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Study of Students Ability to Solve PISA-like Test with Indonesian Contexts in Physics Education of Faculty of Teacher Training and Education Sriwijaya University

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Abstract-This study is aimed to describe the students' ability to solve PISA like test. The study was a descriptive study that was carried out with 22 5th semester students oh physic educatoin departemen, Faculty of Teacher Training and Eeducation, Sriiwijaya University. The instrument used was PISA like test with Indonesian contexts and consist on 3 levels (low, medium, and high). The data analyzed were both quantitative and qualitative techniques. The finding shows that 91% of the students could solve the instruments at low level, 71% were at medium level, and only 45% of students could solve the test at high level. Based on interviews conducted, it was revealed that the students' ability in solve PISA like test at low level was because the students have not been able to use scientific concepts that have been studied in solving the test, in addition to the students' concepts mastery with other concepts- wich have not been comprehensive, and the student have not been trained to find correlation between one of the concepts with others.

Keywords: students' ability, PISA like test

1. Introduction

Constitution of The national Education System No. 20 of 2003 declare that the function of education are to develop skills and build the character and prestige nation civilization in the context of the intellectual life of the nation. Related with the function, education must be organized to make every learner is able to compete in the local, national, regional and the global level.

To see the results of the education process that is able to compete globally, it is evaluated in the form of assessment or assessment education process so as to map the educational outcomes position of a country compared with other countries. One of the programs launched by the OECD (Organization for Economic Co-operation and Development) is the Program for International Student Assessment (PISA), which is a program to assess reading literacy, mathematical literacy and scientific literacy.

PISA's instruments contained in the assessment on the ability of reasoning and thinking skills. Learners may be able to capable a particular science concept, but not necessarily be able to use his science knowledge to understand or solve a problem in the real world because it does not capable way of thinking, so that we can conclude his science literacy is low.

Scientific literacy is one domain of PISA studies. PISA assesses scientific knowledge relevant with science education curriculum in the participating countries without limiting ourselves to the general aspects of the national curriculum of each country. PISA assessment framed in the general life situation of a broader and is not limited to life in school. Those items on the PISA assessment focuses on the related situation to the individual, families and groups of individuals, related to the community (social), as well as related to the cross-country life (global). PISA context includes the areas of application of science in setting personal, social and global, namely: (1) health; (2) natural resources; (3) the quality of the environment; (4) the danger; (5) the development of cutting-edge science and technology.

Scientific literacy is defined as the capacity to use scientific knowledge, to identify questions and draw conclusions based on the facts to understand the universe and make a decision on the changes that occur due to human activity. The National Science Teacher Association (NSTA, 2003) states that scientific literacy is important to measure because the measurement results can provide information that a person who has knowledge of the facts, concepts, and networking concepts and process skills that enable a person to think logically. People who have literacy science in everyday life can be seen from the way he thinks and works. Scientific thinking is the demand of every citizen, and not just scientists. Thinking of people who have science literacy is always doing with the procedures specified, and in the process draw conclusions always use the data, and connect between the data. The realization of citizen science literacy according to the PISA (2006) is characterized by working and thinking scientifically.

If we observe the apparent reality around us, there is no doubt how powerful the influence of science on human life order. Technology as a form of application of science products, has provided a good change noticeably change for the benefit of human life and the changes that can endanger human life itself.

There are many reasons why science literacy a citizen is considered important to develop. First, understanding natural science offers personal fulfillment and joy, for the benefit to be shared with anyone. Second, countries are faced with the questions faced in his life that requires scientific information and ways of scientific thinking to take decisions and important of peoples who need to be informed, such as air, water and forests. Natural science understanding and ability in science will also increase the capacity of students to hold an important and productive work in the future. In the international scientific literacy scale capability is divided into six ability levels, namely level 1, which is the lowest level, to level 6, which is the highest level (OECD, 2013). In this paper, the literacy skills are grouped into three groups, namely low-level, medium level and high level and will be presented the results of a study on the ability of the students solve problems similar to PISA in the context of Indonesia.

2. Research Methods

This research is a descriptive research that aims to analyze the student's ability to solve problems like PISA in the context of Indonesia. Instrument test like PISA compiled based on context, content, and competence. Instrument compiled consists of three categories, namely low category (level 1 and 2) consisting of 15 multiple choice questions, the medium category (level 3 and 4) consisting of 6 questions in the form of discourse and participants give answers based on the information contained in the discourse, and high categories (level 5 and 6) consists of 6 questions open ended. The study was conducted in the first semester 7th students of academic year 2015/2016 in Physics Education Study Program FKIP Sriwijaya University. Data were collected using interviews, and document results of student work. The data were analyzed descriptively (qualitative and quantitative).

3. Result and Discussion

Based on the analysis of student answer to the questions provided, obtained the following results.

Table 1. The mean ability of students is based on the level of question

No	Problem Level	Mean (%)
1	Low Level	91
2	Medium Level	71
3	High Level	45

Table 1 shows that the low-level questions can be answered well by most (91%) students. Mistakes that made by students caused not because they do not understand the concept, but it is because students are not careful and less observant in understanding of the problem, and the students

interpret the question is not in suitable with the context of the question. In Figure 1 is shown question and examples of student answers.

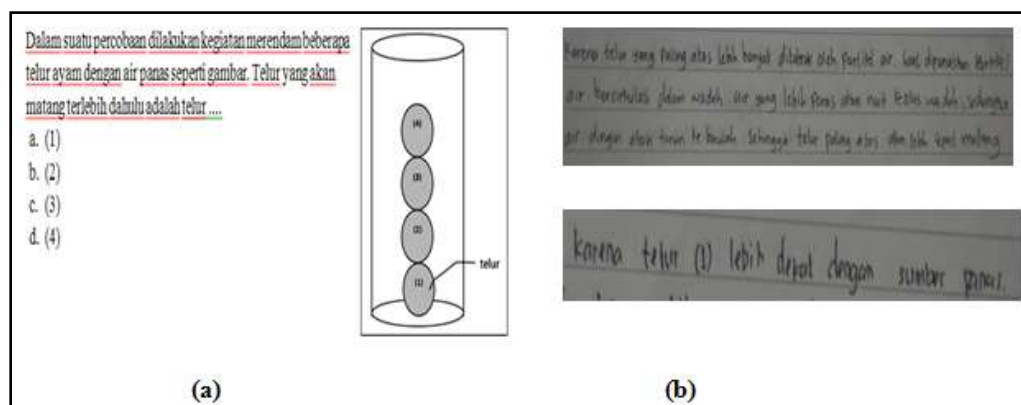


Figure 1. a. Examples quotation of question b. examples of student answers

For problems that are often encountered students in learning, students can finish well. An example is the physical phenomena of the first law of Newton (inertia), students can integrating their knowledge in solving problems.

Problems for the medium level, the average of student's ability to solve problems getting decline, and only 75% of questions that can be answered with either. Weakness students in solving problems at the medium level is because (1) has not been able to integrate the scientific knowledge to be used in solving the problem, (2) have not been able to utilize the available information on the discourse to be used in problem solving.

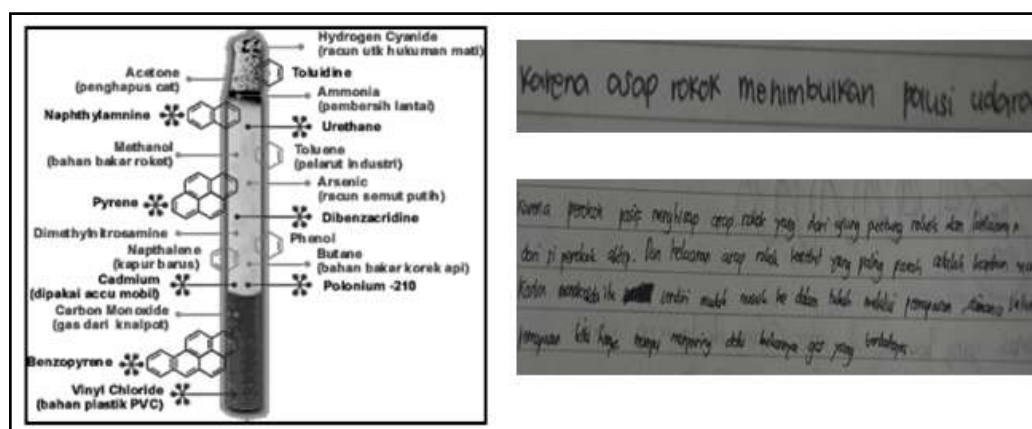


Figure 2. Example of questions and answers about the PISA student in the context of health.

Figure 2 is an example of a medium-level problems associated with the health context. There is a discourse with pictures. Students are asked to answer questions Why passive smokers are at greater risk of smoking than active smokers? Based on the responses of students, the majority (80%) students were not using the information that available in the figure, that the substances contained in cigarettes and the most harmful to health is hydrogen cyanide (poison for the death penalty), and the position of these substances is closer to the smoker passive compared with active smokers. Likewise, the problems in the sample medium oil stove explosion. In figure 3 is shown question and examples of student answers. Based on the answer of students, it appears that the student has not been able to link the concept of density in the context of the

problems. However, after the interview, student can directly explain the problems with using the concept of science. The inability of students to explain and solve problems using scientific concepts it has caused have not been able to integrate scientific knowledge in real situations. Scientific knowledge possessed by students still at the boundary of theoretical knowledge. So that students can use theoretical knowledge, then student must often faced with real phenomena that occur in real life.

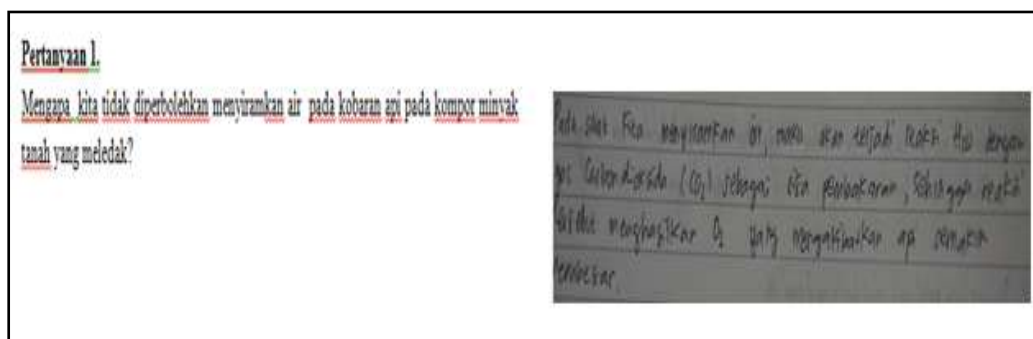


Figure 3. Student's example questions and answers about the content question in accordance with the real situation.

The student's ability to solve the problems at the high level is getting low, and only 45% student that can solve problems well. Problems at a high level. Students are required to be able to use the content, procedural knowledge and their own knowledge consistently to give an explanation in a variety of complex real-life situations that require a high level of cognitive ability are complex. In resolving the problems at the high level, students have not been able related between one concept with another concept to be used in problem solving. In Figure 4 are given the questions and examples of student answers.

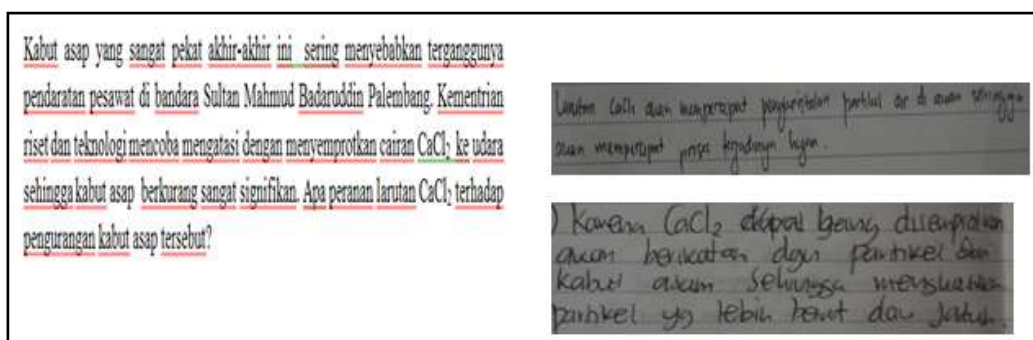


Figure 4. Problem and examples of student answers on the science competence to provide a scientific explanation aspects.

In Figure 4 on aspects of scientific competence, only a small proportion (14%) of students who can provide answers to the logical scientific explanation, in which the answer to associate the concept of bonding between the particles (chemical) with the concept of gravity (physics).

4. Conclusion

Based on the results of research and discussion, the following it can be summarized:

1. The ability of the students solve problems similar PISA still at a low level.
2. Students have not been able to integrate the scientific knowledge to be used in solving the problem.

3. Students have not been able to utilize the available information on the discourse to be used in problem solving.
4. Students are still having trouble in linking between concepts to solve problems.

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