# Chapter 1

# The political context

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**Abstract:** *People have studied, learned and used mathematics for over four thousand years. Decisions on what is to be taught in schools, and how, are ultimately political, influenced by a number of factors including the experience of teachers, expectations of parents and employers, and the social context of debates about the curriculum. The ICMI study is posited on the experience of many mathematics teachers across the world that its history makes a difference: that having history of mathematics as a resource for the teacher is beneficial.*

## 1.1 Introduction

People have studied, learned and used mathematics for over four thousand years, although it is only relatively recently that mathematics has been taught, in most countries, to a high proportion of the population. With the establishment of universal education, more widespread attention has been focused on just what was taught and why. These decisions are ultimately political, albeit influenced by a number of factors including the experience of teachers, the expectations of parents and employers, and the social context of debates about the content and style of the curriculum.

The present ICMI study is posited on the experience of many mathematics teachers across the world that the history of mathematics makes a difference: that having history of mathematics as a resource for the teacher is beneficial. Increasingly a number of local and national governments, and other bodies

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responsible for curriculum design and expectations, are persuaded by the arguments of these mathematics teachers that it is worthwhile to incorporate history of mathematics within mathematics education. Detailed consideration of these arguments will be found later in the book. The next section (§1.2) in this opening chapter summarizes, therefore, the experience of a number of countries across the world (sixteen in all) in relation to the political guidelines governing inclusion of history of mathematics in the school mathematics curriculum. A further critical area is what happens in the textbooks written to deliver the curriculum. Section 1.3 is a case study looking in detail at how curriculum and textbooks can absorb a historical dimension, in the case of one particular country, Poland. Broader issues of the ways in which historical information can be integrated into textbooks are looked at later in the book (§7.4.1). In assessing the current role of history in mathematics education a further area of critical importance, of course, besides curricula and textbooks, is what happens in teacher training colleges. This is explored only briefly in this chapter as it is discussed in some detail in a later chapter (§4.2).

Section 1.4 presents a policy statement around the introduction of a greater historical dimension in the mathematics curriculum, with some ideas for promoting it further. It is important to bear in mind that all of the ideas discussed in the rest of this book depend for their practical implementation on the development of a political consensus in the many countries and educational systems across the world. While this ICMI Study volume is not a text in practical political science, one of the aims of the Study is to inform and guide policy-makers about the incorporation of history in pedagogy, a task in which all readers, as concerned citizens as well as wearing a range of other hats, may choose to become involved. The final section of this opening chapter presents some quotations, illustrating how these matters have been thought of by mathematicians, advisers and other opinion formers over the past two centuries, to support the arguments for using the history of mathematics while learning and teaching mathematics at all levels.

## 1.2 What part does history of mathematics currently occupy in national curricula?

### 1.2.1 Argentina

In the Educación General Básica, the curriculum laying down what is required for all pupils up to the age of 14, the Argentinian Ministry of Culture and Education gives eight foci for what mathematical studies at school are intended to achieve. These include conceptual comprehension, pleasure in doing mathematics, the value of new technology, the internal cohesion of mathematics, the significance and functionality of mathematics at work, the habit of setting and solving problems in a

variety of settings, and finally "the value of mathematics in culture and society, in history and the present." Nowhere in the official documents are there found statements about utilising the history of mathematics within the curriculum, although teachers and faculty individually express such an interest and hold annual national meetings to pursue knowledge of history.

### 1.2.2 Austria

In the Austrian syllabus, the general teaching goals for grades 9-12 state that the students should "know about the change of mathematical concepts in the historical development as well as in their personal development." More specifically, in the 9th grade students should know about the change of the concept of function; in the 10th grade they should know the historical meaning of logarithms and in grade 11 they should learn historical aspects of the calculus. None of this is compulsory, however. In school books for grades 5 to 8, there are historical notes, ranging from a few lines up to several pages, in connection with trigonometry, complex numbers, and limits of a sequence as well as with other topics. Thus some lines are included about historical figures such as Al-Khwarizmi, Archimedes, Cardano, Eratosthenes, Galileo, Omar Khayyam, Pythagoras, and Adam Ries.

### 1.2.3 Brazil

From 1931 to 1954, Brazil had a mandatory national curriculum for secondary school mathematics, and from 1946 to 1954 a mandatory curriculum for elementary school mathematics. From 1954 onward, the regulations were changed so that each state can establish its own curriculum. Nevertheless, tradition, inertia, and the fact that textbooks define, in practice, the actual curriculum assure a homogeneity among the curricula of the individual states.

In 1997, after wide discussions and consultations, the ministry of education issued 'parameters' for the first four years of schooling. In 1998 similar parameters were established in an analogous way, for grades 5 to 8, and for grades 9 to 11 of secondary school. The parameters are not mandatory, but there have been in the late 1990s a considerable number of requests, from state offices of education, for a national curriculum for Brazil as a whole. The Ministry of Education has chosen not to establish a mandatory national curriculum, but the national parameters have to some extent taken on this role.

In the parameters for grades 1 to 8, there is a strong emphasis on the history of mathematics, and on the fact that mathematics is not just a body of knowledge, but also of processes and practices that were slowly created in response to human needs and curiosity. The parameters also call attention to the fact that mathematics should not be treated separately from other school subjects, nor indeed from broader concerns with the environment, health, etc. Within mathematics, too, teachers are urged to try to foster integration of arithmetic, geometry, and measurements. Four resources are listed for doing mathematics inside the classroom: problem solving, history of mathematics, information technologies, and games. Specifically in relation to the history of mathematics the parameters say:

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