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METHODS OF TEACHING THE CONCEPTS OF PERIMETER AND AREA IN PRIMARY GRADES

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Abstract: This article examines effective methods for teaching the concepts of perimeter and area in primary grades. The concepts of perimeter and area are important components of elementary mathematics because they help pupils understand geometric shapes, measurement, spatial relationships, and practical applications of mathematics. The article discusses the gradual introduction of these concepts through visual materials, practical activities, problem-solving tasks, measurement exercises, and interactive teaching methods. Particular attention is paid to distinguishing perimeter from area, developing pupils’ ability to apply formulas, and connecting mathematical concepts with everyday situations. The use of manipulatives, grid paper, geometric figures, group activities, and problem-based learning can increase pupils’ interest and improve their mathematical reasoning. The article also presents methodological recommendations for organizing lessons on perimeter and area in primary education.
Keywords: primary education, mathematics education, perimeter, area, geometric shapes, measurement, mathematical reasoning, problem-solving, interactive methods, practical activities.

INTRODUCTION

Mathematics education in primary school plays an important role in developing pupils’ logical thinking, spatial imagination, problem-solving skills, and ability to apply mathematical knowledge in everyday situations. Geometry and measurement are particularly important areas of primary mathematics because they enable pupils to understand the properties and relationships of objects in the surrounding environment.

The concepts of perimeter and area occupy an important place in the study of geometry and measurement. Although these concepts are closely related to geometric figures, they describe different characteristics. Perimeter refers to the length of the boundary of a figure, whereas area represents the amount of surface occupied by that figure. Understanding this distinction is essential for pupils’ further study of mathematics.

In primary grades, however, pupils may experience difficulties in distinguishing perimeter from area. Some pupils may confuse the units of measurement, while others may apply formulas mechanically without understanding their meaning. Therefore, teaching these concepts should be based not only on formulas but also on visual representation, practical measurement, comparison, and problem-solving activities.

The purpose of this article is to examine effective methods for teaching the concepts of perimeter and area in primary grades and to identify methodological approaches that contribute to pupils’ deeper understanding of these concepts.

LITERATURE REVIEW AND METHODOLOGY

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The teaching of perimeter and area is traditionally connected with the development of pupils' measurement and geometric reasoning skills. In primary mathematics education, the formation of mathematical concepts is most effective when abstract rules are introduced after pupils have acquired practical experience.

The methodological approach to teaching perimeter and area should therefore proceed from concrete objects to visual models and then to symbolic representations and formulas. For example, before introducing the formula for the perimeter of a rectangle, pupils can measure the sides of a rectangular object with a ruler and calculate the total length of its boundary.

Similarly, the concept of area can initially be explained by covering a surface with equal square units. This helps pupils understand that area is associated with the number of unit squares that cover a particular surface.

The article is based on methods of pedagogical observation, analysis of mathematical teaching materials, comparison of instructional approaches, and generalization of methodological practices. Particular attention is given to visual, practical, interactive, and problem-based methods.

DISCUSSION AND RESULTS

1. Introducing the Concept of Perimeter

The concept of perimeter should be introduced through familiar objects and practical situations. Teachers can ask pupils to observe the boundaries of a desk, notebook, classroom board, book, or playground.

At the initial stage, pupils can trace the boundary of a geometric figure with a finger or pencil. This activity helps them understand that perimeter refers to the total length around a figure.

For example, if a rectangle has a length of 6 cm and a width of 4 cm, its perimeter can be found by adding all four sides:

P = 6 + 4 + 6 + 4 = 20 cm.

After pupils understand the meaning of perimeter through addition, the teacher can introduce the formula:

P = 2 × (a + b)

where **a** is the length and **b** is the width of the rectangle.

For a square, where all four sides are equal, the formula is:

P = 4 × a.

The formula should be introduced as a convenient way of expressing the repeated addition of equal or related sides rather than as an isolated rule to memorize.

2. Practical Activities for Teaching Perimeter

Practical activities are particularly effective in primary mathematics. One useful activity is "Measure and Calculate." Pupils work in pairs and measure the sides of classroom objects such as books, tables, notebooks, or boards.

They then record the measurements and calculate the perimeter.

Another useful activity is "Build a Figure." Pupils use sticks, strings, or strips of paper to create geometric figures with given side lengths. They calculate the perimeter of each figure and compare the results.

Such activities help pupils understand that perimeter is a measurable quantity and connect mathematical knowledge with real objects.

3. Introducing the Concept of Area

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The concept of area should be developed gradually. Before introducing a formal formula, pupils should understand that different surfaces can have different sizes even when their shapes are similar.
A useful method is to use unit squares. The teacher can present a rectangle divided into equal squares and ask pupils to count the squares.
For example, a rectangle consisting of 5 rows and 4 columns contains:

5 × 4 = 20 square units.

Therefore, its area is **20 square units**.
This activity creates a natural transition to the formula:

A = a × b

where **a** represents the length and **b** represents the width.
The use of square units is important because pupils need to understand that area is measured in square units such as square centimeters, square meters, and square decimeters.

4. Using Grid Paper

Grid paper is an effective visual tool for teaching area. Pupils can draw different geometric figures on a grid and determine their areas by counting the unit squares.
For example, the teacher can provide several rectangles with different dimensions and ask pupils to:

- count the unit squares;
- calculate the area using multiplication;
- compare the results;
- determine which figure has the greatest or smallest area.

Grid-based activities allow pupils to see the relationship between multiplication and area.

5. Distinguishing Perimeter and Area

One of the most important methodological tasks is teaching pupils to distinguish perimeter from area.
The teacher can use the same geometric figure to demonstrate both concepts. For example, a rectangle can be presented as a figure whose boundary represents perimeter and whose internal surface represents area.
The first question relates to area, while the second relates to perimeter. Such practical examples help pupils understand the difference between the two concepts.

6. Problem-Based Learning

Problem-based tasks can significantly improve pupils' understanding of perimeter and area.
For example:
Task: A rectangular garden is 8 meters long and 5 meters wide. How many meters of fencing are needed to surround the garden?
Pupils should identify that the task requires finding the perimeter:

P = 2 × (8 + 5) = 26 m.

Another task can focus on area:
Task: A classroom floor is 8 meters long and 5 meters wide. What is its area?
The solution is:

A = 8 × 5 = 40 m².

By comparing these two tasks, pupils can clearly understand the different purposes of perimeter and area.

7. Interactive and Group Activities

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Interactive methods can increase pupils' engagement in mathematics lessons. Group activities can be organized in the form of mathematical stations.

For example:
Station 1: Measure geometric figures.
Station 2: Calculate perimeter.
Station 3: Calculate area using unit squares.
Station 4: Solve practical problems.
Station 5: Find and correct mistakes in prepared solutions.

Such activities encourage cooperation, communication, and independent mathematical reasoning.
The "Think–Pair–Share" strategy can also be used. First, pupils solve a problem individually, then discuss their solution with a partner, and finally explain their reasoning to the class.

8. Common Difficulties and Their Solutions

Primary pupils may encounter several difficulties when learning perimeter and area.
One common difficulty is confusing the formulas. This can be reduced by explaining the meaning of each formula rather than requiring mechanical memorization.
Another difficulty is confusing units of measurement. Teachers should emphasize the difference between linear units and square units. For example:
Perimeter → centimeters (cm)
Area → square centimeters (cm^2)
Pupils may also calculate area by adding side lengths. To prevent this mistake, teachers should use unit-square models and emphasize that area measures the surface covered by squares.
Another common problem is applying a formula without understanding the conditions of the problem. Therefore, pupils should first identify what the problem asks them to find and then select the appropriate operation or formula.
The teaching of perimeter and area can be enhanced through modern educational technologies and interactive resources. Digital geometric applications allow pupils to change the dimensions of figures and immediately observe how their perimeter and area change.
For example, when the length of a rectangle increases while its width remains constant, pupils can observe changes in both perimeter and area. This provides an opportunity to develop mathematical reasoning and identify relationships between variables.
Project-based activities can also be used. Pupils may be asked to design a small garden, classroom, playground, or room plan. They determine its dimensions, calculate the perimeter, and then calculate the area.

Such tasks integrate mathematics with real-life situations and encourage pupils to apply their knowledge creatively.

CONCLUSION

Teaching the concepts of perimeter and area in primary grades should be organized gradually, from concrete experience to visual representation and finally to formulas and abstract mathematical reasoning. The effective teaching of these concepts requires more than memorizing formulas. Pupils should understand what perimeter and area represent, how they differ, and where they can be applied in everyday life.

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Practical measurements, unit-square models, grid paper, geometric manipulatives, problem-based tasks, group work, and interactive activities can make the learning process more meaningful and effective. Special attention should be paid to distinguishing linear and square units and to developing pupils' ability to select an appropriate method for solving a problem.

In conclusion, a combination of visual, practical, interactive, and problem-based approaches can contribute to the development of pupils' geometric thinking, measurement skills, logical reasoning, and ability to apply mathematical knowledge in real-life situations.

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