

PEDAGOGICAL AND PSYCHOLOGICAL MECHANISMS FOR DEVELOPING LOGICAL AND CREATIVE THINKING OF CHILDREN IN THE PROCESS OF PRESCHOOL EDUCATION

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ABSTRACT. This article scientifically examines the pedagogical and psychological foundations for developing logical and creative thinking in preschool children. The study investigates the cognitive and intellectual characteristics of preschool age, the psychological mechanisms of thinking development, and the impact of modern pedagogical technologies on children's cognitive activity. In addition, the role of a developmental educational environment, interactive methods, problem-based learning, STEAM technologies, and play activities in fostering independent and creative thinking in children is theoretically and practically analyzed. The research findings indicate that the application of innovative and constructivist approaches in preschool education significantly contributes to the development of children's intellectual potential, cognitive activity, and independent thinking skills.

Keywords: logical thinking, creative thinking, pedagogical mechanisms, psychological development, creativity, cognitive activity, interactive methods, developmental education, STEAM technologies, constructivist pedagogy, play activity, intellectual potential, innovative approach.

INTRODUCTION. Preschool education is regarded as one of the most significant stages in human development. It is during this period that a child's worldview, cognitive abilities, curiosity for learning, and capacity to perceive and understand the surrounding environment begin to take shape. A child's subsequent intellectual, moral, and social development largely depends on the pedagogical and psychological environment created during the preschool years. Therefore, the development of logical and creative thinking in preschool children is currently considered one of the most pressing areas of pedagogical and psychological research.

The development of modern society requires individuals not only to acquire existing knowledge, but also to possess innovative thinking, creative approaches to problem-solving, and the ability to make independent and prompt decisions. In today's era of rapidly expanding information flows, intellectual potential has become one of the key determinants of social success. From this perspective, fostering independent and creative thinking from an early age constitutes an important pedagogical necessity. Preschool age is one of the most active and sensitive periods in a child's psychological development, and the knowledge, skills, and patterns of thinking acquired during this stage directly influence the quality and effectiveness of future educational processes.

The development of thinking in preschool children possesses distinctive psychological characteristics. Initially, children perceive objects and phenomena through sensory experiences; subsequently, they begin to compare, classify, and generalize them. During this process, the child's speech, imagination, memory, and attention also develop intensively. In particular, play activity emerges as a crucial instrument for intellectual development. Through play, children imagine various situations, attempt to solve problems, communicate with others, and learn to make independent decisions. In this regard, the effective use of play-based technologies in preschool education plays a vital role in enhancing both logical and creative thinking abilities.

In recent years, child-centered pedagogical approaches based on active participation have become increasingly widespread within educational systems. Developmental education,

constructivist pedagogy, competency-based approaches, and interactive methods all contribute to fostering children's independent thinking and creative activity. Within these approaches, the teacher is no longer viewed merely as a transmitter of ready-made knowledge, but rather as a facilitator and supporter of the child's cognitive activity. As a result, children acquire the ability to express their ideas freely, analyze problematic situations, and generate innovative solutions.

Logical thinking enhances children's abilities to analyze, compare, identify cause-and-effect relationships, and draw conclusions. Creative thinking, in turn, expands their capacity to generate new ideas, discover unconventional approaches, and develop original solutions to various problems. These two forms of thinking are closely interconnected and play a fundamental role in a child's comprehensive intellectual development. Consequently, the integrated development of logical and creative thinking has become one of the primary objectives of modern preschool pedagogy.

International educational practice also places considerable emphasis on fostering children's creative and critical thinking skills. In many developed countries, innovative pedagogical technologies, project-based learning, STEAM elements, and interactive play methods have been widely integrated into preschool education. Such approaches are recognized as effective means of developing independent thinking, problem-solving skills, and creative competencies in children.

In Uzbekistan, significant attention is likewise being devoted to the modernization of preschool education, the development of children's intellectual and creative potential, and the implementation of contemporary pedagogical technologies within educational practice. In particular, creating a pedagogical environment that supports children's free thinking, independent activity, and creative abilities has become one of the priority directions of current educational reforms.

This article provides a scientific analysis of the pedagogical and psychological mechanisms involved in developing logical and creative thinking in preschool children. It also examines the theoretical foundations of existing research in this field and highlights the role of modern pedagogical technologies in the development of children's cognitive and intellectual capacities.

METHODOLOGY. The present study was conducted on the basis of the scientific and methodological principles of pedagogy, developmental psychology, and contemporary educational theories. During the research process, both foreign and national scholarly sources related to the development of logical and creative thinking in preschool children were examined through comparative and systematic analysis. In particular, theoretical approaches associated with children's cognitive development, thinking processes, creativity, and developmental learning environments were explored from pedagogical and psychological perspectives.

The methodological foundation of the study was based on the principles of learner-centered education, constructivist pedagogy, developmental learning, and competency-based approaches. In order to identify the pedagogical factors contributing to the development of children's cognitive activity, such research methods as analysis, synthesis, comparative comparison, generalization, and interpretation were employed. Through these methods, the influence of interactive teaching methods, problem-based learning technologies, developmental games, and the STEAM approach on the development of children's thinking processes within preschool education was scientifically analyzed.

Furthermore, the study employed psycho-pedagogical observation as one of the primary research methods. During the observation process, preschool children's thinking operations demonstrated in play, communication, and creative activities, as well as their responses to problem situations and independent decision-making skills, were systematically examined. Taking into account children's age-related and individual characteristics, the factors influencing the development of their logical and creative thinking were evaluated from a pedagogical perspective.

Throughout the research process, the principles of scientific validity, systematicity, consistency, objectivity, and integrative approach were strictly maintained. In addition, supporting children's free activity in preschool education, considering the dynamics of individual development, and ensuring the interrelation between pedagogical and psychological factors were defined as essential methodological criteria. This methodological framework enabled a comprehensive investigation of the research topic and provided a scientific basis for identifying effective pedagogical and psychological mechanisms for developing logical and creative thinking in preschool children.

MAIN PART. Preschool age is considered a specific sensitive period in a child's psychological development. During this period, the child's thinking processes, speech, imagination, cognitive needs, and creative activity develop intensively. In particular, the formation of logical and creative thinking abilities is regarded as one of the important factors determining the child's success at subsequent stages of education. Therefore, the issue of developing children's thinking in the process of preschool education has become a relevant object of research in pedagogy, psychology, and methodology [1].

In the conditions of today's globalization and digital transformation, society requires from an individual not only knowledge, but also competencies such as creative approaches, problem-solving abilities, analytical thinking, and innovative decision-making. For this reason, educational systems in developed countries pay particular attention to the development of children's critical and creative thinking. Scientific studies conducted by UNESCO and UNICEF also evaluate the development of creativity in preschool education as one of the fundamental factors in shaping an innovative society of the future [2].

The scientific foundations of thinking development in preschool children have been extensively studied in the research of numerous foreign and national scholars. Jean Piaget analyzed children's cognitive development as a stage-based process and characterized preschool age as the period of "preoperational thinking" [3]. Lev Vygotsky substantiated the decisive role of social environment and communicative activity in children's intellectual development [4]. The scientific views of scholars such as Jerome Bruner, Howard Gardner, Maria Montessori, John Dewey, and Seymour Papert have also enriched the theoretical foundations for the development of preschool children's thinking.

The views related to this issue can also be observed in the studies of a number of Uzbek scholars. In particular, E. G'oziyev, M.G'. Davletshin, B.R. Qodirov, G'.B. Shoumarov, and other researchers studied the pedagogical aspects of child psychology and thinking development based on national mentality and scientifically substantiated the psychological mechanisms of education and upbringing [5].

From a psychological perspective, thinking is regarded as the process of generalized and indirect reflection of reality. In the process of thinking, a person comprehends the internal relationships between objects and phenomena, analyzes problems, and draws new conclusions. In preschool children, thinking is initially formed on the basis of practical actions. Through direct perception of the surrounding environment, the child learns, compares objects, classifies them into groups, and gradually begins to understand simple cause-and-effect relationships.

According to Jean Piaget's scientific research, the thinking of preschool children is characterized by egocentrism. A child perceives reality mainly from his or her own point of view and cannot fully understand the perspectives of other people [6]. However, under the influence of socialization, communicative activity, and play processes, the child's thinking gradually acquires a social character.

Lev Vygotsky explained children's psychological development in connection with the social environment. According to the scholar, children's thinking develops through language and

communication. His theory of the “zone of proximal development” is considered one of the important scientific approaches in the history of pedagogy. According to this theory, a child is capable of performing tasks beyond his or her own abilities with the assistance of adults or peers. This demonstrates the significance of a developmental educational environment.

At preschool age, children’s imagination and creative thinking also develop actively. Creative thinking is manifested in a child’s ability to find unconventional solutions, create innovations, and approach problems freely. Psychologists evaluate creativity as a natural human potential. However, an appropriate pedagogical environment is necessary for the development of this potential [7].

Howard Gardner’s theory of multiple intelligences emphasizes that each child possesses individual abilities. The scholar identified linguistic, logical-mathematical, musical, spatial, interpersonal, and other types of intelligence. This increases the importance of a differentiated approach in preschool education.

Logical thinking develops children’s abilities to analyze, compare, generalize, and draw conclusions. These skills serve as an important foundation for the child’s subsequent educational activity. In modern pedagogy, interactive methods, problem-based learning, and developmental tasks are widely used to develop logical thinking.

Play technologies are considered one of the most effective means of developing logical thinking in preschool education. During play, children compare the characteristics of objects, generalize, and attempt to independently solve problem situations. In particular, construction games, logical tasks, and role-playing games are of great importance in developing children’s analytical thinking [8].

Maria Montessori’s pedagogical system places significant emphasis on children’s independent activity and freedom of choice. According to the scholar, a specially designed developmental environment naturally stimulates children’s thinking processes. Today, the Montessori methodology is widely applied in preschool educational practice in many countries around the world.

John Dewey’s concept of “learning by doing,” based on practical activity, also plays an important role in the development of children’s logical thinking. The scholar regarded children’s active participation and practical experience as priorities in the educational process. Activities organized on the basis of this approach contribute to the development of independent thinking and problem-solving skills in children.

Problem-based learning technology is also considered an effective means of shaping children’s logical thinking. The teacher does not provide ready-made knowledge, but rather encourages the child to engage in inquiry and exploration. As a result, the child acquires skills of analysis, hypothesis formation, and conclusion drawing [9].

Creative thinking reflects a person’s ability to create innovations, generate unconventional ideas, and approach problems in original ways. Preschool age is considered one of the most important stages in the formation of creative thinking because children’s imagination and fantasy are highly active during this period. Jerome Bruner substantiated the importance of discovery-based teaching methods in the educational process. According to the scholar, when a child acquires knowledge not in a ready-made form but through independent exploration, his or her creative thinking develops more effectively [10].

Seymour Papert paid particular attention to the development of children’s creative activity on the basis of constructivist pedagogy. In his theory of “constructionism,” he emphasized that children independently construct knowledge through practical activity [11]. Today, this theory constitutes one of the methodological foundations of STEAM education. The STEAM approach develops children’s creative and complex thinking through the integration of science, technology,

engineering, art, and mathematics. Activities organized on the basis of experimentation and project work reveal the child's creative potential.

The communicative competence of the teacher is also considered an important factor in the development of creative thinking. A supportive pedagogical environment enables children to think freely and express their ideas independently. Conversely, excessive control and rigid restrictions may weaken children's creative thinking.

Today, the development of creative and critical thinking is regarded as a priority task in preschool education systems of developed countries. In the Finnish education system, children's independent thinking and free activity are placed at the center of the educational process. In the Singaporean educational model, the development of problem-solving skills and innovative approaches is identified as one of the primary objectives [12].

UNESCO reports emphasize that the development of creativity during preschool age has a positive impact on children's future academic achievement. Therefore, international educational standards place special emphasis on fostering children's creative and critical thinking abilities.

Local studies also highlight the important role of family environment, national values, and communicative activity in the development of children's thinking. In the studies conducted by E. G'oziyev, the development of children's thinking was analyzed in connection with activity and communication. M.G'. Davletshin substantiated the harmony between education and upbringing in the child's psychological development [13].

The issue of developing preschool children's cognitive activity is regarded in modern pedagogy and psychology as one of the scientific problems requiring a comprehensive approach. Research demonstrates that a child's intellectual development during this age period is formed in close interrelation with external influences, pedagogical environment, and social relationships. In particular, the child's need for activity, interest in cognition, and aspiration for independent experience emerge as the main psychological factors influencing thinking development. From this perspective, preschool education should not be directed solely toward the transmission of knowledge, but rather toward the formation of children's thinking operations, which constitutes an important methodological necessity.

Analyses indicate that the development of thinking in preschool children does not occur at the same rate. In some children, imaginative and creative thinking develops relatively faster, whereas in others, logical analytical skills may predominate. This situation is related to the child's individual psychological characteristics, family environment, communicative experience, and the degree of pedagogical influence. Therefore, applying the same teaching methods to all children does not produce effective outcomes. A differentiated and individualized approach is regarded as an essential condition for developing children's natural intellectual potential.

Pedagogical observations demonstrate that cognitive activity in preschool children develops more effectively through play. This is because play represents a natural need of the child, integrating emotional activity, freedom of movement, and independent decision-making. During play activities, children comprehend relationships between objects, use imagination, attempt to solve problem situations, and engage in communication. In particular, сюжетно-ролевые игры (role-playing games) and constructive activities contribute to the parallel development of analytical and creative thinking. At the same time, children's speech activity increases during play, which constitutes one of the psychological mechanisms of thinking development.

Research findings reveal that children's logical thinking is primarily formed through problem situations and practical activity. If teachers provide ready-made answers during lessons, children's independent thinking activity decreases. Conversely, inquiry-based tasks develop children's abilities to analyze, compare, and generalize. Therefore, modern pedagogical technologies prioritize interactive and developmental methods over reproductive teaching methods.

One of the important aspects of developing creative thinking in children is providing them with opportunities for free imagination. Observations indicate that excessively controlled or strictly limited activities may lead to a decline in creativity. Creative thinking develops through freedom, independent decision-making, and experimentation. For this reason, supporting children's individual opinions, responding positively to their questions, and encouraging innovative ideas are regarded as important pedagogical factors in preschool educational institutions.

From a psychological perspective, the development of children's thinking is also closely connected with their emotional state. A positive emotional environment increases children's interest in cognition and ensures their active participation. In contrast, fear, pressure, or feelings of failure may weaken children's intellectual activity. Therefore, creating a psychologically comfortable environment in the pedagogical process becomes an important condition for the development of creative and logical thinking.

Communicative activity in preschool education is also considered one of the significant factors in thinking development. Through communication with peers and adults, children learn to express their own opinions, understand the perspectives of others, and compare different viewpoints. This leads to the socialization of thinking. In particular, collective activities and lessons organized in small groups develop children's collaborative thinking and joint problem-solving skills.

In recent years, the integration of digital technologies into preschool education has created new opportunities for the development of children's thinking. Interactive programs, visual materials, and multimedia tools increase children's interest and activate perceptual activity. However, studies indicate that excessive use of technology may limit children's independent imaginative activity. Therefore, from a pedagogical perspective, it is considered appropriate to combine digital tools with traditional play and practical activities.

During the analysis, another important aspect was identified: the development of logical and creative thinking in children is directly connected with the family environment. The degree of freedom given to the child within the family, the reading environment, the communicative culture of parents, and their attitude toward the child's questions significantly influence intellectual development. In particular, listening to children's opinions and encouraging them to draw independent conclusions are regarded as effective mechanisms of family upbringing.

General scientific analyses demonstrate that the development of logical and creative thinking in preschool children is a multifactorial and complex pedagogical-psychological process. The effectiveness of this process depends on the harmony between the developmental educational environment, the teacher's methodological competence, the child's individual characteristics, and socio-psychological factors. Therefore, the broad implementation of integrative and innovative approaches aimed at developing children's intellectual potential in the modern preschool education system is of considerable scientific and practical significance.

Conclusion. Scientific analyses indicate that the preschool period is the most important psychological and pedagogical stage for the development of children's logical and creative thinking. A developmental educational environment organized during this period plays a decisive role in shaping the child's intellectual potential. Logical thinking develops children's analytical abilities and problem-solving skills, while creative thinking expands their capacity to generate innovative and unconventional ideas. Therefore, the integrated development of these two directions is considered an important methodological task within the modern preschool education system.

Interactive methods, problem-based learning, STEAM technologies, constructivist pedagogy, and developmental games are proving to be effective tools for shaping children's thinking. In particular, a pedagogical environment that supports children's independent activity and free

thinking is regarded as an essential condition for the development of creativity. In general, the development of logical and creative thinking in preschool education emerges as a strategic factor in shaping the future intellectual potential of society.

The results of the research demonstrate that the preschool period is one of the most important and intensive stages in the formation of human thinking. During this stage, children's cognitive processes, perceptual activity, imagination, and intellectual engagement develop intensively, creating a strong foundation for their cognitive capacities in subsequent stages of education. Therefore, the issue of developing logical and creative thinking in preschool children is becoming not only a pedagogical concern but also a socially and strategically significant priority.

Scientific analysis has revealed that the development of logical thinking in children contributes to the formation of abilities such as analysis, comparison, generalization, understanding cause-and-effect relationships, and independently solving problem situations. Creative thinking, in turn, broadens children's opportunities to propose unconventional ideas, strive for innovation, and approach problems creatively. These two forms of thinking are closely interconnected, and their harmonious development serves as an important factor in ensuring children's intellectual maturity and social adaptability.

The analyses further revealed that the effectiveness of thinking development in preschool children primarily depends on the content and organization of the pedagogical environment. A developmental educational environment supports children's free thinking, independent activity, and cognitive needs while fostering the realization of their intellectual potential. In particular, the integration of interactive methods, problem-based learning, constructive activities, developmental games, and STEAM technologies into the educational process contributes to the parallel development of children's creative and analytical thinking.

Moreover, the research findings demonstrate that the development of children's thinking is closely associated not only with pedagogical activity, but also with psychological and social factors. Family environment, communicative relationships, emotional support, and cooperation with peers play a significant role in developing children's cognitive activity. In particular, responding positively to children's questions, creating opportunities for independent decision-making, and encouraging individual opinions are regarded as major psychological conditions for the formation of creative thinking.

The analysis of modern pedagogical concepts indicates that today's educational system requires a transition from reproductive approaches toward developmental and constructivist approaches. From this perspective, the teacher's primary role is no longer limited to transmitting ready-made knowledge; rather, it involves organizing children's cognitive activity, guiding their independent thinking, and supporting their intellectual engagement. Therefore, the application of innovative pedagogical technologies, consideration of children's individual characteristics, and strengthening of differentiated approaches in preschool educational institutions are regarded as important methodological necessities.

According to the general scientific conclusions, the development of logical and creative thinking in preschool education serves as one of the strategic factors in shaping the future intellectual potential of society. This is because the methods of thinking, cognitive activity, and creative approaches formed during this period establish the foundation for innovative thinking, effective problem-solving, and the development of social adaptability competencies throughout an individual's later life. Consequently, improving scientific and methodological approaches aimed at fostering children's independent and creative thinking remains one of the priority tasks of modern pedagogy.

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