

# What criteria should science textbooks meet?

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**Abstract.** This contribution focuses on the search for criteria that should be met by science textbooks. A literature search was conducted and several tools for textbook evaluation or lists of criteria for science textbooks were found. We looked for criteria common to at least three different tools or criteria lists. The criteria found are related to the information in the textbook, its content, the language used, the graphic presentation, and its clarity. These criteria will be used to create questionnaires for students, teachers, and physics teaching experts. Questionnaires will be then used to evaluate a new upper secondary school physics textbook.

## Introduction

This study follows up on a study [1] leading to the development of a physics textbook for upper secondary school, which is being written at the Department of Physics Education, MFF UK. We aim to get feedback from students, teachers, and physics education experts on the new textbook.

In the Czech environment, textbook evaluation is dealt with by Sikorová, who in a study [2] investigated what criteria for textbook evaluation are important for teachers at different levels and different types of schools. A study by Lepil [3] looks at science textbooks and lists the requirements for science textbooks and the criteria for selecting them. In the international environment, the evaluation of science textbooks is for example addressed in a study conducted in Turkey [4], whose author, with the help of physics teaching students, developed a textbook evaluation tool containing 131 criteria. Criteria for science textbook analysis, which can guide teachers in their selection, are also given in another study [5]. The creation of biology teaching materials and subsequent evaluation of their usability is described in a study [6].

## Theoretical framework

The goal of this study is to create a list of criteria that should science textbooks meet and that could be used as items in questionnaires. These questionnaires will be created for students, teachers, and physics education experts and later we will use them to get feedback on a new upper secondary school physics textbook. For creating the list of criteria, we will use criteria found in other studies.

## Methods and findings

The research started with a literature search focused on science textbook evaluation and analysis of science textbooks. In the search, several studies presented tools designed to evaluate or analyse textbooks. Lists of criteria were also found to guide teachers in their selection of science textbooks. Seven of the tools found were suitable for use in future research. These tools were analysed and the textbook requirements and criteria from each tool were matched against each other. If a criterion was found in at least three different tools, it was considered important for science textbooks and was included in our list of criteria. The criteria found were then organized according to the following areas: information in the textbook (e.g. consistency of content with the curriculum), textbook content and activities (e.g. appropriateness of content to students), language and text (e.g. adherence to terminology), graphic design (e.g. appropriate use of colour), and clarity (e.g. font size). This will be followed by the development of questionnaires for the reflection of

the new physics textbook. Respondents will be students, teachers, and physics education experts. The items in the questionnaires are likely to be the criteria we consider appropriate for the respondents. In addition to the criteria found, there might be other items in the questionnaires that we consider relevant for the reflection of the textbook.

## Conclusion

The main aim of our study is to find out the opinions of students, teachers, and physics education experts on the new physics textbook, and to suggest possible changes to improve the use of the textbook or to improve the textbook itself. A literature search revealed studies dealing with the analysis and reflection of science textbooks. Some of the studies listed the tools used by the authors, and seven of these tools are useful for our study. The aim of this paper was to find the criteria that science textbooks should meet. To find them, we used the tools found in the search, analysed these tools, and looked for criteria that were common to at least three of the tools. We gathered a list of criteria that are apparently important for science textbooks. These criteria are related to information in the textbook, textbook content and activities, language and text, graphics design, and textbook clarity. The criteria found will be used to develop questionnaires for students, teachers, and physics education experts and we will later use them to reflect on a new physics textbook.

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