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Analysis Validity and Readability of Local Potential-Based Textbooks on Plantae Materials to Improve Students' Science Literacy

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Abstract

Textbooks based on local potential of plantae material can be used to improve the science literacy of students at the junior high school. The aim of this study is to analysis validity and readability of textbooks based on local potential to improve student's science literacy. Data analysis was carried out to obtain scores of validation results by material experts and media experts as well as the readability of textbooks by students in small-scale trials. The results of expert validation questionnaire showed an average score for the aspects of material feasibility and media feasibility were 93.36% and 89.29% with a very valid category. The readability test results showed that the textbook had an average score of 71% with understandable criteria. Based on the results of this study, it can be concluded that textbooks based on local potential of plantae material can be used in student learning. This research contributes to the availability of textbooks based on local potential of plantae material. The research has implications for educational practitioners to help improve students' science literacy.

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INTRODUCTION

The world of education today continues to innovate thoroughly. Education in the 21st century has resulted in the advancement of science and technology for human needs (Dewi et al., 2018). Skills that learners must have to face the challenges of the 21st century are needed, including critical thinking skills, problem solving, communication, collaboration, and good character qualities (Syamsuar & Reflianto, 2018). Other skills include literacy skills and mastering information and communication technology (Frydenberg & Andone, 2011).

One of the abilities that students need to have in the 21st century is science literacy (Susiani et al., 2017). Science literacy is the ability to use scientific knowledge, identify questions, and conclude based on scientific evidence found to make decisions related to nature and its changes due to human actions (Cope & Kalantzis, 2009). Science literacy is the ability to use scientific knowledge gained through learning experiences to make decisions with regard to environmental conditions (OECD, 2015).

Students need to be trained to discover their own knowledge through science learning (Fauziyah et al., 2021). Science literacy is needed by students to understand the environment, health, social, modern, and technology so that students have the skills and competencies to make science a scientific attitude (Aberšek et al., 2015). Integrating science literacy skills in learning can encourage students to solve problems and utilize existing technology (Utama et al., 2019). Students are expected to be able to integrate the concepts that have been learned with everyday life, then applied in real life (Nurkaenah et al., 2018).

Efforts to improve science literacy in students can be done in many ways, one of them is the use of appropriate teaching materials in the learning process (Rusilowati et al., 2016). The selection of appropriate teaching materials is a factor that affects the success of teaching and learning. One of the factors that support the science learning process is providing quality and appropriate teaching materials. The existence of textbooks in learning can improve student learning outcomes (Aria et al., 2022). The textbook is equipped with worksheets that allow learners to be actively involved in learning (Yildirim et al., 2011).

Contextual learning with students' lives can train science literacy (Kimianti et al., 2016). Integration of materials that are related to the surrounding environment and varied learning methods can help participants in forming environmental care characters and conservation attitudes (Ramadoss & Moli, 2011). Facts in the field, that the science literacy skills of students are still relatively low. Based on the results of the Program for International Student Assessment (PISA) held by the Organization for Economic Coorporation (OECD) in 2022, Indonesia occupied the 67th out of 81 countries (OECD, 2023). These results increased by 6 levels compared with PISA in 2018 (OECD, 2019).

One of the contributing factors is the low ability to read and write scientific papers, as well as teachers who are not accustomed to learning from the development of science literacy (Anggraini & Huzaifah, 2017). Students are less accustomed to solving science literacy questions prepared by teachers in the learning process (Fauziyah et al., 2021). The use of conventional textbooks that are not science literacy-oriented is also one of the factors (Istyadji & Sauqina, 2023).

The research location is at SMPIT Az-Zahra Demak, which is an integrated Islamic school located in Demak Regency. The results of the analysis and observation of learning at SMPIT Az-Zahra Demak found that the textbooks used were limited to general textbooks. Teachers have not used textbooks that are adapted to the conditions of the school environment. Students' difficulties in identifying plants according to their groups and recognizing local plants around the environment due to inadequate companion textbooks. In addition, the measurement of students' science literacy skills on plant material has never been done. From theses observations, it can be seen that thet learning resources used in SMPIT Az-Zahra Demak are not yet ideal.

Based on factual conditions, a solution is offered in the form of the availability of learning resources in the form of local potential-based textbooks to help teachers and students achieve the learning outcomes of plant material and improve students' science literacy. Learning resources are one of the factors that influence the success of learning (Lim & Morris, 2009). Learning resources are able to train students' independence and construct knowledge gained from their learning experience (Wang et al., 2013). These conditions are able to create student-centered learning (Widiastuti et al., 2018). In addition, students will be trained in solving science literacy questions (Wati et al., 2017).

The textbook prepared as a product is named the textbook plantae which is compiled based on Demak local potential. Previous re-

search mentions that textbooks that are associated with local potential can improve science literacy (Maison & Wahyuni, 2021). The textbook can be used as a source of independent learning for students and help achieve learning objectives on the subject of plants (Aria & Silaban, 2024). Textbooks from the results of regional exploration can be used in learning plant material (Wijana & Mulyadiharja, 2022).

The novelty of this research with previous research is in the aspect of local potential. The main highlight lies in the diversity of star fruit (*Avherroa carambola*) dan water guava (*Syzygium aqueum*). Showing the benefits of plants by local communities that are packaged in science literacy content. The textbooks are also equipped with comprehension tests that are based on science literacy indicators.

Students have diverse and different points of view, so the existence of textbooks can form high curiosity and increase learning motivation (Marzuki et al., 2017). Research by Maghfiroh et al., (2022) states that e-plantbooks with a scientific approach can improve student learning outcomes. The textbook as an independent learning resource is equipped with text, material, images, worksheets and self-evaluation questions, which are expected to liven up the learning atmosphere to make it more interesting, not boring, and easy for students to understand (Oktafiani et al., 2021). The purpose of this study was to analyze a textbook based on Demak's local potential on plantae material to improve students' science literacy. Therefore, this textbook is expected to enrich learning resources, especially on plantae material that is valid and has good readability.

METHOD

The research starts from exploring the potential and problems in the field and continues by data collecting. The product design process is carried out by compiling components in coursebooks followed by design validation by material experts and media experts. Suggestions from experts regarding textbooks as material for improving textbooks. The improved textbook will be tested on a small scale through a readability test. The readability test instrument using the overlap test.

Data collection techniques using instruments in the form of questionnaires and overlapping tests. The questionnaire instruments needed in this study include material expert validation sheets and media expert validation sheets. Test instruments in the form of overlapping tests to measure the readability of textbooks that were tested on a small scale.

The calculation of the level of validity of the textbook used following formula:

$$P = \frac{\sum xi}{\sum xj} \times 100\ \%$$

Information:
P : Choice percentage
∑xi : Total score of expert assesment answer
∑xj : The highest number of answer scores

Table 1. Textbook Validity Answer Criteria

Feasibility Percentage (%)	Criteria
$25.00 < x \leq 43.75$	Invalid
$43.75 < x \leq 62.50$	Less Valid
$62.50 < x \leq 81.25$	Valid
$81.25 < x \leq 100.00$	Very Valid

The results of the overlap test on the small scale trial were analyzed using the formula:

$$P = \frac{f}{N} \times 100\ \%$$

Information:
P : Percentage of score obtained
f : Number of scores obtained
N : Maximum number of scores

Table 2. Readability Test Criteria

Percentage (%)	Criteria
$0\% < x \leq 37\%$	Difficult to understand
$37\% < x \leq 57\%$	Meets the readability requirements
$57\% < x \leq 100\%$	Understandable

RESULT AND DISCUSSION

Results Textbooks Based on Local Potential of Plantae Material

The images of plants and icons displayed in the textbook are the result of exploration in the area of the Great Mosque of Demak, the Tomb of Sunan Kalijaga and SMPIT Az-Zahra Demak. The textbook includes cover, preface, table of contents, overview, instructions for using the book, learning outcomes and objectives, material, reflection, glossary, bibliography and developer. Local potential is presented with material about local plants of Demak Regency in the form of starfruit (*Avherroa carambola*) and water guava (*Syzygium aqueum*).

Science literacy aspects are presented in several textbook features and comprehension test indicators. These features include 1) science as

a body of knowledge, 2) science as a way to investigate, 3) science as a way to think, and 4) the interaction of science, technology and society. Font selection and size as well as sentences in the coursebook are also considered. The appearance of the coursebook is shown in Table 3.

Table 3. Display of Textbook Based on Literacy Science

Aspect	Features	Description
Science as a body of knowledge	"*Ayo Belajar*" (Let's Learn)	Presenting material about plants
	Fun Fact	Presenting information and unique facts
Science as a way to investigate	"*Mencoba yuk*" (Let's Try)	Contains simple observation and experiment activities
Science as a way to think	"*Ayo berpikir ilmiah*" (Let's think scientifically)	Presents rare or little-known plant facts, data and information based on previous research
The interaction of science, technology and society	"*Sains dalam kehidupan*" (science in life)	Presents material on the influence and impact of science on society, both in technology and daily life.

The appearance of the textbook can be seen in several pictures below:

Figure 1. Cover page display. Contains book title, author's name, Demak icon, logo and university identity.

Figure 2. User manual page display. Contains a reader's guide to find out the contents or components in the textbook

Figure 3. Learning outcomes page

Figure 4. Chapter title page

Figure 5. "*Ayo belajar*" page display

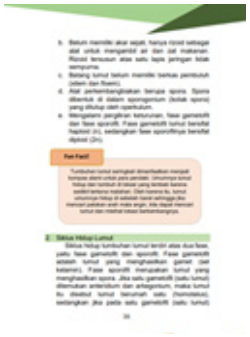

Figure 6. "Fun fact" page

Figure 7. "*Mencoba yuk*" page

Figure 8. "*Ayo berpikir ilmiah*" page

Figure 9. "*Sains dalam kehidupan*" page (The role plants for local people)

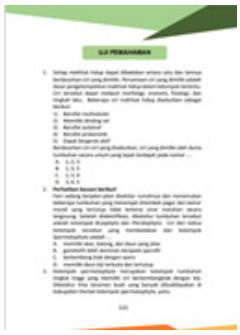

Figure 10. Comprehension test page. This page contains (test students' understanding)

Figure 11. Reflection page (students' expressions after the learning process)

Figure l2. Developer page

Results of Validation Assessment

The validation instrument used is a questionnaire to determine the level of validity of the developed textbooks. The assessment results are shown in Table 4.

Table 4. Assesment Result (a) Material Expert; (b) Media Expert

(a) Material Expert Test Result

Aspect	Persentage scor (%)	Criteria
Content feasibility	92.71 %	Very valid
Feasibility of presentation	100.00 %	Very valid
Language feasibility	87.50 %	Very valid
Local potencial	87.50 %	Very valid
Sciemce literacy	92.19 %	Very valid
Average	93.36 %	Very valid

(b) Media Expert Test Result

Aspect	Persentage scor (%)	Criteria
Graphics	87.50 %	Very valid
Local potencial	81.25 %	Valid
Language	100.00 %	Very valid
Average	89.29 %	Very valid

Based on the results presented in Table 4, the average result of the validation assessment by material experts is 93.36% with very valid criteria and assesment result by media expert obtained of 89.29% wih very valid criteria. Based on the assessment, it can be concluded that the textbook is very valid and can be used in learning.

Results of Readability Test Results

The readability test was carried out with a follow test totaling 68 questions which were tested on 10 class VIII students. The results of the analysis of the readability test of textbooks obtained an average percentage of 71% with understandable criteria. This shows that the developed of textbooks can be read very well and easy for students to understand.

Discussion

Textbook obtained expert validation results with very valid criteria. The criteria are based on some characteristics of textbooks. The local potential is the local plants of Demak Regency in the form of starfruit (*Avherroa carambola*) and water guava (*Syzygium aqueum*). Local potential in science learning can be applied to learning tools, teaching materials, and learning media (Nurjanah et al., 2022). Implementation of local potential in learning has a positive impact on learning outcomes and science literacy skills of students. In addition, it is able to improve the attitude of caring for the environment. (Suryanti et al., 2020).

Images and layouts in the textbook are presented and packaged attractively. The images used in the textbook are mostly personal documents of plant images explored around Demak Regency, especially in Demak and Wonosalam. In addition, the textbook contains pictures of local plants that are easily found by students in their environment and their role in life. Azmi et al., (2023) in their research stated that the plant module that was prepared based on the exploration of local potential in the region was able to improve the science literacy of students. The use of images that learners can find in the surrounding environment is contextualized, This will facilitate the process of absorbing material and increasing learning motivation (Hartati & Subiyantor, 2018).

Science literacy content is one of the characteristics of the expert validation assessment. The results of research by Safitri (2015) shows that one of the success factors of science literacy is through teaching materials used in the learning process. Direct students activity can increase students' interest in learning (Ilyas & Liu, 2020). This is in accordance with the explanation Borah (2021) which stated that contextual learning can

increase students' motivation to complete tasks. The learning experience that students get is able to fulfill learning objectives and be able to solve real-life problems (Liana, 2020).

Textbooks are able to improve science literacy due to balanced coverage of science literacy aspects. Based on Wilkinson (1999), the ratio of science literacy aspects between science knowledge, investigating the nature of science, science as a way of thinking, and the ideal interaction of science, technology, and society is 2:1:1:1. The aspects displayed in the textbook do not only emphasize cognitive knowledge aspects, but activities that involve students directly (Rusilowati et al., 2016).

The aspect of science as a body of knowledge displayed on textbooks is expected to be able to understand concepts, laws and principles in science learning (Fuadah et al., 2017). Science as a way to investigate displayed on textbooks is expected that students have science process skills that help them have a scientific attitude. Furthermore, the aspect of science as a way of thinking expects students to have the ability to think critically and interpret data as previous scientists. This activity will help students to find their own knowledge (Shin, 2018).

The science, technology and society interaction aspect presents activities that will provide insight for students about the factual conditions in the environment around them. Science learning that is integrated with the environment will foster an attitude of environmental care, students will have an awareness to preserve the environment (Fatma et al., 2023). Other research states that environment-based learning can create interest, motivation, and commitment to recognize and protect the environment (Ramadoss & Moli, 2011).

The results of the textbook readability test found that the textbook has very good readability and is easy to understand. All aspects included in the textbook are able to attract students to read and use the developed textbooks in the learning process. The existence of textbooks in learning has an impact on learning outcomes and students' reading literacy (Aria et al., 2022).

The results of research by Ibrohim et al., (2014) showed that students' science literacy skills can be improved through learning assessments combined with local potential. The Plantae textbook is equipped with comprehension test questions based on science literacy indicators. The questions can be done independently by students after using the textbook in the learning process. Herdiana et al., (2022) shows that local potential learning resources are needed in science learning to train science literacy skills. The hope is that the Plantae textbook developed will be able to improve science literacy when applied to learning.

CONCLUSION

Based on the research that has been done, the product is obtained in the form of textbook based on local potential of plantae material. The average results of the validation of material experts and media experts were 93.36% and 89.29% with very valid criteria. The readability test results showed that the textbook had an average score of 71% with understandable criteria. Based on this research, it can be concluded that the textbook based on local potential of plantae material obtaining result are very valid and easy to understand. This research contributes to the availability of textbook based on local potential of plantae material. The research has implications for educational practitioners to improve students' science literacy.

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