ISSN: 2181-3337 | SCIENTISTS.UZ VOLUME 5 ISSUE 10 | OCTOBER 2026

REFLECTIONS ON THE DRAFT NATIONAL CURRICULUM FOR MATHEMATICS IN PRIMARY EDUCATION

Djumayev Mamanazar
Nizomi Ganjavi National Pedagogical University of Uzbekistan

DOI: 10.67620/sai.510b0018

ABSTRACT

To foster core competencies in students and enhance their interest in mathematics, practical exercises, applications, small-scale research tasks, and project-based work have been incorporated into the draft National Curriculum. This article offers reflections on the proposed curriculum for primary education, with particular attention to its structure, learning objectives, content domains, and practical orientation. The discussion considers mathematical reasoning, modeling, problem solving, communication, and working with data as interconnected competencies that enable students to apply acquired knowledge in unfamiliar situations. It also examines the development of creative thinking, collaboration, digital and technological literacy, and social-emotional competence through mathematical activities. The proposed content encompasses numbers and operations, geometry and measurement, algebra and relationships, and statistics and probability, while preschool knowledge and skills provide a foundation for subsequent learning. Particular emphasis is placed on understanding problems, constructing mathematical models, comparing alternative solutions, and presenting results. International assessment programs are considered as points of reference for improving mathematics education in accordance with local conditions. The article recommends strengthening the practical and applied dimensions of instruction through interactive methods, educational research, and interdisciplinary connections. Beyond acquiring knowledge and skills, students should develop the competence to use mathematics meaningfully in daily life and in their continued education.

ACCEPTED

07.11.26

Keywords: *primary mathematics education, national curriculum, competency-based education, mathematical reasoning, problem solving, project-based learning.*

CC BY

Introduction

Mathematics serves as a foundation for understanding the world; it plays a crucial role in uncovering the underlying principles of the events and phenomena around us, as well as in the advancement of industry, science, technology, and engineering. It is both a duty and an obligation for all of us to nurture a young generation worthy of our great scholars—such as Muhammad al-Khwarizmi, Ahmad al-Farghani, Abu Rayhan al-Biruni, and Mirzo Ulugbek—to impart modern knowledge to students, and to create opportunities for the youth of our country to discover and appreciate the beauty of mathematics.

It is well known that the study of mathematics sharpens the human intellect, develops focus, fosters the determination and willpower needed to achieve one's goals, instills a sense of algorithmic discipline, and, most importantly, encourages critical reasoning and broadens one's thinking. As our esteemed President Sh. M. Mirziyoyev has noted, mathematics is the foundation of the exact sciences, and a child

who understands it well can develop sound judgment and succeed in many fields (President of the Republic of Uzbekistan, 2020b).

In our country, mathematics was designated as one of the priority areas for the development of science in 2020, and a series of systematic measures are being implemented to elevate the development of mathematical science and education to a new qualitative level (Mirziyoyev, 2020).

In particular, a number of significant tasks regarding the comprehensive improvement and development of mathematics education and the field of mathematics were outlined in the "Concept for the Development of the Public Education System of the Republic of Uzbekistan until 2030" (adopted pursuant to Decree of the President of the Republic of Uzbekistan No. PF-5712 dated April 29, 2019; President of the Republic of Uzbekistan, 2019a); in Resolution No. PQ-4387 dated July 9, 2019, "On Measures for State Support of the Further Development of Mathematics Education and Science, as well as for the Fundamental Improvement of the Activities of the V. I. Romanovsky Institute of Mathematics of the Academy of Sciences of the Republic of Uzbekistan" (President of the Republic of Uzbekistan, 2019b); in Resolution No. PQ-4708 dated May 7, 2020, "On Measures to Improve the Quality of Education and Develop Scientific Research in the Field of Mathematics" (President of the Republic of Uzbekistan, 2020a); and in the Address to the Oliy Majlis delivered on January 24, 2020 (Mirziyoyev, 2020).

In particular, the "Concept for the Development of Mathematics Education," included within this program, was developed to ensure the implementation of tasks aimed at comprehensively improving mathematics education and advancing it to a new level of quality (Djumayev, 2026).

Standards for Mathematical Practice

These competencies involve the ability to apply acquired knowledge and skills to solve practical problems and navigate unfamiliar situations.

These standards consist of generalized, practically applicable criteria that encompass the following domains of students' mental activity (for ease of future reference, these domains are coded as M1, M2, M3, M4, and M5, respectively).

- Reasoning (M1): providing logically sound and clear arguments to justify or prove a mathematical idea, or to respond to the ideas of others;
- Modeling (M2): expressing academic and real-life problems in the language of mathematics and constructing mathematical models for them;
- Problem-solving (M3): resolving problems by applying mathematics;
- Communicating (M4): interacting using the language of mathematics, based on mathematical concepts, signs, and symbols;
- Working with data (M5): collecting, analyzing, and representing data in various forms.

Structure and Objectives of the National Curriculum

Below, we present the content of the National Curriculum for primary education:

The National Curriculum consists of the following components:

- The scope of the National Curriculum;
- Guidelines for teachers;
- Work plan.

The scope of the National Curriculum includes:

- The foundations of the National Curriculum;
- Learning objectives.

The guidelines for teachers provide recommendations on how to effectively implement the National Curriculum in practice. Their main components are as follows:

- The structure of the curriculum scope;
- Key features of the curriculum;
- The progression of learning objectives;

ISSN: 2181-3337 | SCIENTISTS.UZ

- Work planning and lesson planning;
- Methodological approaches to teaching and learning;
- The educational environment;
- Assessment.

The work plan includes the following:

- recommendations for teaching learning objectives—as defined by the curriculum—in a sequential manner;
- descriptions of suggested learning activities for each objective;
- a list of subject-specific terminology for students;
- an analysis of common misconceptions;
- sample lesson plans.

Objectives of Primary Mathematics Education

The primary objectives for teaching mathematics at the primary education stage are as follows:

- to foster and encourage a positive attitude toward mathematics, a sense of interest, a readiness for independent learning, and creative learning experiences among students;
- to develop foundational mathematical concepts regarding numbers, quantities, measurement, shapes, and spatial relationships;
- to build skills in performing arithmetic operations—addition, subtraction, multiplication, and division—and applying them to simple, real-life situations;
- to develop geometric reasoning by identifying geometric shapes and exploring their properties through practical study;
- to cultivate mathematical discourse and communication skills by ensuring the correct use of mathematical terminology and the clear expression of ideas through graphs, tables, diagrams, or mathematical expressions;
- to develop foundational problem-solving skills by understanding simple real-life situations, creating models, applying solution methods, and interpreting the results;
- establishing a foundation of knowledge, skills, competencies, and values necessary for the continued study of mathematics at the basic secondary education stage.

Development of Cross-Curricular Competencies

Creative Thinking

Creative thinking involves finding innovative, original, non-standard, and effective solutions—practical, results-oriented, and optimal—as well as actively participating in the development, evaluation, and refinement of ideas that express imagination in a compelling way.

Creative thinking is fostered in students as they approach mathematical situations using various methods and work to discover independent solutions. Students learn to extend numerical and geometric patterns, create new configurations from shapes, solve word problems through diverse approaches, and represent their solutions using drawings, diagrams, models, or mathematical expressions. Furthermore, through practical tasks and game-based activities, students develop creative, flexible, and proactive thinking skills by comparing different solution options, selecting the most efficient methods, and refining existing ideas.

Collaborative Work

Collaborative work entails the ability to work together toward a common goal, harmonize diverse perspectives, find solutions to problems collectively, make group decisions, share responsibilities, achieve results as a team, and resolve disagreements constructively.

Collaborative skills are developed in students as they work together on mathematical tasks and problems. Through activities in pairs and groups, students learn to exchange ideas, listen to each other's proposed solutions, divide tasks, and reach a consensus on a final solution. Furthermore, through

ISSN: 2181-3337 | SCIENTISTS.UZ

mathematical games, practical exercises, and modeling activities, students cultivate the ability to assist one another, work cooperatively, and achieve outcomes together.

Communication

Communicativeness refers to the ability to express one's thoughts clearly and fluently—whether verbally, in writing, or non-verbally—in a manner appropriate to the audience and the situation. It encompasses listening to and understanding others, asking relevant questions, engaging in civil dialogue and negotiation, and conducting meaningful, effective communication.

This skill is developed in students as they learn to express their ideas in a simple, understandable way and practice listening to and comprehending others. Students learn to articulate the solutions to problems—both orally and in writing—using numbers, mathematical symbols, illustrations, diagrams, tables, and simple charts. Furthermore, effective communication skills are cultivated through question-and-answer sessions, discussions in pairs or groups, the explanation of one's own ideas, the respectful consideration of others' perspectives, and the collaborative determination of solutions.

Problem Solving

Problem-solving involves identifying a problem, breaking it down and analyzing it, developing and evaluating solutions by applying appropriate strategies or methods, making informed decisions, and effectively implementing the chosen solutions.

In students, problem-solving skills are developed through the process of understanding issues related to simple real-life or academic situations, selecting a method for resolution, and verifying the results. Students learn to analyze the conditions of a problem, extract essential information, create models—using drawings, diagrams, tables, or physical manipulatives—and derive solutions through mathematical operations. Furthermore, skills for solving problems systematically and effectively are cultivated by documenting the solution, verifying the answer, and comparing various approaches.

Digital Literacy

Digital literacy entails the effective, conscious, safe, responsible, and creative use of modern information and communication technologies, digital tools, resources, and artificial intelligence capabilities across various life situations. It involves processing information; searching for and analyzing content found on the internet, media platforms, and other sources; critically evaluating the reliability of such content and interpreting it accurately; adhering to ethical standards in online communication; and making sound decisions within the digital environment.

Digital literacy is developed in students through the use of basic digital tools. By engaging with interactive exercises, virtual models, tables, and diagrams, students learn to observe, compare, and represent data. Furthermore, they acquire the skills to use digital tools correctly, safely, and responsibly in the context of mathematical activities.

Technological Literacy

Technological literacy entails the correct use, management, evaluation, and understanding of technology, as well as the safe and effective application of technical tools (devices, equipment, and mechanisms).

Technological literacy is developed in students through the use of measuring instruments, models, and simple technical devices. Students learn to take measurements, make observations, and compare results using various tools such as rulers, compasses, clocks, scales, and others. Furthermore, skills for the correct, safe, and effective use of technical tools are cultivated.

Social-Emotional Competence

Social-emotional competence involves recognizing and managing one's own emotions and behaviors; demonstrating empathy toward the feelings of others; establishing and maintaining positive social relationships; setting goals and working consistently toward achieving them; making responsible decisions based on social and ethical norms; and exercising flexibility to act consciously and effectively in

ISSN: 2181-3337 | SCIENTISTS.UZ

various personal and social situations.

Social-emotional competence is developed in students as they work on mathematical tasks—by exercising patience, striving to overcome challenges, and regulating their own activity. Students learn to identify and correct their own errors, complete tasks step-by-step, and work with patience and focus to achieve results. This process is facilitated through mathematical games, practical exercises, and activities conducted in pairs or groups. Furthermore, social-emotional skills are cultivated during collaborative discussions and teamwork, as students learn to listen to the perspectives of others, support one another, and engage responsibly.

At the primary education level, the mathematics curriculum encompasses the following sections (content domains) related to the subject matter:

- Numbers and operations;
- Geometry and measurement;
- Algebra and relationships;
- Statistics and probability.

National Curriculum Model for Mathematics

Numbers and Operations

This content area covers the origin of numbers (arising from counting objects), their meaning and representation; addition, subtraction, multiplication, and division of numbers up to 100,000; and an introduction to common and decimal fractions, including performing basic operations with them.

Geometry and Measurement

This content area involves studying simple 2D and 3D geometric shapes, describing them, and expressing their properties using mathematical language. It includes exploring symmetrical shapes and identifying their axes of symmetry, as well as describing the position of a point within a coordinate quadrant. Furthermore, it encompasses becoming familiar with systems of measurement units for length, mass, volume, capacity, temperature, and time; estimating measurements; applying calculation skills involving measurements to solve mathematical problems; and determining the relationships between length, area, and perimeter through the study of simple and complex 2D shapes.

Algebra and Relationships

This content area focuses on developing foundational algebraic skills. It involves analyzing sequences (patterns) of numbers or geometric shapes to identify underlying rules, as well as utilizing simple relationships between specific concepts to analyze mathematical situations.

Statistics and Probability

This content area encompasses planning and conducting investigations, identifying similarities and differences within datasets to answer both statistical and non-statistical questions, discussing conclusions, and pinpointing potential sources of error. Emphasis is placed on statistical reasoning—understanding the need for data and the importance of analyzing it—as well as interpreting and analyzing data presented in tables, diagrams, and graphs. Additionally, it covers introductory concepts regarding events that are certain, impossible, or random (probabilistic).

Applying Mathematics to Problem Solving

The most significant feature of the curriculum is that it is built upon the concept of applying mathematics to problem solving. Accordingly, the intrinsic connection between the subject's content areas and various concepts, skills, competencies, and values is outlined below. Figure 1 brings together selected correspondences between the problem-solving stages and the mathematical competencies described in the curriculum.

The application of mathematics to problem solving is carried out through the following stages:

- Identifying (understanding) the problem;
- Mathematical modeling;

ISSN: 2181-3337 | SCIENTISTS.UZ

- Applying mathematics;
- Interpreting, reflecting upon, and evaluating alternative solutions;
- Presenting an optimal solution.

The application of mathematics is rooted in mathematical reasoning and encompasses the following interconnected cognitive skills:

- Deduction and induction;
- Analysis and synthesis;
- Hypothesizing and proving;
- Evaluating and creating.

The problem identification (understanding) stage encompasses the following learning objectives:

- comprehending the essence of a problematic situation, analyzing it, and identifying the specific problem presented.

The mathematical modeling stage encompasses the following learning objectives:

- utilizing various methods of mathematical interpretation to model phenomena in nature and society through mathematical expressions, tables, and graphs;
- expressing academic and real-life problems in the language of mathematics (as mathematical problems) and constructing their mathematical models.

The stage of applying mathematics encompasses the following learning objectives:

- solving problems by employing learned mathematical concepts, principles, and methods;
- using analysis, synthesis, comparison, induction, and deduction in the process of solving a problem;
- generating and refining new mathematical knowledge during the problem-solving process;
- effectively resolving problems through the application of mathematics.

The stage of interpreting and evaluating alternative solutions encompasses the following learning objectives:

- analyzing, comparing, and evaluating alternative methods and algorithms for solving a problem;
- translating the mathematical solution back into the context of the real-world problem, interpreting it in relation to the original issue, and evaluating how well or closely the derived solution aligns with the actual solution to the problem;
- formulating and exploring alternative solutions and hypotheses, providing mathematical justification, and selecting the most optimal approach.

The stage of presenting the optimal solution encompasses the following educational objectives:

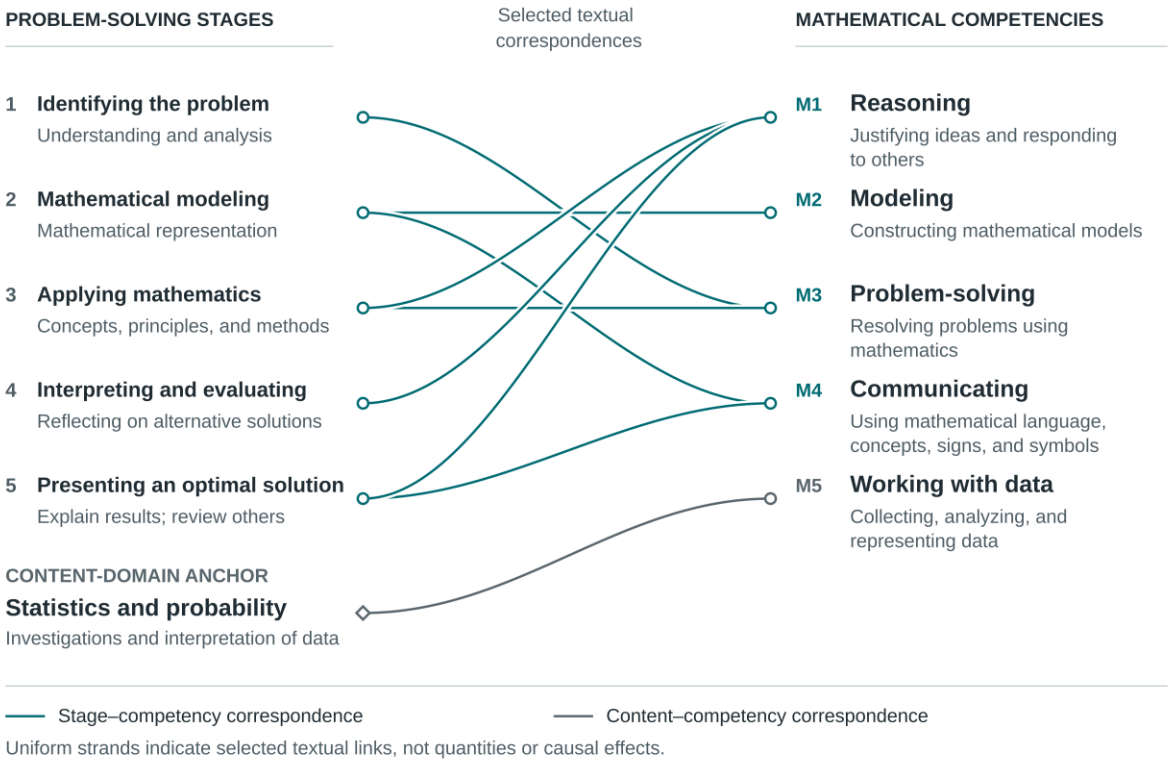
- presenting problem-solving algorithms in the form of a small-scale research study or project;
- expressing the solution—both orally and in writing—using mathematical language, symbols, and graphs;
- utilizing educational and digital technologies, including artificial intelligence capabilities, during the presentation;
- analyzing and evaluating the solutions proposed by others, and providing well-founded feedback.

In Figure 1, we bring together selected textual correspondences between the problem-solving stages and the mathematical competencies described above. The braid distinguishes stages of activity from the competencies they may engage, rather than imposing a one-to-one correspondence. Reasoning, for example, is relevant to applying mathematics, justifying alternative solutions, and responding to others' work. The separate statistics and probability anchor makes the connection with working with data explicit without assigning that competency exclusively to one stage. These links are interpretive correspondences within the present discussion, not measured relationships or evidence of curriculum effectiveness.

ISSN: 2181-3337 | SCIENTISTS.UZ

Figure 1

Curriculum concordance braid: Selected textual correspondences between problem-solving stages and mathematical competencies



Note. Uniform strands represent selected conceptual correspondences grounded in the manuscript, not quantities, causal effects, or exclusive assignments. Working with data is linked to the statistics and probability content description. Unshown pairings do not indicate that a competency is absent.

Knowledge and Skills to Be Acquired During the Preschool Period

The knowledge and skills to be developed in this subject during the preschool period include the following:

Numbers and Counting

- Counting numbers from 1 to 10 in both forward and reverse order;
- Adding and subtracting single-digit numbers using visual aids and practical exercises;
- Understanding the concepts of "many" and "few" (or "more" and "less").

Geometric Shapes

- Recognizing and naming shapes such as circles, squares, triangles, and rectangles;
- Grouping and comparing shapes, and identifying similarities.

Volume, Length, and Mass

- Comparing objects based on their volume, length, or mass (large–small, long–short, heavy–light);
- Understanding volume through play activities involving water and sand.

Logical Thinking

- Identifying patterns in simple sequences composed of shapes or objects;
- Developing logical thinking through games that involve completing sequences or matching items.

Location and Orientation

- understanding and applying concepts such as left-right, up-down;
- using simple directional drawings.

Modern Goals and International Points of Reference

The modern goals and objectives of teaching mathematics are as follows:

- formation and development of the system of mathematical knowledge and skills necessary for

students to apply in daily activities, study subjects and continue their education;

- formation of a person who can work successfully in a rapidly developing society and think clearly, critically, and logically;
- appreciation of national, spiritual, and cultural heritage; rational use and preservation of natural and material resources; and cultivation of mathematical culture as a component of universal culture.

The integration of our country into the world community, the development of science and technology, and the competitiveness of the young generation in the changing world require perfect mastery of sciences, which is ensured by introducing international experience and models into the education system, including teaching mathematics. The relevance of international standardization to improving education is also discussed by Djumayev (2025).

This is also reflected in the work of a number of international educational organizations. In this context, the Programme for International Student Assessment (PISA), conducted by the Organisation for Economic Co-operation and Development (OECD) to evaluate the reading, mathematics, and science knowledge and skills of 15-year-old students, is particularly noteworthy (OECD, n.d.).

Furthermore, one can point to the Trends in International Mathematics and Science Study (TIMSS), organized by the International Association for the Evaluation of Educational Achievement (IEA), which monitors the quality of mathematics and science education internationally. This study facilitates the comparison of students' achievement in mathematics and science across different countries, while also helping to identify variations among national education systems (IEA, n.d.).

Conclusion

In light of the aims of these international assessment programs, it would be appropriate to incorporate relevant content, assessment criteria, and mechanisms into the teaching of mathematics, while adapting them to suit local conditions.

The STEAM (science, technology, engineering, arts, and mathematics) educational framework, applied within the block-module of exact sciences, is designed to demonstrate the relevance of students' acquired knowledge, skills, and competencies to their daily lives. It achieves this by fostering creativity through educational research, experimentation, and project-based work, both within the classroom and in extracurricular activities, while cultivating an interest in innovation.

A competency-based approach to mathematics education entails that students acquire a diverse range of skills, enabling them to act effectively in various professional, personal, and social situations encountered in everyday life. Consequently, this approach focuses on strengthening the practical and applied dimensions of mathematics education. Organizing mathematics lessons requires placing greater emphasis on practice rather than theory, and moving away—to some extent—from an approach based solely on providing students with ready-made learning materials. It is recommended to incorporate interactive methods into mathematics instruction, such as case studies, research-based tasks, projects, and small-scale mathematical explorations. Developing basic research skills in students necessitates the appropriate application of scientific inquiry methods, including observation, experimentation, measurement, analysis and synthesis, induction and deduction, as well as comparison and analogy. Beyond merely fostering knowledge and skills, it is crucial to cultivate the competence to apply these in real-life situations.

REFERENCES

1. Djumayev, M. I. (2025). Raqamli ta'lim muhitida xalqaro standartlashtirish mohiyati [The essence of international standardization in a digital educational environment]. *Fizika, matematika va informatika*, (1), 192–199. https://www.tgfu.uz/main_admin/jurnallar/file/FMI2025.pdf
2. Djumayev, M. I. (2026). Raqamli ta'lim muhitida milliy o'quv dasturini amaliyotga joriy etishning asosiy tamoyillari [Key principles for implementing the national curriculum within a digital

ISSN: 2181-3337 | SCIENTISTS.UZ

educational environment]. *Maktabgacha va maktab ta'limi, 4*(6), 178–186. https://doi.org/10.5281/zenodo.20756558

3. International Association for the Evaluation of Educational Achievement. (n.d.). *TIMSS*. https://www.iea.nl/studies/iea/timss
4. Mirziyoyev, S. (2020, January 24). *Text of President Shavkat Mirziyoyev's Address to the Oliy Majlis*. President of the Republic of Uzbekistan. https://president.uz/en/lists/view/3324
5. Organisation for Economic Co-operation and Development. (n.d.). *Programme for International Student Assessment (PISA)*. https://www.oecd.org/en/about/programmes/pisa.html
6. President of the Republic of Uzbekistan. (2019a, April 29). *On approving the Concept for the Development of the Public Education System of the Republic of Uzbekistan until 2030* (Decree No. PF-5712). LexUZ. https://lex.uz/ru/docs/-4312785
7. President of the Republic of Uzbekistan. (2019b, July 9). *On measures for state support of the further development of mathematics education and science, as well as for the fundamental improvement of the activities of the V. I. Romanovsky Institute of Mathematics of the Academy of Sciences of the Republic of Uzbekistan* (Resolution No. PQ-4387). LexUZ. https://lex.uz/docs/-4409503
8. President of the Republic of Uzbekistan. (2020a, May 7). *On measures to improve the quality of education and develop scientific research in the field of mathematics* (Resolution No. PQ-4708). LexUZ. https://lex.uz/docs/7604147
9. President of the Republic of Uzbekistan. (2020b, January 31). *Shavkat Mirziyoyev exchanges visions with scholars and youths*. https://president.uz/en/lists/view/3332