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## **Completeness of Science Literature Elements in Class VII Science Literacy Assessment Instruments**

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### **ABSTRACT**

This study was conducted with the aim of identifying the presentation of scientific literacy aspects in the scientific literacy assessment instrument for the seventh grade science material. This study uses qualitative descriptive analysis. The object of research in this study is the scientific literacy assessment instrument from the researcher Muftianah and Wahono (2018), and the researcher Arfianti (2015). The data collection technique used is literature study. The data analysis technique in this research uses content analysis. The results of the study indicate that aspects of scientific literacy have been presented well, although there is one aspect that has not been included in the scientific literacy instrument, namely the scientific process aspect. In the scientific literacy instrument for the two researchers, the aspect of scientific literacy that often appears is the aspect of science content. Thus, in measuring scientific literacy skills, all aspects of scientific literacy must be contained in scientific literacy instruments. Based on the results of the study, it can be concluded that the aspect of scientific literacy, the two instruments that have been analyzed there is one aspect that has not been included in the scientific literacy instrument, namely the scientific process aspect. In the scientific literacy instrument of the two researchers, the aspect of scientific literacy that often appears is the aspect of science content. Thus, in measuring the ability of scientific literacy, all aspects of scientific literacy must be contained in scientific literacy instruments.

## INTRODUCTION

Advances in knowledge and technology have had an influence on the development of education in Indonesia along with advances in information technology showing rapid progress in curriculum, learning methods, and more advanced supporting facilities (Wulandari & Sholihin, 2016). The shift in life in the digital era has caused rapid changes marked by the involvement of technology in daily activities. This is continuously with things that take time to become more efficient, routine things to become automatic, and things that require stage complexity to become more efficient. In the phenomenon of the shift in the 21st century which requires a skill in order to be able to deal with the changes that occur. The skills needed are basic literacy, competence and character. The digital era gave birth to the millennial generation. In the field of education, the teacher functions as a facilitator, while students must be actively involved in learning. The interaction between teachers and students became more intensive. Learning resources are increasingly diverse and more easily accessible either by using books, the internet and others.

Education in Indonesia has a big role in making the Indonesian nation qualified and proactive towards rapid technological advances. Scientific literacy is a skill in using knowledge, solving problems and drawing conclusions related to science.

Scientific literacy ability is a basic competency that must be possessed by

students in the field of science and has been recognized as an important issue that is currently being discussed by all countries including Indonesia. Scientific literacy is not only to understand the concept of science but also to understand the domain of scientific issues in the contextual realm that must develop through technology. This is because many of the materials tested by PISA are not included in the Indonesian curriculum. The Indonesian curriculum must be improved to the maximum aimed at preparing to compete globally. The scientific literacy assessment system should be carefully designed to measure knowledge by taking similar types of questions to PISA to encourage the improvement of students' scientific literacy (Toharudin et al., 2011).

In the era of the 21st century, a generation that has good literacy skills is needed. An effort to improve scientific literacy must also be balanced with a quality assessment (Inzanah et al., 2017). In this regard, a quality literacy assessment is required, in accordance with the objectives and indicators that have been set. So that the results of the assessment are able to show scientific literacy skills accurately. And then able to determine policies that are in line with the orientation and learning objectives that are supported by assessments that will provide good and correct values. An assessment is said to be good depending on the quality of the content of the instrument to be used. If an assessment uses a quality instrument, it will produce correct data (Arikunto, 2016). With the development

of science and the development of the times, an assessment is required to be able to adapt to field conditions. As it should be, a development continues to be carried out in accordance with existing needs and demands.

Scientific literacy is a form of assessment that is real, meaningful to students, so that they are able to develop the ability to think at higher levels so that they can contain components of scientific literacy such as concepts, processes to context (Mueller, 2005).

The presentation above shows that it is necessary to complete the elements of scientific literacy in an assessment instrument. Therefore, we want to know the elements of scientific literacy that are in the seventh grade scientific literacy assessment instrument, so we conducted a study on "The completeness of scientific literacy elements in the seventh grade junior high school science literacy assessment instrument".

## METHODS

This research uses descriptive qualitative research and uses a literature review research approach, namely analyzing scientific literacy assessment instruments, so that research can be carried out that aims to determine the completeness of the elements of scientific literacy in the scientific literacy assessment instrument. The elements of scientific literacy analyzed in this research are science content (knowledge), science

context, and scientific process (competence).

The object of research that will be analyzed in this study is a scientific literacy assessment instrument for seventh grade junior high school students which has been developed by previous researchers. The object of research to be analyzed is the quality of the science literacy assessment instrument for science subjects for class VII students (Muftianah & Wahono, 2018). Second, the development of test questions on heat and transfer material for measuring the achievement of students' scientific literacy abilities (Arfianti, 2015). Aspects of scientific literacy can be seen in Table 1.

**Table 1.** Science Literacy Aspect

Literacy Aspect	Category
Science Content (Knowledge)	1. Information text
	2. Fiction text
Science Context	1. Issue
	2. Activity
	3. Scientific facts
Science Process (Competency)	1. Finding Information
	2. Interpretation and Integration
	3. Evaluation and Reflection

(Asrijanty, 2020)

The data collection technique used in this research is literature study. Literature study is a study of collecting information and data from various materials in the library such as documents, books, magazines, historical stories, and so on (Mirzaqon & Purwoko, 2018). Collecting data by means of literature study in this research, namely by collecting information or data based on

documents and books related to scientific literacy.

The data obtained were then analyzed using content analysis techniques. This content analysis starts from data reduction techniques (collection of data from various information media then summarized and selected according to the research focus), data presentation (data obtained are presented in narrative form), and drawing conclusions (drawing conclusions based on the data that has been obtained).

## RESULTS AND DISCUSSION

Instrument is a measuring tool used to assess something in the context of collecting data in order to obtain the desired information. The function of the instrument itself is made as a measuring tool that must be in accordance with the subjects delivered so that it can meet the assessment aspects (Purwanto, 2011). The results of the research on the completeness of science elements can be seen in Table 2.

**Table 2.** Results of Scientific Literacy Aspects in Scientific Literacy Assessment Instruments

Science Literacy Aspect	Evaluation Instrument	Category	Number of Question
Science Content	Muftianah and Wahono (2018)	Information text	2,3,4,9,15,16,20,24,28,34,35
		Fiction text	8,36,37
	Arfianti (2015)	Information text	26,27,28
		Fiction text	1,16,17,29,30,31,32,33,34,35
Science Context	Muftianah and Wahono (2018)	Issue	6,7,12
		Activity	10,32,33
		Scientific facts	17,18,21,22,25,29
	Arfianti (2015)	Issue	-
		Activity	2,3,4,5,6,7,9,10,11,12,13,14,15,19,22,23,24,25
		Scientific facts	8,18,20,21
Science Process	Muftianah and Wahono (2018)	Information finding	-
		Interpretation and Integration	1,13,26
		Evaluation and reflection	5,11,14,19,23,27,30,31
	Arfianti (2015)	Finding Information	-
		Interpretation and Integration	-
		Evaluation and Reflection	-

An instrument was developed to assess individual aspects of scientific literacy skills (Gormally et al., 2012). Each student is expected to be able to solve scientific problems faced in everyday life. A development of assessment instruments based on

scientific literacy can provide an understanding of the concepts and methods of science, the impact of technology and science on the surrounding environment (Astuti et al., 2013).

Scientific literacy began to appear in 1950, literally meaning literacy means "literacy", while science means natural knowledge (Pahrudin et al., 2019). It is important for students to know scientific literacy in order to know about the environment, health, economy, and other problems that are met by modern society which is very dependent on the progress and advancement of scientific technology (Rusilowati et al., 2018). According to PISA, scientific literacy is the ability to use scientific knowledge, identify questions, and draw conclusions based on evidence in order to understand and make decisions about nature and its changes due to human activities. Scientific literacy has three aspects consisting of science content, science context, and scientific process (Vitasari & Supahar, 2018). These aspects can be used as an assessment of the scientific literacy skills of students. Aspects of science content, the context of science, and the process of science are measuring tools of scientific literacy ability in solving scientific problems in terms of students' cognitive skills. In order to transform the definition of science into assessment, PISA identifies three major dimensions of scientific literacy, namely content (knowledge), the context of science, and the process of science (Toharudin et al., 2011).

Based on table 2 conducted in Muftianah and Wahono's research (2018), aspects of science content (knowledge) are divided into two categories, namely informational texts and fictional texts. Information text is a text that describes a fact, data and

information to develop scientific knowledge, the information text in this question contains 11 questions, namely numbered questions 2, 3, 4, 9, 15, 16, 20, 24, 28, 34, 35. While the fiction text is a text that contains the experience of getting entertainment, enjoying stories, and contemplating to the reader, the fiction text in this matter has 3 questions, namely numbered questions 8, 36, 37. Aspects of the context of science are divided into three categories, namely questions covering science issues, scientific activities, and facts (Asrijanty, 2020).

The question covering science issues is a natural phenomenon or phenomenon that is put forward to be responded to through a systematic process, the scientific issue in this matter there are 3 questions, namely numbered 6, 7, 12. Questions covering scientific activity are activities or scientific methods for someone who wants to get a science or science systematically and sequentially, scientific activity in this matter there are 3 questions, namely numbered questions 10, 32, 33. Questions include scientific facts referring to the simplest knowledge in science in the form of abstract concepts from objects or natural events being studied in science, scientific facts in this matter there are 6 questions, namely numbered questions 17, 18, 21, 22, 25, 29.

Aspects of the scientific process (competence) are divided into three categories, namely finding information, interpreting and integrating, and evaluating and reflecting (Asrijanty,

2020). Finding information is an activity of seeking information, accessing information and finding explicit information in the discourse, in this case there are no questions that fall into the category of seeking information. Interpreting and integrating activities is an activity to understand explicit or implied information by combining interpretations between parts of the text to produce inferences. Interpreting and integrating activities in this matter there are 3 questions, namely numbered 1, 13, 26. Evaluation and reflection activities are credibility assessment activities text, the reliability of the text and being able to relate the contents of the text to things outside the text, evaluating and reflecting activities in this matter there are 8 questions, namely numbered 5, 11, 14, 19, 23, 27, 30, 31.

Based on the research results of Muftianah and Wahono (2018) in the questions made related to scientific literacy, it can be seen that the element of scientific literacy that most often appears is science content as many as 14 questions.

Based on table 2 in Arfianti's research (2015), the aspect of science content (knowledge) is divided into two categories, namely informational text and fiction text. Information text is a text that describes a fact, data and information to develop a scientific knowledge, the information text in this question has 3 questions, namely numbered questions 26, 27, 28. While fiction text is a text that contains the experience of getting entertainment, enjoy the story, and do reflections on the reader, the fictional text in the problem.

## CONCLUSION

The conclusion of this study is scientific literacy includes several elements consisting of context elements (knowledge), elements of science content, elements of the scientific process. So that these aspects must be complete in the scientific literacy instrument.

Based on the results of research studies on scientific literacy instruments, it is concluded that from the aspect of scientific literacy, the two instruments that have been analyzed have one aspect that is not yet included in the scientific literacy instrument, namely the scientific process aspect. In the scientific literacy instrument for the two researchers, the aspect of scientific literacy that often appears is the aspect of science content. So, in measuring scientific literacy ability, all aspects of scientific literacy must be contained in scientific literacy instruments.

## SUGGESTIONS

Based on research data in the implementation of the assessment, educators should use good and correct instruments, educators are expected to understand the literacy aspect because of the lack of understanding of educators about scientific literacy-based instruments.

## REFERENCES

- Arfianti, D. (2015). *Pengembangan soal tes pada materi kalor dan perpindahan untuk pengukuran pencapaian kemampuan literasi sains peserta didik* [Unpublished M.Pd. thesis]. Universitas Negeri

- Yogyakarta.
- Arikunto, S. (2016). *Dasar - dasar evaluasi pendidikan edisi 2*. PT Bumi Aksara.
- Asrijanty. (2020). AKM dan implikasinya pada pembelajaran. *proceedings jendela literasi kita*. Diakses dari <https://lpmpjatim.kemdikbud.go.id/jelita/asesmen-kompetensi-minimum-dan-implikasinya-pada-pembelajaran/>
- Astuti, W. P., Prasetyo, A. P. B., & Rahayu, E. S. (2013). Pengembangan instrumen asesmen autentik berbasis literasi sains pada materi sistem ekskresi. *Jurnal Lembaran Ilmu Kependidikan - Journal of Educational Research*, 41(2), 39–43.  
<https://doi.org/10.15294/lik.v41i1.2228>
- Gormally, C., Brickman, P., & Lutz, M. (2012). Developing a test of scientific literacy skills (TOSLS): Measuring undergraduates evaluation of Scientific information and arguments. *CBE-science education*, 11, 364–377.  
<https://doi.org/10.1187/cbe.12-03-0026>
- Inzanah, I., Ibrahim, M., & Widodo, W. (2017). Pengembangan perangkat pembelajaran IPA berbasis kurikulum 2013 untuk melatih literasi sains siswa SMP. *Jurnal Penelitian Pendidikan Sains*, 4(1), 459–467.  
<https://doi.org/10.26740/jpps.v4n1.p459-467>
- Mirzaqon, A., & Purwoko, B. (2018). Studi kepustakaan mengenai landasan teori dan praktik konseling expressive writing library. *Jurnal BK UNESA*, 8(1), 1–8. Diakses dari <https://ejournal.unesa.ac.id/index.php/jurnal-bk-unesa/article/view/22037>
- Mueller, J. (2005). The authentic assessment toolbox enhancing student learning through online faculty development. *Journal of Learning and Teaching*, 1(1), 1–7.  
<https://doi.org/10.33559/mi.v13i3.1215>
- Muftianah, J., & Wahono. (2018). Kualitas instrumen penilaian literasi sains mata pelajaran IPA untuk peserta didik kelas VII. *E-Journal-Pensa*, 6(3), 458–464. Diakses dari <https://jurnalmahasiswa.unesa.ac.id/index.php/2/article/view/25176>
- Pahrudin, A., Irwandani, Triyana, E., Oktarisa, Y., & Anwar, C. (2019). The analysis of pre-service physics teachers in scientific literacy. *Jurnal Pendidikan IPA Indonesia*, 8(1), 52–62.  
<https://doi.org/10.15294/jpii.v8i1.15728>
- Purwanto. (2011). *Evaluasi hasil belajar*. Pustaka Pelajar.
- Rusilowati, A., Nugroho, S. E., Susilowati, E. S. M., Mustika, T., Harfiyani, N., & Prabowo, H. T. (2018). The development of scientific literacy assessment to measure student's scientific literacy skills in energy theme. *Journal of Physics Conference Series*, 983(1).  
<https://doi.org/10.1088/1742-6596/983/1/012046>
- Toharudin, U., Hendrawati, S., & Andrian Rustaman, H. (2011). *Membangun literasi sains peserta didik*. Humaniora.
- Vitasari, S. D., & Supahar. (2018). Assessment instrument of scientific literacy skills based on nature of science for middle school. *Journal of Development Research*, 2(2), 59–65.

<https://doi.org/10.28926/jdr.v2i2.55>  
Wulandari, N., & Sholihin, H. (2016). Analisis kemampuan literasi sains pada aspek pengetahuan dan kompetensi sains siswa SMP pada

materi kalor. *Journal of Edusains*, 8(1), 66-73.  
<https://doi.org/10.15408/es.v8i1.1762>