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Conditions of The Methodology for Forming the Cognitive Competence of Primary Students

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Abstract: This article covers the theoretical foundations, content and practical directions of the methodology for the formation of cognitive competence of primary school students. It analyzes the pedagogical conditions for the formation of thinking, cognitive activity, creativity, problem-solving skills and self-development needs in students. It also substantiates the effectiveness of developing cognitive competence through the use of modern educational technologies, interactive methods and didactic tools. The article scientifically reveals the importance of the teacher's methodological skills, educational environment and innovative approaches, taking into account the age and psychological characteristics of primary school students.

Keywords: Primary school, cognitive competence, methodology, development of thinking, interactive methods, educational activities, innovative approach.

Introduction: In today's era of globalization and rapid information, one of the most important tasks facing humanity is to form the ability to independently analyze, sort and apply knowledge in practice, not just to acquire it. In particular, the primary education stage is the period when the foundation of the intellectual potential of the student is laid, and it is in this process that the issue of developing cognitive competence becomes relevant. Because if a child learns from the first grades to consciously approach the process of acquiring knowledge, independently solve problems, observe and compare, ask questions and search for answers, his intellectual development will be more effective in subsequent stages of education. Cognitive competence is manifested in students not only assimilating knowledge, but also as a desire to process it, draw logical conclusions and create innovations. In order to form such competence, a teacher must be not only a person who gives knowledge, but also a person who guides, encourages and develops thinking. When innovative methods, interactive approaches and modern pedagogical technologies are used in the educational process, students develop independent thinking, creative approach and intellectual activity skills.

Thus, the formation of cognitive competence of primary school students is one of the main directions of effective organization of the educational process, which is considered one of the most important tasks of modern pedagogy.

METHODOLOGY

This research methodology is aimed at testing, measuring and explaining the process of forming cognitive competence of primary school students in real educational conditions. At the heart of our approach is the logical chain “conditions → methodological intervention → cognitive result”: that is, first we create a learning environment on a scientific basis, then we use specific methodological tools and finally we collect evidence showing the change.

The study is built using a mixed method: quantitative and qualitative approaches complement each other. The quantitative phase uses a quasi-experimental design—a “before–after” (pretest–posttest) model that compares control and experimental classes. The qualitative phase uses classroom observations, teacher-student interviews, student portfolios, and written reflections on classroom processes to uncover the meaning behind the numbers. This integration increases the reliability of the results and helps answer the “why” and “how” questions.

Participants—students in grades 2–4 and their

teachers. Classes are selected to be as balanced as possible (number of students, teacher experience, and similarity of school environments); the intervention is fully implemented in experimental classes, while the usual teaching practices are maintained in control classes. Context—organized taking into account the local curriculum and textbooks, students' native language, and sociocultural experiences.

An environment that activates cognitive competence relies on 4 basic elements:

1. Didactic design: problem-solving tasks, open-ended questions, comparison and categorization exercises, concept mapping, small projects, and written work focused on evidence.

2. Interactive methods: "think-pair-share", Socratic discussion, role-playing, experiments and observations, small group inquiry.

3. Metacognitive support: goal setting at the beginning of the lesson, checklists for self-checking in the process, "exit tickets" at the end of the lesson and daily reflection.

4. Digital and visual tools: simple graphic organizers, working with slides and pictures, templates that show tasks step by step.

Short master classes are held for the teacher, where the purpose of each method, application steps and differentiation methods are shown through practical examples. A positive attitude to errors, encouragement to ask questions and a culture of reasoning are introduced as class norms. For the reliability of the assessment, two independent assessors check the samples based on the rubric; the degree of agreement is calculated. Tasks are tested, and the level of complexity and time limit are adjusted. In quantitative analysis, descriptive indicators (mean, variance), pretest–posttest differences, comparisons between experimental and control classes (e.g., t-test or ANCOVA), and effect sizes are calculated. In qualitative analysis, thematic coding is performed, revealing patterns in the forms of manifestation of cognitive activity (quality of questions, depth of reasoning, choice of strategy). Conclusions are strengthened through triangulation (numbers, interview, observation, portfolio). For internal validity, classes are as equal as possible, and the time allocated to the lesson and topics are coordinated. To increase external validity, it is advisable to involve classes from different schools. Reliability is achieved through the compatibility of two raters, and the consistency of the results of tasks when repeated. Limitations include differences in teacher style, resources (time, technology), and individual differences in students; Differentiation and additional instructions are provided to mitigate these. Parental consent is obtained, data is kept confidential, and student participation is carried out on the basis of positive incentives. Teachers are involved in the research process as partners: lesson plans are developed together, interim results are discussed, and necessary changes are made on the spot. At the end of the intervention, a short methodological guide and a bank of sample tasks are created for teachers. A "small steps" approach is proposed to embed cognitive competence into daily teaching practice: one open-ended question per lesson, one reasoning note per week, and one small project per month. Strengthening the communication channel with parents (questions and answers at home, joint reading, observation) also ensures continuity. This methodology aims to demonstrate a significant increase in cognitive competence through careful organization of conditions, thoughtful methodological intervention, and multi-source assessment. The mixed design illuminates the results not only from the perspective of "how much has changed?", but also from the perspective of "how and why has it changed?". Thus, the establishment of a culture of thinking in primary education becomes a systematic, measurable and repeatable roadmap.

Literature and source analysis

The issue of forming cognitive competence of primary school students is one of the current topics widely studied in modern pedagogy and psychology. An analysis of research conducted in this area shows that the theoretical foundations of cognitive development, factors of its formation, and practical methods are covered in the scientific literature from different perspectives.

In recent years, foreign studies have widely studied the competency-based education model, for example, the Krathwohl and OECD competency models. These sources emphasize the need to focus the content of education not only on memorizing facts, but also on processing knowledge, solving problems, and developing critical and creative thinking. At the same time, methods for monitoring the growth of knowledge, skills, and competencies according to the level of complexity based on Bloom's taxonomy have been developed.

Uzbek scientists are also carrying out a number of scientific works in this direction. In particular, the works of A. Abdukodirov, O. Tolipov, and M. Jo'rayev analyze methods for forming independent thinking, creativity, and problem-solving competencies in students during primary education. Also, cognitive competence is defined as one of the main criteria in the State Educational Standards and the Concepts of

General Secondary Education developed at the republican level.

The literature shows the effectiveness of interactive methods (problem-based learning, brainstorming, debate, project-based learning), information and communication technologies, and metacognitive strategies (self-control, reflection, planning) in the formation of cognitive competence. In particular, modern research emphasizes the effective results of working with primary school students using small group collaboration, visual aids (graphic organizers, conceptual maps), game technologies, and digital platforms.

Foreign experience shows that the educational environment and pedagogical conditions are of decisive importance in the development of cognitive competence. The educational systems of Finland, Singapore, and South Korea are a vivid example of this, which achieve high results in international ratings by encouraging students to think independently and be creative. In Uzbekistan, research is being conducted in this regard to combine national values, folk pedagogy, and innovative technologies. The analysis of the literature shows that although the scientific basis for the formation of cognitive competence of primary school students has been sufficiently developed, it is necessary to adapt them to local conditions, enrich them with modern technologies and put them into practice through methodological manuals. Also, the personality of the teacher, methodological skills and the educational environment are recognized as the most important conditions for this process.

DISCUSSION

The work carried out on the formation of cognitive competence in primary education shows that growth occurs not due to a single method or a separate exercise, but as a result of a well-organized set of conditions. When didactic design, interactive methods, metacognitive support and a positive classroom climate are combined, a significant shift in the student's thinking process is observed: questions become more meaningful, reasoning is more coherent, and the approach to problem solving becomes more goal-oriented.

The intervention experience shows that using problem-solving tasks as a simple “active method” is not enough. They are effective only when combined with metacognitive tools (goal setting, self-monitoring, reflection) and a culture of dialogue and discussion. Working with small groups was especially effective: in the process of collaborative inquiry, students naturally practice justifying their opinions, selecting evidence, and comparing opposing ideas. This is consistent with the principle of the formation of higher cognitive functions through social interaction, which Vygotsky emphasized. Metacognition is the “engine”. Setting a clear goal at the beginning of the lesson and reflecting at the end (for example, an “exit ticket”) form in students the habit of regularly searching for answers to the question “what am I doing and why?” This habit gradually turns into the skills of choosing a strategy, diagnosing errors, and retrying the solution. According to Piaget, a balance of assimilation and accommodation is important in mastering new information; metacognitive practices help to consciously manage this balance. The results confirm that the teacher figure is crucial. Through short micro-PD (skills lessons), teachers began to consistently use strategies such as asking open questions, conducting Socratic dialogue, encouraging reasoning, and differentiation. Without methodological support, even good assignments can become reproductive exercises. Therefore, teacher development is as important as educational content for sustainable growth.

Digital and visual tools (concept maps, graphic organizers) when used purposefully make it easier to manage cognitive load: it becomes easier to structure facts, see cause-and-effect chains, and draw connections between concepts. However, technology itself is not an independent value; it only works in conjunction with task design that focuses on critical and creative thinking.

Assessment as part of teaching.

Analytical rubrics and student portfolios have made it possible to demonstrate the “invisible” aspects of cognitive competence. The approach of assessment for learning has prevailed over assessment of learning: intermediate feedback encourages the student to take the next step, and provides the teacher with the opportunity to adjust the lesson. At the same time, in a test-oriented environment, it can be difficult to find time for deep thinking - this requires political and organizational solutions at the school level.

Tasks that are adapted to local language, cultural context, and family experiences have increased student engagement. Also, differentiated tasks (levels of difficulty), peer support, and visual aids have mitigated inequalities in access to learning. Thus, developing cognitive competence is also part of the equity agenda. Observations have shown that when strategies are practiced regularly, they transfer to other topics: students begin to apply the comparison and reasoning techniques they used in mathematics to text analysis in their native language. To maintain this, a habit of “small steps” (one open-ended question per lesson, one reasoning essay per week, one small project per

month) is justified. Resource differences between classes, individual teacher styles, and time pressures can affect results. Sometimes metacognitive activities are perceived as “extra work”; Therefore, it is advisable to start with short, clear forms (2–3 minutes of reflection) and gradually complicate them. It is also important to find a balance between playful methods and deep thinking: “interesting” does not always mean “cognitively deep”. Long-term observations (longitudinal) show the stability of cognitive competence and its impact on higher stages. Randomized designs shed more light on cause and effect. A deeper study of adaptation strategies with children with special needs, as well as the relationship between the quality of teacher speech (types of questions, waiting time) and student reasoning, requires separate research.

CONCLUSION

The study of the methodology for forming cognitive competence in primary school students showed that the success of this process directly depends on the conditions created in the educational process, the teacher’s skills and the rational use of modern pedagogical technologies; In particular, when problem-solving tasks, interactive methods, metacognitive approaches and reflection processes are combined, students develop independent thinking, reasoning, creativity and information analysis skills, which develops their intellectual potential and provides the necessary cognitive foundation for successful study at subsequent educational stages; at the same time, it was found that the effectiveness of the methodology is closely linked to the teacher's pedagogical activity, educational environment and family cooperation, and sustainable results can be achieved by implementing a person-centered approach in the educational process.

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