Khine Swe, M. (Ed.) (2013) Critical Analysis of Science Textbooks: Evaluating instructional effectiveness [Kritična analiza naravoslovnih učbenikov: ocenjevanje učinkovitosti poučevanja]. Dordrecht [etc.]: Springer. ISBN 978-94-007-4167-6.

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Science educators agree that textbooks play a crucial role in teaching and learning processes (Clement, 2008; Koppal & Caldwell, 2004); consequently, numerous research studies have been conducted in the analysis of science textbooks. In 1941, Graham noted that 'The textbook is an old instrument in learning and teaching processes' and traced the origin of the textbook back to the classical Greek era. With the invention of the printing press, textbooks became omnipresent in every school. Since textbooks are being used as a major source of information in teaching a particular subject, the quality and accuracy of the content is crucial for their educational effectiveness.

Critical Analysis of Science Textbooks: Evaluating instructional effectiveness includes contributions by authors from various backgrounds, theorists and practitioners. In analysing science textbooks, researchers look into the balance between theoretical and practical knowledge, the portrayal of minorities, women and gender fairness, the treatment of socio-scientific and controversial issues, and the depiction of graphical information, vocabulary load, comprehensibility and readability at the intended level, the representation of indigenous knowledge, the role of textbook questions, and cultural and religious sensibility.

This book is organized in four parts. While Part 1 introduces the theoretical background, criteria and protocol for evaluating the quality of science textbooks, Part 2 covers textual and language analysis of the science textbooks. Part 3 of the book presents research efforts in content analysis of the textbooks. Part 4 summaries the findings and issues presented by the international researchers.

In Chapter 1, Devetak and Vogrinc note that textbooks are an important source for students to obtain knowledge, and that inadequate and inconsistent science knowledge presented in the textbooks can affect students' conceptions about scientific phenomena. They present the criteria for evaluating the quality of science textbooks, using didactic principles.

In Chapter 2, Slough and McTigue observe that in recent years school-based science textbooks have become similar to the design of web pages and science trade books with photographs, table, textboxes, flow charts, drawings,

and other visual representations. It seems that teachers state that while an increasing visual presence in science has been noted by many and explored in middle and high school science textbooks, information about the graphical demands of science textbooks are not widely available. In this chapter, the authors discuss the development of a new instrument, the Graphical Analysis Protocol (GAP), based on four principles: (1) graphics should be considered by form and function; (2) graphics should help a viewer build a mental model of a system; (3) graphic and texts should be physically integrated; and (4) graphic and texts should be semantically integrated. The authors discuss three research articles that used GAP as an analytical instrument.

Chapter 3, entitled 'Understanding the Disciplines of Science, Analysing the language of science textbooks' (authors Muspratt and Freebody), examines textbook analysis from the perspective of language. They argue that there is systematic variation in the ways the authors of science textbooks deploy linguistic features in representing scientific knowledge. As a consequence, texts present different ways of understanding the world.

Dimopoulus and Karamanidou, in Chapter 4, assert that currently science is presented as static and absolute knowledge in school, but in reality it is dynamic and subject to negotiation in meaning making.

In Chapter 5, Orgill explores the use of analogies in science textbooks. She observes that science instructors and textbook authors often use oral and textual analogies with the intention of helping students learn new concepts. The chapter summarizes the methods and results of several published analyses of analogy use, and presents classroom teaching models in the effective use of analogies.

Bryce, in Chapter 6, discusses the textual features and language demands of primary school science textbooks. She describes reading comprehension as a part of science teaching and learning, similar to the exploration of concepts through hands-on activities. As a result, language and literacy demands of reading science textbooks continue to challenge students. The chapter calls for more informational texts in primary grades.

As previously mentioned, Part 3 presents research efforts in the analysis of the content of the textbooks. It has eight chapters composed by fourteen different authors.

King, in Chapter 7, describes a review of the earth science contents of all the science textbooks for 11–16-year olds in schools in England and Wales. In this study, the contents of the textbooks were evaluated against the earth science statements in the National Curriculum for Science. They were found 531 'misconceptions', analysis of which showed that the parts of the earth science

curriculum most prone to misconception are processes and plate tectonics.

Chapter 8, by Rillero, investigates the science contents in 19th century United States reading textbooks, which helped students to read and learn about the world in this era. The chapter presents the results of the analysis that determines the quantity of science and type of science in 20-year periods during the 19th century. The science content in the books was probably the first formal science education of most students, and biology content increased relative to other since subjects.

Caravita and Valente, in Chapter 9 present a cross-country analysis of educational approaches to environmental complexity in life sciences school manuals. The authors describe the importance and concerns of educational institutions in European countries on this important issue.

Chapter 10, by Niaz and Coştu, analyse a Turkish general chemistry textbooks based on a history and philosophy of science (HPS) perspective. The chapter presents the results from the analysis of general chemistry textbooks published in Turkey. The detailed findings of this study can aid in the design and implementation of HPS perspectives to assist students' conceptual understanding.

Park and Lavonen's chapter addresses the development analysis of standards-based school physics textbooks in Finland and the United Stated. In this chapter, they report the differences between a curriculum based on the National Science Education Standards (NSES) in the United States and a curriculum following National Core Curriculum in Finland. They present general features, questioning style, and laboratory activities.

In Chapter 12, Binns presents a qualitative method to evaluate how textbooks portray scientific methodology. He notes that a key aspect of scientific literacy is to have a clear understanding of how scientists work. The chapter describes the qualitative methods and how the instrument was used to identify the quality of a textbook's presentation of scientific methodology.

Valanides et al. report the findings of an analysis of the set of science textbooks used in Cyprus' school curriculum, in Chapter 13. The set includes teacher's book, worksheets, and evaluation sheet for the sixth-grade primary classes. The authors suggest the use of analogies and the integration of ICT, and encourage teachers to use tools for scaffolding pupils' thinking and meaning construction.

The last chapter, by authors Treagust and Yang, reports on an analysis of nine science textbooks used in Western Australian high schools. Their study reveals that the use of humour is higher than other categories. The authors note that humorous diagrams are effective for showing learners scientific entities

and phenomena, and also suggest exploring more deeply the pedagogical value of diagrams and how these can help students in their conceptual understanding of science subjects.

In conclusion, we can say that textbooks are an indispensable part of the educational process, not just in science, as described in this book, but also in other school subjects. Therefore, it is essential that students can become accustomed to learning from good textbooks with no scientific mistakes and with up-to-date research-based approaches to learning the subject. For this reason, it is important that textbooks undergo systematic and thorough analysis using adequate and objective criteria. There are many criteria in science textbook analysis set by the different stakeholders and users with a variety of emphases, and what constitutes a good science textbook is an open-ended question. Textbook researchers attempt to look at the issues related to the quality of the textbook from different perspectives. Apart from the various approaches described in this book, others also evaluate the prevalence, function, and structure of graphics and photographs and inclusion of history of science, assessing comprehension demands and language structure (Bezemer & Kress, 2010), balancing gender representation, and examining the text book as a cultural object (Izquierdo & Gouvea, 2008).

The editor of the Springers' volume about textbooks analysis, Myint S. Khine, said that the contributors to this monograph have considered challenges and potentials in textbook analysis and presented their findings. It is hoped that this collective work will continue and lead to more rigorous attempts and establish a framework for analysing science textbooks in the future.

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