
FEASIBILITY ANALYSIS OF PRESENTATION 8 GRADE STUDENTS' SCIENCE TEXTBOOK ON PRESSURE CHAPTER: A CASE STUDY IN SMP NEGERI 22 SURABAYA

Ahmad Singgih Sugiarto¹, Siti Nurul Hidayati^{2*}

^{1,2} Jurusan IPA, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Negeri Surabaya

*E-mail: sitihidayati@unesa.ac.id

Abstract

This research aimed to analyze the feasibility of the presentation of 4 science textbook for grade 8th junior high school, especially in the pressure chapter used in SMP Negeri 22 Surabaya. The type of research used in this study is qualitative research using descriptive analysis and data collection techniques using observation methods. The instruments used in this study refer to the feasibility instrument of a teaching book issued by the National Education Standards Agency (BSNP) which included the presentation of the material and the completeness of supporting the presentation of the material. The results of this study show that the teaching book requires several improvements. The improvements include the concept map presented, the addition of training questions, illustrations, glossaries and several references not yet listed in the bibliography.

Keywords: *Study of textbook, presentation feasibility, pressure.*

INTRODUCTION

The development of science, technology, and information and communication systems that occur throughout the world, making the world's citizens no longer have restrictions to communicate. Distance limitation is the biggest problem of world citizen communication, nowadays it is no longer the main problem of the world's citizens, even today the world's citizens communicate easily without any territorial boundaries among countries. According to Maemunah stated that acceleration in science and technology, communication systems such as easy Internet access to be one of 21st-century traits (Maemunah, 2018).

The development of technology and information systems as one of the 21st century characterizes has changed many aspects of people's lives in the world. Changing the pattern of people's lives as the impact of the development of technology and information systems, to demand the industry as an integral part of people's lives to be able to follow the change of community needs In the world. It is the underlying industry in different parts of the world experiencing an industrial revolution known as the 4.0 Industrial Revolution.

Based on data on the projected population of Indonesia contained in the annual statistics book released by the Central Statistics Agency (BPS) in 2018, it shows that the total population in Indonesia by mid-2017 is 261 million (Badan Pusat Statistik, 2018). With a population

of 261 million, Indonesia ranks 4th as the most populous population in the world. The large population density of a country is in line with the market potential of the country. With a market potential of this size, Indonesia is in two choices. Become a market participant or will only be a market observer. It would be very unfortunate if the population of Indonesia only became a market observer amid the huge market potential in Indonesia. Therefore, the population of Indonesia must be able to compete, especially in the era of the Industrial Revolution 4.0.

Human resources must compete in the era of the 4.0 Industrial Revolution. One of the ways that can be done in preparing human resources (HR) that can compete in the era of Industrial Revolution 4.0 is through quality education in Indonesia. A quality education is expected to produce quality human resources as well. According to Muhali states that general understanding such as the relationship between education and socio-economic structures can help to project an anticipatory future education against the Industrial Revolution of 4.0. (Muhali, 2018).

Based on the data contained in the Human Development Indices and Indicators 2018 Statistical Update released by the United Nations Development Programme (United Nations Development Programme, 2018), the quality of Indonesian education is ranked at 116 from 189 countries in the world with the category Medium human development together with the

Philippines and Vietnam respectively in the ranks of 113 and 117. The quality of education in Indonesia is still far behind when compared with other ASEAN countries such as Singapore which is ranked 9th in the category of very high human development. Thailand, Brunei Darussalam and Malaysia are in the high human development category with successive ranks of 84, 39 and 57.

Based on the data released by the Programme for International Student Assessment (PISA) published in 2016 shows that the average score of PISA students in Indonesia in 2015 in science amounted to 403. This is far below the average of PISA's 2015 in science, namely 493 (OECD, 2015).

Based on these data, it becomes a necessity for the Indonesian government to improve the quality of education in Indonesia if Indonesian citizens are to be able to compete in the 4.0 Industrial Revolution era. According to Muhali, the impact of the Industrial Revolution 4.0 on society and the environment is still unknown, but the visible fact is that the need for higher knowledge and thinking skills is very urgent to consider given the potential of the control system that has an impact on the social system. the result is so strong (Muhali, 2018). Meanwhile according to Maemunah stated that due to the development of digital technology has disrupted various aspects of life including education. Therefore strategic policies need to be formulated in various aspects ranging from institutions, fields of study, curriculum, resources, as well as innovative development (Maemunah, 2018). Improvement and enhancement of the quality of education in Indonesia is very much needed, including the improvement and enhancement of the quality of science education or science.

Science and technology become an inseparable part of it. Both of them are two domains which continuously interact with each other in it, therefore science has become an inseparable part of the development of the industrial revolution. According to Prasetyo, science education, as a small part of the education field, is believed to be able to contribute to the development and civilization of the nation (Prasetyo, 2011). Meanwhile, according to Ariyanto, the role of science and technology has a very central role in human civilization. Therefore many countries are currently competing to develop science and technology. It is believed that with the advancement of science and technology will impact on the progress of the nation (Ariyanto, 2018).

Based on this, improving the quality of science education becomes a necessity to be done to accelerate human resources who can compete in the era of the 4.0 Industrial Revolution. Improving the quality of science education in Indonesia can be done in various ways such as the improvement of teacher competence and

improvement of educational teaching materials including student teaching books, Student's worksheets (LKPD), media, and so on. Increasing the competency of teachers can be done through training and workshop. While the improvement of teaching materials can be done by continuously evaluating the teaching books that have been used in schools, whether they are ideal enough to be used as teaching materials that are capable of following the changing patterns of the world.

Palupi stated that teaching book or textbook is one of the most important teaching materials as a learning resource other than teachers, therefore all learners should have their teaching books as a means of study (Palupi, 2014). according to Wibowo explained that the teaching and learning process, both in school and tutoring, is not separated from teaching materials or lesson textbooks (Wibowo, 2012). However, Wibowo also stated that explanations of science concepts given in textbooks are often incorrect or lacking and the concepts described tend to be simplified (Wibowo, 2012). Analysis of errors or shortcomings of learning resources in this matter the materials or books used in the learning and correction of the mistakes of students concepts using materials sufficient in terms of material is very rare. Academic teachers in science or natural sciences subjects tend to directly utilize the textbook of lessons available as teaching materials in learning.

Some research shows that textbooks used in students often experience errors and even experience misconceptions. Research conducted by Fadhillah shows that in the book Physics for senior high school year x by Purwoko and Fendi in semester 1 material shows that there are misconceptions in some of the material in it. These materials include measurements, straight motion, and dynamics of motion with successive percentages of misconceptions of 5.13%; 6.89%; and 14.81% (Fadhillah, 2012).

METHOD

The type of research that will be used in this research is descriptive of quality by analyzing the 4 natural science textbooks for 8th grade junior high school books, especially in the pressure chapter used in SMP Negeri 22 Surabaya. The books used in this research were:

1. Ilmu Pengetahuan Alam Kelas VIII SMP/MTs Semester 2 written by Siti Zubaidah, et al. published by kementerian pendidikan dan kebudayaan in 2017. (refer to book 1)
2. Ilmu Pengetahuan Alam SMP/MTs Kelas VIII Semester 2 written by Dara Nurani, Henny Purnama

Wati, dan Ruttiyati. published by Intan Pariwara in 2017. (refer to book 2)

3. IPA TERPADU Untuk SMP/MTs Kelas VIII written by Tim Abdi Guru published by Erlangga in 2017. (refer to book 3)
4. IPA FISIKA 2 written by oleh Marthen Kangeran published by Erlangga in 2006. (refer to book 4)

Instruments to be used to conduct teaching book analysis, adopted from a teaching book feasibility instrument published by the National Education Standards Agency (BSNP).

Table 1. Presentation of Eligibility Instruments

Component Rating	Indicators	Sub indicators
Presentability	Presentation techniques	4
	Supporting material presentation	8
	Presentation of Learning	5
	Completeness	6

(BSNP, 2014)

RESULTS AND DISCUSSION

Based on the results of the analysis conducted by the reviewers, the learning process required the integration of the four teaching books. It is not separated from the advantages and disadvantages inherent in each teaching book.

Based on the teaching book Assessment instruments issued by the National Education Standards Agency (BSNP) stating that the eligibility of the presentation through the existence of 4 supporting domain rendering material. The accuracy of the indicators in the textbooks is presented as follows:

1. BOOK 1

Illustrations presented in the textbooks are in accordance with the material presented, particularly in the chapter on pressure. In Archimedes' legal material there is material about the three positions of objects in liquid, which are floating, floating, and sinking. In the material, there is no visual representation of the three objects' positions.

Walsh stated (Walsh, 2015) the interaction between the reader and the text and the interaction between the reader and the picture will be different. Through reading the image, it is expected to be able to involve the reader in the picture with various numbers and various levels. Wermer stated (University of South Florida, 2002) visual images used in textbooks have a dynamic effect on the

reader. Besides this, the visual images provided in the textbooks help students learn to construct abstract thinking skills. According to Piaget on Matt Jarvis (2011) cited on Ibda (Ibda, 2015) explained that at the age of 12 years and over, a new operating period will arise. In this period, children can use their concrete operations to form more complex operations. At this stage, children begin to have the ability to think abstractly. Based on this, by providing illustrations of the forces acting on floating objects help to abstract ideas that are abstract.

In the stresses pressure, a concept map and map has been presented. The concept map is presented at the end of the chapter along with a summary. Based on the instrument issued by BSNP which states that the concept map should be presented at the beginning of the chapter, then improvement in the textbook is needed by changing the location of the concept map at the end of the chapter to the beginning of the chapter.

In the pressure chapter, only one example of the question was found at the C3 cognitive level. Based on this, it is necessary to add examples of practice questions that have a uniform spectrum from C1 to C6 by entering several questions in the HOTS category.

Important words related to pressure material have not been accommodated entirely in the textbook index. In the index, only the word osmosis is found. Several words such as adhesion, cohesion, and diffusion are not found in it.

Figure 7.22 on page 30 contained a picture of the Sphygmomanometer taken in Markuso's book, 2011. After checking the bibliography, the reviewers did not find any bibliography from the picture.

2. BOOK 2

The illustrations presented in the task content are presented on page 10. The water drawn is seen in the glass and covered with paper and then turned over. The picture aims to prove that air has air pressure that can hold water from spilling. But the diagram shows that the glass is placed on a solid object. quoted When referring to the picture, the picture cannot show that the air has pressure that can withstand the presence of water in the glass so it does not spill.

At the beginning of the chapter, a concept map is presented regarding the interrelationships between concepts that will be studied in the chapter. But there are a few notes about the level of concept hierarchy contained in the concept map. There are concepts about liquid pressure not included such as hydrostatic pressure, Pascal law, and Archimedes law. Also, indicators are also included in the concept map.

Fujiawati (Fujiawati, 2016) explain that ar which describes the conceptual structure that is the interrelation

between concepts of a picture that states a meaningful relationship between the concepts of a subject matter that is connected with a conjunction to form a proposition. This kind of map has a tiered structure, that is, from general to specific, equipped with appropriate connecting lines. Therefore, the concept map will encourage students to connect concepts during learning, so that meaningful learning is achieved. Meanwhile according to Suparno in Yogihati (Yogihati, 2011) explained that the concept map is a schematic picture to present a series of concepts and relationships between concepts. Thus the concept map can be interpreted as a schematic tool to show the meaning of a concept based on a proposition. This concept map reveals meaningful relationships between concepts and emphasizes key ideas. The concept map is arranged in a hierarchy, the more general concepts are above in the map, while the specific ones below and the relations between concepts are placed between the concepts with arrows. Dahar dalam Fujiawati (Fujiawati, 2016) explain the characteristics of concept maps as follows:

- a. Concept map (concept mapping) is a way to show the concepts and propositions of a field of study, whether it is the field of study of physics, chemistry, biology, mathematics, and others. By making their concept maps students "see" the field of study more clearly, and learning the field of study is more meaningful
- b. A concept map is a two-dimensional picture of a field of study or a part of a field of study. It is this characteristic which shows propositional relations between concepts. This is what distinguishes meaningful learning from learning by noting lessons without showing the relationship between concepts.
- c. The third characteristic is about how to state the relationship between concepts. Not all concepts have the same weight. This means that some concepts are more inclusive than other concepts.
- d. The fourth characteristic is hierarchy. If two or more concepts are described under a more inclusive concept, a hierarchy is formed on the concept map

Based on this description, the concept map presented in the textbook still requires several improvements in its presentation.

Based on the description of the instrument items that explain that at the end of each chapter a summary or summary is given which is the key concept of the chapter concerned, which is stated in concise and clear sentences, to make it easier for students to understand the entire contents of the chapter. However, the summary in the textbook is in the form of mind mapping where students are still required to fill in the summary map.

Examples of problems presented in the stresses chapter are only two examples of problems with the type of questions that are in the cognitive level of C3. Based on

the description of the instrument items explaining that the sample questions presented in the textbook should have a fairly even spectrum from C1 to C6, especially questions that are HOTS to strengthen the understanding of concepts obtained by students. The author can improve the book by adding a few examples of questions, especially questions that are HOTS to help improve student understanding.

The table of contents presented in the textbook only contains a list of chapters and a list of sub-chapters arranged according to the order of basic competency material. The list of tables and figures required by the description of the assessment aspects is not found in them.

A glossary of definitions of important words in the textbook is presented alphabetically at the end of the textbook. Several important words related to stress material, such as diffusion and osmosis are not found in it.

In students' textbooks on page 17, there is a picture of the process of transporting photosynthesis results taken in the book Reece et al, 2012. After checking the bibliography page, the reviewers did not find a bibliography from the picture. The author can improve the bibliography by including the book Reece et al, 2012. In addition to image references that are not listed in the bibliography, the consistency of writing the source of the image also needs to be improved. Writing the source of picture 3.13 with pictures 3.14 and 3.15 is different, the writer can improve the consistency of writing the reference image used.

3. BOOK 3

Basic competence (KD) regarding pressure is contained in KD 3.8 written "Understanding the pressure of substances and their application in everyday life, including blood pressure, osmosis, and capillarity of transport tissues in plants". Based on the KD demands, the concept demands to be achieved on the KD are about the pressure on the substance. Substance itself has 3 forms which are solid, liquid, and gas. Concept maps presented in textbooks, especially on pressure (fluid) material only present liquid. In addition to the concept map that only discusses the pressure on liquid, the concept of non-flowing liquid (hydrostatic pressure) is written that the hydrostatic pressure is determined by the density and depth of the liquid. However, the concept of liquid depth is under the concept of density. Not quite right if the concept of depth is placed under the concept of density considering these two things are two concepts that have the same position. Also, the peak concept written on the concept map is about liquid matter, but at the legal level written about Boyle's law. Boyle's law itself is a law that explains the pressure of a gas in a closed room. So it is not

quite right if Boyle's Law is included in the concept of liquid.

In the textbooks, especially in the chapter on pressure (fluid), only one example of the problem in the C3 area is presented. By the description of the instrument that explains that in the textbooks should be presented examples of problems with a uniform spectrum from C1 to C6, especially questions that are HOTS in the textbook that can strengthen students' understanding of the concept.

According to Noviyanti, et al (Noviyanti, Astuti, & Purworejo, 2019) explained that the 2013 Curriculum Orientation focused more on HOTS high-level thinking skills and Character Education Development (PPK), namely to prepare Indonesian human resources to have the ability to live as individuals and faithful, productive, creative, innovative, and effective citizens and be able to contribute to social life, nation, state and world civilization. According to Heong, et al on Hanifah (Hanifah, 2019) explains that higher-order thinking uses thinking broadly to find new challenges. Higher-order thinking requires a person to apply new information or knowledge that he has manipulated information to reach possible answers in new situations. Based on this, then the HOTS questions should be presented with questions including examples of the problem.

The pictures that are presented in the textbook, have included the source of the picture both from pictures taken from a particular source and pictures that come from the publisher's documents. However, there is one picture that does not include the source of the image. The Image Exploration Concept 8.1 on page 231 does not yet include the source of the image. Is the image of the aircraft used in the textbook taken from a particular source or is it a personal document.

4. BOOK 4

Some of the pictures in the textbook, especially in the pressure chapter, have included the source of the image. However, there are some pictures in the textbooks that do not include the source of the pictures, such as on page 93. Also, reviewers did not find errors in numbering and naming in tables, pictures, and attachments in the textbooks, especially in the pressure chapter. All that is written is by what is written in the text.

The table of contents that presented in the textbook, only chapters and sub-chapters that are presented in the textbook by the order of the material from basic competencies. In the textbook, there are no tables and picture lists.

Glossary, keywords, and a list of physical quantities and units that are aspects of the assessment in reflecting the indicators of the completeness of the presentation not presented in the textbook.

CONCLUSION AND SUGGESTION

Conclusion

Based on the results of SCIENCE study book Grade VIII SMP is used in SMP Negeri 22 Surabaya, can be concluded as follows: (1) Reviewed from the feasibility of presentation, the four SCIENCE teaching books used in SMP Negeri 22 Surabaya, in general, has fulfilled the feasibility of serving as a teaching book used in the learning process; (2) Improvements in the number of learning content presentations in textbooks are needed to improve the quality of textbooks.

Suggestion

The following are the advice of researchers related to the study of IPA SCHOOL of science class VIII in the pressure material used in SMP Negeri 22 Surabaya: (1) teachers can further maximize to integrate the four teaching books in the learning process, because the four books complement each other the shortcomings that exist in each teaching book; (2) the teacher can use the SCIENCE BSE book in practical activities at the beginning of learning, using IPA Curriculum 2013 and Integrated IPA book in delivering materials, and IPA KTSP book to improve the understanding of learners through examples of questions; (3) for other schools who want to use more than one IPA book in the learning process, it can be done by conducting a teaching book in advance to find out the advantages and disadvantages of each teaching book; and (4) for researchers can then add research objects in the form of student learning outcomes in the use of four teaching books, so it can be known significantly the results of learning..

REFERENCES

- Ariyanto, D. A. S. (2018). Sains dan teknologi dalam perkembangan peradaban manusia. *Seminar Nasional Pendidikan Teknik Otomotif*, 93–95.
- Badan Pusat Statistik. (2018). *Proyeksi Penduduk Indonesia 2015-2045 Hasil SUPAS 2015*.
- BSNP. (2014). Instrumen 1 Penilaian Buku Teks Pelajaran (Buku Siswa) Sekolah Menengah Atas/Madrasah Aliyah. *Badan Standar Nasional Pendidikan*, (Ki 2), 1–23.
- Fadhillah, N. (2012). *Analisis Miskonsepsi buku PHYSICS FOR SENIOR HIGH SCHOOL YEAR X (BILINGUAL) Karangan Purwoko dan Fendi pada Materi Semester I*.
- Fujiawati, F. S. (2016). *Pemahaman konsep kurikulum dan pembelajaran dengan peta konsep bagi mahasiswa pendidikan seni*. 1(1), 16–28.
- Hanifah, N. (2019). *Pengembangan instrumen penilaian Higher Order Thinking Skill (HOTS) di sekolah dasar*. 1(1), 1–8.
- Ibda, F. (2015). *Perkembangan Kognitif: Teori Jean Piaget*. 3, 27–38.

- Maemunah. (2018). Membangun Pendidikan yang Mandiri dan Berkualitas pada Era Revolusi Industri 4.0 Aula Universitas Muhammadiyah Mataram. *Prosiding Seminar Nasional Pengabdian 2018 Univeristas Muslim Nusantara Al-Washliyah*, (September), 2016–2018.
- Muhali, D. (2018). Arah Pengembangan Pendidikan Masa Kini Menurut Perspektif Revolusi Industri 4.0. *Seminar Nasional Lembaga Penelitian Dan Pendidikan (LPP) Mandala*, (September), 14–1.
- Noviyanti, F. E., Astuti, D., & Purworejo, U. M. (2019). *Penguatan pendidikan karakter melalui pembelajaran ipa berbasis hots*. 638–644.
- OECD. (2015). *Pisa 2015*.
- Palupi, L. A. (2014). *Analisis Miskonsepsi Buku Sekolah Elektronik (BSE) IPA Terpadu kelas VIII SMP/MTs pada Materi Pokok Getaran dan Gelombang*.
- Prasetyo, Z. K. (2011). *Kurikulum dan pembelajaran sains dalam membangun peradaban bangsa*. 1–9.
- United Nations Development Programme. (2018). *Human Development Indices and Indicators 2018. Human Development Indices and Indicators 2018*. <https://doi.org/10.18356/656a3808-en>
- University of South Florida. (2002). *Theory and research in social education* 30 / 03.
- Walsh, M. (2015). *Reading visual and multimodal texts : how is 'reading' different ?* (April).
- Wibowo, A. M. (2012). Peningkatan Pemahaman Konsep Sains di Madrasah Ibtidaiyah Melalui Perbaikan Bahan Ajar. *Madrasah*, 4(1992), 161–172.
- Yoghiati, C. I. (2011). *Peningkatan kualitas pembelajaran fisika umum melalui pembelajaran bermakna dengan menggunakan peta konsep*. 6(2010), 104–107.