

Practicality of Development of Question Biology Science Based on Scientific Literacy on the Organism Classification and the Material and it's Changes Classification and Energy in Life for Junior High School Students of Class VII Semester I

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Abstract – This research is motivated by the unavailability of question based on scientific literacy in school. This is caused by teachers do not recognize of scientific literacy and scientific literacy assessment standards in PISA studies and teacher have not been trained to make question of based scientific literacy. To solve the problem the author develop of question biology science based on scientific literacy the organism classification and the material and its changes classification and energy in life for junior high school students of class VII semester 1.

The purpose of the research is to produce of problem based on scientific literacy that is valid, reliably and practically. This type of research is the development by using models Plomp which consists of preliminary phase, the prototype phase and assessment phase. The instrument used were question based on scientific literacy, validation instrument to collect validity data, instrument of practicality to know the practical level of problem, instrument reliability to find out the test score when tested many times.

The research results shows validity of the matter logically and empirically is 68.06%, the resulting product is valid to improve the scientific literacy of students. The practically test for by teachers to get the value of 78.12% and 89.03% assess students, so that the average be 83.60% with very practical criteria. Reliability of about 0.43% with a medium level of reliability.

Keywords – Scientific Literacy; Validity; Practicality.

I. INTRODUCTION

Literacy of science is the ability to apply concepts or facts obtained in school with natural phenomena that occur in everyday life. In addition, science learning more emphasis on providing direct learning experience, so that students can understand the nature around scientifically. Literacy of science is a goal to be achieved by the subjects that on science (biology, physics, chemistry and earth sciences). Science literacy assessment program for international students has been launched since 2000 until now. The 2003 PISA study argued that science literacy is a living skills element that should be the key to the educational process.

Based on measurement data of Program for International Student Assessment-Organization for Economic Cooperation and Development (PISA-OECD) in 2012 it is known that the ability of science literacy in Indonesia is still low category.

The result of PISA research on the science literacy of Indonesian students in 2003 put Indonesia on the order of 38 out of 41 countries participating in science literacy test. While in 2006 Indonesia ranks 50th out of 57 participants. In 2009 the science literacy scores of Indonesian students were on the order of 60 out of 65 participating countries, while in 2012 Indonesian students scored 383 in rank 64 of 65 participants of the State. This shows that the score of Indonesian students' science literacy is not very encouraging.

Several studies have measured and analyzed students' difficulties in working on science literacy. One of the factors influencing the low literacy of students' science is that the learning process does not support students in developing the science literacy skills, students who are not accustomed to working on discourse problems, and science literacy tests are more difficult than the usual teacher test questions.

According to Hamzah (2016:40) the basis of scientific literacy measurement based on PISA is to use knowledge and identify problems to understand facts and make decisions about nature and changes that occur in the environment. Meanwhile, tests used by teachers have not been fully compatible with the scientific literacy measurement grounds.

Based on interviews conducted at SMPN 11 Padang found that the unavailability of question biology science based on scientific literacy, teachers generally do not recognize the science literacy even the term science literacy as foreign to teachers, the unavailability of problems that are designed that demand reasoning in answering, teachers are not yet accustomed to making question biology science based on scientific literacy, according to science teachers during this school only encourages students to memorize, so less attention to aspects of applying knowledge. The learning orientation that is still fixed on this memorization is also proven from daily repetition of the material classification of living creatures are at the level of C1 53%, C2 33% and C3 13%, daily repetition of material classification materials and the changes are at the level of C1 60%, C2 30% and C3 10%, daily replication of energy matter in life is at the level of C1 70%, C2 20% and C3 10%. The semester test is at C1 level 55%, C2 35%, C3 10% and very rare until C4 stage, while according to PISA 2006 the questions that meet the criteria of science literacy are C4-C6. Suciati (2010: 2) adds a learning appraisal in the national education curriculum demanding understanding of high-level science concepts (C4, C5 and C6).

Huryah (2015) has conducted research on science literacy review of high school students of class X in Padang City by using some literacy of science that is translated. From the result of the research, it can be concluded that the students' science literacy is still moderate. Miswati (2016) has also conducted science literacy test on science Olympics participant held at State University of Padang followed by junior and senior high school students by using all components of science literacy and obtained the result of science literacy of Olympic students included in low category.

The 2013 curriculum not only makes cognitive a primary goal, but skills are also an important component. Skills demanded in the 2013 curriculum include 1) reasoning skills; 2) graphic reading skills; 3) the skills of communicating information; 4) skills to interpret data. These skills are an important component that is also discussed in the PISA study. Even in Kemendikbud (2013:4) it is said that the Curriculum 2013 is considered as the key to boost the legacy

of science literacy value of Indonesian students. Therefore the development of question biology science based on scientific literacy is very important to do to support the curriculum program.

Tests on science literacy have been conducted in several junior and senior high schools in Indonesia, including in West Sumatra. But the results obtained almost the same that the level of science literacy students is still relatively low. According to the researchers' analysis after making observations to several schools. This is caused by students who have not been trained to do question biology science based on scientific literacy because the problems have not been based on science literacy that is not available in school.

Based on the above problems and considering the importance of science literacy for a student then the researcher will conduct research by title "Development of Question Biology Science Based on Scientific Literacy on The Organism Classification and The Material and it's Changes Classification and Energy in Life for Junior High School Students of Class VII Semester 1".

II. REVIEW OF LITERATURE

1. Practicality

According to Arikunto (2012: 77), a test is said to have high practicability if the test is practical and easy in administration. Purwanto (2009: 141) states, a test is said to have good practicality if the possibility to use the test is large.

Arikunto (2012: 77) states that, a test is said to be practically the following test. (1) Easy to implement, for example does not require a lot of equipment and give freedom to students to do in advance the part that is considered easy for students. (2) Easy examination, meaning that the test is equipped with a key answer and scoring. For the objective matter, the examination will be easier to do if done in the student answer sheet. (3). Equipped with clear instructions to be given / initiated by others.

2. PISA (*The Program for International Student Assessment*)

It is a study of national level student appraisal programs organized by the Organization for Economic Cooperation and Development (OECD). PISA aims to examine periodically the ability of 15-year-old students in reading (reading literacy), mathematics (literacy), and science (literacy). The research conducted by PISA covers three periods, namely 2000, 2003, and 2006. In 2000 PISA

research focused on reading ability, while the other two aspects became companion. In 2003 the mathematical aspect became the main focus and then passed the IPA aspect in 2006.

PISA measures students' ability at the end of compulsory education to know the readiness of students to face the challenges of today's knowledge society. Assessments undertaken in future-oriented PISA are testing the ability of young people to use their skills and knowledge in dealing with real-life challenges, not merely measuring the capabilities listed in the school curriculum. In PISA there are three aspects, namely reading aspect aims to know the ability of students in understanding the reading (understanding), using (identifying) the information contained in the reading and reflecting and evaluating the reading (reflecting on written text). Mathematical aspect aims to know the ability of students in identifying, understanding and using the basic mathematics that students need in the face of everyday life science aspect aims to know the ability of students in identifying problems in order to understand the facts of nature and environment and use his knowledge to understand the various natural phenomena and changes that occur in the environment of life (Hayat, 2010: 95).

Each country that joins the PISA must follow established procedures such as trial, survey, use of questionnaire tests, population determination, sample management, data analysis and quality control. The design and implementation of the study is under the responsibility of an international consortium comprising The Australian Council for Education Research (ACER) and WESTAT United States (Kemendiknas, 2011: 28)

3. Literacy of Science

The term literacy of science or literacy was first introduced by Paul de Hurt of Stanford University. Hurt defines science literacy as an act of understanding science and applying it to the needs of society (Fitriyanti, 2007: 67). Literally literacy comes from the word literacy which means literacy or literacy eradication movement.

Science literacy is defined as the ability to use science knowledge, identify questions, and draw conclusions based on evidence, in order to understand and make decisions regarding nature and changes made to nature through human activities (Firman, 2007: 50). Furthermore Firman (2007: 51) states that a person whose science literacy has knowledge and understanding of the fundamental concepts of science, the skill of conducting the scientific inquiry process, applies

such knowledge, understanding and skills in a wide variety of contexts.

Science literacy also requires the ability to use scientific inquiry, such as identifying the necessary evidences for answering scientific questions, recognizing problems that can be solved through scientific inquiry (Rustaman, 2013: 6). Furthermore Rustaman (2013: 7) states that science literacy is considered a key learning outcome in education at the age of 15 for all students, whether to continue studying science or not afterwards.

The dimensions of literacy include content, process and context. The content of science literacy refers to the key concepts necessary to understand natural phenomena and the changes made to nature through human activity. In this connection PISA does not specifically limit the scope of science only to the knowledge that is the subject of school science curriculum, but includes knowledge that can be obtained through other sources. The concepts are drawn from the fields of biology, physics, chemistry, and earth and space science, which are related to major themes (Permendikbud, 2014: 33).

In the process, science literacy accesses students 'ability to use scientific knowledge and understanding, such as students' ability to search, interpret and treat evidence. The process of science refers to the mental processes involved when answering a question or solving a problem, such as identifying and interpreting evidence and explaining the conclusion (PISA, 2006: 6).

PISA (2006) establishes five components of the science process in science literacy assessment: 1) recognizing scientific questions, ie questions that can be scientifically investigated, such as identifying questions that can be answered by science; 2) identify the evidence required in a scientific investigation. This process involves identifying or submitting evidence necessary to answer a question in a scientific inquiry, or procedure required to obtain the evidence; 3) attract and evaluate conclusions. This process involves the ability to relate the conclusions to the evidence that underlies or should underlie that conclusion; 4) communicating valid conclusions, expressing precisely the conclusions drawn from available evidence and 5) demonstrating an understanding of the concepts of science, ie the ability to use concepts in situations different from what they have learned

III. METHODOLOGY

This type of research is research development (research and development). The development of question biology science based on scientific literacy uses a plomp model consisting of three stages, namely preliminary research phase, prototype phase, and assessment phase. Subject of this research is validator, teacher of science field study and student of class VII. The trial of this research was conducted at SMP Negeri 11 Padang.

In the assessment phase, a practicality test is conducted. This practicality test is done by using questionnaires of practicality test for students and teachers. Practicality test is done by students who follow the field test and teachers SMPN 11 Padang. Practicality test question is a practicality test question used by the teacher to assess the level of student science literacy. This activity is carried out to find out the benefits, ease of use and efficiency of time used by students to do the question biology science based on scientific literacy. Sukardi (2008: 69) suggests practicality considerations can be seen in the following aspects: (1) ease of use, including easy to manage, stored, and can be used at any time, (2) the time required in the implementation should be short, fast and precise, (3) the students' appeal to the questions presented, (4) easily interpreted by other teachers and teachers, (5) has the same equivalence, so that it can be used as a substitute or variation.

In this study the practicality of the question is done to see the response of subject teachers and students' responses. Practicality test question done with the steps as follows:

a. Teach practicality by teachers

- 1) Researchers provide guidance on how to fill out a questionnaire to the teacher.
- 2) The teacher reads the problem, observes the research implementation and the teacher is given the opportunity to the students to ask the students' opinions in doing the question biology science based on scientific literacy.
- 3) Teachers are required to fill out a questionnaire that already contains statements on question biology science based on scientific literacy issues.

b. Practicality testing by students

- 1) Provide question biology science based on scientific literacy and provide direction in working on the problem.
- 2) Students working on question biology science based on scientific literacy with time 90 minutes.

- 3) Provide direction to students to fill in the questionnaire.
- 4) Students are required to fill out a questionnaire that already contains statements about question biology science based on scientific literacy issues they have been working on.

IV. RESULTS AND DISCUSSION

1. Result of Phase Assessment

a) Practicality of Question Biology Science Based on Scientific Literacy by Master

In the framework of improvement and development of question biology science based on scientific literacy with the components of science literacy along with the curriculum in force in the school then the teacher's practicality assessment is required. Science subject teachers also participate assess the practicality of the problem, because teachers also participate in learning activities at school.

Based on the teacher's response to the practice of question biology science based on scientific literacy, it is known that the whole matter is considered very practical by obtaining a value of 78.12%. Details of the results obtained for each aspect of question biology science based on scientific literacy practice can be seen in Table 1.

Table 1. Details of Results Obtained for Each Aspect of Practicality of question biology science based on scientific literacy

No.	Aspect of Assessment	Average (%)	Category
1.	Ease of use	77,77	Practical
2.	Time effectiveness	75,00	Practical
3.	Interpreting	79,16	Practical
4.	Equivalence	80,55	Practical
Average		78,12	Practical

Practicality of question biology science based on scientific literacy by teachers by assessing 4 aspects such as aspects of ease of use, time effectiveness, interpretation and equivalence is considered very practical by teachers, so that the product developed in the form of question biology science based on scientific literacy can be used to support the effectiveness of learning in school.

b) Practicality of Question Biology Science Based on Scientific Literacy by Students

To know the student's response about the practicality of question biology science based on scientific literacy, students are asked to fill out questionnaires practicalities. Based on the analysis of the student response questionnaire, it is known that in general the students assess the question biology science based on scientific literacy that meets the practical criteria to be used. The data of students' practicality can be seen in Table 2.

Table 2. Practicality Test Results of Question Biology Science Based on Scientific Literacy by Students

No.	Aspect of Assessment	Average (%)	Category
1	Ease of use	88,80	Very practical
2	Effectiveness time	89,84	Very practical
3	Interpreting	87,90	Very practical
4	Equivalence	89,58	Very practical
Average		89,03	Very practical

Practicality of question biology science based on scientific literacy by students by assessing 4 aspects such as aspects of ease of use, time effectiveness, interpretation and equivalence assessed practical by students, so that the product developed in the form of question biology science based on scientific literacy can be used to support the effectiveness of learning in school.

2. Discussion

Practicality of Question Biology Science Based on Scientific Literacy

a) Practicality of Question Biology Science Based on Scientific Literacy by Master

The data analysis of teacher practicality test results showed that the science-based literacy question on IPA subjects produced fulfilled the practical criteria with an average value of 78.12%. It shows that this developed problem is practical from the aspects of ease of use, the effectiveness of time, interpretation and its equivalent to the

subject matter taught in the school. Assessment with practical criteria given by teacher to easiness aspect in using this problem because of problem does not have to have special skill in its use. The question of having a guide sheet of use and filling out questions that facilitate the teacher in understanding how to answer each item of questions contained in this science-based literacy questions. Zuriyani (2012: 95) argues that to measure the practicality of the instrument is to see whether the teacher (and other experts) consider that the material is easy and can be used by teachers and students.

The effectiveness aspect of the timing of the test is considered practical by the teacher with a score of 75.00%. This means that development of question biology science based on scientific literacy support the implementation of tests that are quite effective and efficient enough. Viewed from the aspect of interpreting 79.16% score means practical. This indicates that according to the teacher about question biology science based on scientific literacy is easy to understand and the discourse contained in the matter is displayed with a context that is very close to everyday life. According Hayat (2010: 78) the preparation of tests should be prepared by allocating time. Adjust the lesson time and approximate length of time the students need to complete all the questions.

Equivalence aspect means there is a relationship or equivalent. In this case the researcher tried to see the teacher's appraisal of the material relation to the problem with the demands of the curriculum in the school. From this aspect, it is found that 80.55% with practical criteria means that the matter already has equality with the curriculum applicable in school. The equality in question is within the scope of the assessment instrument. Where assessment in schools that have been referring to the curriculum 2013 not only assess the cognitive aspects, but also the process skills. Equivalence is the corresponding relationship between a particular lingual unit and another lingual unit in a paradigm.

In terms of material, this problem also already has equality with the demands of curriculum applicable in schools, because the curriculum that includes the syllabus of learning has become a reference for authors in designing question biology science based on scientific literacy. In a large dictionary of Indonesian practicality is defined as a practical or efficient. Arikunto (2010: 48) interpret the practicality in the evaluation of education is the ease of existing in the evaluation instrument in preparing, using, interpreting / obtaining results, as well as ease in storing it.

b. Practicality of Question Biology Science Based on Scientific Literacy by Students

Analysis and test results of practicality by students of class VII SMP 11 Padang show that question biology science based on scientific literacy meets very practical criteria. This means students can understand and use this science-based Biology science literacy. Students assess the problem in terms of convenience with the criteria very practical because the problem already contained instructions for use and filling the problem clearly. These instructions are indispensable in every test. For the suitability of the material with the curriculum in the school students also assess very practical because the material tested has become their learning objectives also in school. The difference is only on the difficulty level of the problem. Question biology science based on scientific literacy demands high-level analysis of students, while they are not yet familiar with such questions in schools. So when finished doing the question there are some students who revealed that the time is less. This is supported also by some students' suggestions on the worksheet sheet.

V. CONCLUSIONS

Based on the research development that has been done, has generated question biology science based on scientific literacy for students' class VII have practicality with category very practical.

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