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Process in developing mathematics problem of PISA models base realistic approach of student junior high school in Medan

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Abstract

This research aims to: find a instrument based PISA with an effective realistic approach to improve the ability of problem solving in SMP. There student of grade eight of SMP Negeri 6 Medan as the subject of the study. Walk through, Document and Test models PISA questions on content quantity to ways conducted to obtain data. The result of the research shows that: (1) the instrument developed has fulfilled the criteria of effectiveness by: a) students' learning mastery in a classical way, there are (85,71%) students are complete and as many as 5 people (14.29%) students who are not complete; b) The achievement of goal completion in accordance with the advice given by the validator, c) The time is reached if the time does not exceed the specified time; and d) Student response give positive response to instrument component developed. (2) The characteristics instrument tool in the form of an effective problem in improving students' mathematical problem solving abilities include: a) containing contextual issues that are responsive to the child's culture, b) not using long sentences, c) loading pictures, and d) answer the problem on the problem should not single or use an Open-Ended problem.

Keywords: PISA, RME, Problem Solving.

Introduction

Mathematics is a study that be the basic of science and technology that is very important in every aspect of human life. Therefore, mathematics is very important to teach in every level of education such as SD, SMP, SMA and university. Beside of that mathematics is mother of all science, so mathematics is very important to teach. Many reasons why students need to learn math, math lesson one is making skilled students thought it caused mathematics have some way for resolution of a problem. So in fact the math makes the students as people are tough and not easily discouraged.

See the importance of mathematics, then the student must understand the mathematics. In the appendix to the regulation of the Minister of education national (Permendiknas) Number 20 in 2006 (Wijaya, 2012:16) on standard content said that “pembelajaran matematika bertujuan supaya siswa memiliki kemampuan diantaranya adalah mampu memecahkan masalah yang meliputi kemampuan memahami masalah, merancang model matematika, menyelesaikan model dan menafsirkan hasil yang diperoleh. Mengomunikasikan gagasan dengan simbol, tabel, diagram atau media lain untuk memperjelas keadaan atau masalah. Memiliki sikap menghargai kegunaan matematika dalam

kehidupan, yaitu memiliki rasa ingin tahu, perhatian, dan minat dalam mempelajari matematika, serta ulet dan percaya diri dalam pemecahan masalah."

From the above mathematics learning goals, to see that one of the goals of learning mathematics is to solve the problem.This is in accordance with the Marthin L, Jr. (2016) states that : "kemampuan untuk memecahkan masalah pada dasarnya merupakan tujuan utama proses pendidikan". To be able to produce students who can solve the problem, then needed a learning oriented to problem solving. It is very possible to do through mathematical subjects, because math has a purpose that made graduation standards in the form of problem-solving ability.

Mathematical problem solving ability in research this is students ' ability in solving math problems based on steps-steps Polya. As for the problem solving steps according to Polya (1973: xvi), namely: 1) understand the problem (understanding the problem), 2) designed the plan of settlement (devising a plan), 3) Execute the plan of settlement (carrying out the plan), and 4) look back at step completion (looking back). Factors of students experiencing difficulty in solving math problems, can be sourced from the students as well as teachers. Factors sourced from students i.e. students accustomed to learning by rote and lack of interest and motivation of students to learn. While the cause factor who comes from teachers, i.e. a factor of learning strategies is lacking to build problem-solving skills in mathematics. Most teachers still practice the conventional learning, tasks and issues that are less challenging and not able to dig into the understanding of the students, and teachers just give little chance for students to convey the ideas of a settlement owned by students.

Based on the factors cause which has been described, then the cause of the most dominant i.e. learning strategies. An alternative strategy is to offer through strategy Realistic Mathematics Education. According to Safitri and Surya (2017:95) "Realistic mathematic education (RME) approach come from contextual issues, in this situastion student a should has the active role in learning activities, while teacher plays as facilitator. Teacher and student has a different role. Students can express and communicate the ideas to each other and teacher will help and support to compare the idea and also to make a decision. Which idea are the best among other."

Problem-solving ability pupils can be measured through tests. Wicaksono (2018) stated a good test can measure the three aspects, namely the understanding of the concept of communication, reasoning, and problem solving. In fact, Indonesia is still not much growing tests or questions to measure problem-solving abilities of students. On the national exam, the questions given to students in the form of multiple choice, so without thinking of where students are able to answer the question by way of guessing. This leads to a lack of creativity and the power of reason students.

In order to be achieved the purpose of the assessment which includes the measurement of student problem solving, the need for the development of problem-solving ability to measure the student. Questions will be developed in this study is all about ability of solving math problems based on students of PISA. It caused problems such as PISA mathematics has a number of advantages than other questions, including the mathematical problems such as PISA arranged in a variety of formats. There is a question that asks students to answer questions using their own words, how many questions ask students to write down the process of calculation so that it can be known methods and process thought of students in answering the question, and there is a question that asks students to explain further what is their answer (Achdiyat, Maman, dkk 2017).

In 2003 study conducted by the Programme for International Student Assessment (PISA) shows the achievements of Indonesia on the order of 36 from 41 countries. In 2006, the acquisition of junior high school students score on a mathematics perched on just the number 391 scales (0-800), whereas the average score of 500. The results of the PISA 2009 Indonesia ranked 61 of the 65 participating countries with an average value of only 371 and PISA last year 2012 the position of Indonesia ranks 64 out of 65 countries with a score of 375. Matter of PISA developed based on the content, context and competence (OECD, 2010), the four content include: Shape and Space, Change and Relationship, Quantity, and Uncertainty. One of the four content matter of PISA is the Quantity of content. Reserved Quantity on the content related to the relationship and the pattern number, among others, the ability to understand the size, pattern number and everything associated with numbers in everyday life, such as counting and measuring. It contains the content of this number is the ability of reasoning quantitative, represent something with numbers, understand mathematical steps, counting on the outside of the head and do a valuation. Questions on the content of Quantity most implemented in everyday life, as in the exchange rate of the currency, determine bank interest, shopping, counting tax, measure, measure distances and others. So it is clear that the questions on the content of important Quantity to be developed because it directly related to human activity.

Problems encountered by teacher is the lack of availability of questions specially designed accordingly with potential students and characters so students assumed that potential students use problem solving (problem solving) in every answer the matter has not developed in a way maximum. Teachers need to be given socialization of what and how characteristics and framework about questions of PISA by the way develop and adapt PISA model problems for implemented in the process learning in the classroom. Based on the background above, The problems formulation of this research is : generate math problems such as of PISA models base realistic approach on the content quantity is effectiveness in junior high school?

This research aims to find a instrument based PISA with an effective realistic approach to improve the ability of problem solving in SMP. After doing this research study is expected to provide benefits for all people, including: 1) Add teaching materials in the form of questions on the content of Quantity model Pisa, can be input and information that can be used in the process of teaching and learning, 2) Students can be trained in understanding and answering the problems such as

PISA is usually considered difficult and confusing, 3) as an ingredient to learn more about the problems on the model PISA content quantity in mathematics learning in junior high school.

PISA (Programme for International Students Assessment) is a cooperative effort of the countries of the OECD to measure the ability of students aged 15 years in applying science in school to face the challenges of real life. PISA take the assessment in the aspect of knowledge and expertise in the areas of reading, mathematics and science curriculum implementation of learning in school to solve problems related to everyday life (kamaliyah, 2013: 11).

(OECD: 2009a) explains the intent and purpose of PISA to assess students capacity to solve real problems, and therefore includes a range of mathematical content that is structured around different phenomena describing mathematical concepts, structures, or ideas. However, PISA seeks to assess whether students can delve deeper to find the concept that underlie all mathematics and therefore demonstrate a better understanding of the significance of these concept in the world. The characteristics of the mathematical PISA question consists of three components; 1) Mathematical content that is targeted for use in the assessment items, that is quantity; change and relationships; space and shape; uncertainty and data, 2) The context in which the assessment items are located, that is personal, occupational, societal, scientific, 3) The mathematical process that describe what individuals do to connect for the problem with the mathematics and thus solve the problem, and the capabilities that underlie those processes, that is reproduction, connection, reflection.

Ability measured in PISA is the ability of knowledge and skills in three cognitive domain, i.e. reading, mathematics, and natural sciences. To obtain this data, compiled two categories, namely the question of the form the form of a multiple choice question (as much as 44.7% of the total reserved) and shape of the reserved descriptions (constructed respose) (rest or 55.3%). The ability of the measured levels of difficulty levels from lowest to a more difficult level. The questions that must be answered in the form of multiple starts of selecting one of the alternative answers are simple, such as answering yes / no, to the alternative answers were rather complex, such as responding to some of the options presented. In questions that require answers the description, students were asked to answer the short answer in the form of a word or phrase, then the answer is rather long in the form of description that restricted the number of sentences, and answers in the form of an open description. To measure the ability of the students, PISA has six levels as follows (Figure 1).

6	At Level 6, students can conceptualise, generalise, and utilise information based on their investigations and modelling of complex problem situations. They can link different information sources and representations and flexibly translate among them. Students at this level are capable of advanced mathematical thinking and reasoning. These students can apply this insight and understanding, along with a mastery of symbolic and formal mathematical operations and relationships, to develop new approaches and strategies for attacking novel situations. Students at this level can formulate and precisely communicate their actions and reflections regarding their findings, interpretations, arguments, and the appropriateness of these to the original situations.
5	At Level 5, students can develop and work with models for complex situations, identifying constraints and specifying assumptions. They can select, compare, and evaluate appropriate problem-solving strategies for dealing with complex problems related to these models. Students at this level can work strategically using broad, well-developed thinking and reasoning skills, appropriately linked representations, symbolic and formal characterisations, and insight pertaining to these situations. They can reflect on their actions and can formulate and communicate their interpretations and reasoning.
4	At Level 4, students can work effectively with explicit models for complex concrete situations that may involve constraints or call for making assumptions. They can select and integrate different representations, including symbolic ones, linking them directly to aspects of real-world situations. Students at this level can utilise well-developed skills and reason flexibly, with some insight, in these contexts. They can construct and communicate explanations and arguments based on their interpretations, arguments and actions.
3	At Level 3, students can execute clearly described procedures, including those that require sequential decisions. They can select and apply simple problem-solving strategies. Students at this level can interpret and use representations based on different information sources and reason directly from them. They can develop short communications reporting their interpretations, results and reasoning.
2	At Level 2, students can interpret and recognise situations in contexts that require no more than direct inference. They can extract relevant information from a single source and make use of a single representational mode. Students at this level can employ basic algorithms, formulae, procedures or conventions. They are capable of direct reasoning and making literal interpretations of the results.
1	At Level 1, students can answer questions involving familiar contexts where all relevant information is present and the questions are clearly defined. They are able to identify information and to carry out routine procedures according to direct instructions in explicit situations. They can perform actions that are obvious and follow immediately from the given stimuli.

Figure 1: Six levels of ability of mathematics in PISA

Research Methodology

The subject in this classroom action research is student of SMP Negeri 6 Medan in academic year 2017/2018. The subject of research is grade VIII-B SMP Negeri 6 Medan.

Analysis

Activities performed on the stage of self evaluation is an assessment of the results of the tests of mathematical problem solving package design students middle school based on a matter of PISA on content quantity by researchers themselves. The stage of self evaluation include:

- *Analysis of Student:* Activities performed at this stage of the analysis of the students are learning about the characteristics of students in accordance with the design and development of the matter. Characteristics studied included background knowledge, student achievement, school students.
- *Analysis of the literature:* Activities performed at this stage of the analysis of this literature is the study of literature in order to reference the development problem.

Design

Researchers designed a device which covers the matter of grating and math model of PISA in the material quantity. The restyling was done with attention to three things, namely content, invalid constructs, and language. At this stage will also do perevisian against the restyling of math model of pisa by tutors and researchers themselves. The result of this stage is called prototype I.

Stages of Prototyping (Self evaluation,validation, evaluation, revision)

This stage of product which has been designed last will be evaluated

- *Self Evaluation:* At this stage, the researchers reviewed the early prototype designs with validated peers.
- *Expert reviews:* The results of the design on the first prototype, developed on the basis of self Expert reviews (test expert) The results of the design on the first prototype, developed on the basis of self evaluation given to the expert (expert review). Products designed, assessed, and evaluated. Test the validity of that test the validity of the content is done, test the validity of invalid constructs, and test the validity of the language. Suggestions from the validator used to revise the design problem that made researcher. Feedback and suggestions from the validator of the design have been made are written on a sheet of validation as a basis for revising a matter that has been created.
- *One-to-one:* At this stage, researchers asked two students as tester and after that, the students asked for comments about the matter that has been worked on. Comments obtained were used to revise the design tool of learning has been made.
- *Small Group:* The results of the revision and suggestions from expert in the one-to-one on the second prototype.basis to revise the design of the first prototype, which was subsequently named the second prototype. At this stage carried out trials on a small group of non subject research. Small group consists of 5 people. The students have the same characteristics with the characteristics of students who will be made the subject of research. They are requested to provide a response to the resulting product.

Field Test

Advice and trial results on a second prototype basis to revise the design of the second prototype. Revision of results called prototype third, tested to the subject of research (field test), the students of class VIII field become the subject of research.

In more detail, the procedures for research,described in Figure 2.

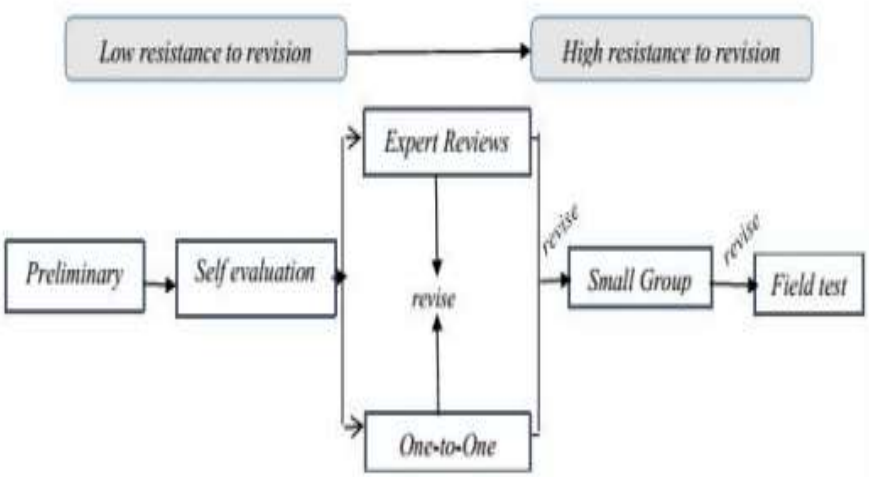

Figure 2: Formative evaluation design (Tessmer, 1993; Zulkardi, 2006)

Technique and instrument collection Data

According to the type of data you want retrieved in this research, then the research instrument used is sheet interviews and model PISA mathematics questions on content Quantity to measure the ability of problem solving math middle school students first. The data collected in this study is in the following way:

- *Walkthrough*

  Walkthrough would be done to the experts (experts) and will be used to see the validation problem which includes validation content validation, invalid constructs, and validation of language. Next up will be given an overview of the number of experts, the focus of which will be discussed, at its execution.

- *Document*

  Researchers designing a device based on the contents of the reserved, invalid constructs, and language. So at this stage I the form of prototype obtained the device model PISA math content quantity.
  The documents used in the one-to-one in the form of sheets of comments/suggestions of students and the student answer sheet for our prototypeI. Analysis of worksheet/suggestions of students and class VIII student answer sheet consisting of three students with math skills are high, medium, and low to see certainty problems of mathematical model of PISA material quantity made by researchers that include validation reserved.
  The documents used in the small group in the form of sheets of comments/suggestions of students and the student answer sheet for prototype II. The analysis is performed against a sheet of comments or suggestions of students and the student answer sheet that totaled six students (two high-capable person, two people, two people are-capable capable low) to see the reserved model of PISA made by researchers has been practical.
  Document that is used in the field test in the form of sheets of comments/suggestions of students and the student answer sheet for prototype III. The analysis is performed against a sheet of comments or suggestions of students and the student answer sheet that totaled 35 students with heterogeneous capabilities to see the reserved model of pisa made by researchers is clear and legible.

- *Test models PISA questions on content quantity*

  To measure the ability of mathematical problem solving of students in solving problems such as PISA mathematical model on content Quantity middle school students first. This test is done to see the student's answers against the problems such model PISA is given.

- *Technical Data Analysis*

  - Descriptive analysis

    A descriptive analysis was used to analyze the data validation with experts ways of revising based on interviews or note validator, and document examination reserved model PISA by the validator and the teacher. The results of the analysis will be used to revise the problems created by the researchers.

  - Descriptive Qualitative

    Qualitative data is data that shows the quality or quality of something that exists, whether circumstances, processes, events / events and others expressed in the form of statements or in the form of words. Qualitative data on this research obtained from the results of

students' mathematical problem solving test

- Descriptive Quantitative

  Quantitative data is data of tangible numbers as a result of observation or measurement. Quantitative data in this research is obtained from the results of students' mathematical problem solving test.

- *Analysis Of Test Data Model PISA*

Test Data analysis problems such as PISA on the content model of the mathematical quantity used to measure the ability of problem solving math middle school students first.
To measure the ability of solving math problems First Middle school students can be found based on the results of the test questions of mathematics model of PISA in a given quantity of content to students. The next scoring will be made against the student's answer. The scoring system is created as shown in Table 1.

Table 1: Guidelines for scoring problem solving ability test

Aspects assessed	Score	Explanation
Understanding the problem	0	No answer at ll
	1	Partially correct of what is known and what is unknown
	2	Completely correct of what is known and what is unknown
Devising a plan	0	No plan at all
	1	Write a plan yet less accurate or less complete
	2	Write a plan with appropriate problem solving yet not complete
	3	Write a plan with correct solutions and complete
Carrying out the plan	0	There is no any attempt
	1	Correct procedure leads to partial correct solution
	2	Results or partially incorrect results due to miscalculation
	3	In the procedure and results are correct
Looking back	0	No inspection results at all
	1	Incomplete examination
	2	Complete and correct examination
Total	0 - 10	

Reframed from: Toh et al, 2011: 33 – 66

Based on those test scores scoring guidelines, then score obtained student assessment will be given by the formula:

$$\text{the value of students} = \frac{\text{score obtained by students}}{\text{the maximum score}} x100$$

The next value of the students analyzed the qualitative and descriptive are grouped by category in Table 2 below:

Table 2: The category test score

Level of mastery	Standard score
90 – 100	Very high
80 – 89	High
65 – 79	Moderate
55 – 64	Low
0 - 54	Very low

Modification of Arikunto (2010)

Research Result And Discussion

Research Result

This research is a *development research* type formative evaluation which is one step development of problems that have been implemented in the development process. The product of this research is about PISA based on Realistic Mathematics Approach. The purpose of this development is: develop problems such as PISA models that meets effective so that it can be used in the process of teaching and learning. Formative evaluation types include self evaluation, expert review and one-to-one, small group, and field tests.

Preliminary Stage

Analysis

- *Analysis of student:* At the one-to-one stage in SMP Negeri 6 Medan, in class VIII-H the number of students who are the subject is three people with the ability of one person with high ability, one person of moderate ability, and one person

of low ability. The information is given directly by the Class VIII Mathematics teacher at the school. At the small group stage at SMP Negeri 6 Medan, in class VIII-A number of student is 6. Two person have high ability, two person have moderate ability and one person have low ability. The information is given directly by the class VIII Mathematics teacher at the school. At the field test stage at SMP Negeri 6 Medan , in class VIII-B number of student is 35 person with the everage of level ability.The information is given directly by the class VIII Mathematics teacher at the school.

- *Analysis curriculum:* At the analysis curriculum stage, researchers identify learning materials based on the curriculum that has been formulated for Junior High School. The standard contents of mathematics learning include Numbers, which include the line and row, Pattern Numbers.

- *Analysis PISA question:* At the analysis of PISA question, researcher researchers analyze the problems of PISA and PISA framework so that researchers can know in detail the characteristics of the PISA problem in general as well as problem-solving characteristics formulated in the question of PISA.

Designing of PISA

At this stage, the researcher prepares and designs question of the problem solving mathematics of PISA models on quantity material based on information and knowledge obtained in the analysis phase.The results obtained at this stage are instruments of instruments consisting of; 1) Question card and answer key from PISA model on quantity content, 2) Question of PISA models on quantity content. The device generated at the self evaluation stage is called prototype I which is a matter of PISA model of quantity material and amounts to 7 items. The prototype I instrument device is attached.

Self Evaluation

At this stage, the activities carried out include doing the analysis of students, curriculum, and questions PISA, As well as questioning.

Expert Review and one-to-one

Expert Review

At this stage, validity is consulted and examined based on content, constructs, and languages by thesis supervisors. Expert reviews are used to test the validity of the questions to be used. Validation is done by giving the product in the form of lattice sheet problem, problem solving ability based on math problem of PISA, and validation sheet to validator. Validator consists of three lecturers of mathematics education and one mathematics teacher in SMP Negeri 6 Medan. Researchers asked for opinions and suggestions from some lecturers and teachers who are experienced in mathematics education as research validators. Suggestions and comments obtained from validators on prototype I devices based on materials, constructs, and languages are presented in Table 3 below :

Table 3: Comments and suggestions of validator

Indicators of validation	Comments/Suggestion
Material	• There are some questions that are less in accordance with the situation that have the PISA (question 1, 2) • There are some questions that are less in accordance with the competence that have the PISA (question 3)
Construct	• The questions of number 5 does not have directional answers • The figure of question 1 less clear and should be illustrated each step
Language	• The question of number 3 have multiple interpretations • Set the layout • Pay attention to spelling and capitaliztion • Simplify convoluted sentences

One-to-one Stage

At this stage , the question of prototype I is tested to three student with the difference ability.The three students are from class VIII of SMP Negeri 6 Medan with different abilities. The three student The three students were asked to work on the PISA model question which amounted to 7 questions.Then each student is asked opinions, suggestions, and commentary on each of the questions given in writing (comments and suggestions attached students). It is necessary to observe the responses and constraints faced by students in solving the question. Besides through written suggestions and comments, the author also gives students the opportunity to ask questions and discuss questions that are difficult to understand. Based on comments, suggestions and discussion results obtained some additional information that can be useful in the revision of Pisa prototype I model presented in the following table (Table 4).

Table 4: Comments and suggestions of students to one-to-one

Number of questions	Comments/Suggestions
1	• The step distance is too large • Not informed. 1km is how? So it's hard to find again
2	• The question is a bit tricky in the words " Maximum" which makes the student misunderstood the meaning • Confused. What is the point?
3	• The problem is a bit difficult, should be told how the number were right and wrong
4	• The question is complicated

While the revisions made based on comments and suggestions from students on one-to-one are as follows (Table 5):

Table 5: Revisions based on students comments/ suggestion one-to-one

Comments/Suggestions	The revision divisions
• The step distance is too large • Not informed 1 km is how? So it's hard to find again	• Change the distance from one kilometre to half a kilometre
• The question is a bit tricky in the words "Maximum" which makes the student misunderstood the meaning	• Change the word "Maximum" to "enough"

Small Group Stage

The students in small group is student 1 with low ability, Student 2 and Student 3 with medium ability, and Student 4 and Student 5 with high ability. Students work on the questions given by the researcher on the answer sheet provided and write a commentary on the question. The answer of student and comments and short discussion results are made into revisions to produce the question of PISA models that is practical. Student comments on this small group stage are not used because students do not comment properly. Here are the answers given by students in solving the problems and revisions that need to be done in small groups.

Field Test Stage

- **Description of the implementation of the Field Test stage**

  This field test aims to determine the readability and clarity of the PISA model of quantity material that has been developed in students with a wider subject. The valid prototype III of revision based on comments and suggestions from the validator and the practical result of the revision based on the comments and answers of the students in the small group was tested to 35 students of class VIII-B SMP Negeri 6 Medan with heterogeneous ability. The answer sheets and comments sheets at this stage are combined with the aim that students directly comment on the completed problem thereby reducing the reduced frequency of comments on the completed question. So, after students complete one question, immediately given a comment on the question. During the test, researchers observed the constraints faced by students in solving the question of PISA model. The problem is said to be practical if students are able to understand, read and interpret the problem so that it can be solved. In the field test stage, will be tested the validity and readability of PISA model that has been valid and practical to students with more heterogeneous ability. Here are some student answers on the field test to measure the clarity and legibility of the developed PISA model.

- **Description of PISA Test Data Analysis on Quantity Content to measure problem solving abilities.**

  Data test result test field test test package problem solving skills based on math problems PISA content quantity is analyzed and then converted into qualitative data to determine the category of level of problem solving ability of students.

  The percentage of students' problem solving ability level during the test, can be seen in table 6 below:

Table 6: Distribution of the problem solving ability's score average

Value	Frequency	Percentage (%)	Categories
90≤ x ≤100	3	8.57%	Very high
80≤ x < 90	20	57.15%	High
65≤ x <80	10	28.58%	Moderate
55≤ x <66	1	2.85%	Low
0≤ x < 55	1	2.85%	Very low
Sum	35	100	
Average		78.34%	Moderate

Mathematical problem solving abilities of students based on realistic mathematical approach using instrument tools developed categorized moderate that is 78,34%.

- **Description of Instrument Device Based Effectiveness of Realistic Mathematical Approach Field Test**

  The device of question with Realistic Approach that developed will be eligible to be used if give positive impact to the learning that must fulfill the criteria of effectiveness. The device of question with Realistic Mathematics Approach is said to be effective in terms of 1) the learning completeness students in classical 85% of students who follow the learning is able to reach a minimum value of 75; 2) completeness of learning goals, 3) time spent in learning efficient or not beyond ordinary learning, and 4) student responses to learning. The following will be presented a discussion for each indicator in measuring the effectiveness of learning devices based on Realistic Mathematics Approach in Field test.

Discussion

After going through the process development consisting of 3 stages large, three prototype cycles and processes revisions based on validator suggestions and test on the students, obtained the device the developed problem can be categorized as valid. Valid illustrated from the results of the validator assessment, where almost all validators states both based on the content (in accordance with Basic Competence, Indicators and Framework of the problem PISA model on Quantity content), construct (develop ability mathematical reasoning, including: identify statements and determine the mathematical way relevant to the problem; give explanation by using model; create inter-relationship patterns statement; make that statement support or deny the argument (example denial), and language (in accordance with EYD, not convoluted, does not contain interpretation double, boundary questions and answers clear, and use that language can be understood by all who are read it).

Based on the above table 4.6 , it can be seen that the problems that have been developed can show / measure the problem solving ability of junior high school students. Information from the table shows that students' math-class problem solving abilities are spread in 5 categories.

The instrument based on realistic mathematical approach developed has fulfilled the effective category in terms of: (1) students' learning mastery in a classical way; (2) the completeness of the stated objectives; (3) student response give positive response to instrument component developed; and (4) The time is reached if the time does not exceed the specified time.

Conclusions

1. This research has produced a product of mathematics model of PISA on content quantity for class VIII SMP student which valid and effective. Valid is illustrated by the validators' validation scores, where all validators claim to be good based on content (as per the basic competence, and indicators) of constructs (in accordance with PISA theory and criteria), and language (in accordance with applicable language rules). And effective based on field test results.
2. The instrument based on realistic mathematical approach developed has fulfilled the effective category in terms of: (1) students' learning mastery in a classical way, there are (85,71%) students are complete and as many as 5 people (14.29%) students who are not complete; (2) The achievement of goal completion in accordance with the advice given by the validator, (3) The time is reached if the time does not exceed the specified time; and (4) Student response give positive response to instrument component developed.
3. Mathematical problem solving abilities of students based on realistic mathematical approach using instrument tools developed categorized moderate that is 78,34%
4. The characteristics instrument tool in the form of an effective problem in improving students' mathematical problem solving abilities include: a) containing contextual issues that are responsive to the child's culture, b) not using long sentences, c) loading pictures, and d) answer the problem on the problem should not single or use an Open-Ended problem.

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