An Analysis of Science Literacy Ability of the Students Grade VII on the Environmental Pollution Materials in Pariaman City

Ummul Chairani[1], Linda Advinda[2]

[1,2]Department of Biology Education, Faculty of Math and Science, Universitas Negeri Padang, Sumatera Barat, Indonesia

ABSTRACT: This was a descriptive research. The sample was taken by using a purposive sampling technique. The data were collected by using valid and reliable scientific literacy questions and were supported by interviews. The data were analyzed by calculating the average value of the scientific literacy test results. The validity of the data used triangulation technique. The results showed that the scientific literacy results of the students grade VII based on the total score, aspects of science competence, science knowledge and science context showed that the students grade VII of SMPN 7 Pariaman got the highest average score, followed by the students grade VII of SMPN 2 Pariaman and SMPN 6 Pariaman with low category.

KEYWORDS: Science Literacy, Science Competence, Science Knowledge, and Science Context.

I. INTRODUCTION

Nowadays, science learning in the 21st century is marked by the development and progress of the times in various fields of life, especially in the field of science and technology (IPTEK). Advances in science and technology are very rapid and sophisticated, encouraging educational institutions to prepare the quality human resources and have various skills as a provision to face the challenges and problems of life in the era of modernization and industrialization and are able to compete globally (Yuliati, 2017: 22).

The efforts to produce quality resources can be realized by improving the quality of education. This is in accordance with the opinion of Widhy (2013) that the quality human resources are produced by quality education. Science as a branch of science provides various learning experiences to understand the concepts and processes of science. Science as a science process skill includes observing, asking questions, classifying, and interpreting data, and communicating the results orally or in writing, digging and filtering relevant factual information to test ideas or solve everyday problems (Purnamasari et al, 2018). The implementation of the 21st century education in learning requires students to have critical thinking skills, knowledge and abilities of digital literacy, information literacy, media literacy and mastering information and communication technology to face the 21st century education (Wijaya, et al. 2016: 267). In addition, an important skill that students have in the 21st century is scientific literacy (Rahmadani, et al, 2018: 184). NCRL and Metiri Group (2003) stated that one of the skills that students must possess in the 21st century is scientific literacy.

Scientific literacy is the ability to understand and apply scientific concepts and processes in solving scientific issues and problems encountered in everyday life. Based on the results of interviews between researchers and students, it is known that students have never been tested on scientific literacy questions so that students do not yet know their reasoning abilities in answering scientific literacy questions. The students' statements were supported by the results of the researcher's interview with the science teacher which stated that the students had never been tested on scientific literacy questions and the evaluation instruments that were often used by teachers in learning were still in the form of multiple choice science questions. Then, the cognitive aspect was at the C2 level and had not referred to scientific literacy questions.

Based on the information presented, the researcher analyzed the scientific literacy skills of the students grade VII on environmental pollution materials in Pariaman City. The achievement of students' scientific literacy skills is important to analyze in order to find out the factors that influence the results of scientific literacy and the efforts made to improve scientific literacy so that they can provide the right solution for the problems faced, especially in the field of science and to improve the quality of science learning.

II. RESEARCH METHOD

This type of research was a descriptive research. In this research, no manipulation of the variables was carried out, but described the achievement of students' scientific literacy skills on environmental pollution material in Pariaman City according to the actual conditions. The population in this research was all the students grade VII of SMP in Pariaman City who were actively registered in

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the even semester of the 2020/2021 academic year. The sample was taken by using the purposive sampling technique based on the certain characteristics determined by the researcher. The characteristics of the schools chosen were SMPN with A accreditation, implementing the 2013 curriculum and the schools have certified science teachers. In each selected school, one class was randomly selected as the research sample. Based on the steps in sampling, the list of students who became the samples can be seen in Table 1 as follows.

Table 1. Sample

No	School	Number of Students	Sample
1	SMPN 2 Pariaman	32	
2	SMPN 6 Pariaman	30	94 Students
3	SMPN 7 Pariaman	32	

Source: Data of Research Place

This research was conducted at junior high schools in Pariaman City consisting of three junior high schools: SMPN 2 Pariaman located on Dr. M. Djamil Street, KampungBaru, Pariaman*Tangah*. SMPN 6 Pariaman is located on Gondariah Street, KampungGadang, NorthPariaman. SMPN 7 Pariaman is located on SitiManggopoh Street, Manggung, EastPariaman. The time of the research was carried out in the even semester of the 2020/2021 academic year.

In this research, the researcher used an instrument in the form of a question script in the data collection to analyze the students' scientific literacy. To find out whether the questions were good and appropriate to use in this research, the following steps were carried out.
1. Make a grid of questions.
2. Arrange questions based on the created grid.
3. Validation of questions.
4. Testing the questions.
5. Analyzing the test questions with analysis of validity, level of difficulty and discriminatory power and reliability

Question analysis aims to identify good and bad questions. By the analysis of the problem, it can be obtained a good instrument to make improvements. The details of the techniques and data collection tools can be seen in Table 2.

Table 2. Techniques and Instruments

No	Techniques of Data Collection	Instruments	Types of Data	Sources of Data
I	II	III	IV	V
1	Scientific literacy test	The scientific literacy assessment instrument is in the form of a question script.	The achievement of students' scientific literacy and description of students' answers to each question	Students
2	Interview with the students.	Interview guidelines	Students' perceptions of their achievements and difficulties in working on scientific literacy questions.	Students
I	II	III	IV	V
3	Interview teacher with the	Interview guidelines.	The teachers' perception of the achievements and difficulties of students in answering the text of scientific literacy questions	Teachers

III. RESULT AND DISCUSSION

The research data were in the form of interviews and the interviews have been collected from the research respondents, namely the students and teachers at SMPN 2 Pariaman, SMPN 6 Pariaman, and SMPN 7 Pariaman. The results showed that the achievement

of the students' scientific literacy was relatively low. This can be seen from the mean scores obtained based on the total score, aspects of scientific competence, science knowledge and science context and is supported by the results of the interviews.

Science Literacy Test Results.
a. Science Literacy Test Results Based on the Total Score
The results of the students' scientific literacy achievements based on the total score can be seen in Table 3.

Table 3. Science Literacy Test Results Based on the Total Score

Schools	SMPN 2 Pariaman	SMPN 6 Pariaman	SMPN 7 Pariaman
Mean	49,69	45,83	52,66
Category		Low	Low

b. Science Literacy Test Results Based on the Science Competency Aspect
1) Explaining Scientific Phenomena
The results of the students' scientific literacy achievements based on the aspect of scientific competence in explaining scientific phenomena can be seen in Table 4.

Table 4. Scientific Literacy Test Results Based on the Science Competence Aspect Explaining Scientific Phenomena.

Schools	SMPN 2 Pariaman	SMPN 6 Pariaman	SMPN 7 Pariaman
Mean	47,36	43,85	51,44
Category	Low	Low	Low

2) Evaluating and Designing Scientific Investigations
The results of the students' scientific literacy achievements based on the aspectof scientific competence evaluating and designing scientific investigations can be seen in Table 5.

Table 5. Results of Scientific Literacy Test Based on the Evaluating and Designing Scientific Investigation Aspect

Schools	SMPN 2 Pariaman	SMPN 6 Pariaman	SMPN 7 Pariaman
Mean	49,52	46,41	52,64
Category	Low	Low	Low

3) Interpreting Scientific Data and Evidence
The results of the students' scientific literacy achievements based on the aspect of scientific competence in interpreting scientific data and evidence can be seen in Table 6.

Table 6. Results of Scientific Literacy Test Based on the Science Competence Aspect Interpreting Data and Scientific Evidence

Schools	SMPN 2 Pariaman	SMPN 6 Pariaman	SMPN 7 Pariaman
Mean	52,01	45,24	53,79
Category	Low	Low	Low

The results of students' scientific literacy achievements based on the total aspects of scientific competence can be seen in Table 7 below.

Table 7. Results of Science Literacy Test Based on the Total Science Competence Aspects

Aspects	Total
Explaining Scientific Phenomena	47,63
Evaluating and Designing Scientific Investigations	49,59
Interpreting Scientific Data and Evidence	50,46
Mean	49,22
Category	Low

c. Scientific Literacy Test Results Based on the Science Knowledge Aspect
1) Content Knowledge

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The results of the students' scientific literacy achievements based on the content knowledge aspect can be seen in Table 8.

Table 8.Resultsof Scientific Literacy Test Based on the Content Knowledge Aspect

Schools	SMPN 2 Pariaman	SMPN 6 Pariaman	SMPN 7 Pariaman
Mean	50,12	44,10	53,37
Category	Low	Low	Low

2) Procedural Knowledge
The results of the students' scientific literacy achievements based on the aspect of procedural knowledge can be seen in Table 9.

Table 9.Results of Scientific Literacy Test Based on the Procedural Knowledge Aspect

Schools	SMPN 2 Pariaman	SMPN 6 Pariaman	SMPN 7 Pariaman
Mean	48,88	47,14	51,34
Category	Low	Low	Low

The results of the students' scientific literacy achievements based on the aspect of scientific knowledge as a whole can be seen in Table 10 below.

Table 10. Results of Science Literacy Test Based on Total Science Knowledge Aspect

Aspects	Total
Content Knowledge	49,30
Procedural Knowledge	49,16
Mean	49,23
Category	Low

d. Science Literacy Test Results Based on the Science Context Aspect
1) Personal Context
The results of the students' scientific literacy achievements based on the aspect of personal context can be seen in Table 11.

Table 11.Results of Scientific Literacy Test Based on the Personal Context Aspect

Schools	SMPN 2 Pariaman	SMPN 6 Pariaman	SMPN 7 Pariaman
Mean	50,83	48,00	53,54
Category	Low	Low	Low

2) Local/National Context
The results of the students' scientific literacy achievements based on local/national context aspects can be seen in Table 12.

Table 12.Results of Scientific Literacy Test Based on the Local/National Context Aspect

Schools	SMPN 2 Pariaman	SMPN 6 Pariaman	SMPN 7 Pariaman
Mean	48,96	44,89	51,88
Category	Low	Low	Low

3) Global Context
The results of the students' scientific literacy achievements based on the aspect of the Global Context can be seen in Table 13.

Table 13.Results of Scientific Literacy Test Based on the Global Context Aspect

Schools	SMPN 2 Pariaman	SMPN 6 Pariaman	SMPN 7 Pariaman
Mean	49,06	41,33	52,50
Category	Low	Low	Low

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The results of the students' scientific literacy achievements based on the total Science Context aspects can be seen in Table 14 below.

Table 14. Results of Science Literacy Test Based on Total Science Context Aspect

Aspects	Total
Personal Context	50,85
Local/National Context	48,65
Global Context	47,77
Mean	49,09
Category	Low

Based on the results of the research described above, it shows that the achievement of scientific literacy results for the students grade VII based on the total score, the aspects of scientific competence, science knowledge and science context shows the students grade VII of SMPN 7 Pariaman get the highest mean score, followed by the students grade VII of SMPN 2 Pariaman and SMPN 6 Pariaman with the low category.

IV. CONCLUSION

The research was conducted byusing the instrument in the form of scientific literacy questions describing the scientific literacy achievements of the students of SMPN 2 Pariaman, SMPN 6 Pariaman, and SMPN 7 Pariaman. The results of the study provide the input to the schools to improve the students' scientific literacy. Teachers can use scientific literacy questions as a guide in making High Order Thinking (HOT) questions to improve the students' higher order thinking skills. Scientific literacy questions can also be used by the students for practice in order to train their thinking skills so that they will be accustomed to work on analytical questions.

REFERENCES

1) NCRL and Metiri Group. 2003. *EnGauge 21st Century Skills for 21st Century Learner*. California Metiri Group.
2) OECD. 2019. *PISA 2018 Results (Volume III):Student's Well-being, PISA*. OECD Publishing: Paris.
3) Purnamasari, E., Anhar, A., Advinda, L., &Sumarmin, R. 2018. "The Effect of Problem Based Learning Learning Model Assisted by LKPD on Biology Learning Outcomes of Class XI Students of SMA Negeri 12 Padang*" International Journal of Progressive Sciences and Technologies (IJPSAT)*, 6(2), 347-354.
4) Rahmadani, Y., Fitakurahmah, N., Funky, N., Prihatin, R., Majid, Q., and Prayitno B.A. 2018 Profile of Science Literacy Skills for High School Students (SMA) in Karanganyar. *Journal of Biological Education*. 7(3), 183-190.
5) Widhy, P.2013. Integrative Science to realize 21stCentury Skills in Science Learning in Junior High School.*Proceedings of the 2013 MIPA National Seminar*, Yogyakarta, Pages: 1-13.
6) Wijaya, Y., Sudjimat, D.A and Nyoto. 2016. The Transformation of 21st Century Education as a Demand for Human Resources in the Global Era of Aesthetics. *Journal of Mathematics Education*. 1(2), 263-278.
7) Yuliati, Y. 2017. Science Literacy in Science Learning.*PendasCakrawala Journal*. 3(2), 21-28.