Analysis of junior high school students ‘capability on completing mathematical problems of the PISA model using the Lubuklinggau context reviewed from the PISA level

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Abstract. This study aims to describe the ability of junior high school students to solve PISA mathematical problems using the Lubuklingau context in terms of the PISA level. The subjects in the study were students of class IX.5 Middle School 5 Lubuklinggau. The method in this research is descriptive qualitative method. The instruments and data collection techniques used were test sheets and questionnaires as well as interview guidelines. Data analysis of data through 3 channels, namely data reduction, data presentation, and drawing conclusions. The results obtained indicate that the level I PISA Problem in the category is excellent with an average value of 91.07, level II in the category is excellent with an average value of 91.96, level III in the good category with an average value of 72.45, level IV in the good category with an average value of 61.61, level V in fair category with an average value of 58.16, and level VI in poor category with an average value of 38.10. So it can be concluded that the ability of class IX students of SMP Negeri 5 Lubuklinggau in solving mathematical problems using the PISA model Lubuklinggau context in terms of PISA level is included in both categories with an overall average value of 68.89.

1. Introduction
Globalization is characterized by demands for every community to have various competencies or abilities to be able to compete [1]. One of the important abilities possessed by every Indonesian is literacy. According to the OECD that mathematical literacy is the ability of individuals to formulate, apply, and interpret mathematics in various contexts [2]. Mathematics learning in Indonesia has been designed so that literacy skills are owned by every student. Indonesia has participated in international studies that assess students' literacy abilities through the Program for International Student Assessment (PISA). The Program for International Student Assessment (PISA) is a test system initiated by the OECD (Organization for Economic Cooperation & Development) for evaluation in education system from 72 countries around the world. PISA measures what a student knows and what student can do (application) with the knowledge and every three years, students 15 years chosen at random, to take a test of three basic competencies in reading, mathematics and science [3]. This age of 15 is the final transitional age from the age of compulsory education [4]. This means that the student has obtained knowledge and the skills to participate in modern society OECD [5].

As for things there are updated in the PISA study includes mathematical literacy, literacy reading and literature. Questions in the PISA study include questions that require higher-order thinking (HOT)
skills for each student. Besides that, this PISA study uses a broader context and uses a higher level, level one to level six. According to OEAC, these sixth levels have different characteristics, ranging from differences to generalizing complex differences [6]. This has become one of the problems for Indonesian students because students in Indonesia are still very difficult to improve higher thinking skills (HOT). The results of the PISA study from 2000 to 2012 which showed the ability of Indonesian students is still far from expectations [7]. This fact can be seen in the years 2006 to 2012 Indonesia's PISA mathematics rank continues to decline. The lowest rank was obtained by Indonesia in 2012, which ranked 64 out of 65 countries participating in PISA mathematics [8]. However, in 2015 Indonesia is increasing whose optimism is still low compared to the average OECD. Based on the average value, there was an increase in the value of PISA Indonesia in the three competencies tested. The biggest increase was seen in science competence, from 382 points in 2012 to 403 points in 2015. In mathematics, competence increased from 375 points in 2012 to 386 points in 2015. Reading competence has not shown a significant increase, from 396 in 2012 to 397 points in 2015. Raise the position in Indonesia to 6th place above when comparing the second position from the bottom in 2012 [3].

The results of the three-year PISA study revealed variations that were agreed on Literacy achievement based on three aspects. First, aspects of the role of the school have been shown to influence the achievement of students' science scores, it is recommended that students who score high for scientific literacy because of the importance of the principal's role, fulfilling their responsibility for good headmaster, their students supporting higher grades in science. If calculating principals who support students' achievements and reporting them openly, then their PISA award rates prove to be higher. Regarding education programs, it is very important to see the interests of students in the future to be able to compete with other countries in the era of globalization. The ability of students to solve PISA questions needs to be known because it is useful for teachers to assess how high a student's abilities are and their readiness to compete especially in schools in Lubuklinggau.

From the statements above, the results of the PISA study provide a lot of information which is very important for the quality of education, especially for teachers, which is to add information to use data from PISA as a reference to support teaching materials. Based on the above description, the researcher will analyze the ability of junior high school students to solve PISA mathematical problems using the Lubuklinggau context in terms of the PISA level.

2. Methods
This research used a type of descriptive qualitative research method, designed to learn student mathematical understanding ability in solving PISA mathematical model problems using the Lubuklinggau context that has been approved for validity and practicality according to the development that has been done in the discovery. The sample in this study was grade IX.5 students of junior high school state (SMPN) 5 Lubuklinggau. The sample chosen with the consideration of the students mentioned earlier is 15 years according to the PISA question criteria.

Data collection is put forward in qualitative research, the main data collection techniques are tests and in-depth interviews, then complete combination or triangulation [9]. (1) tests used to determine students' mathematical abilities in solving PISA mathematical model problems using the Lubuklinggau context include a description of the results of development that have been carried out by researchers who have obtained validity and practicality and in accordance with the level or ability in PISA, (2) interviews to know how students work on problems and collect data related to students' ability to solve problems.

Techniques of data analysis used in this research are qualitative data analysis, which includes: (1) data reduction, in this case, the researcher reports the results of interviews and collects test data and distribution of informants related to students in solving questions, (2) data presentation. This also forms a narrative text, text in the form of notes from interviews with research information as structured information that provides an assessment of the factors that enhance students' ability to solve problems.
problems, (3) PISA questions given to students and the results of interviews conducted by researchers to students seen from the grades of students obtained viewed through the PISA level.

This research was conducted on students of class IX.5 SMP 5 Lubuklinggau with twenty-eight of students, symbolized by S1, S2, S3, to S28. To assess the students' mathematical abilities to solve PISA questions, a rubric is used which can be seen in Table 1. Furthermore, the students' ability scores are obtained in accordance with the criteria of student ability categories [10].

| Range Results | Category   |
|---------------|------------|
| 80-100        | Excellent  |
| 60-79         | Good       |
| 40-59         | Fair       |
| 20-39         | Poor       |
| 0-19          | Very Poor  |

3. Results and discussion
PISA students' mathematical ability levels are divided into six levels. In this study, the distribution of levels in the 6 PISA mathematics units using the Lubuklinggau context which has been tested for validity and perfectionism can be presented in the following table:

| No. | PISA Level | Unit Questions |
|-----|------------|----------------|
| 1.  | Level I    | 2.1            |
| 2.  | Level II   | 4.1            |
| 3.  | Level III  | 3.2; 4.2; 6.1  |
| 4.  | Level IV   | 1.1; 1.2; 5.1; 5.2; 6.2 |
| 5.  | Level V    | 3.1            |
| 6.  | Level VI   | 2.2; 3.3       |

From table 2 that overall of the 6 units of questions there are 13 questions given to students to see students' mathematical abilities according to the PISA level. The students' ability group to work on PISA mathematical models using the Lubuklinggau context described in accordance with the PISA assessment domain which includes mastery of the material and students' mathematical abilities from the knowledge gained to be used to solve problems that exist in daily life or are real.

Details of students' ability to solve PISA model problems using Lubuklinggau from the sixth levels of PISA are as follows:

3.1. Students' ability in problem-solving PISA level 1 mathematical
From the results of the research that has been carried out, it can be seen the ability of students to solve Level 1 PISA questions about worth comparison. Based on the results of the analysis that has been done on level 1 questions given to students only one question is a question on unit 2 number 1. This problem is a matter of comparison about durian batik craftsmen who calculate many craftsmen who are needed to produce the desired durian batik. Questions on level 1 include questions dominated by students, namely 24 students or 85.71% of 28 students included in the excellent category, 2 students in the good category and 2 students in the very poor category means that almost all students can complete Level 1 PISA questions are good, there are 2 students who give correct results but the completion step is still not right and there are only 2 students who don't understand the problem.
Overall the average value of students' mathematical abilities at level 1, namely 91.07 included in the excellent category. This means that students have been able to answer questions in a context where the information in the problem is very relevant and the question given is very clear.

3.2. Students' ability in problem-solving PISA level 2 mathematical
Level 2 questions given to students also include questions that can be solved well. Problem level 2 is given as much as one question about rows and a series of numbers, with the context of Bukit Sulap. Twenty eight students who solved the question "determine the number of cars that can park on the Hill of Magic using a series formula" there were 23 students who could answer very well or there was 82.12% included in the excellent category, 3 students or 10.72% included in either category, 1 student or 3.57% is included in the sufficient category and 1 student who is in the very poor category or 3.57%. Overall the average value of students' mathematical abilities at level 2 is 91.96. This means that students have been able to formulate, use, and carry out basic procedures and conditions.

3.3. Students' ability in problem-solving PISA level 3 mathematical
PISA level 3 provided 3 questions namely about the context of social arithmetic learning in which to calculate the profit and loss percentage; The context of number patterns and algebraic operations involving rational numbers is only about 10 students who are able to answer well or only 35.71% are included in the excellent category meaning less than half of students are able to choose and use easy problem-solving strategies. The character at this level is that students must be able to interpret and use representations based on different sources of information and can state the immediate reasons for the extract obtained. Overall, the average value of students' mathematical abilities at this level is 72.45, which is included good categories.

3.4. Students' ability in problem-solving PISA level 4 mathematical
PISA level 4 questions, there are 5 questions related to the As-Salam Mosque that help carry out operations on algebraic forms and solve problems related to operations on algebraic forms; The Temam Waterfall relationship relates to calculating the cost of visiting Temam Waterfall and the cost of playing in each person's Waterpark and making and solving mathematical models of problems related to visitors; Watervang Dam which aims to calculate the area of the Watervang Dam bridge.

The ability of students to complete 5 research questions can analyze only 6 students or around 21.43% who are able to work on the problems included in the category excellent, but at this level of 28 students, none get a maximum score. However, there are some students who are able to use their skills well but have not been able to come up with reasons that are contextual and can help students to create different models and connect them to the real world. This question is related to the research [1] the results of the analysis of the ability to solve mathematical problems (PISA) resulting in a level 4 problem that is less mastered by students, of the 23 students who answered this problem none of the students was able to answer the questions correctly. Overall the average value of students' mathematical abilities at this level is 61.61 which is good categories.

3.5. Students' ability in problem-solving PISA level 5 mathematical
Overall, the abilities of grade IX students of SMPN 5 Lubuklinggau differed in completing level 5 PISA questions. Of the 28 students who completed the "durian coffee business who wanted to calculate profit or loss from each sale", from the results of the analysis conducted 12 students could appropriately be obtained or 42.86% who meet the mathematical requirements included in the excellent category and 1 student is included in the good category, while the rest receives included in the fair category and there are no additional 5 students whose mathematical abilities are included in the very poor category. So that it can be removed from the ability of students at this level in the category enough with the average value obtained as a whole 58.16. Hope that at this level students will be able to work using broad thinking and punishment but have not been able to link their mathematical knowledge and skills to those they face.
3.6. Students’ ability in problem-solving PISA level 6 mathematical

From the results of the analysis of PISA level 6 questions related to the turnover of durian coffee every month and calculates the desired benefits in selling durian batik, only 3 students are available who are able to finish well or 10.71% of the ability of students who are included in either category who want to be students have already able to generalize by using information based on available information. In this case, there are 25 students who have the ability to think but have not been able to reason but have not been able to apply their understanding by combining technical operations and developing new strategies in dealing with new problems. The overall mathematical ability of students at level 6 is included in the poor category with an average value of 38.10. This is different from the PISA results in 2012 where Indonesian students only reached level 3 and no students were able to reach levels 5 and 6 [11].

Overall, from 28 students’ mathematical abilities in solving mathematical problems in the PISA model from level 1 to level 6 can be seen in table 9 below:

| No. | Level PISA | Average Result | Category   |
|-----|------------|----------------|------------|
| 1.  | Level I    | 91.07          | Excellent  |
| 2.  | Level II   | 91.96          | Excellent  |
| 3.  | Level III  | 72.45          | Good       |
| 4.  | Level IV   | 60.61          | Good       |
| 5.  | Level V    | 58.16          | Fair       |
| 6.  | Level VI   | 38.10          | Poor       |
|     | The average score | 68.89       | Good       |

From table 3 it can be seen that only at level 1 and level 2 are included in the excellent category. This is in line with the research [12] the results of measuring the ability of high-level thinking of junior high school students in Jember in solving PISA-standard questions concludes that the ability of students to solve all questions classified as the high-level ability is only at a low level. Overall the average result of the ability of students to solve mathematical problems using the PISA Lubuklinggau model context seen from the PISA level is 68.89, which means mathematical abilities in the good category. This is in line with research [10] the development of mathematical problems PISA Level 4, 5, 6 models using the Lampung context results that the questions using the context facilitate students in situating mathematics into context so that it will help students in using literacy skills in answering questions, and can challenge students' mathematical thinking patterns.

4. Conclusion

Based on the results of a research conducted by researchers at SMPN 5 Lubuklinggau, it can be concluded that: Class IX SMP Negeri 5 Lubuklinggau in problems solving mathematical PISA model using the Lubuklinggau context in terms of the PISA level is included in both categories with good value based on 68.89.

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