



Indonesian Journal of Educational Research and Technology



Journal homepage: <http://ejournal.upi.edu/index.php/IJERT/>

Media Analysis of Biology Teaching Book Grade XII: A Study Based on Science Literation Category

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ABSTRACT

The purpose of this study is to analyze Biology textbooks as a source of scientific literacy. To support the research, the authors use descriptive research methods and a cloze test evaluation sheet to evaluate the quality of the books as a source of scientific literacy reading in terms of the scientific literacy category. From the research results, it is found that there are differences in the components of the contents between book A and book B.

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ARTICLE INFO

Article History:

Submitted/Received 11 Des 2020

First revised 26 Jan 2021

Accepted 2 Feb 2021

First available online 12 Feb 2021

Publication date 01 Mar 2021

Keyword:

Analyze,
Biology textbook,
Scientific literacy,
Science

1. INTRODUCTION

Mastery of scientific literacy is a guide in the 21st century. In the 21st century, the development of technology and science is very rapid, and has an impact on human life, which demands that everything is completely regulated by technological advances. Scientific literacy is present, bringing a number of conveniences to deal with problems caused by science itself. By mastering scientific literacy, it is hoped that humans can master the problems that arise in the surrounding environment, and take advantage of the development of science and technology (science and technology) properly. In an era of rapid development, people are required to be able to compete and adapt to become superior and quality human resources. The realm of education is one way to instill scientific literacy in students from an early age. according to PISA research from 2000 to 2018 which is listed in **Table 1**.

Table 1. Acquisition of Indonesia's PISA scores.

Year	Score	Rank
2000	393	38 from 41countries
2003	395	38 from 40 countries
2006	393	50 from 57 countries
2009	383	60 from 65 countries
2012	383	64 from 65 countries
2015	403	62 from 70 countries

Acquisition of Indonesia's PISA scores Shows Indonesia's PISA data. It can be concluded that, for six consecutive years Indonesia tends to be in the same position. Bottom position. Compared to other participating countries. Of course, this is an important note for the government to be able to improve the literacy quality of the nation's children. Especially in terms of scientific literacy. This is an effort to prepare the younger generation to be ready to compete with the global market in terms of the quality of intellectual intelligence. Education is an environment that has a big role in improving the quality of national literacy (Pratiwi, 2019, p. 52). If you look at the science literacy program, the assumption will be more specific to the teaching field of Natural Sciences. This means that the quality of scientific literacy will appear in line with the quality of educators and textbooks as a reference source for the implementation of teaching and learning activities in the school environment (Mochamad Irsyan *et al.*, 2013). Therefore. We need to revisit the readiness of educators and the quality of textbooks as a source of scientific literacy which is pegged to science books, this is in line with Government Regulation No. 13 of 2015 Article I paragraph 23 which explains that "Textbooks are the main source of learning to achieve basic competencies and core competencies".

Most of the people understand that textbooks are the only source of teaching material in Natural Sciences (IPA) subjects. Therefore, it is very necessary to examine the quality of Natural Science textbooks as the main source of scientific literacy in schools. There have been

many studies examining the quality of Natural Science textbooks through several aspects, such as through the analysis of the legibility approach, the content of process skills and so on. Scientific literacy itself can be interpreted as the individual's capacity to use scientific knowledge, identify questions, and draw conclusions based on facts to make decisions in overcoming problems that occur due to human activities. (Rusilowati *et al.*, 2016). In his research, he analyzed the readability of books, said that the level of readability of science books, especially science books, had met the standards, could be developed and were easy to read and effective. However, it is necessary to analyze in terms of the components of scientific literacy itself to ensure that the science book as a reference for developing the level of scientific literacy is correct in terms of its quality.

The purpose of this study was to assess the quality of science books, especially Biology books for grade 12 SMA, in terms of the components of scientific literacy suggested (Chiappetta *et al.*, 1991) in A Quantitative Analysis of High School Chemistry Textbooks for Scientific Literacy Themes and Expository Learning Aids. There are four main components of scientific literacy, namely scientific knowledge, investigation of the nature of science, science as a way of thinking, scientific interaction. There are four categories of scientific literacy according to Chiappetta *et al.* first, scientific knowledge which in each indicator describes facts, concepts, principles, laws, hypotheses, theories, models and asks students to recall the knowledge they have (Chiappetta *et al.*, 1991). Second, science as a way of thinking which in each indicator contains aspects of inquiry learning, calculating, explaining answers, experimentation. Third, the category of science as a way of thinking in each indicator contains a description of the usefulness of science and technology for society, the negative effects of the development of science, discussing problems that occur in the environment based on a scientific perspective, and mentioning careers in technology (Chiappetta *et al.*, 1991).

2. METHOD

This research uses descriptive research method, with document analysis method. Where makes the analysis sheet for the category of scientific literacy as a source of analysis instruments for Biology textbooks for class XII SMA as a sample. The sample of books used in this study contained two books, which are shown in **Table 2**.

Tabel 2. Sample of book.

Buku	Judul	Penulis	Penerbit
Buku A	Biologi SMA/MA Kelas XII	Slamet prawirohanto	Bailmu
Buku B	Biologi SMA/MA Kelas XII	Fadiah Rachmawati	BSE Depdiknas
Buku	Judul	Penulis	Penerbit
Buku A	Biologi SMA/MA Kelas XII	Slamet prawirohanto	Bailmu
Buku B	Biologi SMA/MA Kelas XII	Fadiah Rachmawati	BSE Depdiknas

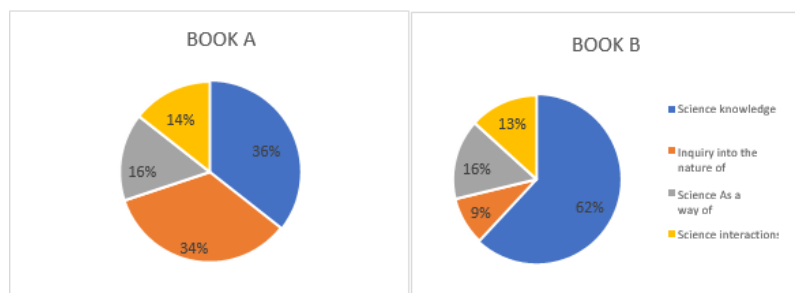
This study uses an analysis sheet of scientific literacy indicators. The science analysis sheet used was adopted from (Chiappetta *et al.*, 1991) in A Quantitative Analysis of High School Chemistry Textbooks for Scientific Literacy Themes and Expository Learning Aids. **Table 3** where in the process the author will take the following steps:

- 1) The author will conduct a literature study to determine the book sample to be studied as an object of research
- 2) The author will analyze the presentation of the emergence of scientific literacy Indicators
- 3) The author performs data processing in accordance with the predetermined formula
- 4) The author determines the average percentage of the components of each indicator of scientific literacy from textbooks that have been designated as objects of analysis
- 5) The author performs calculations as a step data processing against the number of predetermined categories. In this way, adding up all the percentage of occurrences of statements in accordance with predetermined scientific indicators.
- 6) The author provides descriptive analysis based on processed data.

Table 3. Percentage of science categories analyzed.

Category of scientific literacy	Book A		Book B	
	Qty	%	Qty	%
Science knowledge	143	36	140	62
Inquiry into the nature of science	138	34	21	9
As a way of thinking	63	16	35	16
Science interactions	58	14	30	13
Total	402		226	

Based on the data that has been attached. It can be seen that the dominant component contained in the Biology textbook for Class XII SMA is an indicator of scientific knowledge. In their research, Chiappetta *et al.* concluded that, in the preparation of Biology and Chemistry textbooks, it is indeed more giving a large portion related to matters of scientific knowledge. Furthermore, in the data obtained, the position of the scientific literacy category is an investigation of the nature of science that competes with science as a way of thinking. For book A, the category of scientific literacy as an investigation has 138 statements, while in book B there are 21 statements for the category of scientific inquiry. For the category of science as a way of thinking, there are 63 statements for book A, while in book B there are 35 statements. Finally, for the category of scientific literacy as a science interaction. There are 58 statements in book A, while in book B there are 30 statements. The function of the presentation is as a comparison of the quality of textbooks used as a reference in the implementation of biology learning for class XII Science. Hopefully, it can be a comparison in choosing textbook sources in order to carry out good biology learning. As a more relevant comparison, **Figure 1** is shown as an explanatory indicator.



Figures 1. Shows the percentage of each category of scientific literacy

Book A has a more even distribution of science categories than book B. Book B gives a larger portion of the weight of the category of scientific literacy as knowledge, with a magnitude of 62%, and gives a small portion of the weight of the category of scientific inquiry, which is only 9%. Meanwhile, book A gives almost the same weight to the category of scientific literacy as scientific knowledge, and investigation of the nature of science by 36% and 34%. The rest of the two books have almost the same portion in the category of scientific literacy as a way of thinking and scientific literacy as an interaction of science.

3. RESULTS AND DISCUSSION

Based on the results of the analysis of student textbooks conducted by Sandi et al. He said that, in fact, there were no definite provisions regarding the scope of each category of scientific literacy for textbooks. However, if science content has a greater proportion or weight than other categories of scientific literacy, it is feared that it will affect student learning systems or classroom learning activities. When the proportion related to the understanding of science that is owned by a student is low, it will make it difficult for him to put scientific theory that is understood into everyday life, so that his ability to understand the interaction of science, technology, and society will not develop optimally. In his research Sandi et al. said, first, that the condition of textbooks is not the main factor determining the level of mastery of scientific literacy in a country. Second, there are differences in components between Indonesian science textbooks and American science textbooks.

American science textbooks place a great deal of weight on investigating the nature of science. This is in stark contrast to the components of the science literacy category of textbooks in Indonesia. Science textbooks in Indonesia emphasize a large proportion of the concept of science. Even though the main points in science learning are in the category of scientific inquiry, where in the category of scientific inquiry it contains the presentation of questions, experimental activities, and discussion activities which are the main points in the science learning process. This is thought to be a factor that contributes significantly to the level of literacy knowledge in American students. Based on the results of PISA research, in 2015 there was an increase in the field of student skills in all subjects including science and mathematics (Mochamad Irsyan *et al.*, 2013). The release made to 72 countries as PISA participants showed that Indonesia had increased its educational attainment by 22.1 points.

These results place Indonesia as the 5th country with the fastest increase in terms of increase compared to other PISA participant countries. However, this does not have a major influence on the level of Indonesian literacy compared to other countries. Indonesia is still in the lowest position, and Indonesia's PISA score has not increased significantly. This is a big homework for the government in terms of improving the quality of education.

If improvements in the quality of education are not carried out, it is feared that in the future Indonesia will experience difficulties in terms of global competition (Pratiwi, 2019).

4. CONCLUSION

From the results of the research that has been done, it can be concluded that the condition of scientific literacy in Indonesia is still below the standard. This can be caused by the quality of textbooks which still give a large proportion of scientific theory, while the context and process of science are still given less weight. With so much weight given to scientific theory, this will affect the mindset of students in implementing theory into their daily lives. By giving space to the process and context of science, students can develop every theory they have learned, and implement every science they learn in everyday life. The discussion process in science learning can also be carried out by fellow students and teachers to complement each other's knowledge.

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