

METHODOLOGY FOR USING PISA TASKS IN MATHEMATICS EDUCATION

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Abstract: *This article examines the methodology of using Programme for International Student Assessment (PISA) tasks in mathematics education to enhance students' mathematical literacy, critical thinking, problem-solving abilities, and real-life application of mathematical knowledge. The study highlights the pedagogical principles underlying PISA-based instruction and explores effective strategies for integrating contextual and competency-oriented tasks into the mathematics curriculum. Particular attention is given to the development of students' abilities to analyze, interpret, and solve problems situated in authentic life contexts. The article discusses the role of teachers in designing learning environments that promote inquiry, reasoning, and independent decision-making. Furthermore, it presents methodological recommendations for adapting PISA tasks to different educational levels and assessing students' mathematical competencies. The findings suggest that the systematic use of PISA-oriented tasks contributes to improving learning outcomes and preparing students for the challenges of modern society.*

Keywords: *Mathematics education, PISA tasks, mathematical literacy, problem-solving skills, competency-based learning, critical thinking, real-life contexts, assessment, teaching methodology, educational innovation.*

In the context of rapid social, technological, and economic changes, modern education systems are increasingly focused on developing students' competencies that enable them to apply knowledge effectively in real-life situations. Mathematics education, in particular, has moved beyond the traditional emphasis on memorization and routine calculations toward fostering mathematical literacy, critical thinking, and problem-solving skills. These competencies are essential for preparing students to meet the demands of the twenty-first century and to participate successfully in an increasingly knowledge-based society.

One of the most influential international assessments evaluating these competencies is the Programme for International Student Assessment (PISA), organized by the Organisation for Economic Co-operation and Development (OECD). PISA assesses the extent to which 15-year-old students can use their knowledge and skills in reading, mathematics, and science to solve real-world problems. Unlike traditional examinations

that focus primarily on curriculum content, PISA emphasizes the practical application of knowledge, reasoning, and decision-making in authentic contexts.

The growing importance of PISA results has encouraged educators and researchers to reconsider teaching methodologies and assessment practices in mathematics classrooms. PISA tasks provide valuable opportunities for students to engage with contextualized problems, interpret data, evaluate different solution strategies, and communicate mathematical reasoning. Consequently, integrating PISA-oriented tasks into mathematics instruction can contribute significantly to the development of students' mathematical literacy and higher-order thinking skills.

This article explores the methodology of using PISA tasks in mathematics education. It examines the theoretical foundations of PISA-based learning, identifies effective instructional approaches for implementing such tasks, and discusses the role of teachers in facilitating competency-based learning. The study also presents practical recommendations for incorporating PISA tasks into classroom activities and assessment processes to improve students' mathematical performance and readiness for real-life challenges. Through a systematic and purposeful application of PISA-oriented methodologies, mathematics education can better support the development of competent, independent, and lifelong learners.

Theoretical Foundations of Using PISA Tasks in Mathematics Education

The modernization of mathematics education requires teaching approaches that develop not only subject knowledge but also students' ability to apply mathematical concepts in practical situations. PISA tasks are designed to assess mathematical literacy, which is defined as an individual's capacity to formulate, employ, and interpret mathematics in a variety of real-world contexts. Therefore, the integration of PISA tasks into classroom practice serves as an effective means of promoting competency-based learning.

Unlike traditional exercises that often focus on routine calculations and memorized procedures, PISA tasks encourage students to analyze situations, identify relevant information, select appropriate mathematical strategies, and justify their solutions. Such tasks help learners establish connections between mathematical theory and everyday life, thereby increasing both motivation and learning effectiveness.

Methodological Approaches to Implementing PISA Tasks

The successful use of PISA tasks in mathematics education requires a systematic methodological approach. Several key principles should guide teachers in the implementation process:

Context-Based Learning

PISA tasks are generally presented within authentic contexts such as personal finance, environmental issues, transportation, health, or technology. Teachers should introduce students to real-life situations that require mathematical reasoning and decision-making.

Contextual learning enables students to understand the practical value of mathematics and improves their ability to transfer knowledge across different situations.

Problem-Solving-Oriented Instruction

One of the primary objectives of PISA-based teaching is the development of problem-solving competence. Teachers should encourage students to:

- Understand and analyze the problem;
- Identify relevant mathematical information;
- Select appropriate strategies;
- Evaluate different solution methods;
- Interpret and communicate results.

Such activities foster analytical thinking and independent learning.

Inquiry and Discussion-Based Learning

PISA tasks often allow multiple solution strategies. Therefore, classroom discussions and collaborative learning activities play an important role in helping students compare approaches and justify their reasoning. Through group work and mathematical debates, students develop communication skills and deeper conceptual understanding.

Stages of Working with PISA Tasks

The process of solving PISA-oriented problems may be organized into several stages:

Understanding the Context

Students carefully read the task, identify the real-life situation, and determine the purpose of the problem.

Mathematical Formulation

At this stage, learners translate the contextual situation into mathematical language by identifying variables, relationships, formulas, graphs, or numerical data.

Mathematical Processing

Students perform calculations, apply mathematical concepts, construct models, or analyze data to obtain solutions.

Interpretation and Evaluation

The obtained results are interpreted within the original context. Students evaluate whether their answers are realistic and meaningful for the given situation.

Communication of Results

Learners explain and justify their reasoning using mathematical language, tables, graphs, diagrams, or written arguments.

The Role of Teachers in PISA-Oriented Mathematics Instruction

Teachers play a crucial role in creating a learning environment that supports mathematical literacy development. Their responsibilities include:

- ✓ Selecting appropriate PISA-style tasks according to students' abilities;
- ✓ Guiding students through inquiry and exploration processes;
- ✓ Encouraging independent and critical thinking;

- ✓ Providing constructive feedback;
- ✓ Assessing both solutions and reasoning processes.

Teachers should act as facilitators rather than mere transmitters of knowledge, helping students develop confidence in solving unfamiliar and complex problems.

Benefits of Using PISA Tasks

The systematic implementation of PISA tasks in mathematics education offers several advantages:

- ✓ Improves mathematical literacy;
- ✓ Enhances critical and analytical thinking;
- ✓ Develops problem-solving competencies;
- ✓ Increases students' motivation and engagement;
- ✓ Strengthens the connection between mathematics and real-life situations;
- ✓ Promotes independent learning and decision-making skills;
- ✓ Prepares students for international assessments and future professional challenges.

The integration of PISA-oriented methodologies into mathematics instruction contributes to the formation of competent learners who are capable of applying mathematical knowledge effectively in diverse contexts and solving practical problems encountered in everyday life.

The use of PISA tasks in mathematics education represents an effective approach to developing students' mathematical literacy, critical thinking, and problem-solving competencies. In contrast to traditional teaching methods that primarily focus on procedural knowledge, PISA-oriented instruction emphasizes the application of mathematical concepts in authentic and meaningful real-life contexts. This approach enables students to understand the practical value of mathematics and strengthens their ability to make informed decisions based on mathematical reasoning.

The study demonstrates that the systematic integration of PISA tasks into classroom practice encourages active learning, independent inquiry, and collaborative problem-solving. Through contextualized activities, students learn to analyze information, construct mathematical models, interpret results, and communicate their solutions effectively. These skills are essential not only for academic success but also for lifelong learning and participation in modern society.

Furthermore, the successful implementation of PISA-based methodologies depends largely on the teacher's role in designing competency-oriented learning environments and selecting appropriate instructional strategies. Teachers who facilitate discussion, encourage multiple solution methods, and provide meaningful feedback contribute significantly to the development of higher-order thinking skills among learners.

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