

Georgia

Tamari Shoshitashvili
National Assessment and Examinations Center

Introduction

Overview of Education System

Education in Georgia is based on principles of each citizen's freedom of choice and collaboration, fair competition and equal opportunity, civil unity, and respect for cultural identity. Education that is offered in Georgia encourages people to acquire and develop the knowledge and skills necessary for social accomplishment and self-realization.

The government of Georgia defines the broad goals of basic education, attainable results, strategies for action, and curricula. Education is regulated by the Law of Georgia on General Education (adopted in 2005).

In 2018, the Minister of Education, Culture, and Sport of Georgia launched the General Education Reform Support Program in more than 100 schools.¹ The program is introducing constructive principles (active learning and teaching, knowledge building, learning to learn, interconnecting and organizing knowledge, and emphasizing comprehension not memorization), assessment oriented toward student development, and teamwork practices based on responsibility and collaboration. The program will be implemented gradually in every public school until 2023. The purpose of the program is to facilitate the introduction of a new third-generation national curriculum in support of general education reform.

According to the Law of Georgia on General Education, the education system consists of three levels: primary education (Grades 1 to 6), basic education (Grades 7 to 9), and secondary education (Grades 10 to 12). After completing basic education, students can continue on to a vocational education institution or pursue an undergraduate education. To receive a bachelor's degree, a student must complete secondary education.

Georgia has 2,295 schools (2,076 public and 219 private), educating 591,850 students at all levels; 529,300 students are enrolled in public school, and 62,550 students are enrolled in private school. There are 63,700 teachers in Georgia; 55,900 teach in public schools, and 7,800 teach in private schools.²

According to the constitution, the official language of Georgia is Georgian, and Abkhazian is the official language in the territory of Abkhazia (currently occupied by Russia). The majority of general education institutions provide instruction in Georgian. The Georgian language belongs to the Caucasian language group, which has its own unique alphabet. Considering the multiethnic

population of the country, comprising Azeri, Armenian, Russian, Abkhazian, Ossetian, Greek, Jewish, Kurdish, and Ukrainian communities, the law stipulates that students have the right to receive general education in their native language.

According to the Law of Georgia on General Education, the Georgian government encourages ethnic minorities to receive general education in their native language and simultaneously improve their official language knowledge skills. This approach contributes to ethnic minorities' integration into Georgian society. The Minister of Education, Culture, and Sport of Georgia has also implemented the Teach Georgia program; Teach Georgia consultant teachers are selected via a contest and assigned to various regions in non-Georgian schools. Additional services and scholarships are available for students who pass a national entrance examination and decide to continue their education at higher education institutions.

Use and Impact of TIMSS

Recommendations from the TIMSS 2015 National Report were discussed among the Minister of Education, Culture, and Sport of Georgia, invited experts, nongovernment organizations, and a national curriculum group. The report was also reviewed by employers and other interested individuals, who made suggestions about how TIMSS results could be used to improve the quality of education.

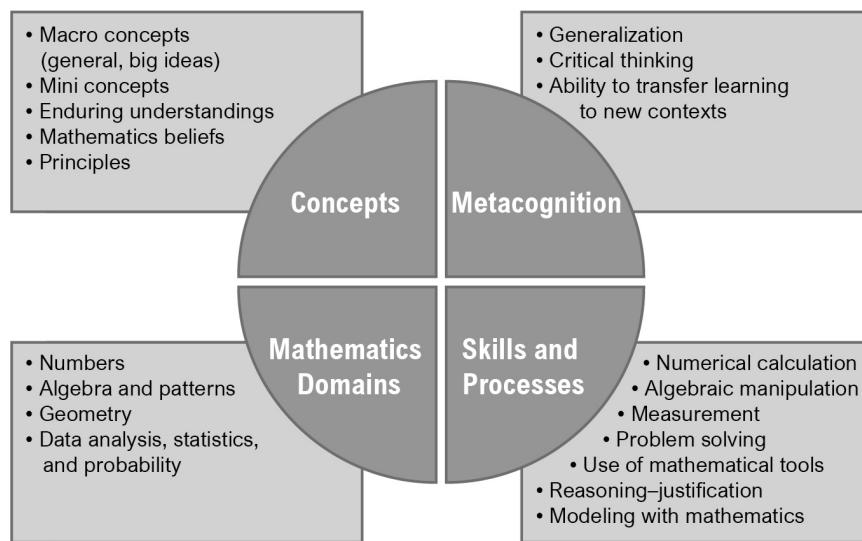
The Mathematics Curriculum in Primary and Lower Secondary Grades³

Mathematics is regarded as one of the most important subjects in Georgia, and it has received significant attention from policymakers and schools. This belief is reflected in various aspects of national policy (e.g., the development of Olympiads, which are competitions that encourage talented students to learn mathematics and science, in 2008).

The introduction to the national curriculum states that its main purpose is to support every constituency involved in general education—including teachers, students, parents, textbook authors, and education managers—in planning and implementing the learning process effectively.⁶ The national curriculum describes requirements that students must fulfil for the successful completion of every grade and presents them in the form of outcomes and relevant indicators.

Since the adoption of the Law on General Education in 2005, the curriculum has been changed several times, with the most recent revision being effective from 2011 to 2016.⁴ Now the third-generation curriculum reform is underway. The main difference between this new curriculum and the former curriculum is that it is more focused on developing thinking and analytical skills, understanding ideas, and using concepts to help students think and understand materials deeply, with an ability to transfer learning to new context. A concept is “a mental construct that frames a set of examples sharing common attributes. Concepts are timeless, universal, abstract and broad.”⁵

Exhibit 1: Mathematics Framework



The new curriculum seeks to:

- Develop students' thinking abilities
- Develop abilities for deductive and inductive reasoning; supporting opinions with relevant arguments; and analyzing phenomena, facts, and events
- Master mathematics as a universal language of science and as a description of the universe
- Understand the role of mathematics as a significant component of human culture
- Prepare students for professional careers
- Acquire the mathematical knowledge to complete daily tasks and develop the skills needed for the practical application of this knowledge

Mathematical competence includes mastering mathematical concepts and procedures, as well as acquiring skills for applying them when solving problems, and developing communication abilities essential for obtaining and providing information through mathematical language and methods. As such, mathematics education aims to develop reasoning, communication, application and modeling, and problem solving skills, as well as a positive attitude toward the subject. To reflect these objectives, the national curriculum in mathematics is divided into four domains:

- Numbers and Operations
- Geometry and Spatial Reasoning
- Data Analysis, Probability, and Statistics
- Algebra and Patterns

Although these domains are interrelated and cover knowledge and skills to be acquired at school, the division of mathematics into domains should not be confused with the division of mathematics

courses. Domains merely help to outline the range of materials to be taught and highlight topics that should be given special consideration at different stages of the learning process.

The four domains encompass the following content:

- Numbers and Operations—Numbers, their uses, and ways to present them; operations on numbers and numerical relationships; estimation and approximation of quantities; quantities, measurement units, and other uses of numbers
- Geometry and Spatial Reasoning—Geometric objects, their properties, relationships, and constructions; measures and methods of measurement; transformations and symmetry of figures; coordinates and their uses in geometry
- Data Analysis, Probability, and Statistics—Data sources and data collection methods; ways of organizing data and means of data representation; summarizing numerical characteristics of data; probabilistic models; sampling methods and numerical characteristics of samples
- Algebra and Patterns—Sets, mappings, and functions and their uses; elements of discrete mathematics and their uses; algorithms and recursions; algebraic operations and their properties

Apart from more general aims, the curriculum defines specific objectives to be achieved within each domain at every level of general education—primary (Grades 1 to 6), basic (Grades 7 to 9), and upper secondary (Grades 10 to 12). Exhibit 2 outlines the objectives for each mathematics domain in Grades 4 and 8.

Exhibit 2: Mathematics Domain Objectives, Grades 4 and 8

Grade	Domain	Objectives
4	Numbers and Operations	Represent whole numbers in decimal notation; add, subtract, multiply, divide, and compare numbers; recognize and compare simple fractions ($1/2$, $1/3$, $1/4$); use and convert between measuring units; use arithmetic operations to solve practical problems
	Geometry and Spatial Reasoning	Develop skills essential for describing and constructing geometrical figures; find components of geometric objects and their relationships; classify figures in terms of their attributes; recognize figures based on verbal descriptions and create graphical models
	Data Analysis, Probability, and Statistics	Become acquainted with elements of descriptive statistics, including ways of collecting, organizing, and interpreting qualitative and discrete quantitative data
	Algebra and Patterns	Develop skills needed to recognize correspondence and relationships between quantities; learn to build and solve simple algebraic expressions
8	Numbers and Operations	Represent rational numbers in decimal notation or using fractions; calculate using addition, subtraction, multiplication, and division; compare rational numbers; analyze various properties of numbers including operations of square or cubic roots
	Geometry and Spatial Reasoning	Use Cartesian coordinates to find unknown magnitudes of a given geometric shape; calculate area of planar shapes by subdividing into simple shapes or by completing to a simple shape; complete a missing step in a geometric proof

Grade	Domain	Objectives
9	Data Analysis, Probability, and Statistics	Gather data and organize it in tables or charts; convert data represented in one way into another graphical form; build simple sample spaces; calculate simple probabilities
	Algebra and Patterns	Recognize linear relationships between variables; solve systems of linear equations with two unknowns; solve linear inequalities and interpret the results geometrically using a number line; solve word problems by writing linear equations; model real life situations

The Science Curriculum in Primary and Lower Secondary Grades⁶

The subject group of science consists of the following subjects: Nature Study, which comprises the fundamentals of biology, physics, chemistry, and Earth science for primary education, and biology, chemistry, and physics for basic and secondary education. Science is prioritized in Georgia's general education system. It equips a student with knowledge and skills that will ensure the student's advancement along with fast-moving human progress. These skills and knowledge enable a student to use modern science and become a valuable and active participant in society. This kind of student will be able to apply knowledge not only for career advancement but also for the well-being of society. Mastering the natural sciences facilitates the comprehension of connected processes in the universe as well as the importance of caring for the surrounding world and maintaining a healthy and safe lifestyle.

In the course of teaching natural sciences, it is essential to focus on the formation of attitudes and approaches, the development of research skills, and knowledge utilization. These activities are the requirements of modern pedagogy as well as classic Georgian didactics. According to Georgian educator Iakob Gogebashvili, the main goal of studying nature is to ignite within youths a passion to love, explore, and research nature.⁷

Aims and Objectives of Teaching Natural Sciences

The purpose of teaching the subjects combined in the group of natural sciences is to evoke a student's interest in studying the foundations of natural sciences and to develop research skills, which will give the student an opportunity to become acquainted with the surrounding world, learn more about it, and feel a responsibility toward society and environment.

In accordance with the education goals, the curriculum covers the following aspects of problem solving:

- Studying the living world and living processes happening in it
- Studying physical and chemical phenomena happening in the world
- Studying Earth and the universe
- Studying the interrelationship between humans and the environment
- Forming observation and description skills
- Developing classification skills
- Forming skills in anticipating/formulating a hypothesis

- Developing planning skills
- Forming skills in experimenting/testing
- Developing data recording skills
- Developing analyzing skills
- Forming inference and assessment skills
- Developing modeling skills
- Forming communication skills
- Developing interest in natural sciences
- Grasping the importance of natural sciences
- Developing a positive attitude toward scientific research and novelties
- Developing a desire for collaboration
- Grasping the importance of maintaining a healthy and safe lifestyle
- Forming a responsibility to care for the environment

Primary Education (Grades 1 to 6)

An integrated subject, Nature Study is taught at the primary level of general education. Nature Study combines knowledge from the fields of biology, physics, chemistry, and Earth science, and comprises four branches:

- Scientific Research—Within the scope of this branch, a student becomes acquainted with the foundations of scientific research. The student learns how to formulate a research question; make assumptions; plan and implement simple, practical activities; observe and describe phenomena; create use models; organize and analyze results; draw a conclusion and compare it with an assumption; and present work to classmates. Initially, a student does all of these activities with the help of a teacher, but by the end of this level (i.e., by the end of sixth grade), the scope of independent working increases, and students plan and conduct research without the teacher's active involvement. Scientific Research is a comprehensive area that connects with the other three branches of Nature Study.
- The Living World—Within the scope of this branch, a student becomes acquainted with the diversity of the living world; the construction of organisms and characteristics of life; the basic requirements for life; and the attributes of major groups of organisms, their life cycles, and forms of adaptation with the environment. A student perceives the surrounding world via simple research activities; observes the living world by means of his/her sense organs or simple tools; collects and processes data; makes assumption and checks his/her interest-evoking idea through practical activities; gathers information; and draws conclusions on the basis of his/her observation and opinions.
- Bodies and Phenomena—Within the scope of this branch, a student tries to formulate assumptions regarding physical and chemical phenomena on the basis of his/her observations and learns new terms based on simple practical activities. A student

becomes acquainted with the basic concepts of physics, chemistry, and simple technology via real situations and examples of everyday life, which makes it easier for him/her to learn comprehensively the same or other topics on the next level.

- Earth and the Universe—Within the scope of this branch, a student becomes acquainted with views regarding Earth, the Solar System, and other cosmic objects and develops her/his perception concerning orientation in time and space. A student learns about ongoing cyclic processes in nature. The student becomes familiar with the resources essential for the existence of life on earth and the ways and means of their utilization. The curriculum also incorporates practical activities for mastering these methods, including observation and learning trials, familiarization with simple tools and implementing measuring and computing activities, orientation in place, utilization of maps, modeling of objects and processes, and other activities.

Basic Education (Grades 7 to 9)

In Grades 7 to 9, biology, chemistry, and physics are taught as separate subjects. Each subject comprises two branches:

- Biology—Scientific Research, Living World
- Physics—Scientific Research, Physical Phenomena
- Chemistry—Scientific Research, Chemical Phenomena

At this level of general education, student skills essential for cognition become more developed. A student advances from a stage of external descriptions of phenomena to a stage of comprehension of phenomena, learns the main laws of physics and chemistry, and learns biological patterns. A student develops an empirical perception of the world and learns creative thinking. The student tries to define humans' role and purpose in the world.

At a basic level of general education, a student develops the following skills:

- Applying some modern methods of research
- Researching and using scientific literature
- Planning and conducting experiments; collecting and processing data
- Critical analysis; drawing conclusions
- Presenting findings (creating graphs, diagrams, models)

Secondary Education (Grades 10 to 12)

At the last level of general education, natural sciences are taught more comprehensively and the foundation for professional education is laid. A secondary school graduate should be able to continue education to the graduate's desired level and successfully integrate into modern society. Students at this level are given an opportunity to become familiar with careers in the field of natural sciences, appreciate the significance of science and technology for scientific and technical progress, and understand the responsibility that will be imposed on him/her as researcher or citizen.

At this level of secondary education, biology, chemistry, and physics are taught as separate subjects. Each subject comprises two branches:

- Biology—Scientific Research, Living World
- Physics—Scientific Research, Physical Phenomena
- Chemistry—Scientific Research, Chemical Phenomena

At this level of instruction, a student develops the following skills:

- Strengthening independent thinking, so the student can manipulate his/her or others' data, anticipate the results of a new or a changed situation, articulate a hypothesis, and create an experimental model
- Preparing and implementing a project and defending it in front of wide audience

Assessment in natural sciences is based the following essential components:

- Home assignments—Working on natural science texts, preparing answers to questions, conducting home experiments and preparing the corresponding protocols, observing objects and processes and recording results, searching and/or processing information, creating a concept map, modeling, preparing papers, and working on projects. Skills to assess include thinking, researching, problem solving, working independently, and self-management.
- In-class assignments—Debating/discussing a topic, observing objects and processes, conducting experiments, searching/processing data, creating models, field work, creating concept maps, and working on natural science texts. Skills to assess include thinking, research, problem solving, social interaction, communication, and self-management.
- Summary assignment—Field work, researching, creating models, working on individual/group projects, presenting, and testing. The various types of a summary assignment must be applied during a school year. Skills to assess include thinking, researching, problem solving, social interaction, communication, and self-management.

Results achieved at the end of a one specific learning unit (e.g. a topic, a chapter) should be assessed by a component of a summary assignment.

Professional Development Requirements and Programs

A teacher has the right to advance his or her status based on various activities of professional development.⁸ To achieve the following objectives, teachers must meet several requirements:⁹

- To obtain the status of senior teacher, a practitioner-teacher must prove competency in a subject and a profession by passing a 60 percent barrier. To prove competency, a practitioner-teacher has the choice to meet part of a 19-credit score requirement by means of activities that are previously defined for practitioner-teachers.

- To obtain the status of lead teacher, a senior teacher must accumulate 1 credit score by means of compulsory and supplementary activities and pass an external observation that is equal to 4 credit scores.
- To obtain the status of mentor teacher, a lead teacher must accumulate 25 credit scores through compulsory and supplementary activities.

The Teacher's House offers teachers of natural sciences special trainings that include teachings based on research, principles of conducting laboratory tests, and other practices.

Training designed for mathematics teachers addresses contextual topics as well as methods. Training focused on content is intended for beginning teachers. Beginning teachers study comprehensive courses in various branches of math, such as geometry, data analysis, and probability. Training for senior and lead teachers aims to acquaint them with the modern technologies.

According to changes starting 2021, practitioner-teachers will stay within a system only in non-Georgian sectors and schools. For advancement in a status, they must pass:

- An exam in a corresponding subject with a result of no less than 50 percent
- A comprehensive assessment

A practitioner-teacher must pass a professional skills exam that corresponds to the intended status-level advancement. The practitioner-teacher must also undergo an assessment of teaching practice (classroom observation, panel interview conducted by a school community, and portfolio assessment).

Monitoring Student Progress in Mathematics and Science

Since 2006, the assessment scale in Georgia has been changed from a scale ranging from 2 to 5 to a scale ranging from 1 to 10. Teachers are required to develop assessment methods themselves to measure their students' progress.

In 2011, the Minister of Education, Culture, and Sport of Georgia introduced school leaving examinations. To obtain a school diploma, students in the 12th grade were required to pass computer adaptive standardized examinations in all school subjects. The National Examinations Center administered the examinations online in every school. Those exams were abolished in 2019. In 2019, the National Assessment and Examinations Center presented a new National Assessment Project to the Georgian government.¹⁰

In accordance with the new project, assessments will be conducted in the end of fourth, sixth, and tenth grades. The test will be administered electronically across all of Georgia. Results will be provided electronically to students, teachers, and school principals. Schools will use these results to improve the quality of learning and teaching, the school climate, and student achievement.

Special Initiatives in Mathematics and Science Education

The Minister of Education, Culture, and Sport of Georgia awards honor students with gold and silver medals after completion of secondary school. Additionally, the Ministry along with the Educational and Scientific Infrastructure Development Agency implements the subprogram My First Computer to increase the motivation of honor students. Within the framework of this program, students enrolled in public schools who have successfully completed the base level of general education (i.e., ninth grade) and continue their education in secondary school (tenth grade), are awarded with personal computers.

Suggested Reading

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