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OPPORTUNITIES OF THE 5E MODEL AND ITS ROLE IN PRIMARY EDUCATION (ON THE EXAMPLE OF MATHEMATICS)

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Abstract
This article highlights the didactic opportunities and pedagogical significance of the 5E model in organizing effective mathematics lessons in primary education. The study analyzes the role of the 5E instructional model, consisting of the stages Engage, Explore, Explain, Elaborate, and Evaluate, in developing students' mathematical thinking, independent reasoning, and practical competencies. During the research process, observation, pedagogical experiment, interview, and comparative analysis methods were used. The results showed that mathematics lessons organized on the basis of the 5E model increase students' interest in learning, develop their logical thinking skills, and create opportunities to connect theoretical knowledge with practice. In particular, the use of interactive methods and problem-based situations in developing mathematical competencies among primary school students ensures high effectiveness. The study concludes that integrating the 5E model with modern educational technologies contributes to improving the quality of primary mathematics education.

Keywords:5E model, mathematics education, primary school, competency, interactive method, creative thinking, problem-based learning, pedagogical technology, mathematical thinking, educational effectiveness.

Introduction

Today, the education system is focused on the development of the student's personality, and forming competencies such as independent thinking, problem-solving, and active participation among students has become highly important. In particular, the 5E model is widely used as one of the modern approaches to effectively teaching mathematics in primary grades. This model makes it possible to activate students' learning activities, organize experience-based learning, and ensure deep

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understanding of knowledge. As the Republic of Uzbekistan aims to build a highly developed society as an independent and democratic state, profound reforms and broad opportunities are being created in the system of education and upbringing. In our country, mathematics was identified as one of the priority areas for the development of science and education in 2020, and a number of systematic measures aimed at raising mathematics education and science to a new qualitative level are being implemented. One of the major efforts in reforming the education sector in our country is to ensure that students receive education in line with modern requirements and acquire deep knowledge in becoming comprehensively developed individuals. This, in turn, contributes to the development of students' creative potential. Today, creativity is considered the driving force of the fourth industrial revolution worldwide. A number of scholars such as B. Abdullayeva, S. Alikhonov, M. Barakayev, M. Tojiyev, and D. Yunusova have conducted scientific research on improving the content and teaching methodology of mathematics courses. Research on the formation and development of mathematical literacy among primary school students and the influence of the information environment on personal development has been carried out by scholars including N. Bikbayeva, M.E. Jumayev, R.A. Mavlonova, N.X. Rahmonqulova, B.Ye. Sabirov, A.V. Sadikova, and M.I. Toshpulatova. The theoretical and methodological foundations of informatization of educational processes, the use of information technologies, and information exchange in electronic environments have been studied in the scientific works of A.A. Abduqodirov, U.Sh. Begimqulov, and G.S. Ergasheva.

Research Methodology:

Today, the 5E model can be considered one of the modern and effective methods for developing students' creative thinking abilities. As we know, the 5E model is a methodological approach used to effectively organize the educational process and ensure students' active participation. This model consists of five stages, each aimed at meeting different needs of students during the learning process.

Engage: At this stage, it is necessary to arouse students' interest in a new topic and involve them in the lesson. Activities such as asking questions, showing short videos, pictures, or stories related to the topic are commonly used at this stage.

Explore: This stage encourages students to work independently or in groups. Students conduct research on the topic, carry out various experiments, or solve problems. It is

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important to create opportunities for students to acquire new knowledge independently.

Explain: At this stage, the teacher explains the studied material to the students. Students express their own ideas, and the teacher provides more detailed explanations of the concepts related to the topic.

Elaborate: This stage provides students with opportunities to deepen their newly acquired knowledge. Students apply their knowledge in different situations, adapt it to new contexts, connect it with other topics, or begin solving more complex problems.

Evaluate: This stage is aimed at assessing students' level of understanding. Students test their knowledge, while the teacher uses various assessment methods such as tests, questions, or discussions to evaluate students' comprehension.

In teaching mathematics in primary school, the 5E model (Engage, Explore, Explain, Elaborate, Evaluate) allows the educational process to be organized logically and step by step. At each stage, appropriate methods, pedagogical approaches, and didactic tools are selected according to the objectives. This model encourages students to engage in active learning, express their opinions freely, and work independently as well as collaboratively in groups. The model enables students not simply to receive ready-made knowledge, but to discover it independently and apply it in practice. Mathematics lessons organized on the basis of the 5E model help develop competencies such as independent thinking, logical analysis, problem-solving, and creative approaches among students. Each stage of the model ensures a purposeful and systematic organization of the educational process. For primary school students, this model creates opportunities to perceive learning more as a process of discovery and creativity. As a result, students not only acquire mathematical knowledge, but also learn how to apply it in real-life situations.

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Opportunities Emerging from the Use of the 5E Model in Primary School Mathematics Table 1

Opportunities	Description
Introduction of new methodological approaches	Unlike traditional methods, the student's activity is placed at the center of the learning process
Differentiated education	Provides opportunities for individual work with students of different abilities
Integration with technological tools	The model can be enriched through multimedia, interactive whiteboards, and virtual laboratories
Competency-based education	Not only knowledge but also practical skills are developed
Effective forms of assessments	Suitable for diagnostic, formative, and summative assessment methods

As we know, the topics of all subjects are introduced taking into account the age characteristics of students. However, despite this, it is not always possible to achieve high learning outcomes. There are certain topics that require the use of various methods and tools during the process of explaining them to students. The following can be considered as such topics.

Topics Taught Using the 5E Model in Different Grades

Table 2.

No.	2nd Grade	3rd Grade	4th Grade
1	Addition up to 100	Multiplication	Practical tasks
2	Addition and subtraction within 100	Addition and subtraction of multi-digit numbers	Real-life problem solving
3	Solving word problems	Three-digit numbers	Equations and inequalities
4	Addition and subtraction of three-digit numbers	Multiplication and division by 10, 100, 1000	Solving problems
5	Meter, centimeter, decimeter	Solving problems	Fractions and decimals
6	Multiplication table	Fractions and values	Decimals and percentages
7	Length of a line segment	The geometric meaning of angles	Average arithmetic
8	Perimeter	Standard methods for area calculation	Distance, time, speed
9	Angles	Angles	Rectangular parallelepiped (cuboid), cube
10	Time (hour, minute)	Decimals and percentages	Methods for solving word problems

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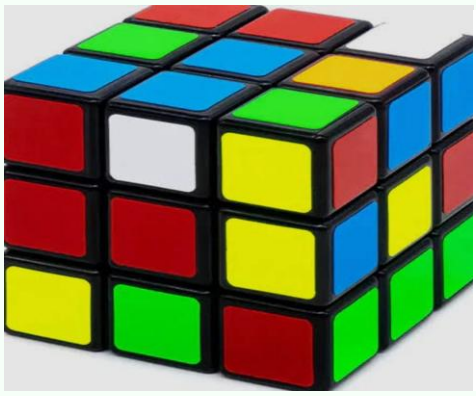
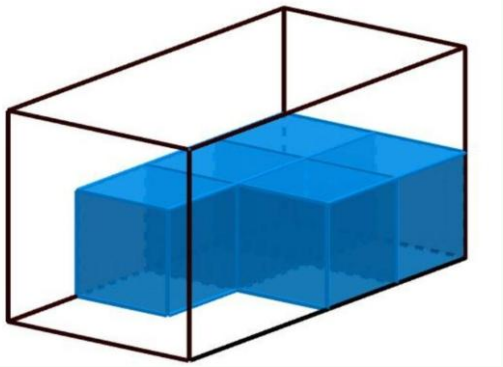
In 4th-grade mathematics classes, teaching the topic "Rectangular Parallelepiped (Cuboid) and Cube" based on the 5E model has several effective aspects, and the effectiveness of the lesson process can be observed through the following analysis.

1. Engage (Attracting Attention and Motivation)

Students' interest is stimulated when the teacher shows a cube or a box and asks questions such as: "What shape is this?" and "Where have you seen it before?





2. Explore (Investigation):Students observe independently, touch and examine the cube and cuboid, and count their faces, edges, and vertices. Result: Both shapes have 6 faces, 12 edges, and 8 vertices.

Comparing a Cube and a Cuboid (Rectangular Parallelepiped) Table 3.

Features	Cube	Cuboid (Rectangular Parallelepiped)
Definition	A shape with all equal edges.	A shape with different length, width, and height. (h, a, b)
Edges	All are equal (a = a = a)	Different (a ≠ b ≠ h)
Faces	6 squares	6 rectangles
Volume formula	$V = a^3$	$V = a \times b \times h$
Surface area formula	$S = 6a^2$	$S = 2(ab + bc + ah)$
Appearance	Equal-sided	Elongated or varied
Examples	Dice cube, sugar cube	Book, box, brick

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During the process, students ask each other questions and work collaboratively in groups. Although the cube and cuboid are similar geometric solids, their main difference lies in whether their edges are equal or different. A cube is considered a special type of cuboid in which all edges are equal. Comparing these concepts helps develop students' spatial imagination and logical thinking skills.

3. Explain (Explanation)

The teacher provides a clear explanation. A cube is a three-dimensional shape in which all sidesare equal.

Mathematical explanation:

Simple explanation: "If the side length is 2 cm, then: $2 \times 2 \times 2 = 8$ cm³."

A cuboid is simply a box-shaped object such as a book, brick, or box.

4. Elaborate (Extension) Time: 10 minutes

Students apply their knowledge by constructing cubes and cuboids using paper materials and solving problems.

Example:

Find the volume of a cube with a side length of 3 cm. $3 \times 3 \times 3 = 27$ cm³.

Calculation Table

Table 4.

Face name	Dimensions (dm)	Formula	Calculation	Area
Blue face	7 × 3	S = a × b	7 × 3	21 dm²
Green face	7 × 2	S = a × b	7 × 2	14 dm²
Red face	3 × 2	S = a × b	3 × 2	6 dm²

All faces of a cuboid are formed by combining two out of its three dimensions (7, 3, and 2). Through this table, students develop an understanding that each face of a rectangular parallelepiped is determined by the product of two of its three dimensions. This approach helps students systematically understand geometric relationships and strengthens mathematical knowledge through visual learning.

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5. Evaluate (Assessment)

Students are given a short test, questions, or problems in order to assess their knowledge. Questions: How many faces does a cube have?
Are all its sides equal? Which object resembles a cube?

Lesson Analysis Based on the 5E Model

Table 5.

Stage	Teacher Activity	Student Activity	Skills Developed	Outcome
Engage	Asks questions	Provides estimates	Critical thinking	Interest
Explore	Provides resources	Examines	Curiosity	Understanding
Explain	Explains	Analyzes	Analysis skills	Knowledge gained
Elaborate	Assigns tasks	Completes tasks	Creativity	Application
Evaluate	Assesses	Answers questions	Self-assessment	Reinforcement

The analysis results showed that the use of the 5E model in primary school mathematics lessons serves as an important pedagogical tool for increasing educational effectiveness. Lessons organized on the basis of this model enhance students' interest in mathematics and develop their independent thinking, problem-solving, logical analysis, and creative approach skills. In particular, through the Engage and Explore stages, students are actively involved in the topic, while the Explain and Elaborate stages create opportunities to connect theoretical knowledge with practical activities. Through the Evaluate stage, students' knowledge, skills, and competencies are effectively assessed. During the analysis, it was observed that teaching the topic "Rectangular Parallelepiped and Cube" based on the 5E model improved students' spatial imagination, geometric thinking, and ability to apply mathematical concepts in practical situations. The use of interactive methods, group work, problem-based situations, and visual tools during the lesson significantly increased students' classroom activity. In addition, the 5E model serves as an effective methodological basis for implementing a differentiated approach in primary education, developing students' individual abilities, and organizing competency-

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based education. The step-by-step and systematic structure of the model helps students acquire knowledge deeply and consciously.

In conclusion, the 5E model, as a modern pedagogical technology in primary school mathematics education, has broad didactic opportunities and contributes to improving the quality of education, developing students' mathematical literacy, and shaping them into creative and independent thinkers. In the future, designing various topics of primary mathematics lessons based on the 5E model, integrating them with digital technologies, and developing methodological recommendations will have significant scientific and practical importance.

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