

Chapter 2

Physical Features of Textbooks

Textbooks around the world differ greatly in size, length, and other structural features. They also vary in the types of chapters and units they contain and in the ways they are laid out. There are also notable differences in sequencing and complexity as one examines closely the presentation of the mathematics and science topics.

There are differences in sequences and complexity specific to particular parts of textbooks designed for a small number of class periods. There are also structural features that cut across the entire book. These more pervasive features represent an important aspect of textbooks that seems likely to influence the learning opportunities the textbooks are intended to promote throughout an entire school year. We will term these more pervasive features ‘macro’ structures. This is in contrast to the structures associated with specific lessons intended for use in a small number of classroom instructional sessions that we term ‘micro’ structures.

Macro structures form the basic context in which each textbook builds up the vision of mathematics or science it intends to convey. They seem clearly to be a part of the vision of science or mathematics embodied in the textbook but also to embed or make manifest parts of that vision. In contrast, micro structures embody pedagogical intentions for a single lesson.

This chapter focuses on the physical features of textbooks. We will explore the structure of textbooks in the following chapters. We will first examine how such structures contribute to distinct types of educational opportunities throughout the entire book and then focus on how single lessons within the textbook are designed.

STUDYING THE WORLD'S TEXTBOOKS

The TIMSS curriculum analysis was designed to characterize learning opportunities in countries around the world. The textbook analysis was a part of that effort. The textbook analysis, together with teacher questionnaire data and an analysis of content standards, were used to characterize the curriculum of each participating country. This present book reports only on the textbook data.

A representative sample of textbooks was selected in each participating country. Each TIMSS country selected textbooks for analysis that represented the material to which no less than half of the mathematics and science students were exposed at each of the two grade levels studied.¹ Additionally, the textbook sample included the advanced mathematics and physics textbooks. These represented the most commonly used textbooks for the final year of college-preparatory mathematics and physics.

This resulted in a total sample of 72 mathematics and 60 science textbooks intended for nine-year-olds (fourth grade in most countries). It included 72 mathematics and 120 science textbooks intended for thirteen-year-olds (eighth grade in most countries). Finally, it included 50 advanced mathematics and 44 advanced physics textbooks intended for the final year of secondary school coursework in those subjects.² The TIMSS textbook study faced the challenge of characterizing these 418 mathematics and science textbooks from 48 educational systems.

The challenge of collecting valid, reliable, and comparable data across the participating countries was formidable (as was true of all other components of TIMSS). Methods had to be developed that would retain these characteristics despite the tremendous linguistic, typographic and physical variety of textbooks.

THE VARIETY OF TEXTBOOKS

To exemplify the challenge and the variety of textbooks, we consider two mathematics textbooks, one each from the People's Republic of China and from Israel. Both of these textbooks are intended for thirteen-year-old students. They are representative of the mathematics – mostly geometry – that a majority of the students in this age group are intended to master.

Exhibit 2.1 Two Geometry Textbooks (China and Israel)



The textbook from the People's Republic of China is titled "Geometry." It is the first of two volumes published by the government-managed People's Educational Press and distributed to the students in the second grade of junior middle school (age 13). There was a teacher's

According to the Book

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