

**METHODOLOGY FOR DEVELOPING BASIC COMPETENCIES IN  
MATHEMATICS AMONG ELEMENTARY SCHOOL STUDENTS**

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**Annotation:** This article explores the methodology for developing basic competencies in mathematics among elementary school students. It emphasizes the critical role of mathematics education in fostering essential skills for future academic and life success. The paper discusses theoretical foundations, practical approaches, and pedagogical strategies for cultivating key mathematical competencies such as problem-solving, logical reasoning, critical thinking, and communication. It also highlights the importance of active learning, differentiated instruction, and continuous assessment in this process, aiming to provide a comprehensive guide for teachers to effectively enhance students' mathematical abilities.

**Keywords:** Basic Competencies, Mathematics Education, Elementary Grades, Problem-Solving, Logical Reasoning, Critical Thinking, Communication, Active Learning, Differentiated Instruction.

**Аннотация:** В данной статье исследуется методика развития базовых компетенций по математике у учащихся начальных классов. Подчеркивается решающая роль математического образования в формировании основных навыков для будущего академического и жизненного успеха. В работе обсуждаются теоретические основы, практические подходы и педагогические стратегии для развития ключевых математических компетенций, таких как решение задач, логическое мышление, критическое мышление и коммуникация. Также подчеркивается важность активного обучения, дифференцированного подхода и непрерывной оценки в этом процессе, с целью предоставить учителям всеобъемлющее руководство для эффективного повышения математических способностей учащихся.

**Ключевые слова:** Базовые компетенции, Математическое образование, Начальные классы, Решение задач, Логическое мышление, Критическое мышление, Коммуникация, Активное обучение, Дифференцированное обучение.

**Annotatsiya:** Ushbu maqolada boshlang'ich sinf o'quvchilarida matematika fanidan tayanch kompetensiyalarni rivojlantirish metodikasi o'rganiladi. Unda matematika ta'limining kelajakdagi akademik va hayotiy muvaffaqiyat uchun muhim ko'nikmalarni shakllantirishdagi hal qiluvchi roli ta'kidlanadi. Maqolada muammolarni hal qilish, mantiqiy fikrlash, tanqidiy fikrlash va kommunikatsiya kabi asosiy matematik kompetensiyalarni rivojlantirishning nazariy asoslari, amaliy yondashuvlari va pedagogik strategiyalari muhokama qilinadi. Shuningdek, ushbu jarayonda faol o'qitish, differensial o'qitish va uzluksiz baholashning ahamiyati ta'kidlanadi, bu esa o'qituvchilar uchun o'quvchilarning matematik qobiliyatlarini samarali oshirish bo'yicha keng qamrovli qo'llanma bo'lishni maqsad qilgan.

**Kalit so'zlar:** Tayanch kompetensiyalar, Matematika ta'limi, Boshlang'ich sinflar, Muammolarni hal qilish, Mantiqiy fikrlash, Tanqidiy fikrlash, Kommunikatsiya, Faol o'qitish, Differensial o'qitish.

## Introduction

Mathematics education in elementary grades serves as the cornerstone for a child's cognitive development and future academic success. Beyond simply acquiring numerical skills, the primary goal of modern mathematics curricula is to cultivate a set of basic competencies that enable students to understand, apply, and reason mathematically in various contexts. These competencies extend beyond rote memorization of facts and procedures, encompassing critical thinking, problem-solving, logical reasoning, and effective communication of mathematical ideas. In an increasingly complex and data-driven world, these foundational mathematical competencies are indispensable for navigating daily life and excelling in higher education and professional careers.

The traditional approach to mathematics teaching, often characterized by direct instruction and repetitive drills, may not fully address the holistic development of these essential competencies. There is a growing recognition that effective mathematics instruction in elementary schools must adopt methodologies that actively engage students, encourage exploration, and foster a deeper conceptual understanding. This article aims to explore a comprehensive methodology for developing basic competencies in mathematics among elementary school students. It will delve into the theoretical underpinnings, practical strategies, and pedagogical considerations necessary to equip young learners with the mathematical toolkit required for lifelong learning and success.

## Methodology

This article employs a qualitative, theoretical, and analytical approach to delineate a methodology for developing basic competencies in mathematics among elementary school students. The methodology primarily involves a synthesis of established educational theories, a review of best practices in mathematics pedagogy, and an analysis of the components of mathematical competencies. No empirical data collection was conducted for this theoretical exposition.

The core components of this methodology include:

### Conceptual Framework Development

A conceptual framework for basic mathematical competencies is established, drawing upon national and international curriculum standards and educational research. This framework defines what constitutes "basic competencies" in elementary mathematics, typically including:

**Problem-solving:** The ability to understand, analyze, and solve mathematical problems.

**Logical Reasoning:** The capacity to think logically, make deductions, and justify conclusions.

**Critical Thinking:** The skill to evaluate mathematical information and arguments.

**Communication:** The ability to express mathematical ideas clearly and coherently.

**Application:** The skill to apply mathematical concepts to real-world situations.

### Theoretical Foundations Review

A thorough review of relevant pedagogical and psychological theories underpins the proposed methodology. Key theories include:

**Constructivism:** Emphasizing that students construct their own understanding through active engagement with mathematical concepts (Piaget, 1970). This theory informs the importance of hands-on activities and discovery learning.

**Sociocultural Theory:** Highlighting the role of social interaction and collaboration in learning (Vygotsky, 1978). This supports the use of group work and peer learning in developing competencies.

Cognitive Learning Theory: Focusing on how information is processed, stored, and retrieved, informing strategies for effective instruction and memory retention (Bruner, 1960).

Competency-Based Education: A framework that shifts focus from content delivery to the demonstration of specific skills and abilities.

Literature Review on Pedagogical Strategies

A systematic review of academic literature, including research articles, educational reports, and pedagogical texts, was conducted to identify effective teaching strategies for developing mathematical competencies in elementary grades. This review focused on:

Active learning techniques (e.g., games, manipulatives, inquiry-based learning) (Karimov, 2020).

Differentiated instruction approaches to cater to diverse learning needs (Usmonova, 2022).

Formative and summative assessment methods for competencies.

The role of real-world contexts in making mathematics relevant (Sobirov, 2019).

Integration of technology to support competency development (Egamberdiyev, 2021).

Identification of Methodological Principles

Based on the theoretical synthesis and literature review, a set of methodological principles for developing basic mathematical competencies is articulated. These principles guide teachers in designing and implementing lessons that are competency-focused, student-centered, and effective. Examples include fostering a growth mindset, promoting conceptual understanding over rote memorization, and encouraging mathematical discourse.

By integrating these methodological components, this article aims to provide a robust and practical framework for elementary mathematics teachers to systematically cultivate essential mathematical competencies in their students.

## Results

The synthesis of theoretical perspectives and pedagogical practices reveals a clear set of results concerning the effective methodology for developing basic mathematical competencies in elementary school students. These results underscore the importance of shifting from a content-centric approach to a competency-based one, fostering deeper engagement and more robust understanding.

Enhanced Problem-Solving Abilities

A consistent finding is that methodologies emphasizing active learning, inquiry-based tasks, and real-world problem scenarios significantly enhance students' problem-solving abilities. When students are regularly presented with non-routine problems that require them to apply multiple concepts and strategies, they develop flexibility in their thinking. The use of open-ended tasks and opportunities for students to articulate their problem-solving processes (both verbally and in writing) further refines this competency (Nazarov, 2018).

Development of Strong Logical Reasoning Skills

Effective methodologies promote logical reasoning by encouraging students to justify their answers, explain their thinking, and critique the reasoning of others. Activities that involve pattern recognition, classification, sequencing, and deductive thinking (e.g., "if-then" statements in simple contexts) are crucial. When teachers consistently ask "Why?" and "How do you know?", students are compelled to develop and articulate logical arguments, moving beyond mere computation (Xolmatov, 2023).

Cultivation of Critical Thinking

The development of critical thinking is observed when students are encouraged to analyze mathematical information, identify assumptions, evaluate the reasonableness of solutions, and

question given data. Methodologies that incorporate error analysis, where students identify and correct mistakes (their own or others'), or engage in debates about different solution paths, are particularly effective. This fosters a skeptical yet constructive approach to mathematical inquiry (Zokirov, 2024).

#### Improved Mathematical Communication

Results indicate that methodologies prioritizing mathematical communication lead to students being more articulate in expressing their ideas. This includes using appropriate mathematical vocabulary, representing concepts visually (diagrams, graphs), and explaining procedures clearly. Group work, peer teaching, and presenting solutions to the class provide ample opportunities for students to practice and refine their communication skills (Karimov, 2020).

#### Increased Motivation and Self-Efficacy

When students are actively involved in constructing their own knowledge and are given opportunities to succeed through varied learning experiences, their motivation and self-efficacy in mathematics significantly increase. Methodologies that incorporate games, interactive technologies, and differentiated tasks ensure that students feel challenged but not overwhelmed, fostering a positive attitude towards mathematics and a belief in their own capabilities (Egamberdiyev, 2021).

These results collectively demonstrate that a competency-based methodology, rooted in active and student-centered learning, is highly effective in developing essential mathematical skills that extend beyond procedural knowledge, preparing elementary students for future academic and real-world challenges.

### Discussion

The results presented in the previous section strongly advocate for a competency-based approach to elementary mathematics education. This discussion will delve into the implications of these findings, address the practical challenges in implementing such a methodology, and propose strategies for successful integration into classroom practice.

#### Implications for Curriculum and Instruction

The observed improvements in problem-solving, logical reasoning, critical thinking, and communication underscore the need for curricula that explicitly define and prioritize these competencies. Traditional curricula often focus heavily on content coverage, potentially neglecting the development of deeper thinking skills. The findings suggest that instructional design should shift towards:

**Problem-Rich Environments:** Lessons should be built around meaningful problems that require students to think, explore, and apply multiple concepts, rather than simply practicing isolated skills.

**Emphasis on Process over Product:** While correct answers are important, the methodology should equally value the process of arriving at a solution, including the strategies used, the reasoning applied, and the communication of ideas.

**Interdisciplinary Connections:** Integrating mathematics with other subjects can provide authentic contexts for applying competencies and make learning more relevant and engaging (Sobirov, 2019).

#### Addressing Implementation Challenges

Implementing a competency-based methodology is not without its challenges, particularly in elementary settings:

**Teacher Training and Mindset Shift:** Many teachers may be accustomed to traditional teaching methods. A significant challenge lies in providing robust professional development that not

only introduces new strategies but also fosters a fundamental shift in pedagogical mindset towards nurturing competencies. Teachers need to feel confident in facilitating inquiry-based learning and assessing qualitative aspects of student thinking (Usmonova, 2022).

**Assessment Complexity:** Assessing competencies is more complex than assessing factual recall or procedural fluency. It requires observation, analysis of student thinking processes, and varied assessment tools (e.g., rubrics for problem-solving, portfolios, performance tasks). Developing and implementing these assessment methods effectively requires training and resources.

**Time Constraints and Curriculum Pressure:** Elementary teachers often face pressure to cover a vast amount of curriculum content within limited timeframes. Shifting to a competency-based approach may initially feel slower, as it prioritizes depth of understanding over breadth of coverage. Advocacy for flexible pacing and a focus on essential competencies is crucial.

**Parental Expectations:** Parents, accustomed to traditional grading and content-focused instruction, may need to be educated about the benefits of a competency-based approach. Clear communication about the long-term advantages of developing these skills is vital for gaining parental support.

#### Strategies for Successful Implementation

To overcome these challenges and effectively implement the methodology, several strategies are recommended:

**Professional Learning Communities (PLCs):** Establishing PLCs where teachers can collaborate, share best practices, co-plan competency-focused lessons, and collectively analyze student work can be highly effective.

**Resource Development and Sharing:** Creating and sharing high-quality, competency-rich mathematical tasks and assessment tools tailored for elementary students can significantly support teachers. This includes digital resources that promote interactive learning (Egamberdiyev, 2021).

**Formative Assessment Integration:** Embedding continuous formative assessment throughout lessons allows teachers to monitor the development of competencies in real-time and provide targeted feedback. This helps in identifying areas where students need additional support or challenge.

**Student Self-Assessment and Reflection:** Encouraging students to reflect on their own learning processes, identify their strengths and areas for improvement, and set personal goals fosters metacognition—a key aspect of competency development (Xolmatov, 2023).

**Creating a Supportive Classroom Culture:** Fostering a classroom environment where mistakes are viewed as learning opportunities, risk-taking is encouraged, and mathematical discourse is valued, is paramount for competency development.

In conclusion, while the transition to a competency-based methodology in elementary mathematics presents challenges, the profound benefits for student learning and future success make it a worthwhile endeavor. Through targeted professional development, supportive resources, and a commitment to student-centered practices, educators can effectively cultivate the essential mathematical competencies that empower young learners.

#### Conclusion

The development of basic mathematical competencies in elementary school students is a critical imperative in modern education. This article has outlined a comprehensive methodology that moves beyond traditional rote learning, focusing instead on fostering essential skills such as problem-solving, logical reasoning, critical thinking, and effective communication of mathematical ideas. Rooted in constructivist and sociocultural theories, this methodology

emphasizes active student engagement, inquiry-based learning, and the application of mathematics in meaningful contexts.

The results consistently demonstrate that when this methodology is applied, students exhibit enhanced abilities in solving complex problems, articulating logical arguments, critically analyzing mathematical information, and communicating their mathematical understanding. Furthermore, such an approach significantly boosts student motivation and self-efficacy, creating a more positive and empowering learning experience.

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