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EFFECTIVE METHODS FOR TEACHING ADDITION TO PRIMARY SCHOOL STUDENTS

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Abstract
Addition is one of the fundamental concepts of elementary mathematics. Teaching it correctly and effectively plays a crucial role in developing children's mathematical thinking, number sense, and computational skills. Appropriate teaching methods not only enhance logical reasoning and calculation abilities but also foster students' interest in mathematics. This article focuses on the use of age-appropriate, engaging, and effective methods for teaching addition, emphasizing the importance of interactive and game-based approaches to make the learning process more enjoyable and meaningful for young learners.

Keywords: Addition, sum, elementary mathematics, visual aids, mathematics teaching methodology, primary education, game-based learning technologies, number concept.

INTRODUCTION

The sum is the result of the addition operation. In primary school mathematics education, this operation should be taught to children not only as a means of performing operations with numbers but also as an important tool for solving real-life problems. Through the concept of addition, students understand the fundamental mathematical idea that "the quantity is increasing." This, in turn, helps to develop essential cognitive skills such as logical thinking, comparison of quantities, grouping, and generalization.

For primary school students, arousing interest in learning is of great importance for the successful acquisition of any topic. Although the addition operation may seem simple at first glance, it can sometimes be a complex concept for children. Therefore, teachers should take into account the psychological characteristics of

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young learners and explain the concept not through abstract ideas but through examples that they can see, touch, and understand through action.

From a mathematical point of view, if **a** and **b** are two natural numbers, their sum **a + b** is also a natural number. Through this simple definition, students are gradually introduced to the logical essence of the addition operation, the relationships between numbers, and the idea of increasing quantity.

Theoretical Foundations of the Concept of Sum

The definition of the addition operation is based on the inductive definition introduced by the German mathematician Hermann Grassmann (1809–1877). This definition consists of two parts, as follows:

1. Adding 1 to any natural number **a** directly gives the number that comes immediately after **a**.
2. That is,

$(\forall a \in N)(a+1=a')(\forall a \in N)(a + 1 = a')(\forall a \in N)(a+1=a')$

3. The operation **a + b′** means that adding the number **b′**, which comes immediately after **b**, to **a** gives a number that comes immediately after **a + b**. That is,

$(\forall a,b \in N)[(a+b')=(a+b)+1](\forall a, b \in N)\ [(a + b') = (a + b) + 1]\ (\forall a,b \in N)[(a+b')=(a+b)+1]$

According to Peano's second axiom, if **n** is a natural number, then **n + 1** is also a natural number. From this, it follows that when **a** and **a + b** are natural numbers, **a + b′ = (a + b)′** is also a natural number. Moreover, based on Peano's fourth axiom and the equality **a + 1 = a′**, the sum of two natural numbers **a** and **b** is completely defined and itself a natural number.

Thus, the addition operation is a well-defined and unambiguous operation that can always be performed within the set of natural numbers.

From the definition of addition of natural numbers, it is evident that every natural number is equal to the sum of the preceding natural number and one. Following this pattern, the addition table for single-digit numbers is constructed.

From the above, it can be seen that if, in the sequence of natural numbers, we count **b** numbers immediately following **a**, the last number counted will be the sum of **a** and **b**, denoted as **a + b**.

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Here, **a** is called the *first addend*, **b** the *second addend*, and **a + b** the *sum*.
When explaining this concept to children, it is necessary to illustrate these relationships through examples to make the underlying regularities clear and comprehensible.
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International experience and its application in the uzbek education system

Various advanced methods for teaching addition in elementary mathematics have been developed and implemented internationally. Notable examples include educational approaches from Singapore, the Montessori system, Finland, Japan, and the United States.
The Singapore education model (CPA – Concrete, Pictorial, Abstract) consists of three main stages:
1. Concrete stage – learning through tangible, physical objects;
2. Pictorial stage – using pictures and diagrams;
3. Abstract stage – representing concepts through numerical symbols and formulas.

In the Montessori approach, students are taught using special counting materials (such as number rods or lines), emphasizing individualized instruction and learning through practical activity.
In Finland's educational practice, learning takes place through play-based methods, in a stress-free environment, and by using real-life examples that connect mathematics to everyday experiences.
Japanese teaching methods rely on traditional counting tools, such as the "Soroban" abacus, to help students learn addition. In addition, Japanese teachers often use poems and songs to help children memorize sums up to ten.
In the United States, greater emphasis is placed on conceptual understanding, diverse computational strategies, and solving real-world mathematical problems that foster comprehension of the addition operation.
International research shows that the most effective methods for teaching addition — and indeed for teaching mathematics in general — include interactive and engaging approaches, extensive use of visual aids, and linking instruction to real-life contexts.

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In Uzbekistan, elements of these international methodologies — especially those derived from the Singapore and Finnish education systems — are currently being piloted in primary education. The key goal remains the same: to develop children's mathematical thinking and strengthen their computational skills.

Conclusion

In conclusion, the process of teaching addition to primary school students should not be limited to the mechanical performance of arithmetic operations. It must aim at developing students' mathematical thinking, problem-solving abilities, and interest in learning. The integration of visualization, game-based learning, real-life examples, and repetition ensures that the learning process becomes both meaningful and engaging for young learners. When children are actively involved in discovering numerical relationships through visual aids, tangible objects, and interactive activities, their understanding becomes deeper and more enduring.

Furthermore, the use of interactive and play-based methods stimulates curiosity and intrinsic motivation, which are essential for effective learning at the primary level. The incorporation of real-life situations allows students to connect mathematical knowledge with their daily experiences, thereby helping them understand the practical relevance of addition and other mathematical concepts. Repetition, when applied in a creative and engaging way, strengthens students' computational fluency and confidence in mathematics.

The teacher's role is of particular importance in this process. A skilled educator, who takes into account children's psychological and developmental characteristics, can successfully apply differentiated approaches — adjusting the level of difficulty, providing encouragement, and ensuring that each student achieves progress at his or her own pace.

Overall, effective teaching of addition in primary education contributes to the formation of logical reasoning, perseverance in problem-solving, and positive attitudes toward mathematics. Such a foundation not only improves academic achievement in later grades but also fosters the development of analytical and critical thinking skills essential for lifelong learning.

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