



General and Education Context in Ontario, Canada and Mainland China

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1 INTRODUCTION

In this chapter, we discuss the general and mathematics education context in China and the province of Ontario in Canada. There are a number of differences in the history of education in these two countries, as the

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educations systems have developed through a variety of twists and turns. We will first discuss the background of basic education reform and development in China. Then we will discuss the development of education in Canada and the province of Ontario.

2 THE BACKGROUND OF CHINA'S BASIC EDUCATION REFORM AND DEVELOPMENT

Basic education was a foundational project for improving the national quality of life in China (Zhu, 2018). Development of education in China was one of the nation's top priorities. Since the founding of the People's Republic of China, basic education reform has been shaped from experience, as well as the continuous exploration of developing educational ideas through changes in society and technology.

The development of basic education in China can be divided into four stages. The first stage was the period between 1946 and 1956. During this period of national economic recovery and socialist transformation in China, basic education reform consisted of two tasks: reforming education and creating a new educational theoretical system. In 1951, the Central People's Government Administration Council created a document titled *Decision on Reforming the Academic System*, which clearly stipulated the new academic system of the People's Republic of China.

The second stage is the adjustment period of education reform (1956–1976). In 1957, Chairman Mao (1992) proposed the first education policy after the founding of the People's Republic of China, so that the educated could develop through moral, intellectual, and physical education as well as being conscious socialists and knowledgeable workers. The third stage was the comprehensive recovery period of reform and the nation's opening (1976–1999). In 1976, the Ministry of Education stipulated the *Provisional Draft of a Full-Time Ten-Year Elementary and Middle School Teaching Plan*, which uniformly stipulated that the full-time elementary and middle school education system should be ten years—five years for elementary schools and five years for middle schools.

In 1985, the Ministry of Education's *Decision of the Central Committee of the Communist Party of China on the Reform of the Education System* proposed the implementation of nine-year compulsory education, a system of operating schools at the central, provincial, and central city levels, and schools implementing a principal responsibility system. In 1986, the National People's Congress created the *Compulsory Education*

Law of the People's Republic of China, which aligned China's basic education with the legal system. In 1993, the Ministry of Education's *Outline of China's Educational Reform and Development* stipulated that compulsory education should be basically universalized. In 1999, the Ministry of Education's *Decision of the Central Committee of the Communist Party of China and the State Council on Deepening Education Reform and Comprehensively Promoting Quality Education* stipulated that the basic popularization of compulsory education and the elimination of illiteracy were the foundation for comprehensively promoting quality education.

The fourth, and current, stage is to deepen the reform of basic education (2001–present). In the twenty-first century, with the establishment of a knowledge-led economy and information-oriented society, China issued the *National Medium and Long-term Education Reform and Development Plan* with the goal of adapting to the general trend of education development and to provide a plan for the balanced development of compulsory education (Ministry of Education, 2000). In 2001, China's Ministry of Education issued the *Decision on the Reform and Development of Basic Education* and carried out a new round of curriculum reform. Aimed at the strategic position of China's basic education in the country, it proposed to deepen education reform and solidly promote quality education and thus accelerate the construction of a new basic education curriculum system that meets the requirements of quality education.

In 2011, China proposed to amend the compulsory education curriculum standard—"Full-time Compulsory Education Curriculum Standard" (2011 Edition), which was developed from the "Full-time Compulsory Education Curriculum Standard (Experimental Draft)." The structure, ideology, curriculum goals, content standards, and implementation suggestions had been modified to highlight the cultivation of students' innovative awareness. In 2019, China proposed the *Opinions on Deepening the Quality of Compulsory Education and Teaching* to implement the spirit of the Nineteenth National Congress of the Communist Party of China and the deployment of the National Education Conference, to accelerate the modernization of education, and to provide a satisfactory education for the people.

2.1 *The Main Elements of Basic Education*

Basic education currently includes early childhood education, primary education, and general secondary education (Wu & Peng, 2016). "Basic

education implemented a system of local responsibility and hierarchical management under national guidance” (Liu, Peng, & Luo, 2020, p. 51) under local guidance. The structure of the school system was mainly 6-3-3. Ordinary elementary schools were for six years, and the ordinary middle schools were divided into two stages of three years called primary and advanced. There are still a few areas in the country that implement basic education as 5-4-3. In this implementation model, ordinary primary school was a five-year system, and ordinary middle schools were still separated into the primary and advanced stages, which were four-year and three-year, respectively.

Compulsory education occurs through grades 1–9, and enrollment in school begins at the age of six. Elementary school teaching is divided into subjects, and teachers teach one subject. However, in some areas, there are small-sized classes and the basic education work unit is composed of one to three teachers in each class, and the number of students is around 30. In this case, one teacher teaches all subjects in the elementary grades. Teachers are “all-round” (always available) to undertake the teaching activities of a class, and the routine management of classroom affairs. In some rural areas, due to the shortage of teacher resources, a mixed-class teaching was adopted, meaning multiple grades in one class. In these areas, the ordinary junior high school and ordinary high school still maintain subject-specific teachers.

3 THE BACKGROUND OF EDUCATION IN CANADA AND ONTARIO

Canada is very multicultural country home to 37.8 million people, living in ten provinces and three territories. Ontario is the largest province in Canada with about 14.7 million people (Statistics Canada, 2011). It is located between the provinces of Manitoba and Quebec, and most of the province is located north of the United States. Before being colonized by the British and French in the 1600s, Ontario was home to aboriginal peoples and the province lies mostly on treaty land.

There are over 2 million children from age 5 to 18 in Ontario’s K to 12 schools (Education Facts, 2018–2019). There are public schools, Catholic public schools, in English and French in Ontario where curriculum and educational policy are the responsibility of the provinces and territories. There is no Canadian Department or Ministry of Education. At age 4, students attend junior kindergarten and at age 5, senior kindergarten.

Then they start in grade one at age 6. Elementary school is K to grade 8 and secondary school is grades 9 to 12.

Some elementary schools are separated into two separate schools: elementary school and middle school. The middle school is usually grades six to eight or grades seven to nine. A common model for elementary school is K to grades 5 or K to grades 6. The designation of elementary school and middle school differs across school districts and across provinces.

There are seven subjects in the Ontario elementary curriculum. In most schools, these subjects are language, mathematics, science and technology, social studies (history and geography), health and physical education, arts, and French as a second language. It is common that the elementary school teacher to teach all subjects except French and perhaps some of the arts-based subjects (visual arts, drama, and music). Some middle schools use a moderated secondary school system where a teacher may teach fewer subjects but more classes of the subject. These specialized teachers teach other classes than their own.

Secondary school starts in grade 9 in Ontario. The students are placed into one of three possible streams for some courses including mathematics. The streams are academic, applied and locally developed course. The students then follow these streams through to university for students in the academic stream, and college for students in the applied and locally developed course streams. There is discussion in school districts to merge the students in grade 9 into one stream. This process is called destreaming.

There are a variety of assessment methods used in elementary, middle, and secondary schools. The teacher does the assessment and then a report card is sent home at least two times per year. The report cards summarize the students' performance and information about learning skills and work habits. Assessment of elementary students is completed in schools by teachers and is done on a continuous basis and communicated to parents in the form of report cards three times a year.

There are large-scale provincial assessment tests written each year in grades 3 and 6. These tests focus on mathematics, writing, and reading and are administered at the school by the classroom teacher. The tests are marked and analyzed by a provincial organization called the Education Quality and Accountability Office (EQAO). These EQAO scores are submitted to the school and placed in the students' academic record. They are intended to provide an understanding of the performance of

the grade 3 and 6 students over their elementary school career and to assist teachers and principals in identifying areas for improvement. The tests are administered in May each year.

3.1 *History of Mathematics Education in Ontario*

Mathematics in North America has a long history. As early as 1871, there has been a tension between science and mathematics and where they should fit into the curriculum. Mathematics was seen as a tool to support science but it was not a field of study (Bing, 2015). The Ontario provincial department of education was exploring the possibility that mathematics be treated as separate subject similar to reading and writing.

In the early 1900s, there were complaints by senior educators that there was an overemphasis on mathematics and that there should be a greater emphasis on the sciences. Over that short period of time, mathematics went from being absent from the curriculum to being over-emphasized. Over these many years, the place of mathematics in the Ontario curriculum has been discussed and transformed without settling on how important mathematics should be to the citizens on the province.

In the middle of the twentieth century, a greater emphasis was placed on mathematics. The Cold War and the race to the moon increased the interest in mathematics (Bing, 2015; Cole, 2013). About the same time, the “Hall-Dennis” (Ontario Department of Education, 1968) report on Ontario education focused on identifying the purpose of education. The report suggested that mathematics should not be necessarily a subject but a tool to support a curriculum focused on communication. They also suggested that Ontario should have a curriculum that emphasizes concepts rather than subjects. However, they did conclude that mathematics as a subject was still important and that every student should be well versed in the subject (Memon, 2006).

Over the next 30 years, a number of task forces, commissions, and reports were written to improve education in Ontario. Some reports indicated that learning mathematics should be more comprehensive than understanding a set of facts and basic skills and proposed that applications of mathematics be situated in science, technology, and business (Ontario, 1994). This report also encouraged meta-cognitive strategies. More significantly, it proposed that destreaming of mathematics at the secondary school level should occur. This is particularly significant

because mathematics at the secondary level has been streamed for many years.

In 1993, a commission proposed the establishment of the EQAO (Education Quality and Accountability Office, 2017). The EQAO was formed to provide accountability to parents, educators, and students about student performance in reading, writing, and mathematics. The tests were to be administered at grades 3, 6, and 9 and the results were to be published for the schools and the community. These large-scale provincial assessment tests provide statistical information to schools and parents about students' performance. While these tests have been controversial, we will not describe the benefits and challenges of these tests in this book. In 2005, the Ontario province released the current version of the mathematics curriculum. In Chapter 3 of this book, we explore the Ontario curriculum in more detail.

It is clear to us that mathematics has had a varied history in Ontario. There is a cycle between mathematics being a tool for science, technology, and business, to being an exploratory subject with its own field to a call to "back to the basics." There is a call to better explore what we should be teaching. Should we be focusing on knowledge, application, using a set of tools, on calculation and computation, and/or a combination of all of these possibilities? As we learn more about other countries, particularly China, we might have a better sense of the purpose and value of mathematics.

4 INTERNATIONAL LARGE-SCALE EXAMS IN CANADA AND CHINA

International assessment studies such as the Trends in International Mathematics and Science Study (TIMSS) and Programme for International Student Assessment (PISA) have also compared the mathematics teaching and achievement of different nations. TIMSS, which is conducted by the International Association for the Evaluation of Education Achievement, is an assessment given to fourth and eighth grade students every four years that evaluates their proficiency in mathematics and science. In addition to content-based assessment, TIMSS also collects data from students, teachers, and school principals on factors related to educational opportunities in mathematics and science (Niss, Emanuelsson, & Nystrom, 2013).

As part of the TIMSS assessments, there have also been studies such as the 1999 video study that collected and analyzed over 1000 videos of in class teaching from teachers in eight countries. These videos were later compiled with transcripts and related materials and made publically available through an online database. PISA is conducted by the Organization for Economic Co-operation and Development every three years that surveys 15-year-olds in mathematics, science and reading literacy, and cross-curricular competencies such as learning strategies (OECD, 2017). In 2015, 72 countries/regions participated in PISA.

According to Cai, Mok, Reddy, and Stacey (2016), these large-scale assessments can be beneficial for nations that are hoping to monitor the progress of new initiatives, or for comparing their own achievement in respects to similar nations. Furthermore, for developing nations, these assessments provide a model for setting up their own method of monitoring the effects of policy and curriculum changes (Cai et al., 2016). In addition to the data and analysis done by OECD, IEA, and their partner agencies, TIMSS and PISA have also catalyzed further comparative studies and inquiries into what top scoring countries are doing that lead to students' success (Munson, 2011; Paine & Schleicher, 2011).

However, Feniger and Lefstein (2014) and Tsai and Li (2017) caution educators on their interpretation and use of large-scale international assessment results as they often neglect cultural and contextual influence, and function on the assumption that achievement is a result of national structures and policies. Furthermore, Tsai and Li (2017) suggest that tests such as TIMSS exacerbate the "teaching to the test culture in mathematics teaching and learning" (p. 1264). Niss et al. (2012) state that, in order for TIMSS and PISA to be "meaningful and reasonable in participating countries," there must be a "fair amount of harmonization of items, item types, response formats and score coding" (p. 1000). In this way, the mathematics is not necessarily embedded within the appropriate cultural, technological, or socioeconomic conditions, which directly influence educational performance (Feniger & Lefstein, 2014).

The international large-scale exams are important to study to better understand the similarities and differences in Canadian and Chinese mathematics education. China has consistently ranked high on these exams while Canada has been in the middle of these results. The next chapter will explore the historical origins of mathematics education in China and Canada.

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