. Dewey (2007); and Scholars such as Anderson (2010) have interpreted critical thinking as a person's ability to make independent decisions and analyze problems K. Robinson (2011) defined creativity as a pedagogical factor that unleashes the natural creative potential inherent in every individual. P. The concept of "21st Century Skills" developed by Trilling and Ch. Fadel (2009) provided the theoretical basis for the 4K module. Singapore, Finland, and the United States have extensive experience in organizing the educational process based on the 4K module. For example, in Singapore, the "Teach Less, Learn More" concept is being used to develop students' independent thinking and teamwork skills. In Finland, all stages of the learning process are integrated into 4K competencies, with each lesson focused on creative and critical thinking. Uzbek scientists are also conducting research to adapt the content of the 4K module to the national education system S. Tursunov (2020) revealed the importance of 4K competencies in preschool education in his research N. Sodiqova (2021) analyzed the

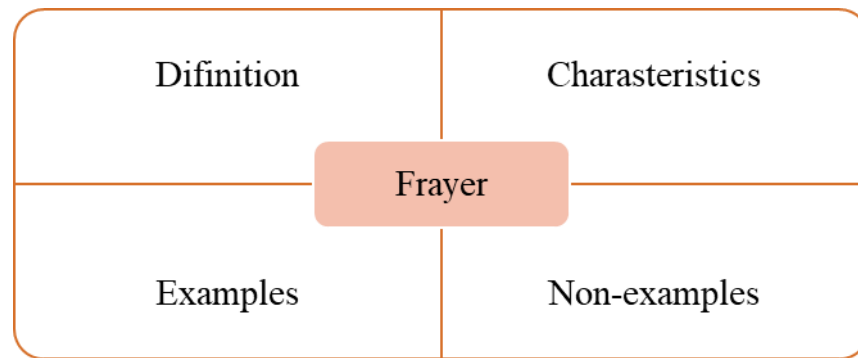
methodological foundations of the 4K approach to the formation of communicative culture in students Sh. Rasulova (2022) considers project-based teaching methods to be effective in developing creativity. The analysis of the literature shows that the 4K module is not only a conceptual basis of modern pedagogy, but also an important factor in preparing future primary school teachers for the requirements of the global labor market. Combining international experience and local scientific research will contribute to the successful implementation of the 4K module in the education system of Uzbekistan.

**MATERIALS AND METHODS**

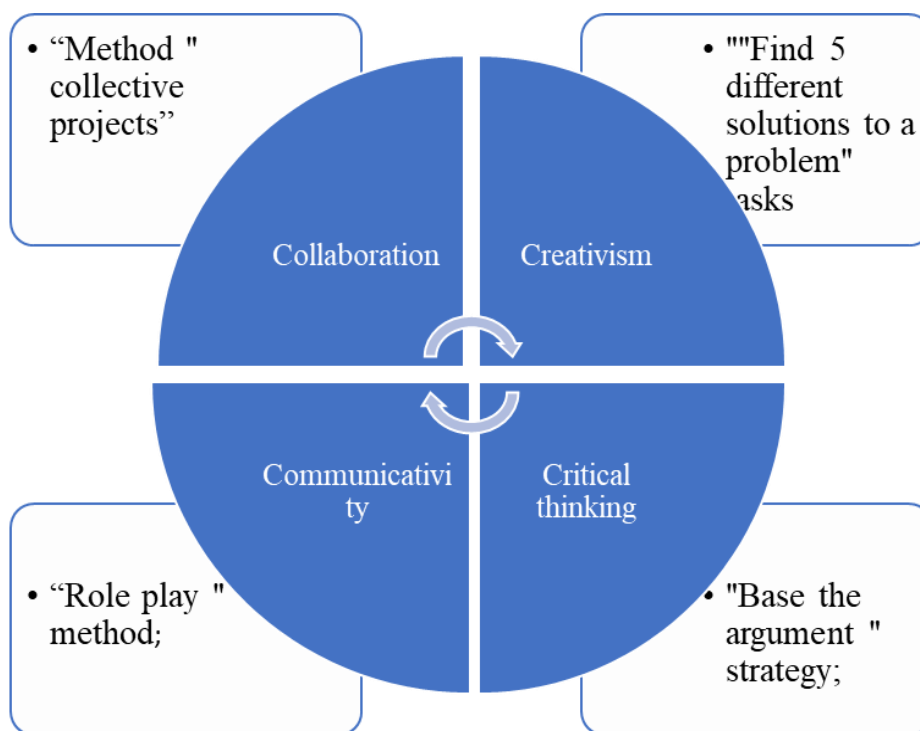
The methodological basis of this study is based on modern pedagogy, innovative educational theory, and the concept of international competence-based approaches. The content of the 4K module, its international experience and application in Uzbekistan were systematically analyzed. The following scientific and methodological methods were used in the research process: 4K model (P. Trilling and B. Fadel concept); P. Trilling and B. The Fadel concept focuses on developing 21st Century skills () in the modern education system, with a focus on arming students with the four core-oriented skills needed to succeed in a complex world, as shown in their book "21st Century Skills: Learning For Life In Our Times" (2009: 1 Learning and innovation skills: o critical thinking and problem Solving (Critical Thinking and Problem Solving) o creativity and innovation (Creativity and Innovation). O Communication (Communication O collaboration (Collaboration Information, media, and technology skills (Information, Media, and Technology Skills) Life and career skills (Life and Career Skills) Interpersonal and Personal Responsibility.



**Figure 1.** A student with 4K competencies will have the following indicators when solving problems.



**Figure 2.** One of the main methodological methods in the development of critical thinking is the “cluster” method.



**Figure 3.** Team projects " method (Collaborative Project-Based Learning) is a training/performance method.

They argue that the education system should focus on developing these practical skills to prepare students for their future lives and workplaces, rather than just imparting knowledge, which represents a new paradigm of education. The main idea is to “teach 21st century students not only subjects, but skills such as” 4K” (Critical Thinking, Creativity, Communication, Collaboration) that will help them work successfully in a complex world”, with the goal of adapting education to the changing needs of the modern world and helping students succeed throughout life. The 4K concept is commonly used to describe competencies in the cognitive, metacognitive, social, and emotional domains. 4K is collaboration,

communication, critical thinking, and creativity. The K approach includes 4 principles by its name: Collaboration: This helps develop students’ teamwork skills. It helps them develop skills in collaborative work, effective communication, and mutual support. It builds the ability to communicate effectively and work as a team to achieve a common goal. This quality is manifested in several interconnected abilities: the ability to perceive the general Goya as a single goal; the formation of a social attitude, that is, supporting the opinion of the majority, discussing, negotiating, coordinating their actions with the actions of others; fulfilling the obligations assumed; independence and initiative. Communicativeness: Learns to express his

thoughts clearly and clearly, listen and understand the interlocutor, and effectively use language tools to convey information.

Through this competence, the student can enter into any conversation without fear. They can initiate discussions, taking into account the purpose and context of the conversation, and ask and answer questions. The skill of defending one's point of view is developed. Creative thinking: learns to apply new approaches to achieve its goals, seeks innovative solutions, has unexpected ways to solve problems through creativity, and it is divided into the following components: curiosity - interest in the environment, the desire to independently collect more information, and find answers to questions; imagination - the ability to develop many new ideas of its own; the development of ideas – the ability to evaluate ideas in different positions, identify their strengths and weaknesses, react to different conditions through a new approach is formed. Critical (critical) thinking: involves the critical evaluation of information, the development of skills to form one's own thoughts and reflections. Students form their own opinions based on analyzing problems and logical thinking. The importance of critical thinking in digital education is great. The ability to critically evaluate, analyze, and interpret information helps to draw accurate and logical conclusions and make rational decisions. When working collaboratively as a team, students can engage in social interaction through critical thinking. The characteristics of critical thinking are presented in Figure 1.

Communication: asks questions and answers questions, asks for clarification of information that is not understood, explains their point of view, avoids or resolves conflict situations. Collaboration: asks for help, listens to other ideas and opinions, and makes suggestions, works collaboratively, and allows others to give feedback. Critical thinking: analyzes information, proposes hypotheses and solutions, argues, and evaluates. Creativity: suggests ideas, appreciates them, applies basic skills in unusual situations, finds original solutions, continues to search for new ideas and solutions even after completing the task. Through these competencies, the student moves from passivity to initiative and independence in completing tasks, which can also be assessed and observed through behavioral indicators. What conditions are needed for the new model to work well? An innovative approach based on the "4K" model does not require special conditions for application in schools. For example, students develop critical thinking skills as well as communication skills through questions and exercises. Educational institutions have all the conditions to work with these methods. What 4K model methods can be used to form these competencies? Let's look at the structure of the "Corner of Ideas" or the Camers method. Concepts related to the topic are hung on four corners. Students go to the selected concepts related to the topic. Then they justify their opinions. The Frayer model is a graphic organizer (Figure 2). It was created in 1969. Many people use this type of organizer to learn vocabulary words. The

Frayer model graphic organizer is versatile and can be used in all subjects, helping students not only expand their vocabulary but also develop the skill of working with different concepts.

## RESULTS AND DISCUSSION

Team projects "method" (Collaborative Project-Based Learning) is a training/performance method that encourages students or employees to work together in small groups by solving a particular problem or creating a project, and this method develops collaboration, creative thinking, and problem-solving skills. In this method, participants interact by jointly planning, dividing tasks, collecting materials, and presenting the results on the project, resulting in a final product that not only has knowledge but also some practical result. The task "Find 5 different solutions to a problem" is a type of didactic task that helps develop critical, creative, and logical thinking in students. Problem-solving assignment an assignment that requires you to analyze a given problem or situation and propose at least five different ways, methods, or solutions to it. This task is important in helping students break free from one-sided thinking; teaching them to look at problems from different perspectives; developing creative and critical thinking; and developing the ability to express independent opinions. It has the following main characteristics: it is not limited to one correct answer; solutions must be diverse; the student can justify their opinion; it can be done individually or in a group.

In this case, the problem is presented in a real-life or learning situation and the task is to find 5 different solutions. Example: Problem: Students are not active in class. Assignment: Suggest 5 different solutions to solve this problem. In which subjects is it used: primary education, pedagogy, mother tongue and reading literacy, educational lessons, methodological subjects. As a result, this task develops the competencies of the student to analyze the problem, advance alternative thoughts, make decisions. The "role Game" method is a play-by-play method that simulates how people behave, speak, and act on real-life situations or specific characters, and is used in education, therapy, and team training, in which participants enter a specific role, feel like that character, and repeat his actions. The "Justify the Evidence" strategy is an educational strategy that develops students' critical thinking, logical analysis, and the ability to defend an opinion with evidence. The "base argument" strategy is a method that requires the reader to prove an opinion, conclusion, or decision expressed through concrete evidence, examples, cause-and-effect relationships, teaches to reinforce thought with evidence; avoids unreasonable reasoning; develops logical and critical thinking; increases speech and written statement skills. The components of this strategy are as follows: Idea (claim) the idea expressed by the reader. Evidence – a fact, example, experiment, or observation. Justification an explanation of why this particular evidence supports the idea. Conclusion – a general final thought. Application procedure: the teacher will ask questions or problems. The reader has his or her

opinion “Why do you think so?” question. The student provides evidence, justifies their opinion, and draws a final conclusion. Example (suitable for elementary school) Opinion: Reading books is beneficial. Evidence: Students who read books have a wider vocabulary. Reasoning: Because books contain many new words and expressions. Conclusion: That's why it's important to read books regularly. The advantage of this strategy is that it forces the student to think; teaches them to make independent and reasoned decisions; forms a culture of debate; and develops written and oral speech.

The 4K module is guiding global education towards humanity, creativity, and social activism. The development of critical thinking and intellectual abilities of future primary school teachers based on the 4K module is developing students' skills in generating innovative ideas and creating startups. This module is not only reflected in the classroom, but also in students' social projects, competitions, and club activities. The following factors are important for the successful implementation of the 4K module in developing the critical thinking-based intelligence of future primary school teachers: Teachers' in-depth knowledge of modern pedagogical technologies; Use of innovative teaching methods (STEAM, CLIL, Singapore technology, etc.); Widespread use of digital platforms and multimedia tools in the educational process; Formation of independence, creativity and communication culture in students. The results showed that the 4K model-based approach significantly increased students' thinking independence, intellectual activity, and critical analysis skills. In addition, the application of the 4K model based on critical thinking: increases the intellectual potential of students; makes the learning process interactive and reflective; develops professional competencies (creativity, analytical thinking, teamwork) in future teachers. These results are consistent with international educational research (OECD, UNESCO, Trilling & Fadel, 2012), confirming that the 4K model is an effective tool for developing 21st century skills.

## CONCLUSION

In conclusion, the 4K module is one of the most effective ways to develop human capital, in line with the global demands of modern education. International experience shows that young people who have developed 4K competencies are not only knowledgeable, but also creative, critical thinkers, and individuals who can work collaboratively, making a significant contribution to the development of society. The widespread introduction of this module in the education system of Uzbekistan will ensure the competitiveness, spiritual maturity, and keeping up with the times of the future generation. The learning process, based on the 4K model, is focused on critical thinking: it is an important factor in the development of students' intelligence; should be introduced as an innovative methodological approach in the teacher training system; the results will serve to improve the professional training of future primary school teachers.

## ACKNOWLEDGMENT

The authors express sincere thanks to the Head of the Tashkent University of Applied Sciences, Uzbekistan for the facilities provided to carry out this research work.

## CONFLICT OF INTERESTS

The authors declare no conflict of interest

## ETHICS APPROVAL

Not applicable

## FUNDING

This study received no specific funding from public, commercial, or not-for-profit funding agencies.

## AI TOOL DECLARATION

The authors declares that no AI and related tools are used to write the scientific content of this manuscript.

## DATA AVAILABILITY

Data will be available on request

## REFERENCES

- Resolution of the President of the Republic of Uzbekistan No. PQ-4319. (2019). *Concept of digitalization of the education system*. Uzbekistan.
- Anderson, T. (2010). *Theories of learning and educational practice*. New York, NY: Routledge.
- Dewey, J. (2007). *Democracy and education*. Mineola, NY: Dover Publications.
- Dilnoza, P. (2025). Methodology for developing the intellectuality of future primary school teachers on the basis of critical and creative thinking. *International Journal of Pedagogics*, 5(3), 100–103.
- Ennis, R. H. (1985). Critical thinking and subject specificity: Clarification and needed research. *Educational Researcher*, 14(3), 4–10.
- Eshbekovich, P. J., Muxammedsaidov, B. K., & Daminova, R. B. (2022). Technology to develop students' technical thinking in technology classes. *World Bulletin of Social Sciences*, 10, 77–82.
- Eshbekovich, P. J. (2020). “STEAM”-education as an innovative approach to the development of vocational training for students. *European Journal of Research and Reflection in Educational Sciences*, 8(3).
- Fadel, C., & Trilling, B. (2009). *21st century skills: Learning for life in our times*. San Francisco, CA: Jossey-Bass.

- Khudoykulovna, A. D. (2025). Efficiency factors of teaching mathematics and natural sciences based on new innovative pedagogical technologies. *American Journal of Education and Learning*, 3(9), 665–674.
- Abdieva, K. (2025). Methods for improving the methodological preparation of future primary school teachers for the development of 4K skills. *International Journal of Artificial Intelligence*. Retrieved from inlibrary.uz
- Pardaboyeva, D. G. (2024). Improving the methodology of intellectual development of future primary school teachers based on critical thinking. *Inter Education & Global Study*, 4(1), 220–227.
- Pardaboyeva, D. G. A. (2024). Theoretical foundations of developing critical thinking in primary grade students. *Eurasian Journal of Academic Research*, 4(7S), 521–523.
- Rasulova, S. (2022). *Developing creative thinking through innovative projects*. Tashkent: Teacher Publishing House.
- Robinson, K. (2011). *Out of our minds: Learning to be creative*. Chichester, England: Capstone Publishing.
- Sodiqova, N. (2021). Communicative methods in the formation of 4K competencies. *Pedagogy and Innovation*, 3(12), 45-52.
- Tursunov, S. (2020). The importance of the 4K module in preschool education. *Theory and Practice of Education*, 2(5), 23–30.
- OECD. (2021). *Learning compass 2030: A framework for future skills*. Paris, France: OECD Publishing.
- Ministry of Public Education of Singapore. (2020). *Teach less, learn more: Educational framework*. Singapore: MOE.
- Yoʻldoshev, J. (2021). *Pedagogical technologies and pedagogical skills*. Tashkent, Uzbekistan.

