



**COMPARATIVE THINKING DEVELOPMENT IN STUDENTS THROUGH
PUZZLES AS A PEDAGOGICAL CHALLENGE**

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ABSTRACT	KEYWORDS
<p>In the context of modern education, the development of comparative thinking in students is considered one of the key factors ensuring the effectiveness and competitiveness of the learning process. This process involves training learners not only to absorb and recall information, but also to analyze, compare, contrast, and synthesize various data and phenomena. The ability to think comparatively allows students to develop a critical approach toward information, to see the similarities and differences between concepts, and ultimately, to make reasoned judgments. One of the most effective pedagogical methods for fostering comparative thinking is the targeted use of logical puzzles and problems (masalalar) in the educational environment.</p>	<p>Comparative thinking, developing thinking, students, puzzles, pedagogy, creativity, analytical skills, education.</p>

INTRODUCTION

The purposeful integration of puzzles into the learning process creates favorable conditions for the activation of students' cognitive activities. Puzzles often require analyzing several aspects of a problem, comparing different solving strategies, and choosing the most optimal solution. This process naturally develops the habit of comparing and evaluating, which, in turn, forms the foundation of comparative thinking. It also helps students to overcome cognitive inertia – a state where the learner remains stuck using familiar, routine approaches – by prompting them to seek alternative viewpoints and consider new possibilities. From a pedagogical perspective, the value of puzzles in achieving educational goals goes beyond mere intellectual entertainment. Puzzles are an effective means for forming analytical and logical skills, as well as for cultivating perseverance, patience, and creative thinking in students. When learners are confronted with puzzles in the classroom setting, they are compelled to engage in deeper analysis, which necessitates establishing connections between known concepts and unexplored situations. This process inextricably binds the development of comparative thinking with the ability to generalize and categorize new information on the basis of similarities and differences. Thus, the systematic use of puzzles can be viewed as a powerful pedagogical tool in nurturing comparative and critical thinking capabilities.

MATERIALS AND METHODS

It is crucial for the teacher to foster an environment where students feel encouraged to present their own solutions and compare their methods with those of others. This classroom culture, rooted in collaboration and constructive dialogue, leads to the emergence of a more conscious approach towards learning. Students learn to justify their reasoning, respectfully challenge peers' ideas, and accept constructive feedback. Comparative thinking, therefore, becomes a social process as much as a cognitive one, linking independent reasoning with collective discussion. Furthermore, comparative thinking is vital in the context of an ever-changing information society, where knowledge is rapidly updated and diversified. Students equipped with comparative thinking skills are better able to distinguish reliable facts from misinformation, make independent decisions, and adapt to new educational and professional environments. Thus, developing these skills through carefully structured pedagogical methods – particularly via puzzles – is not merely about training students for academic success, but also about preparing them for life-long learning and responsible citizenship [1].

In many cases, the lack of comparative thinking skills leads to superficial learning, where students memorize facts but cannot apply the gained knowledge in unfamiliar situations. This limitation becomes evident during problem-solving tasks, especially those that demand unconventional thinking. By regularly engaging with puzzles, students learn to view problems from multiple perspectives, analyze the efficiency of different solutions, and identify common patterns across diverse contexts. Such skills are indispensable not only in mathematics or logical disciplines, but also in the humanities, sciences, and everyday decision making [2].

RESULTS AND DISCUSSION

From a methodological viewpoint, the inclusion of puzzles in curricula should be systematic and purposeful. The process must begin with the identification of the main cognitive goals and the selection of puzzles that align with the intended learning outcomes. Instructors should plan activities that prompt students to not only solve puzzles but also reflect on the strategies employed, compare solutions, and analyze errors. Teachers play a facilitative role, guiding discussions, encouraging metacognitive awareness, and helping students to articulate their thinking processes. With repeated practice, learners gradually become more adept at comparative analysis, which exerts a positive impact on their overall academic achievement. Another important aspect concerns assessment. Traditional evaluation methods may not be sufficient to measure the growth of comparative thinking. Thus, it is necessary to employ alternative forms such as oral dialogue, reflective journals, and peer assessment, which reward not only the correctness of solutions but also the quality of the reasoning and depth of comparative analysis. These approaches motivate students to take ownership of their learning and to prioritize the process of thinking over mere rote memorization [3].

In terms of educational psychology, the development of comparative thinking through puzzles facilitates the formation of higher-order cognitive skills. These include synthesis, evaluation, abstraction, and the capacity for analogical reasoning. Such skills are of particular importance in a world that emphasizes complex problem-solving abilities. Importantly, puzzles can be tailored to accommodate different levels of cognitive development, making them accessible both to advanced students and those who require more support. When adjusted appropriately, puzzles can serve as differentiated instructional tools, addressing individual learning needs while fostering a sense of accomplishment. The teacher's pedagogical mastery is also reflected in the ability to select puzzles

that are meaningful, age-appropriate, and culturally relevant. The motivational aspect must not be neglected, as puzzles that resonate with students' experiences or personal interests can increase engagement and persistence. By integrating such materials into lessons, educators nurture curiosity and intrinsic motivation – essential drivers of deep and lasting learning [4].

Comparative thinking developed through puzzles is closely associated with creative thinking as well. Both types of thinking involve generating new ideas, questioning the status quo, and seeking alternative perspectives. When students compare multiple solutions to a puzzle, they are essentially tasked with evaluating the strengths and weaknesses of each approach; this process encourages flexibility, originality, and innovation. Ultimately, these qualities foster a growth mindset, helping learners to embrace challenges and learn from failures. Another critical benefit of fostering comparative thinking is the enhancement of academic independence. Students who regularly engage with puzzles become less reliant on external guidance and more inclined to approach learning autonomously. They develop the habit of self-questioning, double-checking their answers, and considering various possibilities before settling on a conclusion. Such habits lay the foundation for lifelong learning and intellectual resilience. Educational practice shows that group and paired work with puzzles is especially effective. Through cooperation, students can compare their thinking processes with those of peers, refine their arguments, and expand their perspectives. This shared intellectual activity contributes to the development of communication skills, empathy, and mutual respect. It also allows for the pooling of diverse experiences, enriching the learning environment and fostering a sense of community [5].

Although the importance of puzzles in developing comparative thinking is widely acknowledged, it is essential to recognize that the success of this approach depends largely on the pedagogical competence and creativity of the teacher. The educator must skillfully balance challenge and support, set clear expectations, and cultivate a safe and positive classroom atmosphere. Only then can students feel secure in experimenting with different solutions and openly sharing their ideas. Special attention should be paid to connecting puzzle-solving activities with real-life applications. Students need to see the relevance of comparative thinking outside the classroom in order to fully appreciate its value. Real-world examples and interdisciplinary links enhance the transferability of learned skills, encouraging students to recognize patterns and make meaningful comparisons in everyday life. The process of developing comparative thinking through puzzles is continuous and cumulative. Progress may not always be immediately visible; however, with sustained effort and thoughtful teaching, significant transformations occur over time. By embedding comparative thinking within daily instructional practices, educators help students form robust cognitive habits that will serve them throughout their academic and professional journeys [6].

Developing comparative thinking in students has become a central focus in contemporary educational practice. Among the variety of strategies available to educators, the integration of puzzles into teaching is emerging as an innovative approach to stimulate analytical reasoning, promote intellectual agility, and encourage multidimensional thinking. Puzzles inherently require students to recognize patterns, distinguish similarities and differences, form hypotheses, and test solutions against given criteria. Analytical exploration of how puzzles can foster comparative thinking illustrates both the pedagogical potential and the challenges present in classroom implementation. Comparative thinking encompasses a set of mental skills that allow learners to juxtapose ideas, evaluate contrasting perspectives, and draw insightful conclusions. When students engage with puzzles, they are required

to hold multiple pieces of information in mind, compare options, reject less plausible solutions, and settle on optimal answers through a process of elimination. This cognitive engagement nurtures a habit of systematic comparison, which extends far beyond the context of puzzles into other academic and real-life domains. For instance, while attempting to solve a logic grid, learners analyze relationships between variables and compare associations, strengthening skills of inference and deduction. Analysis of classroom experiences reveals that puzzles create inclusive and low-pressure environments for developing comparative thinking. Unlike traditional examinations, puzzles often present open-ended scenarios that reward creative thinking and diverse problem-solving strategies. Students collectively or individually explore possible solutions, which naturally encourages discussion, debate, and comparison of alternative approaches. Observations of learners repeatedly indicate higher engagement and enjoyment when working with puzzles than with textbook exercises. The sense of challenge and achievement associated with solving puzzles motivates students to persist in comparing, hypothesizing, and adjusting their reasoning. Educators report that the use of puzzles leads to visible improvements in skills associated with comparative thinking, such as classification, sequencing, distinguishing essential from nonessential information, and synthesizing disparate facts. A central finding is that students gradually become more comfortable with ambiguity and complexity, recognizing that multiple valid perspectives or partial solutions exist. Over time, this breeds cognitive flexibility, a hallmark of advanced comparative thinking. Furthermore, students begin to articulate their reasoning more confidently, explaining why one puzzle solution is more appropriate or efficient than another. This metacognitive reflection is an important indicator of depth in comparative thinking development. Nonetheless, the implementation of puzzles is not without pedagogical challenges. Some students initially struggle with puzzles that deviate from conventional question-answer formats. The open-ended and sometimes abstract nature of puzzles can seem daunting, particularly for students unaccustomed to examining problems from different angles. There is a learning curve associated with adopting a habit of comparison, and some learners require explicit scaffolding in strategies such as making tables, drawing diagrams, or verbalizing thought processes. Teachers must also be cautious not to rely solely on puzzles that emphasize rote pattern recognition, focusing instead on puzzles that genuinely require comparison, evaluation, and synthesis of multiple elements [7].

CONCLUSION

The development of comparative thinking in students through puzzles represents both an opportunity and a challenge within the modern pedagogical landscape. By systematically integrating puzzles into educational practice, teachers create dynamic learning environments that foster critical analysis, creativity, and independence. These skills, essential for adapting to future challenges, enable learners not only to succeed academically but also to become thoughtful, innovative, and responsible members of society. The ongoing development of comparative thinking through puzzles must be viewed as a strategic priority, requiring commitment, reflection, and collaboration among all educational stakeholders.

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