# Spain

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## Introduction

### *Overview of Education System*

The organization of a country's education system is determined by its political, social, and economic background. In the case of Spain, its social, demographic, and political characteristics, along with its territorial organization, have a direct influence on it. The legislative framework governing the Spanish education system comprises the Spanish Constitution of 1978 and a series of acts that expand on the principles established therein.[1]

In the field of education, the decentralization of the state involves an administration model in which responsibilities are shared between the Spanish government and the 17 autonomous communities. In the autonomous cities of Ceuta and Melilla, education competencies are assumed by the Ministry of Education and Vocational Training.

The Spanish government oversees the education system regarding legislation, basic structure, and cooperative initiatives among all autonomous communities and with other countries. Nevertheless, other aspects of education, such as curriculum development, schools, and financial and personnel management in each respective territory are the responsibility of the self-governed regions. Current education regulations, including the Organic Law for the Improvement of Educational Quality (*LOMCE*), issued in 2013, regulate the education system, establish the education competencies carried out by the Spanish government and their distribution in the core curriculum for all education stages.[2] Furthermore, this law guarantees the uniformity and unity of the education system and allows individual communities to make decisions that meet their needs. Thus, the curriculum has a centralized common framework that is developed and implemented by the autonomous communities and schools.[3,4]

Schools in Spain are classified as state-owned or private. State schools are owned and run by a public authority, while private schools are not. However, the majority of private schools are also financed by public sources; the state funds these schools' operational costs under the general system for grant-maintained schools, in return for the public education service they provide to society. Private schools without public funding are mainly financed through tuition fees paid by students' families. However, private schools may also receive support from subsidies or private

institutions, including cooperatives, foundations, and religious orders. Parents and legal guardians are entitled to choose between the different schools mentioned above.

In 2013, *LOMCE* validated the basic structure of the Spanish education system. Its organization was barely modified compared with the previous one established in 2006 by the Organic Law of Education.[5] The system is organized into grades, cycles, and levels of education. The levels of education comprise early childhood education (ages 0 to 6), primary education (ages 6 to 12), compulsory secondary education (ages 12 to 16), and post-compulsory secondary education (over 16 years of age).

Early childhood education is organized into two cycles—noncompulsory early childhood education for ages 0 to 3 and preprimary education for ages 3 to 6—with the second cycle free of charge. During the 2017–2018 school year, the enrollment rate for preprimary education was 38.2 percent for the first cycle and 97.5 percent for the second cycle.[6]

Spain's basic education system comprises primary education (Grades 1 to 6) and compulsory secondary education (Grades 7 to 10). These 10 years of schooling (generally for students ages 6 to 16) are compulsory and free of charge.

The aim of primary education is to facilitate the learning of oral expression, comprehension techniques, reading, writing, numeracy, and cultural skills. Primary education also focuses on the development of social skills, work and study habits, and artistic sense, creativity, and emotional growth. Hence, education at this level is intended to guarantee comprehensive training to develop students' personalities and prepare them for secondary education.

Secondary education is divided into compulsory secondary education and post-compulsory secondary education. Compulsory secondary education comprises four years (Grades 7 to 10) and aims to provide students with the basic elements of culture (humanistic, artistic, scientific, and technological) that will make them conscious and committed citizens and enable them to pursue subsequent studies or directly enter the job market. This stage of secondary education is organized with the goal of providing a common core education for all students while also paying attention to student diversity. Schools can organize the curriculum in a flexible way and adopt measures necessary to address student diversity. In doing so, however, every school must ensure that all its students can reach the targets set for compulsory secondary education without any discrimination that might prevent them from achieving the final qualification.

The primary and secondary school curricula are organized into subject areas regulated by law. Each subject area involves content, assessment criteria, and learning standards, as well as the key competencies recommended by the European Union. *LOMCE* is intended to encourage "mathematical competence and basic competences in science and technology" both in primary and compulsory secondary education.

Post-compulsory secondary education (Grades 11 to 12) includes the baccalaureate and intermediate vocational education and training (VET) levels. Higher education includes university (UNESCO's International Standard Classification of Education [ISCED] Level 6 and above), higher levels of VET, higher studies in art and design, and higher level sports education (ISCED Level 5).[7]

*Use and Impact of TIMSS*

Spain has participated in TIMSS 1995, 2011, and 2015. Based on TIMSS results and those from the Programme for International Student Assessment (PISA) and the Progress in International Reading Literacy Study (PIRLS), along with the national assessments, the government has launched national goals to promote STEM activities as transversal curriculum actions and improve the quality of teaching and learning. Furthermore, the National Institute for Educational Evaluation (*INEE*) published a report of Spain's TIMSS 2015 results.[8] Some of the latest actions taken at national and regional levels to use these outcomes include:

- Publishing an official education newsletter on the INEE[9]
- Holding events to disseminate results to teachers, principals, and the educational community, including:
  - The Current National and International Perspectives in Educational Evaluation conference in 2016[10]
  - The Keys to Improving Education: An Overview of the International Assessments seminar and the Science Challenge, International Assessments at a Glance seminar, both in 2017[11,12]
  - The PISA-TIMSS Science and English in International Assessment symposium in 2017 and 2018[13,14]
  - The Assessment and Competencies workshop on enhancing the education system in 2019[15]
- Regularly publishing information related to TIMSS and other educational assessments on *INEE* social media (mainly through its Twitter account, @educaINEE, and its blog).
- Translating Policy and Compass Briefs in Education into Spanish and publishing them online (six policy briefs have been translated, and publication of the remaining briefs is planned for 2020)

*INEE* has promoted eTIMSS 2019 among the participating schools by developing outreach materials, such as posters, online videos, and several brochures also available on the *INEE* website.

## The Mathematics Curriculum in Primary and Lower Secondary Grades

Mathematics is a core subject and, therefore, mandatory throughout primary and compulsory secondary education. Mathematics allows reaching a deep understanding of reality and gathering information and analyzing it to make decisions in everyday life, and supports cognitive development.

At the primary level, the current National Core Curriculum was published in March 2014 and implemented in the fourth grade during the 2015–2016 school year.[16] The law mandates that core curriculum subjects comprise at least 50 percent of total instructional time for primary education. This national curriculum details the blocks of contents outlined for all six years of primary education as a whole, and each autonomous community develops and implements the curriculum for its region. Mathematics instruction at this level aims to achieve an efficient numeracy

acquisition, and learning must be essentially experiential—that is, teaching must contextualize the content in situations familiar to students, with a problem solving perspective that provides practical application. Problem solving represents a major area of mathematics activity, because it contributes to the acquisition of basic skills, such as reading for comprehension, reflecting, establishing a working plan and modifying it if necessary, verifying the found solution, and communicating the results.

The mathematics curriculum incorporates spiral learning. It is organized into five blocks with topics developed in Grades 1 to 6: Processes, Methods, and Attitudes in Mathematics; Numbers; Measurement; Geometry; and Statistics and Probability. Exhibit 1 summarizes the topics in each block of content that students are expected to have learned by the end of sixth grade.

**Exhibit 1: Mathematics in Primary Education**

| Blocks of Content | Topics |
|---|---|
| Processes, Methods and Attitudes in Mathematics | ▪ Planning the problem solving process: analyzing and understanding the formulation/sentence/statement, implementing strategies and procedures (draw a picture, a chart, an outline, reasoned trial and error, appropriate mathematical operations, etc.), and obtaining results<br>▪ Conducting brief inquiries in numerical, geometric, and functional contexts<br>▪ Using technology resources in the learning process to obtain information, perform numerical computations, solve problems, and deliver results<br>▪ Integrating Information and Communication Technologies in the learning process |
| Numbers | ▪ Integers, decimals, and fractions; Roman numerals<br>▪ Numerical order, use of ordinal numbers, comparing numbers<br>▪ Reading and writing numbers up to six digits<br>▪ Decimal number system: positional value of the figures and equivalences between its elements (units, tens, hundreds, etc.)<br>▪ Decimals: tenths, hundredths, and thousandths<br>▪ Meaning of a fraction as a part of a whole<br>▪ Proper and improper fractions, mixed numerals, graphic representations<br>▪ Equivalent fractions, reducing two or more fractions to a common denominator<br>▪ Relating fractions to decimals, ordering fractions<br>▪ Divisibility: multiples, factors, prime and composite numbers; divisibility criteria<br>▪ Estimating results<br>▪ Ordering sets of numbers<br>▪ Positive and negative numbers; addition, subtraction, multiplication, and division with whole numbers<br>▪ Powers as a product of equal factors; squares and cubes; powers of 10<br>▪ Operations with fractions and decimals<br>▪ Percentages and proportionality: correspondence between simple fractions, decimals, and percentages; percentage increases and decreases; direct proportionality<br>▪ Real-life problem solving<br>▪ Mental computation and computation using standard algorithms<br>▪ Using a calculator |

| Blocks of Content | Topics |
|---|---|
| Measurement | ▪ Units of measurement in the metric system and their equivalents<br>▪ Length, capacity, mass, area, and volume; equivalences between capacity and volume measures<br>▪ Developing strategies for measuring figures accurately and approximately<br>▪ Selecting the most appropriate unit and instrument for expressing a measure<br>▪ Comparing surfaces of plane figures by superposition, decomposition, and measurement<br>▪ Adding and subtracting length, capacity, mass, area, and volume measures<br>▪ Estimating measures of length, capacities, mass, areas, and volume in familiar objects and spaces<br>▪ Managing units of time and understanding analog and digital watches or clocks<br>▪ Angle measurement and sexagesimal system<br>▪ Monetary systems: European Union monetary system, euro, value of coins and banknotes<br>▪ Solving measurement problems |
| Geometry | ▪ Relative positions of lines and circumferences<br>▪ Angles in different positions: consecutive, adjacent, etc.<br>▪ Description of positions and movements in a Cartesian plane<br>▪ Elementary representation of space, scales, and simple graphs<br>▪ Plane and spatial figures: elements, relationships, and classification<br>▪ Classifying triangles, quadrangles, parallelepipeds, and polygons<br>▪ Perimeter and area<br>▪ Circumference and circles<br>▪ Polyhedrons and round shapes: cones, cylinders, and spheres<br>▪ Regularities and symmetries |
| Statistics and Probability | ▪ Graphs and statistical parameters<br>▪ Intuitive introduction to central tendency measures: arithmetic mean, mode, and range<br>▪ Creating and understanding simple graphics: bar graphs, pie charts, and polygonal graphs<br>▪ Critical analysis of the information expressed by statistical graphs<br>▪ Intuitive introduction to computing the probability of an event |

Throughout the various stages of education, students should progress in mathematical thinking skills, specifically the ability to mathematically analyze and research, interpret, and communicate various phenomena and problems in different contexts, and provide practical solutions. Hence, the core mathematics curriculum for compulsory secondary education should not be seen as a set of independent blocks.[17] It must be developed in a holistic manner, thinking about the internal connections of the subject both within the school year and between the different stages. This curriculum aims to integrate knowledge, competencies, and values; thus, learning standards take into account the essential relationship between these elements. In Grades 7 and 8, students follow a common mathematics curriculum organized into five blocks: Processes, Methods, and Attitudes in Mathematics; Numbers and Algebra; Geometry; Functions; and

Statistics and Probability. Students are expected to have acquired the following skills by the end of eighth grade:

- Processes, Methods, and Attitudes in Mathematics—During the stage, students will have learned transversally, how to express in a reasoned manner the process followed to solve a problem; use problem solving strategies, making the necessary calculations and verifying the solutions obtained; describe and analyze situations of change to find patterns, regularities, and mathematical laws in numerical, geometric, functional, statistical, and probabilistic contexts; and use the appropriate technological tools independently (e. g., performing numerical, algebraic, or statistical calculations and making graphs).
- Numbers and Algebra—Students will have studied whole numbers, integers, fractions, decimals, and simple percentages, and their operations and properties, to collect, transform, and exchange information and solve problems related to everyday life. They also will have developed competences in the use of combined operations and in the use of different strategies (using tables or obtaining the proportionality constant) to obtain unknown elements in a problem based on real-life situations in which there are percentage variations and directly or inversely proportional magnitudes. Students will also have learned how to use algebraic language to represent and solve problems by means of first- and second-degree equations and systems of equations, applying algebraic or graphic methods and contrasting the results obtained.
- Geometry—Students will have studied plane figures, their elements, and characteristic properties to classify them; identify situations; describe the physical context; and address problems related to perimeters, areas and angles, and using the appropriate mathematical language to express the procedure followed to find the solution. They also should know the arithmetic meaning of the Pythagorean theorem, the different geometric figures, and how to solve problems involving the calculation of lengths, surfaces, and volumes in the physical world, using properties, regularities, and relationships of polyhedrons.
- Functions—Students will have learned how to use and interpret the Cartesian system; the different ways of presenting a function (e.g., everyday language, numerical tables, graphs, and equations); and the analysis of linear functions to solve problems.
- Statistics and Probability—Students will have studied how to organize and present relevant data, using appropriate statistical methods and tools (organizing data into tables and constructing graphs, calculating relevant parameters, and drawing reasonable conclusions) including the use of technological tools. They also should distinguish between deterministic and random phenomena, and appreciate the possibility offered by mathematics to analyze and make reasonable predictions about random phenomena from the regularities obtained by repeating the random experience a significant number of times, or the calculation of its probability.

## The Science Curriculum in Primary and Lower Secondary Grades

At the primary level, science content is mainly included in Natural Science, but some content is also included in Social Science; both Natural Science and Social Science are core subjects. Overall, the science curriculum is designed to provide a foundation for science education at later stages, through topics such as raising awareness about the world around us, understanding our natural environment, and recognizing scientific and technological advances in everyday life.

In Natural Science, the content revolves around certain fundamental concepts: Introduction to Scientific Activity; the Human Being and Health; Living Things; Matter and Energy; and Technology, Objects, and Machines. Its implementation must enable students to progress in the acquisition of scientific knowledge, in its organization and structuring as a whole. The evaluation criteria and learning standards provided in the core curriculum reflect the skills expressed in the general objectives of the primary education and state the competencies that students should acquire.

Natural Science at the primary level includes the blocks of content outlined for all six years of primary education as a whole. Exhibit 2 summarizes their main topics.

**Exhibit 2: Natural Science in Primary Education**

| Blocks of Content | Topics |
|---|---|
| Introduction to Scientific Activity | ▪ Initiating scientific activity; simple experiments and investigations<br>▪ Using information sources (direct and indirect); using Information and Communications Technology to obtain and select information, simulate processes, and make conclusions<br>▪ Use of materials; safety rules<br>▪ Individual and group work; work and study techniques; developing work habits; effort and responsibility<br>▪ Project planning and report presentation; project implementation |
| The Human Being and Health | ▪ The human body and its functions; anatomy and physiology; body systems<br>▪ Vital body functions: relation function (sensory organs, nervous system, and locomotor system), nutrition function (respiratory, digestive, circulatory, and excretory systems), and reproduction function (reproductive system)<br>▪ Health and illness; main illnesses that affect the systems of the human organism; identifying and assessing healthy habits for the prevention of the aforementioned illnesses; recognizing the damaging effects of alcohol and drug consumption<br>▪ Developing identity and personal autonomy; relationships with others; making decisions: criteria and consequences; peaceful resolution of conflicts<br>▪ Equality between men and women |
| Living Things | ▪ Living and nonliving things, differentiation<br>▪ The inner organization of living things; the structure of living beings: cells, tissues, organs, and systems; main characteristics and functions |

| Blocks of Content | Topics |
|---|---|
| | ▪ Characteristics, classification, and types of living beings<br>▪ Vertebrate and invertebrate animals, characteristics and classification<br>▪ Structure and physiology of plants; photosynthesis and its importance to life on Earth<br>▪ Relationship between living things; food chains; populations, communities, and ecosystems; characteristics and components of an ecosystem; the biosphere and the different habitats of the living things<br>▪ Using technology to study living things |
| Matter and Energy | ▪ Studying and classifying materials according to their properties<br>▪ Using different procedures to measure the mass and volume of objects<br>▪ Explaining observable physical phenomena in terms of density differences; flotation<br>▪ Predicting changes in the motion or shape of an object due to forces<br>▪ Energy and its forms; origin of energy sources and raw materials; renewable and nonrenewable energy<br>▪ Light as an energy source; electricity and the electric current; electrical circuits; magnetism and terrestrial magnetism; magnets and compasses; attraction and repulsion of electric charges<br>▪ Separating the components of a mixture by distillation, filtration, evaporation, or dissolution<br>▪ Chemical reactions: combustion, oxidation, and fermentation |
| Technology, Objects, and Machines | ▪ Machines and devices and their use in the daily life<br>▪ Making simple structures from modular pieces that fulfill a function or condition to solve a problem<br>▪ Electricity in machine development; electrical circuits; effects of electricity; conductors and insulators<br>▪ Relationship between electricity and magnetism<br>▪ Science: present and future of society<br>▪ Remarkable discoveries and inventions<br>▪ Word processing; guided searching for information on the internet; time management and responsible use of Information and Communication Technology |

In primary education, Social Science integrates different disciplines. The second block of the core curriculum for this subject includes contents related to the Universe; the Representation of the Earth and Orientation in Space; Water and its Responsible Consumption; Weather and Climate Change; and Landscape and Human Intervention.

In secondary education, the science curriculum is organized into subjects. During the first three years of compulsory secondary education (first cycle), the science subjects are arranged as follows: Biology-Geology in Grade 7, Physics-Chemistry in Grade 8, and both subjects in Grade 9.

During the first cycle of compulsory secondary education, Biology-Geology focuses on living things and their interaction with the Earth, putting special emphasis on the importance of the conservation of the environment for all living things. Health and its promotion are also essential topics during this cycle. The main objective is for students to acquire skills and competencies that will enable them to take care of their bodies both physically and mentally, as well as assessing

and having a critical attitude toward information and a social mindset that may have negative consequences on their physical, social, and psychological development. Thus, ninth grade students are expected to do the following in terms of the evaluation criteria provided for each block of content:

- Abilities, Skills, and Strategies—Scientific methodology: Students will have learned how to search for, select, and interpret scientific information and use this information to form their own opinion, discussing problems related to the natural environment and health. They also should have carried out an experimental project with the help of laboratory or field practice guidelines, describing the method and interpreting their results.
- The Earth in the Universe—Students will have studied the main ideas about the origin of the Universe and the formation and evolution of galaxies; the movements of the Earth, Moon, and Sun and their relationship to day and night, the seasons, tides, and eclipses; the Earth materials according to their abundance and distribution in the Earth's main layers and the properties and characteristics of minerals and rocks, identifying their most frequent applications and highlighting their economic importance and sustainable management. They also should know the characteristics and composition of the atmosphere and the properties of air and water and its importance for the existence of life.
- Biodiversity on Planet Earth—Students will have studied that living things are made up of cells and will have learned the characteristics that distinguish them from inert matter and their functions, distinguishing between autotrophic and heterotrophic nutrition. They also should be able to describe the general characteristics of the large taxonomic groups; characterize the main groups of vertebrates and invertebrates; and determine through observation the adaptations that enable plants and animals to survive in certain ecosystems and the vital functions of plants.
- People and Health—Health promotion: Students will have studied the different levels of organization of living things (cells, tissues, organs and systems); the concept of health and disease; the basic functioning of the immune system; the difference between food and nutrition; the components and functions of the digestive, circulatory, respiratory, and excretory systems; the sensory organs, the nervous system, the main endocrine glands, and the basic aspects of the reproductive system, distinguishing between sexuality and reproduction.
- The Relief of the Earth and its Evolution—Students will have learned how to link external geological processes with energy; analyze and predict the action of surface water, identifying the most characteristic forms of erosion and deposition; and understand marine dynamics, wind, the geological action of glaciers, and volcanic activity.
- Ecosystems—Students will have studied how to distinguish the components of an ecosystem, recognize and share actions that promote the conservation of the environment, and analyze the components of the soil.
- Research project—Students should know how to develop hypotheses and contrast them through experimentation or observation, use a variety of information sources, and explain their research project publicly.

The teaching of physics and chemistry as scientific disciplines has the added responsibility of providing students with specific tools that will enable them to look into the future confidently, participating in the economic and social development to which the scientific, technological, and innovative capacity of society itself is linked. In the first cycle of compulsory secondary education, the natural science knowledge acquired by students in primary education should be consolidated and broadened. The introduction of concepts must be fundamentally phenomenological; as such, the subject is presented as the logical explanation of everything that the student is used to and knows. It is important to point out that this cycle may be the final cycle in which physics and chemistry is studied, so the main objective of the subject must be to contribute to the foundation of a basic scientific culture. Therefore, the following concepts summarize the evaluation criteria students should have achieved by the end of ninth grade for each block of content:

- Scientific Activity—Students will have learned how to recognize and identify the characteristics of the scientific method; appreciate scientific research and its impact on industry and in the development of society; and develop small research projects that put into practice the application of the scientific method and the use of Information and Communications Technology.
- Matter—Students will have studied the general properties and specific characteristics of matter, linking them with its nature and applications; the relationships between the variables on which the state of a gas depends using graphs and/or tables of results obtained in laboratory experiments or computer simulations; and the methods of separation of the components of a mixture. They should also be able to interpret the arrangement of the elements in the periodic table and recognize the most relevant elements from their symbols; distinguish between atoms/molecules and elements/compounds; and formulate and name binary compounds according to International Union of Pure and Applied Chemistry standards.
- Changes—Students will have learned how to distinguish between physical and chemical changes through simple experiments; characterize chemical reactions as changes from one substance to another; test the influence of certain factors on the speed of chemical reactions by carrying out simple laboratory experiments; and appreciate the importance of the chemical industry in society and its influence on the environment.
- Motion and Forces—Students will have studied the role of forces in causing changes in the state of motion and deformations; the speed of an object as the relationship between the distance traveled and the time it took to travel it; and the usefulness of simple machines in transforming one movement into a different one and reducing the necessary applied force. They should also know about the gravitational force (as responsible for the weight of objects, for orbital movements, and for the different levels of grouping in the universe), the electric charge model, and the magnetic phenomena.
- Energy—Students will have learned how to identify the different types of energy exhibited in everyday phenomena and in simple experiments carried out in the laboratory; connect the concepts of energy, heat, and temperature in terms of kinetic-molecular theory; appreciate the importance of responsible use of energy sources; and explain the physical

phenomenon of electric current and interpret the meaning of the magnitudes (e.g. current intensity, potential difference, and resistance). They should be able to appreciate the importance of electrical and electronic circuits in electrical installations and everyday instruments, describing their basic function and identifying their various components.

## Professional Development Requirements and Programs

As defined by the educational legislation in force, teachers have the right and the duty to participate in professional development activities.[18] Teachers in state schools are eligible to receive financial incentives every six years for participating in these activities.

In addition to postgraduate courses, education training schools in various communities may offer classroom workshops, online courses, support for novice teachers, seminars and working groups, or a combination of these options. There are professional development programs to expand teacher training in science, technology, engineering, and mathematics (STEM) through the dissemination of best practices, resources, and the promotion of active methodologies, such as STEMadrid scheme[19] or STEM Talent Girl.[20]

The International Centre for STEM Education (ICSE) promotes programs to improve STEM education across Europe and the Ministry of Education and Vocational Training is involved. One of ICSE's programs is MaSDiV, an education research project focused on assessment (included in Erasmus+ Key Action 3). This project aims to help teachers facilitate and enhance the learning of mathematics and science as well as link this learning to the instruction of core values in multicultural and diverse classrooms. MaSDiV encompasses the creation, implementation, and evaluation of professional development courses for science and mathematics teachers.[21] The Europe STEM Professional Development Centre Net, (included in Erasmus+ Key Action 2), is another ICSE program. For this program, the National Institute of Technology and Professional Development (INTEF) at the Spanish Ministry of Education and Vocational Training actively participates in the coordination, development and delivery or promotion of professional development among STEM teachers.[22] INTEF is also the contact point for Scientix,[23] a community focused on science education in Europe, and promotes other STEM projects, such as the STEM Alliance project, STEM Discovery Week, and Girls 4 STEM in Europe. More information about these and other projects is provided on INTEF's website.[24]

## Monitoring Student Progress in Mathematics and Science

External assessments at the end of each stage are some of the latest measures introduced by *LOMCE* to improve the quality of the education system.[25] Originally, *LOMCE* previewed four nationwide assessments in Grades 3, 6, 10, and 12. Further normative developments have introduced the following changes in these assessments until a National Pact on Education is in place:[26]

- Grade 3—Assessment remains without changes
- Grade 6—Assessment becomes sample based, although the regions may increase the number of participants above the sample requirements or make it with a census-based approach; it has no academic effects
- Grade 10—Same as in Grade 6
- Grade 12—Assessment serves only the purpose of university admission

Grade 3 results are used to adopt ordinary and extraordinary measures, if necessary (e.g., in the event of unfavorable results), and the assessment has no academic consequences for students. In Grades 6 and 10, the results have only a formative and diagnostic purpose.[27,28,29] Nevertheless, conducting these assessments leads to an analysis of system needs with the aim of improving further education measures.

Primary school teachers are responsible for assessing individual student progress. The assessment must be ongoing and global, taking into account general student progress in all areas of the curriculum. Teachers use the evaluation criteria and learning standards specified for each subject as the basis for determining each student's level of competence. When student progress is inadequate, schools must adopt remedial measures as soon as the difficulties are detected. These measures are designed to guarantee the achievement of essential skills, so all students can progress within the education system.

Schools use assessment results in Grade 3 to plan interventions so that students achieve key competencies in Grades 4 to 6 of primary education. These results enable schools to assess instruction and teacher performance, and to analyze, evaluate, and redirect the teaching methods used in Grades 1 to 3.

## Special Initiatives in Mathematics and Science Education

In primary education, the current curriculum includes science as a separate and core subject with an emphasis on experimental methodology and the use of Information and Communications Technology resources. There are also many education initiatives to raise the attractiveness of science education and scientific careers and boost young people's interest in STEM. Some initiatives at the national and regional levels include Science and Innovation Week held annually in Madrid since 2001; the Spanish Mathematics Olympics and the Spring Mathematics Competition both in primary and secondary education; and Live Science, a program that organizes outreach activities for disseminating science knowledge.[30,31,32,33] Additionally, the Ministry of Education and Vocational Training takes part in European projects, such as Scientix, which promotes best practices in science teaching. Scientix is aimed at teachers, researchers, policymakers, and parents to facilitate the constant dissemination and exchange of technical knowledge and practical examples in science teaching in the European Union.[34]

*LOMCE* establishes that education authorities must provide the necessary resources for students who require special education due to learning disabilities, attention deficit hyperactivity

disorder, high intellectual abilities, delayed integration into the education system, personal problems, and/or unsatisfactory academic records. The goal is for these students to achieve the maximum possible development of their personal abilities and the general objectives defined for all students. From the time their needs are identified, students with special needs receive comprehensive support governed by the principles of standardization and social inclusion (e.g., they can either be provided with an Individual Curriculum Adaptation or teachers that work one on one with them outside of the classroom). These students are guaranteed equal access to education and continuance in the education system, as necessary, at its various levels.

## Suggested Readings


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