Analysis of VIII Grade Students' Science Literacy Skills in Junior High School in Padang

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Abstract

Purpose of the research was to describe the result of VIII Grade Students' Science Literacy Skills analysis in Junior High School in Padang. It was a descriptive research. Samples were taken by using purposive sampling technique. Techniques of data collection used valid and reliable science literacy test and interview with students and teachers. Technique of data analysis was by calculating average score of students' science literacy test. To test data validity, it used triangulation technique. The finding shows that VIII grade students' science literacy skill in SMPN 1 Padang based on total score, basic competence and science competence has the highest average score with low category. Then, it is followed by VIII grade students' science literacy skill in SMPN Ar-risalah Padang and SMP Manjushri Padang with low category. In conclusion, VIII grade students' science literacy skill in Junior High School in Padang is in low category.

1. INTRODUCTION

Education in the 21st century is characterized by the advance development of science and technology. It demands educational institutions to develop new paradigm in making breakthrough thinking process and arranging concepts and actions so that it can produce qualified human resources (Wijaya, dkk. 2016: 263). Purpose of education in the 21st century is to encourage students to have various skills in prepare themselves to face competition in global. One important skill students should have is science literacy skill (Rahmadani et al., 2018: 184).

The science literacy is an ability to understand and apply scientific concepts and process to overcome scientific issues and problems in daily life. According to Program for International Student Assesment (PISA), science literacy is defined as an ability to use science, identify problems and draw conclusion based on scientific evidences in order to understand and make decision about nature and its changes caused by human beings' activities (OECD. 2016: 10). The science literacy consists of four aspects, which are knowledge/ content science, process/ competence science, context/ application science, and science attitudes.

The knowledge/ content science consists of content knowledge and procedural knowledge. Process/ competence science includes explaining scientific phenomena, evaluating and designing scientific observation, and interpreting scientific data and evidences. Context/ application science includes health and disease, natural resources, environmental quality, danger and latest development of science and technology. Science attitude refers to development of science, carrier in science, use scientific concepts and methods in life (OECD. 2017: 17-21).

The science literacy is important to master by students and it is a learning key in education (Fatmawati, et al., 2015: 152). Based on the explanation, it can be stated that science literacy skill is a fundamental thing that students must have to face globalization and industrialization era in order to fulfill life necessities in various situations. So, it needs to integrate in learning process, especially in learning natural science.

Natural Science (IPA) is a science which studies about organisms, natural phenomena, and underlies the development of technology. According to Sudarisman (2015:30), IPA is very important to all aspects of life. Therefore, it needs to study in order to make all indonesians reach science literacy community.

Students' science literacy skill in IPA can be measured through science literacy based cognitive test by formulating its aspects which include content, process and application in a basic competence (Situmorang, 2016: 55).

the science literacy based cognitive test can be designed through questions related to science, society issues, environmental issues and effects of technology (Situmorang, 2016: 55). Based on the explanation above, it can be stated that students' science literacy skill can be measured by formulating its aspects in a basic competence related to science, scientific and technology issues. After that, it is done science literacy based pretest to students.

The pretest was done while observing to know initial competence of students in VIII grade SMP, who are 15 years old, considered as key age in implementing science literacy (Rustaman, 2003: 6). It was done by taking samples from SMP in Padang based on school status differences. As a result, the samples were SMPN 1 Padang (as a public school), SMP Ar-risalah Padang (as an Islamic school) and SMP Manjushri Padang (as a non-Islamic school).

The result of the pretest can be seen in Table 1 below.

Table 1. Result of Science Literacy Pre-test while observing VIII Grade Students in Padang

No	Name of School	Average Score	Category
1	SMPN 1 Padang	53.62	Low
2	SMP Ar-risalah Padang	44.4	Low
3	SMP Manjushri Padang	34.12	Low

The score above shows that the science literacy skill of SMP students in Padang is low. The lack of students' science literacy skill indicates that they cannot understand science concepts and process well. Beside that, they cannot apply their knowledge about science in real life.

To support the data, interviews and observation were done to students and teachers in Natural Science (IPA) learning process to reveal factors which cause the lack of students' science literacy.

Based on interview with some students, it is known that they do not know about science literacy. In addition, they never see and do science literacy based questions. They also stated that the pretest questions were the first time they did. According to them, it was really different from the questions their teachers provide to previous tests. The science literacy test contains long texts and needs high analysis skill, whereas the test provided by teachers does not have any text and easier to do because the questions is more simple. It is in line with Rukman (2015), who states that lack of students' science literacy skills might be caused by teachers never provide the science literacy based test before, it contains some texts, and students' reasoning skill is still low.

The students' statements are also supported by the result of interviews with IPA teachers. They say that they do not understand science literacy and its demands well. Beside that, evaluation instruments used by teacher in learning process are still in C2 level which does not refer to the science literacy questions.

Furthermore, the lack of students' science literacy might also be caused by the different target of IPA learning process established by schools to fulfill the demands of education in 21st century. It is supported by observation result which shows that IPA learning process has been suitable with learning target established by schools but it does not involve science process or not science literacy based. Consequently, there is a gap between science learning in school and the demands of education in 21st century.

It is also in line with Rizkita (2016) who states that students' initial science literacy skill is still low because learning process does not involved science process. Diana (2015) also adds that the lack of students' science literacy skill is caused by different targets between learning in the school and the demands of education in 21st century.

Pre-test of science literacy test was done to know students' initial skill by using science literacy based test made by other researchers. However, students' science literacy skill based on science literacy based test according to basic competence which is being learned by students during observation is not analyzed yet. Therefore, it needs to analyze students' science literacy skill to get information about their science literacy skill achievement. It is important to know in order to provide appropriate solutions to problems faced by students, especially in science, and to improve IPA learning quality. Based on the explanation above, it was done a research entitled "Analysis of VIII Grade Students' Science Literacy Skill in Junior High School in Padang".

2. RESEARCH METHOD

It was a descriptive research. It used purposive sampling technique to take samples based on similarity and difference status of each school. As a result, there were three schools chosen to be the samples. They were SMPN 1 Padang, SMP Ar-Risalah Padang and SMP Manjushri Padang. The similarity of the three schools is VIII grade students in the schools are learning respiratory system and excretory system. On the other hand, the differences of the schools are SMPN 1 Padang is a public, SMP Ar-Risalah Padang is an islamic school and SMP Manjushri Padang is non-islamic school. In each school, sample class was chosen randomly because they were homogenous.

Techniques of data collection used valid and reliable science literacy test and interview with students and teachers. Technique of data analysis was done by calculating

average score of students' science literacy test. To test validity, it used triangulation technique.

3. RESULT AND DISCUSSION

Data of students' science literacy achievements are collected from reseach respondents (SMPN 1 Padang students, SMP Ar-risalah Padang students and SMP Manjushri Padang students). Data were obtained from students' test and supported by interview with students and teachers.

Result of the test shows that students' science literacy achievement is in low category. The lack of students' science literacy achievement is obvious from the average scores based on total score, basic competence and science competence. Data of students' science literacy achievement are presented in Table 2, Table 3, and table 4 below.

3.1. Result of Science Literacy Test Based on Total Score

Table 2. Result of Science Literacy Test Based on Total Score

No	Name of School	Average Score	Category
1	SMPN 1 Padang	50.89	Low
2	SMP Ar-risalah Padang	46.67	Low
3	SMP Manjushri Padang	34.26	Low
4	Combination	45.6	Low

3.2. Result of Science Literacy Test Based on Basic Competences

Table 3. Result of Science Literacy Test Based on Basic Competences

No	Basic Competences	Average Scores			
		SMPN 1	SMP Ar-risalah	SMP Manjushri	Combination
1	Respiratory System	55.3	52.2	35.29	49.65
2	Excretory System	46.01	40.55	33.13	41.12
Total		101.31	92.75	68.42	90.77
Average		50.66	46.38	34.21	45.39
Category		Low	Low	Low	Low

3.3. Result of Science Literacy Test Based on Science Competence

Table 4. Result of Science Literacy Test Based on Science Competence

No	Science Competence	Average Scores			
		SMPN 1	SMP Ar-risalah	SMP Manjushri	Combination
1	Explaining scientific phenomena	46.15	44.16	31.22	42.05
2	Evaluating and designing scientific observation	54.84	46.03	34.45	47.05
3	Interpret scientific data and evidence	51.36	49.86	37.1	47.59
	Total	152.35	140.05	102.77	136.69
Average		50.78	46.68	34.25	45.56
Category		Low	Low	Low	Low

The result of science literacy test combination based on total score shows that the average score is 45.60. It means that VIII grade SMP students' competence in Padang in answering science literacy questions is still low. It might caused by students do not know about the science literacy. Moreover, they do not know definition of it and they do not know about the result of students' science literacy in Indonesia based on the result of PISA is low.

The lack of students' knowledge about science literacy is caused by learning process in schools is not based on science literacy. It is in line with the result of observation in each school which shows that learning process only focuses on curriculum demands and is not based on science literacy learning. It is also supported by result of interview with teachers which reveals that students do not know about it and teachers do nor implements science literacy based learning in the classroom. Firman (2007: 3) also explains that one cause of students' lack science literacy skill is teachers do not involve science process, like formulating scientific questions in observation, using background knowledge to explain natural phenomena, and drawing conclusion based on the fact obtained through observation, in the classroom.

The lack of students' science literacy might also be caused by they never see and do science literacy test in previous time. According to them, science literacy test is very different from IPA test used by teachers in the classroom. In the science literacy test, there are some long texts which need high reasoning and analysis skill to answer it. Meanwhile, in IPA test usually used by teacher is not as long as in science literacy test and it is easier

The different characteristic between IPA test given by teacher and science literacy test makes students feel awkward and difficult to do the test. It is also supported by the result of interview with teachers who state that students never do the test which needs high level thinking skill because they tend to memorize than to reason.

Moreover, teachers also say that science literacy based evaluation has never been done to IPA learning. It is in line with Karnela (2015: 56) who proposes that one of factors which influences students' science literacy skill is they never do science literacy test previously so that they feel uncomfortable with different type of test. In addition, test usually given by teachers is not an analysis test which does not ask students to use their reasoning skill. As a result, they are not accustomed to reasoning and thinking critically. The lack of students' reasoning in answering science literacy test is in line with Zahara (2012), who explains that students still have low skill in reasoning because the science literacy test is very difficult to answer and needs high analysis to answer it.

The observed Basic Competences (KDs) in this research are KD 3.9 (to analyze respiratory system in human being, to understand respiratory system disorder, and to understand efforts to keep respiratory system healthy) and KD 3.10 (to analyze excretory system in human being, to understand excretory disorder, and to understand efforts to keep excretory system healthy). The average score of science literacy test combination based on basic competence is 45.39. It shows that students' competence in VIII grade of SMP in Padang in understanding and mastering respiratory system and excretory system learning materials is in low category.

When it is analyzed based on Minimum Standard of Mastery set by government, learning process is not successful. According to Ministry of Education (2004: 14), students are master if they master 75% of competence or at least they get score of 75. Result of observation done in each school shows that Basic Competence of Respiratory system and excretory system had been learned. Beside that, the science literacy was done

after mid-term test. So, students should be able to get good achievement because they have learned and prepared the test. However, their science literacy achievement is still low. According to students, it is caused by the test is more difficult than the test given by teachers. Consequently, it affects their science literacy achievements.

The competency which gets the highest average score is Basic Competence (KD) 3.9 about respiratory system. It shows that students more understand and master about respiratory system than excretory system. Result of interview with students reveals that they prefer respiratory system material than excretion system material. According to them, learning material in respiratory system is easier to understand; while, learning material of excretory system is more abstract especially about kidney structure. Furthermore, respiratory system learning material is simpler; while excretory system learning material is more complex and discusses more about mechanisms, like urine production mechanism.

The fact that students are more interested in respiratory system than excretory system reflects that they do not like abstract and complex learning material. It means that they are lazy to think and do not like materials which demand analyzing skill so that their critical thinking skill is low. It is in line with Nuryanti, et al. (2018: 157), who state that SMP students' critical thinking skill is low. It might caused by learning tends to memorize than develop critical thinking skill so that students are weak in delivering their own opinion, analyzing and depending on others than being responsible to their own choice.

The lack of students' critical thinking skill can give bad effect to education. Therefore, the skill should be trained because it will lead students to analyze their thoughts in determining the choices and drawing conclusion well. According to Kurniawati (2016: 399), critical thinking skill should be developed because it will make students able to differentiate between right and wrong, imagination and reality, facts and opinions, and knowledge and belief. Thus, critical thinking students are able to solve problems wisely, finish tasks well, and improve their cognitive competence. One way to train the skill is through science literacy based learning (Haryadi, 2015: 6).

There were three science competence observed in this research. They are explaining scientific phenomena, evaluating and designing scientific observation, and interpreting scientific data and evidences. Average score of science literacy test combination based on science competence is 45.56. It means that competence of VIII grade SMP students in Padang in understanding science content and process is still low.

The science content refers to necessary key concepts of science to understand natural phenomena and natural changes through human activities. Scopes of the science content do not only refer to school science curriculum, but also to knowledge got through other available sources of information.

The science process refers to mental process involved in answering a question or solving a problem, like identifying and interpreting evidence and drawing and explaining conclusion.

The lack of students' ability in understanding science content and process shows that students' knowledge in science is still low and limited to science learned in school. Furthermore, their critical thinking in solving problems is also still low. It is in line with Olyvia (2015: 71), who says that students' ability in solving problems shows unsatisfying result. While doing test, they have difficulty in understanding the questions, thinking and finding an appropriate solution. It is caused by learning activities do not lead them to analyze and solve problems in learning.

Based on the finding, it is obvious that the competency which gets the highest average score is in interpreting data and scientific evidence aspect, while the lowest average score is in explaining scientific phenomena aspect. It means that students are better in interpreting data and scientific evidence than explaining scientific phenomena, evaluating and designing scientific observation.

Students' ability in interpreting data and scientific evidence represents that they have ability to transform data from various representations, analyze and interpret data, and draw appropriate conclusion, identify assumption, evidence and reasoning in the texts, differentiate arguments from scientific or theoretic evidence, evaluate scientific argument and evidence from different sources. Although the average score in interpreting scientific data and evidence aspect is higher than in explaining scientific phenomena, evaluating and designing scientific observation, it is still in low category. It means that students' ability in analyzing and evaluating data, claims and arguments in various representations and drawing appropriate scientific conclusion is still in low category

The lowest science competence in science literacy test is in scientific phenomena explanation aspect. The lack of students' average score in this aspect shows that the lack of students' ability in remembering, understanding and applying scientific knowledge and evaluating various natural and technology phenomena explanation. They are difficult to explain phenomena scientifically because their ability in explaining the phenomena scientifically is rarely tested. It makes them difficult to answer science literacy test in scientific phenomena explanation aspect. Beside that, there is no learning material in syllabus which is related to explain scientific phenomena. Teacher only explains the materials on knowledge level and does not present principles about the phenomena scientifically.

Moreover, the lack of students' average score in scientific phenomena explanation aspect is also caused by their interest to read books is low. They are lazy to read long passages and forget about the materials they memorize. It should be easier for them to explain the phenomena scientifically because they accustomed to learn that something happens as a result of something else. It is based on the fact that in learning process, teacher always teaches them to explain scientific theories by using scientific phenomena which are easy to understand by students. However, it is also influenced by internal factors from students themselves, such as they are lazy to read long passages and forget the materials they memorize. It is in line with Yulianda (2016: 138), who finds that students are used to memorizing learning materials but they cannot understand and apply the materials in their lives so that they are easy to forget the materials. As a result, when they are tested, most of them cannot answer it correctly.

Next, another low science competence in science literacy test is in scientific observation design and evaluation aspect. The lack of students' average score in this aspect shows that the lack of students' ability in explaining and evaluating scientific observation and proposing ways to overcome scientific problems. It is caused by the lack of students' science process. It is supported by Winata et al. (2018: 63), who state that it should be a learning process to train students' science process skills so that they accustomed to do activities related to science literacy, like identifying scientific problems. One way to train students' science process skill is through science literacy based learning. by the teacher at each meeting is different, such as observing videos and pictures. Students are used to applying the DL model so that students can easily discuss with the group to answer the problem formulation that has been given. The different stimulation

provided by the teacher makes students more motivated and active in the learning process.

5. CONCLUSION

Based on the finding of the research above, it can be concluded that VIII grade students' ience literacy skill in Junior High School in Padang based on total score, basic competence and science competence is in low category. The VIII grade students' science literacy skill in SMPN 1 Padang has the highest average score with low category. Then, it is followed by VIII grade students' science literacy skill in SMPN Ar-risalah Padang and SMP Manjushri Padang.

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