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Article

Pedagogical and Psychological Possibilities of Technological Education in Developing Constructive Thinking in Early School Age

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Abstract: This article analyzes the pedagogical and psychological potential of technological education in the formation of constructive thinking among primary school students from theoretical and practical perspectives. The study examines the psychological characteristics of primary school age, the developmental features of learning activities, and the role of practical and creative activities in developing constructive thinking within the technological education process. The possibilities of developing independent thinking, problem-solving, modeling, and design skills in students through technological education are substantiated. The research substantiates that technological education creates favorable conditions for the development of independent thinking, problem-solving abilities, modeling, and elementary design skills in young learners. Through hands-on activities, project-oriented learning, and the integration of modern pedagogical approaches, students are encouraged to analyze tasks, plan actions, and evaluate outcomes, thereby strengthening their constructive and reflective thinking. The article emphasizes that the effective organization of technological education, supported by appropriate methodological tools, significantly contributes to the holistic development of learners and enhances the educational process in primary schools. The findings of the study demonstrate that technological education plays a crucial role in shaping constructive thinking, creativity, and practical competence, underscoring its scientific relevance and practical importance for improving primary education systems.

Keywords: Primary School Age, Constructive Thinking, Technological Education, Learning Activity, Pedagogical and Psychological Features

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1. Introduction

At the current stage of societal development, one of the most important tasks facing the education system is to develop an individual's intellectual potential and to foster the ability to think independently, creatively, and constructively. In particular, establishing the foundations of a culture of thinking in students during the primary education stage serves as a solid foundation for subsequent stages of education [1]. From this perspective, the problem of developing constructive thinking at the elementary school age is considered one of the most pressing scientific directions in modern pedagogy and educational psychology.

Constructive thinking is characterized by an individual's ability to analyze problematic situations, set goals, plan, search for solutions, and evaluate the results. This type of thinking in a child is formed not only on the basis of theoretical knowledge but also through practical activity and direct experience [2]. Since the thinking of elementary school students is concrete-operational and concrete-imaginative in nature, the importance of practical, hands-on subjects in developing their constructive thinking is even greater.

In this sense, technological education has great pedagogical and psychological potential for developing constructive thinking in young school-age students. In this subject, practical activities such as object creation, modeling, design, and planning technological processes take precedence, encouraging students to think independently, adopt a creative approach, and engage in results-oriented actions [3]. In the technological education process, the student participates as an active subject and has the opportunity to apply their knowledge and skills in practice.

Pedagogical and psychological research has recognized that organizing the educational process with consideration for students' age and individual characteristics is an important prerequisite for developing constructive thinking. In the early school years, a child's cognitive activity develops through play, practical activities, and collaboration. Technological education, in turn, allows for the application of active teaching methods that are precisely suited to these characteristics, resulting in the development of logical, systematic, and creative thinking skills in students.

At the same time, The reforms being implemented in the education system, the introduction of innovative pedagogical technologies, and the requirements aimed at preparing students as competitive individuals necessitate a reevaluation of the content and methodology of technological education [4]. In particular, a comprehensive pedagogical and psychological study of the issue of developing constructive thinking through technological education is of scientific and practical importance.

This article analyzes the pedagogical and psychological potential of technological education in developing constructive thinking at the elementary school age and highlights the theoretical foundations and practical approaches that contribute to the effective organization of this process.

Literature review: Scientific theories concerning the pedagogical and psychological potential of technological education in the formation of constructive thinking are reflected in the works of Vygotsky, A.N. Leontiev, J. Piaget, Zimnyaya, Bruner, Galperin, and V.V. Davidov.

In modern pedagogical and psychological research, the formation of constructive thinking at the early school age is interpreted as an important factor in personal development. In particular, the scientific views of L.S. Vygotsky, J. Piaget, and A.N. Leontiev have demonstrated that a child's cognitive activity develops in an integral connection with practical activity and the social environment. These theoretical approaches serve as an important source for scientifically substantiating the pedagogical and psychological potential of technological education [5].

Research results show that technological education creates favorable pedagogical conditions for developing constructive thinking in young school-age students. N.K. Krupskaya and P.Y. Galperin emphasized that forming thought through practical actions in education is effective, and the practical work, design, and modeling activities used in technological education are the practical expression of these theories. In this process, students acquire constructive thinking skills by analyzing problematic situations, making plans, and evaluating the results.

2. Methodology

From a pedagogical standpoint, the use of active teaching methods in technological education is of great importance for developing constructive thinking. I.YA. As Lerner and M.N. Skatkin emphasize, problem-based instruction and creative assignments increase students' intellectual activity. The project method, group work, and creative tasks used in the technological education process teach students to think independently, justify their decisions, and adopt a creative approach.

From a psychological perspective, the formation of constructive thinking at the early school age is linked to the development of the child's cognitive processes—attention, memory, thinking, and imagination. In the research of B.G. Ananev and D.B. Elkonin, it is noted that at this age, learning activity is considered the leading activity, in which practical-action and concrete thinking are dominant. When technological education is organized taking these features into account, students' constructive thinking ability develops naturally and effectively.

Moreover, technological education also has a positive impact on socio-psychological development. V. V. Davydov emphasized that organizing education through collaboration fosters the development of higher-order thinking. During group work, students exchange ideas, make decisions together, and acquire teamwork skills. This helps develop the social aspects of constructive thinking.

The interrelationship between learning activity and constructive thinking is considered one of the central issues in educational psychology. In the early school years, learning activity is formed as the leading activity, and it is precisely in the course of this activity that the child's thinking is elevated to a qualitatively new stage.

Learning activity is a purposeful activity aimed at the conscious acquisition of knowledge, skills, and competencies by the student. In educational theory, learning activity is explained as a primary factor in personal development.

Constructive thinking is a type of thinking aimed at analyzing objects and processes in problematic situations, reconstructing them, and creating new solutions. Constructive thinking is the active restructuring of cognitive processes.

The role of problematic situations in learning activity. Elements of problem-based learning encourage students to think, teaching them to analyze and draw conclusions. As Davыdov noted, theoretical thinking develops precisely in the process of solving learning tasks.

Learning Tasks and Constructive Thinking. Learning tasks include the stages of planning, execution, and result evaluation. These processes are considered the main mechanisms of constructive thinking. Galperin's theory of the gradual formation of mental actions provides the scientific basis for this process.

3. Result and Discussion

Psychological characteristics of learning activity in early elementary school age. At this age, students form internal thinking practices through external actions. Early elementary school age is considered the most favorable period for the development of theoretical thinking [6].

Conditions for developing constructive thinking through learning activities. Effectively organized learning activities require the following conditions: problem-based tasks, practical activities, the opportunity for independent decision-making, and reflection. The teacher, as the subject who manages and directs the learning activity, plays a decisive role in developing constructive thinking [7].

The connection between learning activities and creativity. When learning activities take on a creative character, students develop original thinking and the ability to generate

new ideas. This condition ensures a high level of constructive thinking. A number of studies have shown that the level of constructive thinking is higher when practical and project-based methods are used in learning activities [8].

The distinctive characteristics of the psychology of young school-age children.

In young school-age children, cognitive processes develop rapidly. They are inclined to acquire knowledge through practical activity, and teaching based on demonstration and movement is considered effective. Although the concrete-imaginative type of thinking predominates at this age, elements of logical reasoning gradually begin to form.

The activity of reading creates important conditions for the development of a young school-age child's cognitive abilities, perception, observation skills, and memory, and also forms computational skills [9]. A child of this age is distinguished from children of other ages by the sharpness, clarity, purity, and accuracy of their perception, the freedom of their imagination, and the strength of their memory, the vividness of his thinking, his curiosity, and his credulity set him apart from children of other ages.

During the early school years, engaging in reading activities, including exploring the various properties of physical objects, has a significant impact on the development of sensory perception. In elementary school–aged students, the senses of discrimination, sight, and hearing develop particularly rapidly. Russian scientists have found that the ability to perceive color shades increases by 45% in children aged 7-10, and up to 65% in children up to 12 years of age. Teaching young elementary school students to draw has a significant impact on the development of color discrimination sensitivity. The ability to distinguish tones grows especially strongly during the process of teaching children music and singing. Physical education exercises also play a major role in the development of sensory perception [10]. Exercises that engage children in precise movements enhance their muscle-movement sensations.

By the time children enter the early school years, all forms of perception have been largely refined in terms of content, precision, and clarity through education and upbringing. Children of this age sharply differ from people in other age groups in the accuracy, fluency, and acuity of their perception. Because they are absorbed in and look at everything with extreme scrutiny, they are able to master the important characteristics of perception.

A child entering first grade can recognize the color, shape, and size of objects and how they are arranged in space, and can also compare them. A high level of sensory development is considered very important for successful school performance. By school age, typically developing children understand that drawings and photographs reflect real life. Therefore, they try to learn what is depicted in pictures and photographs by comparing them to real life. A child can understand that objects in the surrounding world are depicted in miniature in pictures [11]. These images develop children's aesthetic and artistic taste. This is because through these images, a child can understand, distinguish, and express their own feelings about the beauty of the world and its variety of colors. During the educational and developmental process, children's abilities for voluntary perception and observation grow. The ability to observe is one of the necessary conditions for successful learning. In students, the ability to observe develops alongside their thinking, willpower, interests, and aspirations.

Students at this age can independently control their perceptions. Elementary school students can, with little difficulty compared to adults, estimate a straight line with their eyes and divide it into two equal parts, compare objects and lines by size, and determine the spatial arrangement of objects, They can visually estimate which is closer or farther away, which is higher or lower, and also roughly calculate the time required to cover that distance.

The learning activity requires the child to retain the learning materials provided; the teacher gives the student instructions on what needs to be remembered. The student repeats what he needs to remember and tries to understand it. But at this age, involuntary memory undoubtedly prevails. What a child retains in his memory is largely determined by his interest in the work. Understanding the learning material is the primary condition for retention. Because the first signal system is somewhat superior to the second, young school-age students rely more on concrete, dynamic memory than on logical memory. Therefore, they remember and retain concrete information, events, and phenomena, as well as images and objects, more quickly and firmly than theoretical laws and rules or abstract concepts [12]. As children enter elementary school, their ability to learn material logically—that is, to remember it by understanding its meaning—grows. The amount of material they can retain increases, and their comprehension of its content deepens and becomes more complex. Sometimes elementary school students, even when the material is comprehensible, learn it mechanically without paying attention to its meaning.

A young school-age child has a good emotional relationship with their teacher. Whereas until now he had been absorbing this information under the direct guidance of adults, he now, of his own free will, strives to gather the necessary information and to set clear goals and tasks for himself. This activity in the child indicates that their memory has developed to a certain degree [13]. A well-organized educational process rapidly develops the thinking of children at this age. Children at this age absorb more than at other times. School education changes a student's lifestyle, social status, and role within the classroom community and family environment. His task remains to study, acquire knowledge, and master skills and competencies. The learning activities of elementary school students are governed by a complex, multi-level system of motives. The motives for learning activity indicate why students study. In children entering first grade, social motives predominate. These motives involve securing a new status among peers and engaging in activities that are socially significant and subject to evaluation.

The content of education is organically linked to the student's interest in acquiring knowledge and the feeling of satisfaction from the results of their mental effort. This feeling arises from the teacher's encouragement and shapes in the student a tendency, desire, and enthusiasm to work more effectively. The feelings of pride and self-confidence that develop in a child contribute to the mastery of knowledge and the development of skills. The teaching process for young school-age children begins with an introduction to the main components of learning activities: learning tasks, learning situations, learning actions, monitoring, and assessment (according to V.V. Davidov). In this regard, it is very important that all subject-specific activities be carried out in conditions conducive to cognitive development. The student's mastery of learning activity takes place through the process of solving the system of learning tasks. At the beginning of their studies, elementary school–aged students do not know how to independently set and solve learning tasks. At the beginning, the teacher performs this task. Gradually, the students themselves begin to acquire the necessary skills and competencies to set and solve learning tasks. This is an important stage in the formation of independent learning activity.

A child's ability to compare the results of their independent actions with the characteristics of their own behavior indicates that the capacity for self-control has been formed to a certain extent. During the early school years, reflection within the leading activity is primarily linked to learning processes, monitoring, and assessment. The internalization of these actions allows the student to independently approach the skills and competencies they are acquiring [14]. Little attention has been paid to organizing the learning activities of elementary school students as a group activity. The process of acquiring knowledge has been regarded as an individual process. As a result, in pedagogical psychology, it was believed that students' independent thinking and autonomous activity could only manifest in individual forms of work. Recent studies have made significant corrections to the traditional understanding of thinking independence as

an activity. It has been found that group learning activities based on students' mutual supervision and responsibility create favorable conditions for the development of thinking independence.

Learning activities and constructive thinking are intrinsically linked, each supporting the development of the other. This connection is especially pronounced during the early school years.

Pedagogical possibilities of technological education. In the technological education process, practical work, design, modeling, and creative assignments serve to develop constructive thinking in students. Through this subject, students not only acquire ready-made knowledge but also learn to apply it in practice.

Psychological mechanisms for developing constructive thinking. The development of constructive thinking depends on the harmonious coordination of attention, memory, imagination, and thinking processes. In the technological education process, this complex of mental processes develops.

Developing constructive thinking through practical activities

Practical activity — It is the process by which students learn not only by receiving knowledge, but also by applying, restructuring, and creating it. This method is based on the principle of "learning by doing" — learning through practice, meaning that students independently construct knowledge and develop problem-solving skills in the process of solving a task. Wikipedia

When this method is applied, the student links theoretical knowledge with interactive ideas, can apply it in various situations, and activates their own thinking mechanisms to create new knowledge. During practical activities, students gain experience in constructive thinking by working with materials, planning, and analyzing results. Technology education has extensive pedagogical and psychological potential for developing constructive thinking in young school-aged students. Effective use of these opportunities contributes to improving the quality of education.

Developing constructive thinking through practical activities—not just mastering knowledge, but also involving students.

- ✓ encourages problem-solving,
- ✓ participation in discussions,
- ✓ analysis of information,
- ✓ and independent decision-making in any situation.

In the modern education system, fostering constructive thinking in young school-age students is considered one of the top pedagogical priorities. Especially in the context of rapid technological development, it is crucial to develop children's abilities not only to acquire knowledge but also to analyze, process, and creatively apply it, as well as to make independent decisions. In this process, the pedagogical and psychological potential of the technology education subject plays a special role.

Research results show that technology education creates a favorable learning environment for developing the constructive thinking of elementary school students. The content of this subject is oriented toward practical activity, actively engaging students in the processes of creating objects, designing, modeling, and solving problems. Such activities help to shape a child's thinking in a systematic, goal-oriented, and results-driven manner [15].

From a pedagogical point of view, active teaching methods used in the technological education process — the project method, creative assignments, group work, problem-based learning, and hands-on activities—develop students' skills in independent thinking, understanding cause-and-effect relationships, and substantiating their own opinions. Through this, the key components of constructive thinking—analysis, synthesis, comparison, generalization, and reflection—are effectively developed.

Psychologically, technological education serves to stimulate the cognitive activity characteristic of the early school age. At this age, students' thinking is in the stage of transitioning from concrete-imaginative to logical thinking. The visual aids, hands-on activities, and the ability to see and evaluate the results in technological education stabilize the child's attention, increase their interest, and strengthen their learning motivation. As a result, the student develops a positive attitude toward their own activity and actively participates in the thinking process.

Moreover, technological education is also an important factor for socio-psychological development. During group work, students learn to cooperate with each other, exchange ideas, and make decisions together. This fosters constructive dialogue, teamwork, and social thinking skills. At the same time, it cultivates in the child a culture of defending one's own opinions and taking others' views into account.

The research revealed that for technological education to be organized effectively, the teacher's professional competence, readiness for pedagogical innovations, and psychological approach are crucial. The teacher should guide the student not to work from a prepared example, but to engage in independent inquiry, reflect on mistakes, and find new solutions. Only then does technological education become an effective tool for developing constructive thinkin.

4. Conclusion

In conclusion, the pedagogical and psychological potential of technological education in developing constructive thinking among young schoolchildren is very broad and multifaceted. Through this subject, students develop creative approaches, independent thinking, practical problem-solving skills, and the ability to evaluate their own activity results. Therefore, improving the content of technological education in the primary education system, organizing it based on modern pedagogical technologies, and strengthening the methodological support aimed at constructive thinking is considered to have significant scientific and practical importance. Moreover, technological education creates favorable conditions for forming a positive learning attitude, self-confidence, and responsibility for one’s own learning process. The integration of modern pedagogical technologies—such as interactive methods, collaborative learning, and learner-centered approaches—enhances students’ engagement and supports the systematic development of constructive thinking from an early age. Therefore, continuous improvement of the content, structure, and teaching methodologies of technological education within the primary education system holds substantial scientific significance and practical value. It contributes to the formation of a competent, innovative, and adaptable generation capable of responding effectively to contemporary educational and societal challenges, while also providing a solid foundation for lifelong learning and creative self-realization.

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