

Ontario, Canada

Ontario Ministry of Education

Introduction

Overview of Education System

Education in Ontario, Canada, is governed principally by the *Education Act* and its regulations, which set out the duties and responsibilities of the Minister and Ministry of Education, school boards, school board supervisory officers, principals, teachers, early childhood educators, parents, and students.¹ By law, the Ministry of Education has overall responsibility for developing curriculum; allocating funds to school boards; setting policies and guidelines for school trustees, directors of education, principals, and other school board officials; and setting requirements for student diplomas and certificates. Policy and program requirements are set out in *Ontario Schools: Kindergarten to Grade 12: Policy and Program Requirements, 2016*.²

Primary and secondary public education is free to all individuals who qualify as resident students. With the passage of the *Education Amendment Act (Learning to 18)* in 2006, students are required to continue their education until they graduate or turn 18.³

Based on preliminary 2018-2019 data, approximately 93 percent of Ontario's students are enrolled in publicly funded schools. Ontario has 72 district school boards: 31 English public school boards, 29 English Catholic, 4 French public, and 8 French Catholic. Using the 2018-2019 data, the publicly funded education system had more than 2 million students enrolled in approximately 4,000 primary and 900 secondary schools. Approximately two-thirds of Ontario's students were enrolled in public schools and one-third in public Catholic schools. Approximately 5 percent of Ontario's students were enrolled in French language schools.⁴ There are approximately 76,000 full time equivalent elementary school teachers and 39,000 full time equivalent secondary school teachers in Ontario.⁵ In addition to the Ontario district school boards, at the time of TIMSS 2019 testing in Ontario, there were five provincial schools that serve students who are deaf, hard of hearing, blind, low vision, or deaf-blind, and four demonstration schools for students with severe learning disabilities.^a

There are also students that are unable to attend school settings because of their primary need for care or treatment, or because of a court-order to serve a custody or detention sentence. These students may be enrolled in an Education and Community Partnership Program. These programs are voluntary programs developed between school boards and government-approved facilities

^a As of August 2020, there are four provincial schools that serve students who are deaf, hard of hearing, blind, low vision, or deaf-blind, and three demonstration schools for students with severe learning disabilities in Ontario.

such as custody and correctional facilities, mental health agencies, or hospitals wherein education continues to be provided while students receive treatment or care.

Ontario has more than 1,200 ministry-recognized private schools. Private schools do not receive government funding; however, the Ministry inspects all private secondary schools seeking the authority to grant credits in courses leading to the Ontario Secondary School Diploma (OSSD).

Ontario has a two-year full-day kindergarten program that is child-centered and developmentally appropriate for 4- and 5-year-olds. The purpose of the program is to establish a strong foundation for learning in the early years in a safe and caring play- and inquiry-based environment that promotes the physical, social, emotional, and cognitive development of all children.

Although kindergarten is not mandatory, approximately 90 percent of eligible children are enrolled. Children are required to begin school when they turn 6 years old. Ontario offers four education levels: primary (Grades 1 to 3), junior (Grades 4 to 6), intermediate (Grades 7 to 10), and senior (Grades 11 and 12). Grades 1 to 8 comprise the elementary level, and teachers at this level typically teach all subjects. At this level, students receive 25 hours per week of instructional time. Although there is no mandated percentage of instructional time for science, there is a requirement of 300 minutes per week for instruction in mathematics.⁶ Decisions regarding the amount of time spent on other areas of the elementary curriculum (with the exception of French as a second language in English language schools only and daily physical activity) are made at the local level to give educators choice in integrating subject content. Grades 9 to 12 make up the secondary level. At this level, students earn credits by completing courses, which are a minimum of 110 hours in length.

Many courses in Grades 9 and 10 are currently divided into three types: applied, academic, and locally developed compulsory, which includes mathematics and science. As part of the plan to end early streaming, the Ministry will introduce a new foundational Grade 9 mathematics course for September 2021. The de-streaming of Grade 9 mathematics is the first step towards further de-streaming in other curriculum areas, which will better support all students in having every opportunity to pursue the pathway of their choice after their K-12 education.^b

Students begin to focus their pathways in Grades 11 and 12 according to their intended initial postsecondary destination, whether in apprenticeship training, college, community living, university, or the workplace. Students working toward a secondary school diploma must complete three compulsory credits in mathematics, with at least one credit taken in Grades 11 or 12, and two compulsory credits in science, with one elective credit in either science (taken in Grades 11 or 12), technological education, computer studies, cooperative education, or French as a second language.

Ontario is multilingual and multicultural and has approximately 13.4 million inhabitants, representing about 38 percent of Canada's population.⁷ First Nations, Métis, and Inuit individuals

^b The proposed changes are in response to research and stakeholder concerns recognizing the negative impact on students by streaming them too early and improving opportunities to support all students to reach their potential.

make up almost 3 percent of Ontario’s population.⁸ The languages of instruction in the province are English and French, with Section 23 of the Canadian Charter of Rights and Freedoms guaranteeing Francophones the right to a French language education.⁹ American Sign Language (ASL) and *langue des signes quebécoises (LSQ)* (Quebec Sign Language) are permitted as languages of instruction in provincial schools for students who are deaf or hard of hearing, and in schools under the authority of district school boards, where appropriate.

According to census data from 2016, approximately 67 percent of Ontarians have English as their mother tongue, 4 percent have French, and 27 percent have a first language other than the official languages of English or French.¹⁰ In the English language school system, more than 25 percent of Ontario’s elementary school students have a first language other than English. In the French language school system, 46 percent of Ontario’s elementary school students have a first language other than French.¹¹ The government provides policy direction, programs, and funding support to school boards for students to acquire proficiency in the official languages of instruction^{c,12} and Ontario has policies to support English Language Learners.¹³

Use and Impact of TIMSS

Ontario has participated as a benchmarking participant in each administration of the TIMSS since the first cycle in 1995. TIMSS provides an external measure of student achievement that is part of the province’s multilevel assessment effort to improve the education system’s support of student learning, and ultimately prepare students with the skills, knowledge, and confidence they need to succeed in whatever path they choose. In the fourth grade, TIMSS results provide the only external measure of student achievement in mathematics and science. In the eighth grade, Ontario’s TIMSS results supplement national assessment data from the Pan-Canadian Assessment Program (PCAP). (See section “Monitoring Student Progress in Mathematics and Science,” below, for more information.)

TIMSS results, along with results from other international and national assessments, and related assessment frameworks and research are used to monitor Ontario’s education system in comparison with other jurisdictions within Canada and around the world; communicate to parents and other members of the public about the quality of Ontario’s public school system; benchmark Ontario’s curriculum with other jurisdictions; inform curriculum revisions; and gain insights into the teaching and learning practices of other provinces and countries that can shape the development of resources and professional learning alongside other data from teachers, schools, and school boards. TIMSS results, and the results from other international and national assessments, complement the results of the province’s large-scale assessment program and of classroom-based assessments.

^c *Actualisation linguistique en français (ALF)* and *Programme d’appui aux nouveaux arrivants (PANA)* are programs that are adapted to the specific needs of students, who need support with second language acquisition to succeed at school and/or, who are newcomers and in need of support to adapt to Canadian society.

The Mathematics Curriculum in Primary and Lower Secondary Grades

In 2005, the Ministry of Education released *The Ontario Curriculum, Grades 1 to 8: Mathematics*, and *Le curriculum de l'Ontario—Mathématiques, de la 1re à la 8e année*^{14,15} —the guiding documents under which Ontario students participated in the TIMSS 2019 assessment. In June 2020, the Ministry released a new elementary mathematics curriculum to better prepare students for work and life in a rapidly changing world, strengthen mathematics competence, and improve achievement. (To learn more about the new elementary mathematics curriculum, see the section on *Special Initiatives in Mathematics and Science Education*.)

The 2005 curriculum recognizes student diversity and is based on the belief that all students can learn mathematics. The curriculum supports equity by promoting the active participation of all students and by identifying the knowledge and skills students are expected to demonstrate in every grade. It recognizes different learning styles and sets expectations that call for the use of a variety of instructional strategies and assessment tools. Further, it aims to challenge all students by including expectations that require them to use higher order thinking skills and make connections among related mathematical concepts and among mathematics, other disciplines, and the real world.

The French-language curriculum is developed, implemented, and revised in parallel with the English-language curriculum. A distinct feature of the French-language education system is the *Aménagement Linguistique* policy, which is intended to promote, enhance, and expand the use of the French language and culture in a minority setting and in all spheres of activity.¹⁶

The mathematics curriculum includes five strands or major areas of knowledge and skills: Number Sense and Numeration, Measurement, Geometry and Spatial Sense, Patterning and Algebra, and Data Management and Probability. It also identifies seven mathematical processes: Problem Solving, Communicating, Reasoning and Proving, Reflecting, Representing, Connecting, and Selecting Tools and Computational Strategies. These processes describe the practices students need to learn and apply in all areas of their mathematics studies. In Grades 1 to 12, students engage actively in applying these mathematical processes throughout their programs of study.

Problem solving is central to learning mathematics. By learning to solve problems and by learning through problem solving, students connect mathematical ideas and processes, and develop conceptual understanding. Problem solving enables students to use the knowledge they bring to school and helps them connect mathematics with situations outside the classroom. It gives meaning to skills and concepts in all strands. It provides opportunities for students to reason, communicate ideas, make connections, and apply their knowledge and skills, and it promotes collaboration, the sharing of ideas and strategies, and the discussion of mathematics.

In fourth grade mathematics, students are expected to develop knowledge and skills in the following strands:

- Number Sense and Numeration—Work with whole numbers, decimal numbers, and simple fractions; understand magnitude; solve problems and use proportional reasoning
- Measurement—Use strategies to estimate, measure, and record length, perimeter, area, capacity, mass, volume, and elapsed time; and determine relationships among units and measurable attributes
- Geometry and Spatial Sense—Understand the geometric properties of quadrilaterals and three-dimensional figures, compare angles to benchmarks, construct three-dimensional figures using two-dimensional shapes, identify and describe the location of objects using grid map; and reflect two-dimensional shapes
- Patterning and Algebra—Work with numeric and geometric patterns and make predictions related to patterns and repeating patterns, and understand equality between pairs of expressions, using addition, subtraction, and multiplication
- Data Management and Probability—Collect, organize, and display discrete data, interpret primary and secondary data presented in charts and graphs, make predictions related to simple probability experiments; conduct experiments; and compare predictions to results

In eighth grade mathematics, students are expected to develop knowledge and skills in the following strands:

- Number Sense and Numeration—Use equivalent representations for numbers, including positive exponents; solve problems involving whole numbers, decimal numbers, fractions, and integers; and use proportional reasoning in meaningful contexts to solve problems
- Measurement—Learn about applications of volume and capacity measurements, determine relationships among units and measurable attributes, including the area of circles and volume of cylinders
- Geometry and Spatial Sense—Learn about the geometric properties of quadrilaterals and circles; develop relationships and solve problems involving lines, triangles, and polyhedra; and use the coordinate plane to represent transformations
- Patterning and Algebra—Use graphs, algebraic expressions, and equations to represent linear growth patterns; model linear relationships, both graphically and algebraically; and solve and verify algebraic equations
- Data Management and Probability—Collect and organize categorical, discrete, or continuous primary data and secondary data and display data using charts and graphs, make convincing arguments about data, and use probability models to make predictions about real life events

The Science Curriculum in Primary and Lower Secondary Grades

The Ontario Curriculum, Grades 1 to 8: Science and Technology (2008), and *Le curriculum de l'Ontario—Sciences et technologie, de la 1re à la 8e année* are the guiding documents under which Ontario students participated in the TIMSS 2019 science assessment. These documents are consistent with Canada's goals for science education outlined in the Common Framework of Science Learning Outcomes K–12, which aims to develop the scientific literacy of Canadian students.^{17,18,19}

Ontario's elementary science and technology curriculum is structured around the relationships among the fundamental concepts, big ideas, and goals of science and technology to provide a framework for teaching overall and specific expectations. The French-language curriculum for science and technology is developed, implemented, and revised in parallel with the English-language curriculum, and it follows the aforementioned *Aménagement Linguistique* policy.²⁰

Ontario's elementary science and technology curriculum has three goals: (1) relate science and technology to society and the environment; (2) develop the skills, strategies, and habits of mind required for scientific investigation and technological problem solving; and (3) understand the basic concepts of science and technology. These three goals and their interrelationship within the curriculum expectations reinforce the notion that learning in science and technology cannot be viewed as merely learning facts. Rather, science and technology is a subject in which students learn, in age appropriate ways, to consider the knowledge and skills that will help them understand and critically consider the impact of developments in science and technology on modern society and the environment.

The science and technology curriculum expectations are organized into four strands: Understanding Life Systems, Understanding Structures and Mechanisms, Understanding Matter and Energy, and Understanding Earth and Space Systems. Through scientific research, experimental inquiry, and technological problem solving, students engage in learning activities that enable them to develop knowledge and understanding of scientific and technological ideas in much the same way scientists would. These investigations enable students to develop their ability to design solutions to problems and make connections between science, technology, society, and the environment.

In fourth grade science, students are expected to develop knowledge and skills in the following strands:

- Understanding Life Systems (Habitats and Communities)—Analyze the effects of human activities on habitats and communities; investigate the interdependence of plants and animals within specific habitats and communities; and demonstrate an understanding of habitats and communities and the relationships among the plants and animals that live in them
- Understanding Structures and Mechanisms (Pulleys and Gears)—Evaluate the impact of pulleys and gears on society and the environment; investigate ways in which pulleys and gears modify the speed and direction of, and the force exerted on, moving objects; and

demonstrate an understanding of the basic principles and functions of pulley systems and gear systems

- Understanding Matter and Energy (Light and Sound)—Assess the impact on society and the environment of technological innovations related to light and sound; investigate the characteristics and properties of light and sound; and demonstrate an understanding of light and sound as forms of energy that have specific characteristics and properties
- Understanding Earth and Space Systems (Rocks and Minerals)—Assess the social and environmental impacts of human uses of rocks and minerals; investigate, test, and compare the physical properties of rocks and minerals; and demonstrate an understanding of the physical properties of rocks and minerals

In eighth grade science, students are expected to develop knowledge and skills in the following strands:

- Understanding Life Systems (Cells)—Assess the impact of cell biology on individuals, society, and the environment; investigate functions and processes of plant and animal cells; and demonstrate an understanding of the basic structure and function of plant and animal cell and cell processes
- Understanding Matter and Energy (Fluids)—Analyze how the properties of fluids are used in various technologies and assess the impact of these technologies on society and the environment; investigate the properties of fluids and demonstrate an understanding of the properties and uses of fluids
- Understanding Structures and Mechanisms (Systems in Action)—Assess the personal, social, and/or environmental impacts of a system and evaluate improvements to a system and/or alternative ways of meeting the same needs; investigate a working system and the ways in which components of the system contribute to its desired function; and demonstrate an understanding of different types of systems and the factors that contribute to their safe and efficient operation
- Understanding Earth and Space Systems (Water Systems)—Assess the impact of human activities and technologies on the sustainability of water resources; investigate factors that affect local water quality; demonstrate an understanding of the characteristics of the Earth’s water systems, and the influence of water systems on a specific region

Professional Development Requirements and Programs

The Ministry of Education, the Ontario College of Teachers, teachers’ federations, and Ontario school boards share responsibility for providing ongoing professional learning. The Ministry mandates three professional activity (PA) days per year for schools and school boards to work on provincial education priorities, and as many as four additional PA days for other professional development activities. In July 2019, it was determined that one PA day be devoted to developing

and implementing strategies to improve student achievement in mathematics, with a focus on fundamental mathematics concepts and skills.^d

In addition to PA days, the Ministry supports the professional learning of teachers at all stages of their career (e.g., the New Teacher Induction Program, a growth-oriented teacher performance appraisal process), and by providing ministry-facilitated training and multimedia resources.

In Ontario, the profession of early childhood education is regulated by the College of Early Childhood Educators (ECEs). The College of ECEs requires that all members (i.e., Registered Early Childhood Educators [RECEs]) engage in the Continuous Professional Learning program, a self-reflective and self-directed framework designed to help RECEs reflect, plan for, and document their professional learning.

In mathematics, the Ministry supports job-embedded professional development to improve student learning and achievement, using effective evidence-based practices. In March 2019, it was announced that subsidies are available for educators to achieve additional qualifications in mathematics. Also, in schools with the greatest needs in mathematics, the Ministry is providing additional funding for educators to engage in classroom-based training, co-learning, and coaching opportunities with the support of a school-based facilitator.^e

Monitoring Student Progress in Mathematics and Science

Teachers in Ontario are responsible for classroom assessment and evaluation to improve student learning. Teachers and early childhood educators bring varied assessment and evaluation approaches to the classroom, including assessment “for, as, and of” learning.²¹ The Ministry’s curriculum policy documents include an achievement chart that identifies four categories of knowledge and skills: (1) knowledge and understanding, (2) thinking, (3) application, and (4) communication. The achievement chart is a standard provincewide guide used by teachers to make judgments about student work that are based on clear performance standards and a body of evidence collected over time.²²

The Education Quality and Accountability Office, an agency of the Ministry of Education, develops and administers annual large-scale provincial assessments. These assessments are administered in English or French to all students in Grades 3 and 6 in reading, writing, and mathematics, in Grade 9 in mathematics, and in Grade 10, when the Ontario Secondary School Literacy Test (OSSLT)/*Test provinciale de compétences linguistiques (TPCL)* is first administered. Results do not affect student grades or promotion in Grades 3 and 6, with schools and/or school boards having the option to count the results of the Grade 9 mathematics assessment as a portion of the overall course grade (up to 30 percent). To obtain an Ontario Secondary School Diploma, all students must meet a graduation literacy requirement. Passing the OSSLT/TPCL is the main

^d In August 2020, school boards were directed to include an introduction to the new elementary math curriculum and fundamental math concepts/skills as part of the mandatory PA days prior to the start of the school year.

^e The professional development efforts described are generally relevant to the timing of TIMSS 2019 in Ontario.

means of meeting the literacy requirement. Students who are not successful on this test may retake it or satisfy the requirement by completing the Ontario Secondary School Literacy Course instead.

The Grade 3, 6, and 9 assessments are based on Ontario curriculum expectations, and the OSSLT is based on the cross-curricular reading and writing expectations up to the end of Grade 9. All assessments include both selected response and open response questions, and all writing assessments include extended writing. (More information on provincial assessments can be found on the Education Quality and Accountability Office website.)²³

To complement classroom and provincial-level assessment efforts, Ontario participates in TIMSS and other international and national system-level assessments in mathematics and science, namely the Programme for International Student Assessment (PISA) and the Pan-Canadian Assessment Program (PCAP). Together, the classroom, provincial, national, and international assessments make up Ontario’s multilevel assessment effort to improve student learning, so that Ontario students successfully advance to postsecondary education, training, and the workforce.

Special Initiatives in Mathematics and Science Education

In September 2018, the Ministry asked that all educators support the development of fundamentals of mathematics. To this end, a teacher’s guide and a parent fact sheet were released that emphasize fundamental mathematics concepts and skills that students are expected to know from Grades 1 to 8 to meet current curriculum expectations (see “Suggested Readings,” below). These resources do not introduce new content, but rather help to focus student learning and connect key mathematics concepts and skills. Some of these concepts and skills include working with numbers, recognizing number properties, mastering mathematics facts, developing mental mathematics skills, and developing proficiency with operations. Virtual professional learning sessions on these resources were offered to boards in the fall of 2018.

In March 2019, the Ministry announced a new four-year mathematics strategy to ensure students have a strong understanding of the fundamentals of mathematics and how to apply them. The strategy will help improve student performance in mathematics, help students solve everyday mathematics problems, and increase students’ employability into the jobs of tomorrow. It features a new mathematics curriculum for all students Grades 1 to 12 phased in over four years and subsidies for existing teachers to complete additional qualification courses in mathematics. As previously noted, in June 2020 the Ministry introduced a new elementary mathematics curriculum (i.e., Grades 1 to 8) and is planning to introduce a new foundational Grade 9 mathematics course in September 2021. Continuing to set high expectations for students, the 2020 curriculum places a clear emphasis on the use of high-impact instruction and assessment practices, human rights, and equity and inclusive education. It also aims to challenge all students through the use of higher order thinking skills and seeks opportunities to make connections among related mathematical concepts, other disciplines, and the real world.

In the area of science education, the Ministry is currently engaged in developing a new Ontario Science, Technology, Engineering, and Mathematics (STEM) Education Strategy that will continue

to enable its students to become global leaders in the STEM fields. This strategy will focus on early engagement and inclusive programs to make it clear that STEM careers are a possibility for everyone.

Suggested Readings

Ontario Ministry of Education. (2018). *Focusing on the fundamentals of math—A teacher’s guide*. Retrieved from <http://www.edu.gov.on.ca/eng/teachers/teachers-math-guide.html>

Ontario Ministry of Education. (2018). *A parent’s guide to the fundamentals of math—Grades 1 to 8*. Retrieved from <http://www.edu.gov.on.ca/eng/parents/parents-math-guide.html>

For more information in both English and French about Ontario’s policies, programs and initiatives, consult the Ontario Ministry of Education’s website <http://www.edu.gov.on.ca>

More information about provincial large-scale assessments may be found on EQAO’s website <http://www.eqao.com>

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