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Profile of Science Literacy Skill Domain Knowledge of SMPN 2 Bua Ponrang

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Abstract

The assumptions of the intelligent category of students in society are still based on the assessment of knowledge despite authentic assessment. This study aims to describe the science literacy ability of grade VII students of SMPN 2 Bua Ponrang in the knowledge domain consisting of procedural knowledge, epistemic knowledge, and content knowledge. The research method used descriptive quantitative. The sample is determined by using simple random sampling with the number of sample counted 31person. The results showed procedural knowledge of 37, 34%, epistemic knowledge of 34,91% and content knowledge of 27,94%. Maximum score obtained is 55, an average value of 39.77 and a minimum score of 20. It can be concluded improve the ability of science literacy, especially in the domain of knowledge. This research is hoped to give thought contribution in solving science literacy problem so that it can inspire to design activities and factors that can improve science literacy ability.

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INTRODUCTION

The rapid development of science and technology requires every individual to have basic skills to be used in socializing in the environment, as well as the need for a generation capable of utilizing science and technology that refers to the ability of science literacy (Setiawan *et al*., 2017). Wulandari & Solihin (2016) stated that various efforts are made to encourage education to change along with advances in information technology. Hairani *et al* (2016) concluded that the 2013 curriculum requires learning activities that are interactive, inspirational, fun, challenging and motivating to take an active role in learning activities. The application of learning curriculum 2013 using science literacy as a benchmark in the implementation of learning has not been well realized so that learning should be more on academic objectives and material completion (Haryadi S *et al*, 2015).

One of the markers of the quality of education in Indonesia is the ability of science literacy, the low ability of science literacy indicates that the quality of education is still very apprehensive and needs to be improved (Arisman & Permanasari, 2015). Students are faced with various phenomena and problems in everyday life, they are required to be able to think and be sensitive to the problems existing around them by utilizing their knowledge (Noviani Y *et al*, 2017). Muhajir & Rohaeti (2015) expresses the lack of awareness of the students towards themselves and the social environment of the surrounding community. The lack of responsibility and the students' inability to apply the science learning they get into daily life are an indicator of the low literacy ability of science. One of the educational problems that require attention to be addressed is science literacy (Sari *et al*, 2017).

Teachers have understood the use of learning model and instructional media but they have not been able to optimally teach literacy which includes some aspects. Most of the teacher-centered on academic tasks making the students use less of literacy activities to broaden their knowledge, increase knowledge, and develop student's personality (Mudiono & Madyono, 2014). Hartati (2016) explained that the learning condition also needs to be improved by making the learning process as a learning center (student-centered) during the learning activities. Teachers are required to design and develop science learning that trains students in implementing science skills in everyday life. Thus, the results of the learning design will facilitate the students in understanding science literacy in order to improve the ability of science literacy in all dimensions (Lailatul Q *et al*, 2015).

Literacy of science can be summed up as the ability to apply knowledge about science in everyday life. Learning condition in the modern era requires various parties to keep trying and innovate so that the problem of low literacy skills experienced by students can be solved. The participation of teachers, parents and the environment is needed, so the ability of science literacy is not only the responsibility of teachers. Indonesia have many young teachers and professionals who have been literate on the development of science and have competence in using and processing the technology.

The ability of science literacy in the domain of knowledge is important to be examined. Considering the smart students' assumptions among the people if they receive good cognitive learning outcomes, even though the learning system at school has applied authentic assessment. The result of cognitive learning is obtained from the test about the knowledge possessed by the students so that the public is aware that intelligence is not only due to the influence of one factor but there are several other factors. Thus, this research is done to find out how the science literacy ability of the knowledge domain of SMPN 2 Bua Ponrang students who are unfamiliar with the term of scientific literacy. This research is expected to contribute thoughts in solving the science literacy problem so that it can inspire to design activities and factors that can improve the ability of science literacy.

METHODS

This research uses the quantitative descriptive method. The research is conducted in SMP Negeri 2 Bua Ponrang. The sample of this research is class VII consisting of 31 students which are determined by simple random sampling. The instrument used is the science literacy test consists of 9 items essay test.

The ability of science literacy measured only from the domain of knowledge are aspects of epistemic knowledge, procedural knowledge, and content knowledge. Each aspect consists of 3 items. These three aspects of knowledge will be compared based on percentage analysis. Existing data are also categorized into data on the tendency of science literacy ability to see students' literacy abilities in the very high, high, low and very low categories. The data obtained is used to analyze the level of students' science literacy ability after collecting the data in the form of scores on each aspect of knowledge. Scores obtained by students are then categorized into several groups, described by Table 1.

Table 1. The Formula Category Science Literacy Ability

Category	Formula
Very High Group	$M^i + 1SD_i = X$
High Group	$M_i = X < (M_i + 1SD_i)$
Low Group	$(M_i - 1SD_i) = X < M_i$
Very Low Group	$X < (M_i\text{-}1SD_i)$

(Djemar Mardapi, 2008)

Description:
M_i : Mean ideal
SD_i : Standard Deviation ideal
X : Data

RESULTS AND DISCUSSION

Literacy of science is related to the ability of students in putting meaning and understanding the information, seeking information, science, and facts related to the events experienced in everyday life (Mardhiyyah *et al*, 2016). School as one of the formal educational institutions play an important role in the learning achievement of children. The facilities, curriculum, the interaction between teacher and students, infrastructure to support learning activities, how to teach teachers, and the condition of school environment (Azizah *et al*, 2017). Learning achievement consists not only one domain but also the cognitive, affective and psychomotor domains. In PISA 2015 for the purpose of measurement consists of four dimensions namely context dimension, knowledge dimension, competence dimension, and attitude. In this study, the researcher only measures the knowledge dimension. Knowledge dimension is divided into three, namely content knowledge, procedural knowledge, and epistemic knowledge wherein PISA 2012 (OECD, 2012) knowledge aspect is categorized into the context dimension. The definition of knowledge based on PISA 2015 (OECD, 2013), is the content knowledge including general knowledge of physics, chemistry, biology, earth, and space knowledge. Procedural knowledge is defined as knowledge of standard procedures used by scientists to obtain reliable and valid data. This knowledge is needed to conduct a scientific investigation and to criticize the facts of scientific inquiry to support a particular statement. The epistemic knowledge defined by Duschl is the knowledge to construct and define essential features to build knowledge processes in science and their rules in justifying knowledge formation (OECD, 2013). Epistemic knowledge has a role in justifying the formation of scientific knowledge in control, making decisions, and determining the level of trust based on facts and empirical evidence in the scientific investigation. The justification of such scientific features is used in real life as an individual form that reflects science literacy.

Literacy Level Capability of Science from Knowledge Domain

The science literacy problem of the knowledge domain is tested to students refers to PISA 2015. Question number of 1, 7, and 8 contain aspects of the content, question number 2, 6, and 9 contain procedural aspects, while questions 3, 4, and 5 contain epistemic aspects.

The group is very conducive in this research indicating very high category, the conducive group refers to a high category, the quite conducive group refers to a low category,

and the less conducive group refers to the very low category. Based on the calculation of categories, the tendency of students' abilities can be seen in Table 2.

Table 2. Tendency of Science Literacy Ability

Class interval	Range skor	Frequency	%	Category
44 ≤ X	≥ 44	8	26	Very high
38 ≤ X < 44	38-44	13	42	High
32 ≤ X <38	32-38	7	22	Low
X < 32	< 32	3	10	Very Low

Based on the Table 2, it is found that 21 students are in a very high and high category with a percentage of 68%. 10 students are in the low and very low category with a percentage of 32%. The results of descriptive analysis using SPSS Statistic 16 shown in Table 3 below the maximum scores of science literacy skills knowledge domain obtained by students is 55, minimum score 20, average score 39,77. Score obtained from (student's score) / (maximum score) x 100. Science literacy skill scores acquired knowledge domain if categorized into the minimum completeness criteria determined by the school that is ≥ 75 no students are able to achieve science literacy ability scores in accordance with the minimum criteria, although based on the data tendency of science literacy ability in this study there are in very high and high category but the data has not been able to represent science literacy ability of all students of class VII SMPN 2 Bua Ponrang.

Table 2. The results of descriptive analysis

	N	Range	Minimum	Maximum	Sum	Statistic	Std. Error	Std. Deviation	Variance
VAR00001	31	35	20	55	1233	39.77	1.311	7.302	53.314
Valid N (listwise)	31								

The results of the analysis of science literacy skill test of the knowledge domain, it can be seen that the percentage of student's ability to solve the problems related to science literacy especially on content knowledge aspect, procedural knowledge, and epistemic knowledge.

The analysis result, the score of science literacy ability test students on the aspect of procedural knowledge is 37,34% greater than the epistemic knowledge of 34,91% and the content knowledge of 27,74%. Percentage of each aspect can be seen in Figure 1.

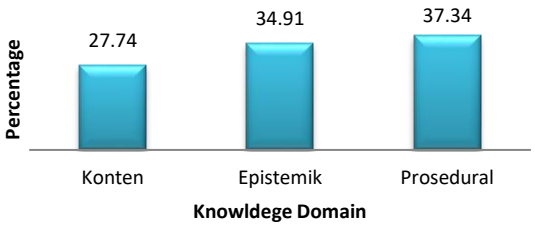

Figure 1. Histogram of Domain Knowledge in Science Literacy

This indicates that the students are more understanding and interested in resolving test questions concerning all the processes that occur and they experience in everyday life. On the question of how the process of digestion of food they eat, because the digestive process experienced by every living creature will make the students be able to answer the problem on procedural knowledge. The students' procedural knowledge is still in the low category due to the percentage achieved is less than 50%. Therefore, another effort should be made to improve the students' procedural knowledge by applying various learning models, such as the research conducted by Irvani, AI *et al* (2017) that compares the procedural knowledge of students who are treated by using the Problem Based Learning model with those who do not use the Problem Based Learning model. Obtained scores of procedural knowledge of students who are treated with learning model are higher than those who are not treated with learning model.

Epistemic knowledge is used to help students solving science and technology problems encountered by students in everyday life in the modern era. Epistemic knowledge can also be defined as students' mastery of accepted science concepts (Fardan *et al*, 2016). The percentage of

epistemic knowledge is still below indicating that the students' ability in the aspect of epistemic knowledge is low. The low ability of science literacy in the knowledge domain is influenced by several supporting factors. Thus, all parties play a role in supporting and influencing the ability of science literacy owned by the students.

Content knowledge in this research refers to PISA 2015 based on students' knowledge of the physics, biology, chemistry, and space encountered in everyday life. The test instrument in the study is made by combining the students' knowledge with the real things found in the surrounding environment related to the science.

The results of this study are supported by research conducted by Aryani *et al* (2016) on the domain of knowledge with procedural, epistemic, and content subdomains. The content knowledge aspect has a higher percentage than the epistemic knowledge and procedural knowledge, whereas in this research the procedural knowledge aspect has a higher percentage than the epistemic knowledge and content knowledge. This difference in results can be due to the unequal knowledge of the students in every aspect of each school. Students of SMPN 3 Batu Kota Malang studied by Aryani, *et al* (2016) are superior in the knowledge aspect compared to students in SMPN 2 Bua Ponrang. On the other hand, the students of SMPN 2 Bua Ponrang are superior in procedural knowledge aspect compared to students of SMPN 3 Batu. It can be concluded that the ability of science literacy in the knowledge domain among Indonesian students is very diverse. The three aspects of the knowledge domain in literacy skills, content science knowledge has the smallest percentage compared to the epistemic knowledge and procedural knowledge. The low ability of science literacy in the domain of knowledge can be caused by the students who are still unfamiliar with the science literacy term. Thus, when students are given a problem in the form of discourse, students find it difficult to work on the questions. Despite, the assessment of science literacy has not been considered by the teachers and the school. Furthermore, the geographical conditions and their parents' occupation as the farmer and fishermen lead them to have less attention to the education of their children.

The research conducted by Pakpahan, R (2016) describes the factors that affect the achievement of student literacy in Indonesia such as (1) A socio-cultural environment such as the condition of the house inhabited by students. This indicates with whom students interact and how far the level of education possessed by their parents; (2) The parents' occupation, parents who work all day also have an influence on student literacy achievement. Parents who work most of the time are still expected to provide supporting facilities such as the book, computer and other means to support learning activity; (3) Identity factor that is the level of student education, students who in early childhood attend school in kindergarten also affect the literacy achievement; (4) Be disciplined to come to school and follow the learning activities; (5) The role of parents and schools in the provision of learning facilities and infrastructure.

Ekohariadi (2009) also concludes that factors affecting the achievement of science literacy are student's attitude, learning strategy using problem-based learning, the learning process in class, educational background of the parents, time used by students to learn, student self-confidence as well as the student's motivation to learn. Masfuah, S (2015) states that personal skills have an influence on the achievement of science literacy. According to Masfuah, personal skill includes the attitude of responsibility, self-confidence, independence, decency, and discipline owned by students. The ability of science literacy is influenced by many factors both derived from the students themselves as well as supporting factors such as teachers and parents. These factors cannot be ignored in solving the problem of literacy. This study also provides answers to the assumptions of people who categorize the intelligence of children only from the knowledge they have as well as the ability of science literacy, students cannot be said to have the ability of science literacy only by judging from one aspect only. However, every aspect should be assessed. Design activities and

factors can be a problem solving to the increase science literacy ability.

CONCLUSION

Based on the research results, it is found that science literacy ability in knowledge domain of procedural knowledge aspect scores of 37,34%, epistemic knowledge amounted to 34,91%, and content knowledge amounted to 27,74% with a maximum score that of 55, a minimum score of 20 and the average value of 39,77. The ability of science literacy students of SMPN 2 Bua Ponrang still falls into the low category because the maximum score of acquisition has not yet exceeded criteria minimum ≥75. Thus, it is necessary to many some efforts to improve the ability of science literacy especially for the domain of knowledge. Hence, people will not always assume that student with good knowledge is a smart one. Moreover, the ability of science literacy is not only built by the knowledge aspect but also it requires support from all parties to improve the ability of students' science literacy not only at SMPN 2 Bua Ponrang but all over Indonesia.

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