READABILITY AND COMPATIBILITY OF CLASS VIII SUBSTANCE PRESSURE MATERIALS WITH SCIENCE PROCESS SKILLS CATEGORIES

Faola Firmanda¹, Laily Rosdiana²
¹,²Department of Science, Faculty of Mathematics and Natural Sciences, Universitas Negeri Surabaya, Surabaya 60231, Indonesia

Abstract

This study aims to determine the readability and suitability of material pressure class VIII with the category of science process skills. The research method used is descriptive research with a qualitative approach. The results of this study indicate that the suitability of the books for science class VIII students with science process skills is 60% in the appropriate category. Aspects of science process skills contained in the book include skills of observation, classification, interpretation, using tools or materials, applying concepts, and communicating. Meanwhile, the results of the readability of the VIII grade students' science book on substance pressure, the average value was 3 in the good category. From the research that has been carried out, it can be concluded that the science student's book on substance pressure material is in accordance with the SPS aspect. Suggestions from researchers, the books used by students should contain all aspects of science process skills. By adding SPS aspects that have not been presented in the book, which include predicting skills, asking questions, hypothesizing skills, and planning an experiment.

Keywords: Book Readability, Science Process Skills, Substance Pressure.
INTRODUCTION

Natural Sciences is closely related to activities to find out a fact, principle, law, scientific process, and theory. Science learning connects the material with the surrounding environment directly. According to the 2013 Curriculum, science learning prioritizes student involvement in the discovery process. The discovery can be in the form of principles, concepts, or problem solving.

Learning activities are communication activities between students and other students, teachers, and books or other learning resources. This interaction can build students' knowledge actively. Learning activities must be encouraging, innovative so that students do not get bored, inspire, can make the class more active, and can attract students' interest in participating in learning activities. (Harianto, 2011).

In the learning process, a textbook is needed as a source of knowledge and a guide for students. Textbooks are suggestions to support a learning activity, as a source of knowledge for students (Depdiknas, 2003). Textbooks are books made by experts or experts in their fields to be used as the function of the textbook (Akbar, 2013). Textbooks function as a medium for teachers in the teaching process and for students to function as teaching media that support the learning process. The function of textbooks is to present learning resources in an orderly and gradual manner, to present evaluation materials, to present the subject matter, methods, and teaching tools, and to reflect certain points of view (A et al., 2017). Regulation of the Minister of National Education No.2 (2008), states that textbooks are reference books that must be used by students or teachers in learning at school.

The teaching and learning process needs to use a learning approach. The appropriate learning approach for science lessons is SPS, which is a systematic and rational thinking skill that is often used in science (Cansiz et al., 2016). Science process skills, increase active student involvement, make it easier for students to understand the rules that are carried out permanently in learning (Karamustafaoğlu, 2011).

Science process skills (SPS) aim to build students' existing knowledge with activities that link cognitive knowledge, psychomotor knowledge, and students' affective knowledge (Siswono, 2017). SPS familiarizes students to think scientifically and get used to communicating, thinking critically, and creatively through solving various kinds of problems presented by educators in learning (Priyani & Nawawi, 2020). Science process skills are considered to provide students with a meaningful learning experience, because SPS helps students to achieve higher-order thinking (Tilakaratne, CTK & Ekanayake, 2017).

Physics is one of the branches of science that requires research, scientific work to get concepts, principles, theories, and laws (Darmaji et al., 2019). The selection of class VIII pressure material, which is analyzed by researchers, because this material discusses a lot of certain principles, theories, and concepts. In addition, this material presents more material related to physics. This makes this material suitable to be applied with science process skills, which involve students directly in concept discovery.

Based on the explanation of the science process skills, the textbooks used by students must include aspects of science process skills. The aspects of the SPS include: (a) aspects of observation skills, (b) aspects of classification skills, (c) aspects of interpretation skills, (d) aspects of predicting skills, (e) aspects of asking questions, (f) aspects of hypothetical skills, (g) skills aspects of planning experiments, (h) aspects of skills in using tools and materials, (i) aspects of skills in applying a concept, (j) aspects of communicating skills (Rustaman, 2005).

The results of a survey conducted by researchers, from 6 schools located in Surabaya, both public and private, the books that are often used in the learning process are science books for SMP/MTs students, which were published by the Ministry of Education and Culture (Kemendikbud) in 2017. The survey was conducted through google form link which is intended for 3 teachers and 3 students in Surabaya. The student books used were designed by the government to implement the 2013 Curriculum.

This research was carried out because most of the science books used in schools did not present SPS aspects. Which, it has an impact on students' ability to respond to a problem. In learning, many students understand the theory or law being taught, but cannot practice it or apply it directly. So this research needs to be carried out in order to determine the suitability of science books with aspects of science process skills. In addition, knowing the legibility of science books on substance pressure materials used in the learning process at school. This research is expected to provide information related to the aspects of SPS that are presented in the science book on pressure material, so that the school is more selective in choosing books to support learning activities in improving students' SPS.

METHOD

The type of research used is descriptive research, with a qualitative approach. In descriptive research, systematically presenting and analyzing
facts related to science process skills in students’ books.

The objects used to determine the readability of the book include 3 science teachers of class VIII and 3 students of class VIII who are in SMPN 17 Surabaya, SMPN 60 Surabaya, and SMPN 62 Surabaya. The object of research is obtained by non-probability sampling with a technique through a certain reason. In this study, the research subject was a science book for SMP class VIII Semester 2, published by the Ministry of Education and Culture 2017, with a material section on substance pressure and its application in everyday life.

This study uses observation sheets, book readability instruments, and questionnaires as research instruments. Data collection techniques in this study used documents in the form of class VIII science books, book readability questionnaires, and interviews. Data collection techniques using documents require instruments as a guiding tool in collecting data from books (Mukhtar, 2013).

This research uses data analysis technique content analysis. Content analysis is a method by making contextual or real conclusions from books or other documents, so that communication messages are easily understood in their entirety (Prastowo, 2016).

Stages of analysis in data processing
1. Adding the frequency of the SPS aspect to the book being analyzed.
2. Calculating the aspects of SPS with the formula:
   \[
   \frac{\Sigma \text{SPS aspects that appear in book}}{\Sigma \text{the SPS aspect}} \times 100\% \quad (1)
   \]

3. Determine the criteria for the suitability of the presentation of the book with the science process skills, based on the Table 1:

Table 1. Criteria for the Suitability of the Presentation of Textbooks

| Percentage | Category          |
|------------|-------------------|
| <40%       | Not Appropriate   |
| 40% - 75%  | Appropriate       |
| > 75%      | Very Appropriate  |

(Wilkinson, 1999)

RESULTS AND DISCUSSION

The results were analyzed in the explanation section, the student activity section, and practice questions on the science textbooks, which were most widely used in SMP/MTs, both public and private, in the city of Surabaya. Based on the results of a survey on the use of science books in public or private schools in the city of Surabaya, many use science books published by the Ministry of Education and Culture.

Table 2 shows the readability of students’ science books published by the Ministry of Education and Culture on pressure materials.

Table 2. Data on the Readability of Science Book

| Name | Average Score |
|------|---------------|
| 1G   | 2.88          |
| 2G   | 3.32          |
| 3G   | 3.16          |
| 4S   | 3.16          |
| 5S   | 2.36          |
| 6S   | 3.12          |

Total 18
Average 3

Note: G = Teacher; and S = Students

Based on Table 2. Readability can be seen when books by 1G have an average score of 2.88; 2G by 3.32; 3G by 3.16; 4S with a score of 3.16; 5S of 2.36; and the 5S has an average of 3.12. With a total of 18 and an average readability of 3 science books, it is in the good category. Figure 1 shows the appearance of SPS in the explanation section, the student activity section, and the practice section of the substance pressure chapter.
Based on the SPS aspect diagram, which is contained in the explanation section it is in the form of observation skills and skills to apply concepts. The number of occurrences of each aspect of SPS from the VIII grade science book published by the Ministry of Education and Culture in the explanation section is that observation skills are developed in 2 statements and skills apply concepts in 3 statements.

Aspects of science process skills, which are contained in the science book chapter pressure, in the student activities section in the form of observation skills, classification skills, interpretation skills, skills in using tools or materials, skills in applying concepts, and communicating skills. The number of occurrences of each aspect of SPS from the VIII grade science book published by the Ministry of Education and Culture in the student activities section is observation skills 6 statements, classification skills 2 statements, interpretation skills 6 statements, skills using tools or materials 6 statements, skills applying concepts 6 statements, and skills communicates 2 statements.

Aspects of science process skills, which are included in the practice section, are in the form of classification, interpretation, and concept application skills. The number of occurrences of each SPS aspect from the VIII grade science book published by the Ministry of Education and Culture in the practice section is the skill of classification 1 statement, interpreting 1 statement, and applying the concept of 1 statement.

Figures 2 and 3 show a recapitulation of the appearance of SPS in the explanation section, student activities section, and practice questions section.

**Figure 2. Recapitulation Diagram of the Emergence of SPS Aspects**

Based on the diagram above, it is known that the SPS contained in the science book consists of observation skills, classification skills, interpretation skills, use of tools or materials, skills in applying a concept, and communication skills. So that in class VIII science books, not all aspects of SPS are included in it. The frequency of occurrence of each aspect of SPS shows a number that differs from one another.

The emergence of each aspect of SPS from the VIII grade science book published by the Ministry of Education and Culture is observation skills 8.22%, classification skills 3.8%, interpretation skills 7.19%, skills using tools or materials 6.17%, skills applying concepts 10.28%, and communication skills 2.6%. The percentage of conformity of science books with SPS in the explanation section, student activities, and practice questions obtained based on table 4. obtained the suitability of books with science process skills by 60%. After being matched with the suitability category for the SPS, the level of conformity with the appropriate category is obtained.

The results of the analysis of science skills in science students' books, show that there are six aspects of science process skills. The six aspects of science process skills include observation, classification, interpretation, use of tools or materials, applying a concept and communicating skills. The results of the analysis of observation skills on the analyzed pressure material, there are 8 statements on pressure material that contains observation skills. Figure 3 contains 8 statements of observation skills in science students' books, found in the explanations and student activities section.

![Figure 3. Statement of Observation Skills](image-url)
phenomena (Ahtee et al., 2012). If students have the ability to observe skills, it will make it easier for them to obtain information, and find problems to be solved (Darmaji et al., 2019).

Classification skills on pressure material, there are 3 statements. Figure 4 contains 3 statements of classification skills in the science student book, the student activities section and practice questions.

In the student science book published by the Ministry of Education and Culture, there are many presentations contained in student activities, to conclude information from the results of the practicum. While in practice questions, interpretation skills are used to conclude information from a table of research results. Interpretation skills include noting and relating observations, finding relationships from a series of observations, and drawing conclusions from what has been observed (Puspita et al., 2017).

Skills in using tools or materials presented in students science books, consisting of 6 statements. Figure 6 contains 6 statements of skills using tools or materials in the student book, in the student activities section.

Interpretation skills include 7 statements in the book. Figure 5 contains 7 statements of interpretation skills in science student books, student activities section and practice questions.

The skills that are presented in the science student's book on pressure material are the skills to apply concepts. Skills in applying concepts, there are 10 statements. Figure 7 contains 10 statements of skills to apply the concepts contained in the science student book, in the explanation section, student activities, and practice questions.
The presentation in this book contains solving problems in certain situations and explaining what actually happened, students connect with previously understood material or concepts. In applying the concept, events that occur in everyday life are presented, so that they are more in line with the environment around students. To apply concepts, students should understand and be able to explain new phenomena by linking old concepts that have been studied (Yunita, 2018).

The skill of applying concepts is an activity that applies, from the application of previously acquired concepts (Virijai et al., 2020).

The communication skills presented in the VIII grade science book material pressure material published by the Ministry of Education and Culture, there are 2 statements contained in the student activities section. Figure 8 contains 10 statements of communicating skills in the science student book, the student activities section.

In this book students are given the presentation of communicating skills by changing the form of presentation of research results in the form of tables, explaining the results of experiments carried out, and submitting reports systematically. Communicating skill is one aspect of SPS that describes the results of observations, both oral and written based on a fact or concept that is concluded through the delivery of the results of scientific activities that have been carried out in the form of writing, posters, multimedia and so on (Sudibyo et al., 2018). The communicating aspect includes the skill of describing something either orally or in writing or through pictures (Elvanisi et al., 2018).

Based on the results of the analysis of science students' books on the pressure chapter, the presentation of science process skills is the skill of applying concepts, followed by observation skills. The skills to apply concepts are spread out in explanation activities, student activities, and practice questions. While the observation skills are only found in the explanation and student activities. The suitability of the subject matter of substance pressure with science process skills by 60% indicates the appropriate category. With the results of the analysis of the readability of science students' books on the material pressure of substances in a good category. Based on the results of this research, in the preparation of science books, materials that discuss laws, theories or principles, in the future it is expected to present all aspects of SPS.

CONCLUSION AND SUGGESTIONS

Conclusion

Based on the results of the analysis conducted by researchers, it can be concluded, the readability of the science book for class VIII students on substance pressure material is in the good category which shows an average of 3. The results of the suitability of the substance pressure material with the SPS aspect show a conformity of 60% with the appropriate category. Science process skills in science students' books cover 6 aspects of science process skills, namely observation skills, classification skills, interpretations, use of tools or materials, skills to apply a concept, and communication skills.

Suggestions

Suggestions from researchers, it is better if the books used by students contain all aspects of science process skills. By adding aspects of predictive skills, asking questions, hypothesizing, and planning experiments. As teaching staff, teachers must make students directly involved during the learning process, by teaching science process skills to students.

REFERENCES

A., A., Festiyed, & R, S. (2017). Analisis Kebutuhan Pengembangan Bahan Ajar IPA Terpadu Bermuatan Literasi Era Digital Untuk Pembelajaran Siswa SMP Kelas VIII. Jurnal Eksakta Pendidikan. Jurnal Eksakta Pendidikan, 1(1).

Ahtee, M., Suomela, L., Juuti, K., Lampiselkä, J., & Lavonen, J. (2012). Primary school student teachers’ views about making observations. Nordic Studies in Science Education, 8(2), 113.
128.
https://doi.org/https://doi.org/10.5617/nordina.346
Akbar, S. (2013). Instrumen Perangkat Pelajaran. Remaja Rosdakarya.
Cansiz, M., Sungur, S., & Oztekin, C. (2016). Exploring The Development of Science Process Skills Through History of Science Instruction. 2735–2741.
Darmaji, D., Kurniawan, D. A., & Irdianti, I. (2019). Physics education students’ science process skills. International Journal of Evaluation and Research in Education (IJERE), 8(2), 293. https://doi.org/10.11591/ijere.v8i2.16401
Depdiknas, P. P. (2003). Standar Penilaian Buku Pelajaran Sains. https://Www.Dikdaski.Go.Id.
Elvanisi, A., Hidayat, S., & Fadillah, E. N. (2018). Analisis keterampilan proses sains siswa sekolah menengah atas Skills analysis of science process of high school students. Jurnal Inovasi Pendidikan IPA, 4(20), 245–252. https://journal.uny.ac.id/index.php/jipi/article/view/21426/12225
Harianto, S. (2011). Belajar dan Pembelajaran Teori dan Konsep Dasar. Remaja Rosdakarya.
Iswatun, I., Mosik, M., & Subali, B. (2017). Penerapan model pembelajaran inkuiri terbimbing untuk meningkatkan KPS dan hasil belajar siswa SMP kelas VIII. Jurnal Inovasi Pendidikan IPA, 3(2), 150. https://doi.org/10.21831/jipi.v3i2.14871
Karamustafaoğlu. (2011). Improving The Science Process Skills Ability of Science Student Teachers Using I Diagrams. Eurasian J. Phys. Chem. Educ, 3(1), 26–36.
Mukhtar. (2013). Metode Praktis Penelitian Deskriptif Kualitatif. Jakarta Selatan. GP Press Grup.
Prastowo. (2016). Memahami Metode-Metode Penelitian: Suatu Tinjauan Teoritis Dan Praktis. Ar-Ruzz Media.
Priyani, N. E., & Nawawi, N. (2020). Pembelajaran Ipa Berbasis Ethno-Stem Berbantu Mikroskop Digital Untuk Meningkatkan Keterampilan Proses Sains Di Sekolah Perbatasan. WASIS: Jurnal Ilmiah Pendidikan, 1(2), 99–104. https://doi.org/10.24176/wasis.v1i2.5435
Puspita, A. R., Paidi, P., & Nurcahyo, H. (2017). Analisis keterampilan proses sains LKPd sel di SMA negeri Kota Bekasi. Jurnal Prodi Pendidikan Biologi, 6(3), 164–170. http://journal.student.uny.ac.id/ojs/index.php/pbio/article/view/7972
Ramadhani, P. R., Akmani, Desnita, & Darvina, Y. (2019). Analisis Keterampilan Proses Sains Pada Buku Teks Pendidikan Fisika Sma Kelas Xi Semester 1. Pillar of Physics Education, 12(4), 649–656.
Rustaman. (2005). Strategi Belajar Mengajar Biologi. IKIP Malang.
Siswono, H. (2017). Analisis Pengaruh Keterampilan Proses Sains Terhadap Penguasaan Konsep Fisika Siswa. Momentum: Physics Education Journal, 1(2), 83. https://doi.org/10.21067/mpej.v1i2.1967
Sudibyo, E., Nurita, T., & Fauzia, A. N. M. (2018). Keterampilan Proses Untuk Melatihkan Keterampilan Proses. Jurnal Pendidikan Pendidikan IPA, 3(1), 21–26.
Tilakaratnea, C. T. K. & Ekanayakeb, T. M. S. S. K. (2017). Achievement level of science process skills of junior secondary students: based on a sample of grade six and seven students from Sri Lanka. International Journal of Environmental & Science Education, 12(9), 2089–2108.
Virjai, F., Asrizal, & Desnita. (2020). Analisis Integrasi Aspek Keterampilan Proses Sains (Kps) Dalam Buku Teks Pelajaran Fisika Sma Kelas X Semester 2. J3(1), 161–168.
Wilkinson, J. (1999). A Quantitative Analysis of Physics Textbooks for Scientific Literacy Themes. Research in Education.
Yunita. (2018). Analisis Keterampilan Proses Sains Melalui Praktikum IPA Materi Bagian-bagian Bunga dan Biji pada Mahasiswa PGSD STKIP Muhammadiah Bangka Belitung. Jurnal Pemikiran Dan Pengembangan SD, 6(1), 27–35.