

A SUGGESTED TOOL FOR EARTH SCIENCE TEXTBOOK SELECTION

by

Waltraud Winkler

Institut für Mineralogie, Universität Salzburg
Hellbrunnerstraße 34, A-5020 Salzburg

Zusammenfassung

Basierend auf einer Vielfalt von Kriterien aus der Didaktik der Geowissenschaften und aus der pädagogischen Literatur wurde eine Checkliste als Leitfaden zur Auswahl von geowissenschaftlichen Schul- und Unterrichtsbüchern zusammengestellt. Die Checkliste gliedert sich in vier Kategorien: geowissenschaftlicher Inhalt, Schwierigkeitsgrad und Lesbarkeit, Methodik und wissenschaftlicher Aspekt. Drei Antwortmöglichkeiten werden für jede Frage geboten, um eine Beurteilung der Qualität des Schulbuches möglich und deshalb einen Vergleich effizienter zu machen. Diese Liste soll als Idee und Anstoß zur Verbesserung des geowissenschaftlichen Unterrichts verstanden werden.

Summary

Based on a variety of criteria from research in Earth Science Education and from educational literature a checklist as guidance for Earth Science textbook selection was assembled. The checklist is split into four categories: Earth Science content, difficulty and readability, methods, and scientific aspects. Three possible answers are provided for each question in order to make a judgment of the quality of the textbooks possible and therefore the comparison more efficient. This paper should be considered as an idea and incentive for Earth Science education improvement.

Introduction

This paper aims at a comparison of Earth Science textbooks after considering educational literature and research on Earth Science Education. It is not a summary of research findings, but it should be a means of applying its results. Taking many years of intensive research in the fields of textbook development and textbook analysis into account, a lot of parameters and criteria have been assembled that were considered important for comprehension, readability of textbooks, motivation for the readers, as well as scientific correctness.

Although many different types of technology such as films, video tapes, laser discs, and other audio-visual media have been introduced in the classroom, the textbooks still play a major role in teaching. Therefore, it is necessary to write these textbooks in a way that makes them helpful for students and teachers as students might consider the subject itself uninteresting when the textbook is not appealing. In order to give educators a helpful tool for choosing acceptable textbooks a checklist providing a number of questions which guide the reviewer towards good quality textbooks was developed.

Basis for textbook judgement

Important research on textbook judgement, respectively textbook comparison, was conducted by KNÜTTER (1979), KOCH (1977), LEONARD & PENICK (1993) and UHE (1979). They set up frameworks of criteria for selecting Biology curricula and textbooks. As there is no comparable research available for Earth Science education and as there are no Earth Science topics included in neither the publication nor the checklist by LEONARD & PENICK (1993), it was necessary to extend their research findings and make it an efficient tool for Earth Science textbook selection as well including criteria from research in the fields of science, learning theory and instruction which were transformed into a checklist for more objective selection (comp. AMERICAN GEOLOGICAL INSTITUTE (1991a, b), ARMBRUSTER, B. B. & ANDERSON, TH. H. (1981), BALLSTAEDT, S., et al. (1981), BAMBERGER, R. (1986), CARPENTER, J. R. (1983, 1990), ERHARD, B. & KUHN, L. (1977), HAKE, H. (1979), HELLER, P., et al. (1987), HOLLIDAY, W. G. (1990), HUBBUCH, S. M. (1989), KUHN, L. & RATHMAYR, B. (1977), LANGER, I., et al. (1974), LEHRPLAN-SERVICE (1987, 1989a, b), MAYER, V. J. & ARMSTRONG, R. E. (1990), NATIONAL RESEARCH COUNCIL (1990, 1996), RUTHERFORD, J. (1964)).

The recommendations of the professional literature can be summarized in four areas:

- content
- difficulty & readability (including illustrations)
- instructional methodology (including teaching methods, motivation, misconceptions)
- scientific aspects

Earth Science textbook selection

In order to be able to choose good textbooks the reviewer needs some guidance, in this case it is provided by an Earth Science textbook selection checklist.

The checklist is organized as follows: It is introduced by a bibliographical section, where the reviewer can fill in the name(s) of the author(s) or editor(s), the title of the textbook, the place of publication, the publisher(s), the date of publication, and the age- or grade-level if provided. The four categories summarized above (Earth Science content, the level of difficulty and readability, instructional methodology, and scientific aspects) form the main part of the checklist. Each of the categories is split into several statements which are in accord with the requirements of the selection of Austrian, German and American educational literature.

In order to enable comparison, a certain type of standard needs to be attributed to the textbooks. Therefore, three choices for judgement are available in this checklist. After considering the following standpoints both of UHE (1979) and LEONARD & PENICK (1993) a decision was made for the three rating possibilities *yes*, *weak*, and *no*. UHE (1979) chooses the use of two possibilities (*yes* or *no*), because he thinks that a more accurate classification in categories is not efficient. In his textbook analysis he offers space for notes next to the columns for *yes* and *no*. LEONARD & PENICK (1993) on the other hand, decide on three choices. Their possibilities are *evident*, *weak*, and *absent*. With their method they ask for the judgement of qualities and of the extent the given curriculum meets the standards of the profession. They state that a decision between *yes* or *no* would not be satisfying, because it is not discriminative enough. These two different viewpoints were combined for the following checklist, especially developed for Earth Science textbooks. As there are criteria included which cannot be answered with either *yes* or *no* (e.g. the quality of illustrations), the two choices were extended by *weak* in order to have a means of commenting on the quality of certain aspects according to LEONARD & PENICK (1993). Where rating is neither necessary nor possible, the choices *yes* or *no* are available. The judging possibilities of the checklist are as follows:

- yes*: The statement is true. The textbook fulfills this statement.
weak: There are some weak points in the text. The statement cannot be answered with either *yes* or *no*. It offers the possibility to judge the quality of a certain aspect.
no: The statement is not true. The textbook does not fulfill this statement.

The decision on one of these answers can be shown in the correct column with a checkmark. The total number of checkmarks in each column can be added up from each list easily - the more positive answers, the better the book.
The suggested checklist can be found as an appendix to this paper.

Conclusion

The results of these checklists may enable the reviewer to gain a more objective overview and may help educators find a book suitable for their classroom. As the number of research findings on educational materials (especially textbooks) increases, the checklist itself needs to be updated and reviewed constantly. Therefore, the checklist should not be seen as a universal textbook selection tool, but it has to be regarded critically. Despite this fact, it was the intention to offer an idea and incentive for Earth Science education improvement.

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Appendix

Suggested checklist for Earth Science textbook selection

CHECKLIST
Author(s) or editor(s):
Title of the textbook:
Place of publication:
Publisher(s):
Date of publication:
Age- or grade-level:
Name of reviewer:

