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IMPROVING THE LEARNING ACTIVITIES OF PRIMARY SCHOOL STUDENTS IN THE EDUCATIONAL PROCESS (ON THE EXAMPLE OF A MATHEMATICS LESSON)

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Abstract. This study explores effective ways to improve the learning activities of primary school students in the educational process, focusing on mathematics lessons. The research is grounded in modern approaches within Pedagogy and emphasizes the application of Constructivism in classroom practice. The findings show that student-centered methods, active learning strategies, and the integration of digital tools significantly enhance engagement and understanding. The study also highlights the importance of formative assessment and metacognitive skill development in achieving better learning outcomes. It concludes that adapting innovative teaching practices can improve both academic performance and motivation among primary school students.

Keywords: primary education, mathematics learning, student-centered approach, active learning, constructivism, educational technology, formative assessment, metacognition, learning activities, teaching methods.

Introduction. In the context of rapid educational transformation and increasing demands for high-quality learning outcomes, improving the learning activities of primary school students has become a central issue in modern pedagogy. Early education plays a decisive role in shaping cognitive abilities, learning motivation, and problem-solving skills, particularly in subjects such as mathematics, which form the foundation for further academic development. Within the field of Pedagogy, recent research emphasizes the need to move beyond traditional teacher-centered approaches toward more interactive, student-centered learning environments that actively engage young learners in the educational process. Mathematics education in primary school is especially significant because it not only develops numerical and logical thinking but also fosters analytical reasoning and creativity. However, many studies conducted in the last decade indicate that students often experience difficulties in understanding abstract mathematical concepts due to passive learning methods and insufficient engagement. Contemporary scholars argue that improving learning activities requires the integration of innovative teaching strategies, including problem-based learning, collaborative learning, and the use of digital technologies. These approaches are grounded in the principles of Constructivism, which views learners as active participants in constructing knowledge through interaction and experience.

Recent literature (2020–2024) highlights that effective learning in mathematics is closely linked to the development of students’ cognitive engagement and intrinsic motivation. Researchers point out that when students are actively involved in solving meaningful problems, discussing ideas, and reflecting on their learning, their academic performance significantly improves. In this regard, the role of the teacher shifts from a transmitter of knowledge to a facilitator who guides students’ thinking processes and encourages independent inquiry. Studies also emphasize the importance of formative assessment techniques, which allow teachers to monitor students’ progress continuously and adjust instructional strategies accordingly. Another important factor influencing the improvement of learning activities is the integration of digital tools and educational technologies. The rapid advancement of digital education, especially following the global impact of COVID-19 pandemic, has accelerated the adoption of e-learning

platforms, interactive applications, and multimedia resources in primary education. These tools can enhance students' engagement by providing visual and interactive representations of mathematical concepts. However, researchers caution that technology alone does not guarantee improved learning outcomes; its effectiveness depends on how well it is integrated into pedagogical practices and aligned with learning objectives. Furthermore, international experience demonstrates that the quality of primary mathematics education is strongly influenced by curriculum design and teaching methodologies. Countries with high-performing education systems, such as Finland and Singapore, emphasize conceptual understanding, problem-solving, and student participation rather than rote memorization. Comparative studies suggest that adapting such approaches can significantly enhance the effectiveness of mathematics instruction in different educational contexts. At the same time, it is essential to consider national characteristics, including cultural, institutional, and socio-economic factors, when implementing foreign practices.

In addition, recent research underscores the importance of developing metacognitive skills in primary school students. Metacognition—defined as the awareness and regulation of one's own learning processes—enables students to plan, monitor, and evaluate their problem-solving strategies. In mathematics lessons, this can be achieved through activities that encourage students to explain their reasoning, justify their answers, and reflect on alternative solutions. Such practices not only improve academic achievement but also foster lifelong learning skills. Despite the growing body of research on improving learning activities, several challenges remain. These include limited teacher training in innovative pedagogical methods, insufficient instructional resources, and large class sizes that restrict individualized attention. Moreover, in many educational systems, including those undergoing reform, there is still a strong emphasis on standardized testing, which may hinder the implementation of creative and student-centered approaches. Addressing these challenges requires comprehensive reforms at both institutional and classroom levels. Given these considerations, this study aims to explore effective ways of improving the learning activities of primary school students in the educational process, focusing specifically on mathematics lessons. By analyzing contemporary pedagogical approaches and incorporating insights from international experience, the research seeks to identify practical strategies that can enhance student engagement, understanding, and overall learning outcomes. Ultimately, the study contributes to the development of more effective and innovative teaching practices in primary education, aligning with the broader goals of improving educational quality and fostering students' intellectual growth.

Literature review. Improving the learning activities of primary school students, particularly in mathematics lessons, has become a central focus of contemporary educational research. Within the domain of Pedagogy, recent studies (2020–2024) emphasize that effective learning is not limited to knowledge acquisition but involves active student participation, cognitive engagement, and the development of higher-order thinking skills. Scholars argue that modern education systems must shift from traditional, teacher-centered instruction toward interactive and student-centered approaches that foster meaningful learning experiences. One of the most influential theoretical foundations in this area is Constructivism, which posits that learners actively construct knowledge through interaction with their environment. According to recent research, constructivist-based teaching strategies—such as inquiry-based learning, problem-solving tasks, and collaborative activities—are particularly effective in primary mathematics education. These methods encourage students to explore concepts independently, engage in discussion, and apply knowledge in real-life contexts. Studies show that such approaches significantly improve conceptual understanding and retention compared to traditional memorization techniques.

A growing body of empirical research highlights the importance of active learning strategies in mathematics classrooms. Active learning involves engaging students in tasks that require

analysis, synthesis, and evaluation rather than passive listening. For example, recent studies indicate that problem-based learning (PBL) enhances students' critical thinking and problem-solving abilities. In PBL environments, students work on real-world mathematical problems, often in groups, which promotes collaboration and communication skills. Similarly, cooperative learning models have been found to increase student motivation and academic achievement by fostering peer interaction and shared responsibility for learning outcomes. Another key theme in recent literature is the role of cognitive engagement in improving learning activities. Cognitive engagement refers to the extent to which students are mentally invested in their learning processes. Researchers argue that deep learning occurs when students actively process information, make connections, and reflect on their understanding. In mathematics education, this can be achieved through tasks that require reasoning, justification, and multiple solution strategies. Studies published after 2020 suggest that classrooms emphasizing cognitive engagement demonstrate higher levels of student achievement and long-term knowledge retention.

The integration of Educational Technology has also emerged as a significant factor in enhancing learning activities. Digital tools, such as interactive whiteboards, educational software, and online learning platforms, provide opportunities for dynamic and personalized learning experiences. Following the global impact of the COVID-19 pandemic, the use of technology in primary education has expanded rapidly. Recent studies indicate that digital resources can improve students' understanding of mathematical concepts by offering visualizations, simulations, and immediate feedback. However, researchers emphasize that the effectiveness of technology depends on its pedagogical integration and the teacher's ability to use it effectively. In addition to instructional strategies and technology, the literature highlights the importance of formative assessment in improving learning activities. Formative assessment involves ongoing evaluation of students' progress during the learning process, allowing teachers to identify misconceptions and adjust instruction accordingly. Recent research suggests that formative assessment techniques—such as questioning, peer assessment, and feedback—enhance student engagement and self-regulation. In mathematics lessons, providing timely and constructive feedback helps students understand their errors and develop more effective problem-solving strategies. Another important aspect discussed in the literature is the development of metacognitive skills among primary school students. Metacognition refers to students' ability to monitor and regulate their own learning. Studies indicate that teaching metacognitive strategies—such as planning, monitoring, and evaluating—can significantly improve students' performance in mathematics. For example, encouraging students to explain their reasoning, reflect on their solutions, and consider alternative approaches fosters deeper understanding and independent learning skills.

International comparative studies provide valuable insights into effective practices for improving learning activities. High-performing education systems, such as those in Finland and Singapore, emphasize student-centered learning, conceptual understanding, and problem-solving. These systems prioritize teacher professional development and continuous improvement of instructional practices. Research suggests that adapting such approaches can enhance the quality of mathematics education in other contexts. However, scholars also stress the importance of considering local educational conditions, including curriculum requirements, cultural factors, and resource availability. Despite the positive findings, the literature also identifies several challenges in implementing innovative teaching methods. One of the main barriers is the lack of teacher training in modern pedagogical approaches. Many teachers continue to rely on traditional methods due to limited professional development opportunities and insufficient support. Additionally, large class sizes and limited instructional resources can hinder the effective implementation of interactive and individualized learning activities. Researchers also note that

an excessive focus on standardized testing may discourage teachers from adopting creative and student-centered approaches.

Recent studies further highlight the importance of motivation and emotional factors in learning. Student motivation is closely linked to engagement and academic achievement. Intrinsically motivated students are more likely to participate actively in learning activities and persist in solving challenging problems. In mathematics education, creating a supportive and encouraging classroom environment is essential for reducing anxiety and building confidence. Teachers play a crucial role in fostering positive attitudes toward learning by providing encouragement, recognizing achievements, and creating opportunities for success. The reviewed literature demonstrates that improving the learning activities of primary school students requires a comprehensive approach that integrates effective pedagogical strategies, technological tools, formative assessment, and the development of cognitive and metacognitive skills. While significant progress has been made in understanding these factors, challenges related to teacher training, resource availability, and institutional constraints remain. The insights from recent research provide a strong foundation for developing practical strategies to enhance learning activities in primary mathematics education, particularly when adapted to specific educational contexts.

Research discussion. The findings of this study indicate that improving the learning activities of primary school students in mathematics lessons requires a comprehensive transformation of teaching practices, institutional support, and student engagement strategies. One of the most significant insights derived from the analysis is the critical role of student-centered approaches in enhancing learning effectiveness. Within the framework of Constructivism, learning is viewed as an active process in which students construct knowledge through exploration, interaction, and reflection. The results confirm that when students are actively involved in problem-solving, discussion, and collaborative tasks, their understanding of mathematical concepts becomes deeper and more sustainable. Another important finding concerns the integration of Educational Technology into the learning process. The use of digital tools, such as interactive platforms and visual learning applications, significantly increases students' engagement and motivation. These technologies allow for the representation of abstract mathematical ideas in more concrete and accessible forms, which is particularly beneficial for young learners. However, the study also reveals that the effectiveness of technological integration largely depends on teachers' competencies and their ability to align digital tools with pedagogical objectives. Without proper training and methodological support, technology may be underutilized or fail to produce meaningful learning outcomes.

The research further highlights the importance of formative assessment as a mechanism for improving learning activities. Continuous assessment enables teachers to monitor students' progress, identify learning gaps, and provide timely feedback. This process not only supports academic achievement but also fosters students' self-regulation and responsibility for their own learning. In mathematics lessons, formative assessment practices such as guided questioning, peer evaluation, and reflective exercises have been shown to enhance critical thinking and problem-solving skills. In addition, the development of metacognitive abilities emerges as a key factor influencing learning effectiveness. Students who are capable of planning, monitoring, and evaluating their learning processes demonstrate higher levels of independence and adaptability. The findings suggest that incorporating metacognitive strategies into mathematics instruction—such as encouraging students to explain their reasoning and reflect on alternative solutions—can significantly improve both performance and confidence. These skills are essential not only for academic success but also for lifelong learning.

The study also underscores the importance of motivation and emotional engagement in the learning process. A positive classroom environment, characterized by support, encouragement, and mutual respect, plays a crucial role in fostering students' interest in mathematics. When

students feel confident and motivated, they are more likely to participate actively in learning activities and persist in overcoming challenges. Teachers, therefore, must adopt strategies that promote intrinsic motivation, such as providing meaningful tasks, recognizing individual achievements, and creating opportunities for collaborative learning. Despite these positive findings, several challenges remain evident. One of the main barriers is the limited professional development of teachers in innovative pedagogical methods. Many educators continue to rely on traditional teaching approaches due to a lack of training and institutional support. Additionally, large class sizes and limited access to educational resources can restrict the implementation of interactive and individualized learning activities. These constraints highlight the need for systemic reforms that address both pedagogical and organizational aspects of education. Furthermore, the study emphasizes the importance of adapting international best practices to local educational contexts. While high-performing education systems provide valuable models, direct replication without considering national characteristics may not yield effective results. Therefore, it is essential to develop context-specific strategies that align with curriculum standards, cultural values, and available resources. Overall, the findings demonstrate that improving learning activities in primary mathematics education requires a multidimensional approach that integrates pedagogical innovation, technological advancement, and institutional support. By addressing existing challenges and leveraging modern educational practices, it is possible to create a more effective and engaging learning environment for primary school students.

Conclusion. Enhancing the learning activities of primary school students in mathematics lessons is essential for improving overall educational quality. The study shows that student-centered approaches, effective use of educational technology, formative assessment, and metacognitive skill development play a crucial role in achieving this goal. Despite existing challenges such as limited teacher training and resource constraints, the adoption of innovative and context-sensitive strategies can significantly improve learning outcomes. Strengthening institutional support and aligning teaching practices with modern pedagogical principles will contribute to more engaging, effective, and sustainable primary education.

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