

# ANALYSIS OF INTERACTION AMOUNG SCIENCE, TECHNOLOGY AND SOCIETY ASPECTS IN STUDENTS THEMATIC BOOK OF V GRADE ELEMENTARY SCHOOL

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**Abstract.** Mastery of science literacy will make easier students to adapt to the advancement of science and technology in the present and future. One attempt to improve the ability of science literacy through the analysis of textbooks lessons. The interaction of science, technology & society is a scientific aspect of science literacy. This research analyzes the literacy indicator of science in the thematic book of grade V SD students. The type of research used is descriptive, by collecting data in the form of documentation study. The sample in this study is several pages in one book analyzed taken by random method using multistage sampling technique. The results show 8.5% of the book presents aspects of interaction of science, technology and society. This aspect has not been presented in the entire theme of the book. The themes 4 and 5 are not presented at all, while themes 1, 2 and 3 each present 13%, 22% and 5% of them. The following findings show that Book Y rarely presents aspects of the interaction of science, technology and society. In other words, this book of Y does not emphasize material that supports the contextual mastery.

**Keywords:** Science Literacy; Interaction of Science, Technology and Society; Analysis of Lessons Textbooks

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## I. INTRODUCTION

Science and technology are part of the 'culture' of modern society. Where their daily lives are significantly influenced by science. One is shown by the rapidly increasing number of science and technology products that closely with the daily life of the community (Miller, 1996 in Yuenyong & Narjaikaew, 2009). So in the era of intense international economic competition, graduate users need skilled staff, those who have good understanding and ability of science to meet the demands of the times.

The abilities associated with the use of science and technology are raised by the term science literacy. Literacy Science involves individuals developing a good understanding of the facts and processes of science inquiry, and awareness of the relationship between science, technology, and society (Chabalengula et al., 2008). Mastery of science literacy can make it easier for students

to adapt to the advance of science and technology in the future.

However, Mastery of science literacy can not be brought up in a short time, but it takes a long time. One of the steps to form the ability of science is through education. Matters relating to science literacy, should be involved in all aspects related to the learning process so that the ability of science literacy can be mastered by students.

In the learning process, textbooks are the closest and directly related to the students. Yusuf (2008) also states that textbooks are one of the tools to improve science literacy. In addition, previous research reported that most science teachers use science textbooks for most of their learning time. This becomes a big problem because almost all of them believe that textbooks play a major role in learning (Lumpe and Beck, 1996 in Kirk et al, 2001). Based on this, research on textbooks is needed as one way to improve the quality of education in Indonesia.



Chiappetta et al (Amelia, 2009; Chabalengula et al., 2008; Lahiriah, 2008; Riadiyani, 2009; Nurfaidah, 2014) states four aspects of science literacy that can be used in analyzing lesson textbooks. These four aspects are Science as a body of knowledge; Science as a way of investigating; science as a way of knowing; and Interaction between science, technology and society. As for this research, it is devoted to studying one aspect that is aspect of Interaction between science, technology and society. This aspect describes the consequences or effects of science on society. This aspect is a science literacy dimension in context. This science literacy criterion covers the application of science and how technology can help or harass humans. In addition, it involves social issues and careers.

The book chosen in the study is a book that is applicable and widely used in the learning process. Based on the current curriculum (curriculum 2013), the thematic book of 2013 curriculum becomes appropriate to be the subject of research. As for V grade elementary school is chosen because at this level students should have prepared themselves to take the final exam to be conducted in the next class, which means students must have understanding and maturity of the material in class V.

The purpose of this study is to obtain information about the presentation of science literacy aspects of interaction among science, technology & society on each theme and on the whole textbook of the lesson. The results of this study are expected to provide benefits for various parties, including the following: 1) For the author of textbooks lessons. The results of this study can be used as a consideration for writing textbooks of quality lessons based on science literacy. 2) For other researchers. The results of this study can be used as consideration for the implementation of further research, either as a reference, support, or comparison of the concept of science literacy. 3) For the government. The results of this study can be used as a consideration in establishing a policy on the guidelines of the provision of making textbooks lessons that are suitable for use in schools.

## II. METHOD

The population in this study is all the material on the thematic book of students of class V that are analyzed. This book is then declared as a book Y. The samples in this study are several pages in the analyzed book taken in a random manner. Samples were taken by multistage sampling technique. As in this research used 3 phase sampling technique, as follows: Stage 1: Theme Selection. The theme analyzed is taken as much as 50% of the total number of themes in the book analyzed. Stage 2: Subtema Selection. The subthemes analyzed were taken as much as 30% of the total number of subthemes present in each chosen theme. Stage 3: Page Selection. The analyzed page is taken as much as 30% of the total number of pages that exist on each selected subtheme. It is adapted from the Journal of research in science teaching (Chiappetta, Fillman & Sethna, 1993). The more detailed sampling of Y book pages is shown in the following table.

Table 1  
Sampling Research

Book	Theme (50%)	Sub Themes (30%)	Σ Total Pages	Σ Pages Identified (30%)
<b>Thematic Class V Elementary School</b>	1	1	64	19
	2	3	34	10
	4	2	39	11
	6	2	42	13
	8	3	44	13
<b>Total</b>	<b>5</b>	<b>5</b>	<b>223</b>	<b>66</b>

The type of research used in this research is descriptive research with documentation method or document analysis method. In using the documentation method, the researcher holds a check-list to search for a predefined variable. The data obtained is then processed by calculating the number and percentage of presentation of science literacy indicator on one aspect of science literacy for each chapter of the

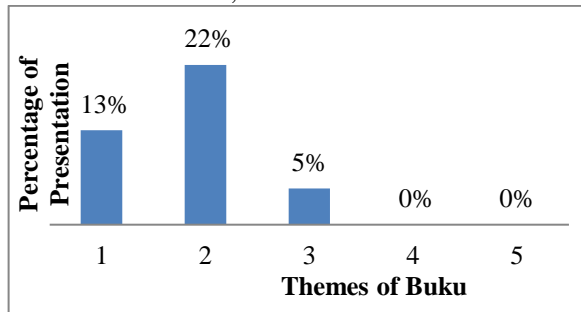


textbook used. The instrument used as a tool for collecting the required data is an analysis sheet containing the science literacy indicators adopted from Chiappetta et al. (1991a in Amelia, 2009; Cansiz & Turker, 2011; Chabalengula et al., 2008; Lahiriah, 2008; Riadiyani, 2009; Rusyati, 2009; Sandi, 2013). However, in this study only reveal one aspect of science literacy, namely the interaction of science, technology & society.

### III.RESULTS

The book analyzed is a thematic book of V grade elementary students which are used as a supporter of the 2013 curriculum in schools. Five of the nine themes in this book are selected for analysis, including: 1) Benda-benda di Lingkungan (theme 1); 2) Peristiwa dalam Kehidupan (theme 2); 3) Sehat itu Penting (theme 4); 4) Organ Tubuh Manusia dan Hewan (theme 6); 5) Ekosistem (theme 8). The number of pages of the book analyzed in this study is 66 pages, the entire paragraph of the material contained in the book, except for pages that only contain reviews and vocabulary questions, and the inclusion of objectives and learning objectives.

The findings show the emergence of indicators of various aspects of science, technology and community interaction on each of the themes studied, as follows:



Graph 1. Percentage of Presentation Aspects of Science, Technology and Society Interaction on Book Y

Graph 1 shows that this interaction aspect of science, technology and society is not always presented in every theme of the book under study. In theme 1 there are 13%, theme 2 as much as 22% and theme 3 by 5%. While the

theme to 4 and 5 is not presented at all, namely 0%. The materials discussed in themes 4 and 5 are Organ Tubuh Manusia & Hewan and Ekosistem.

The interaction aspects of science, technology and society consists of five indicators of science literacy, namely: describe the usefulness of science and technology for the community; describes natural phenomena related to science, technology and society; showing the negative effects of science and technology for society; discuss social issues relating to science or technology; and mentioned his careers and occupations in the field of science and technology (Chiappetta et al. 1991a in Amelia, 2009; Cansiz & Turker, 2011; Chabalengula et al., 2008; Lahiriah, 2008; Riadiyani, 2009; Nurfaidah, SS , 2014). The following data presents an indicator of science literacy on the aspects of the book studied.

Table 2  
 Presentation of Indicators of Science Literacy Aspects of Science, Technology and Society Interactions

Indicators of literacy Science Aspects of Interaction Science, Technology and Society	TEMA					Σ	%
	1	2	3	4	5		
Describe the usefulness of science and technology for society	5	-	-	-	-	5	6
Describes natural phenomena related to science, technology and society	15	2	6	-	-	23	27
Showing the negative effects of science and technology for society	13	11	-	-	-	24	28
Discuss social issues relating to science or technology	3	21	2	-	-	26	31
Mention of careers and jobs in the field of science and technology	6	1	-	-	-	7	8
Σ	42	35	8	-	-	85	100

The total number of statements presented in book Y is 85 statements. The presented statements are found in Themes 1, 2 and 3 of 42, 35 and 8 statements. In this material several discussions are associated with the interaction of science, technology and society. Indicators



discussing social issues relating to science or technology are often presented indicators compared to other indicators of this aspect, at 31%. While the least indicator presented is to describe the usefulness of science and technology for society by 8%.

#### **IV. DISCUSSION**

Literacy of science has an important role in the world of science education. As educators, researchers, and government (BouJaoude, 2002: Zembylas, 2002: Turkish National Education Department, 2006 in Canzis & Turker, 2011) point out that science literacy is considered one of the main goals in science education. Therefore, everything related to the learning process, especially science learning must contain the values of science literacy. This means that every student who has received learning has the ability of science literacy, so they are ready to face the changing demands of science technology and knowledge in the future.

The enactment of the 2013 curriculum impacts on thematic learning that is typical for primary school education. Learning is no longer done on certain subjects, but rather incorporates several areas of study within an appropriate theme. This also affects the textbooks used. The material is presented in a theme and sub-theme consisting of several fields of study. So that become the main attraction in this research, science literacy aspect that studied not only on science subjects as previous research. However, the indicator of science literacy analysis is done on the thematic book of grade V SD students.

The findings indicate the rarity of presentation of aspects of science, technology and society interaction in book Y is 8.5%. The results of research on textbook science curriculum KTSP conducted by Nurfaidah (2017) only presents 1.2% aspects of science, technology and community interaction. So that, if the data compared with the results of analysis in the previous book, the presentation of this aspect has increased by 7.3%. At least the current book has presented a greater proportion of the interaction aspects of science, technology and society. This at least illustrates that the importance of science

literacy has begun to be considered in the preparation of student textbooks.

Approach of Community Technology Science is a learning approach that basically discusses the application of science in the context of human life daily. Therefore, the approach to Community Technology Science is called an integrated approach between science and technology issues in society (Nisbah, 2013). With this approach students are conditioned to be willing and able to apply the principles of science to produce simple technological work or thought solutions to regulate the negative impacts that may arise from the advent of technology products.

The findings of the scarce presented of interaction among science, technology & society in textbooks may be one of the causes of the low value of students' science literacy based on the PISA outcomes of 2000 - 2015 that put Indonesia at the bottom 8 to 2 rank of 65 countries (Arnet et al., 2013, Elianur, 2011; Utomo, 2011). As disclosed in the Word report (2007) that the level of mastery of science literacy learners aged 15 years in Indonesia is low. At this level of ability, Indonesian students are generally judged to be able to remember only scientific facts, terms and laws and use them in drawing simple scientific conclusions (Joseph, 2004 in Amalia, 2009).

Based on this, the book still requires an emphasis in presenting science literacy aspects of community science science interaction. This is in line with Cansiz & Turker (2011) which states that by emphasizing all aspects of science literacy, it will prepare the potential of science-minded citizens for the betterment of the nation and government more suited to rapid global change. Even according to Amalia (2009) textbooks that contain literasi science will be able to increase the average literacy skills of Indonesian students.

Lesson textbooks greatly contribute to the development of student competence through the acquisition, investigation, thinking process and application of knowledge that will ultimately shape the students to have the expected competencies. Therefore, the selection of qualified textbooks becomes a necessity in



supporting learning. For now, it takes textbooks that emphasize science literacy such as aspects of science interaction, community technology. So in the end the quality textbook will deliver quality output as well. Indonesian students can be more wise in interacting with technological advancements that continue to grow. Even among them must be able to create a new technology worldwide.

## V. CONCLUSION

Aspects of science, technology and society interaction are still rarely presented in book Y at 8.5%. However, when compared with the results of analysis in the previous KTSP book, the presentation of this aspect has increased by 7.3%. These findings suggest that book Y does not emphasize material that supports contextual mastery.

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