Design of Teaching Material Literacy Mathematical Nuanced in Junior High School Students

Arvyaty\(^1\), Salim\(^*\), and Era Maryanti\(^1\)

\(^1\)Department of Mathematics Education, Halu Oleo University, Kendari, 93231, Indonesia

\(^*\)salimpsa@gmail.com

Abstract. The purpose of this research is: to identify the necessary development, analyzing of characteristics and describing the validity and practicability of teaching material literacy mathematical nuanced. The method that used in this research is Research and Development which refer to the Borg and Gall that modified in three steps are: preface study, development and evaluation. The result of this research shows that: founding the teaching material that appropriates with the needed, has the current characteristics, a valid teaching materials and practices. The conclusion of this research is the existence of teaching materials developed to facilitate the students in Junior High School solve problems of mathematical literacy.

1. Introduction
Indonesia has been always involved in the prestigious international event i.e. TIMMS and PISA. The focus of the TIMSS is the existing material in the curriculum, for example, the mathematics of numbers, measurement, geometry, data, and algebra. The focus of the PISA is the emphasis on literacy skills and competencies of the students of the school and can be used in everyday life and in various situations [Error! Reference source not found.].

According to the Project Operation Manual (POM) program, BERMUTU suggested one indicator that shows the quality of education in the land of water tend to still low is the result of international assessments of student achievement.[Error! Reference source not found.] TIMSS survey in 2011 put Indonesia on rank 38 of 42 countries. Although the average score down to 386 compared to 397 in 2007, the decrease in score was still below the average for the ASEAN region.[Error! Reference source not found.] The achievement was relatively even worse on PISA survey year 2003 with Indonesia ranked 38 out of 40 countries and only one rank higher from Tunisia.[Error! Reference source not found.]

The low achievement of students in the study PI S measured the students’ mathematical literacy because students in Indonesia did not have all the mathematical skills and could not correlate mathematical concepts with mathematical problems. This condition is also in line with the condition of junior high school students in Kendari is the low ability of students in solving math literacy problems. The students also do not yet have the basics of good math, low learning motivation, and unbridled culture of literacy in routine activities at each school.

The purpose of this research is: to identify the necessary development of teaching material literacy mathematical nuanced in Junior High School students, analyzing of characteristics development teaching material literacy mathematical nuanced in Junior High School students and describing the
validity and practicality of teaching material literacy mathematical nuanced in Junior High School students.

2. Literature Review
Abdul argued that learning materials are all forms of learning materials that are used to help teachers implement teaching and learning activities form of written material or material not written. According to Prastowo extended learning materials is a set of subject matter are arranged systematically, showing the figure intact from the competence that should be controlled by students in learning activities. Sungkono suggests that existence of the learning materials, learning more effective, then the teacher will have plenty of time to guide students in understanding a topic learning. Learning materials developed in this research tailored to the demands of the present and trend of mathematical literacy students. Content materials contained mathematical literacy issues to drive students completion of math literacy problems.

Mathematical literacy is an individual's ability to identify and understand the role of mathematics in general to make reasoned decisions that involve math, so it can meet the needs of that individual's life as a member of the public a constructive, concerned and reflective.

Mathematical literacy by PISA consists of 6 levels. In this research the mathematical literacy measured mathematical literacy level is medium, namely levels 3 and 4. Mathematical literacy level 3 i.e. the ability of the students to be able to carry out the procedure, including the procedure requiring decisions in sequence. Students can select and apply problem-solving strategies are simple. Mathematical literacy level 4 i.e. the ability to select and integrate all types of representation and observe the dependencies in real life.

3. Method
This study uses design Research and Development with reference to the stages according to Borg and Gall (1983) modified into 3 stages, namely: (a) Preface Study Stages: activities in the form of reviewing relevant literature sources theoretically and practical. Researching theoretically performed against a wide range of books and literature related to the topic of research. Practical examination, conducted to elucidate existing learning materials and conduct a review of the relevant research results. Then the analysis of the needs for learning materials. Based on this analysis activity will appear characteristic of materials that will be developed; (b) Development Stages that is after a review at this stage of the preliminary study, then the arranged prototype learning materials. The resulting product development remains a draft 1 that was then given to experts to assess prototype learning materials. Experts give advice on assessment and improvement; (c) Evaluation Stages is the assessment phase by the validator and students. Validator provides assessment and improvement suggestion of product developed while students give a response to the suitability and adequacy content of teaching materials develop.

Respondents used in this research is a mathematics teacher and student 8th grade at Junior High School. The techniques of data analysis include: (1) the validity of learning materials with the materials criteria is said to be valid, if the average assessment validator at least has been in the category of valid until very valid at intervals of 2.5 Va < ≤ 4.00, (2) students have a response to the learning materials if 75% or more of the students gave positive response to teaching materials product.

4. Results and Discussion
The need for developing learning materials for this event will be based on a few things. First, the learning materials used Junior High School mathematics teacher 5 Kendari class VIII in the learning process depends on book packages provided in bookshops and sometimes less in accordance with the product of learning which should be obtained by the students. Math teachers also do not develop mathematical materials for the purposes of supporting learning in the class. Second, students
at the secondary grade 8th have entered the stage of formal operations resulting in learning math students can already be trained its ability to think abstractly, logical, common sense and draw conclusions from the information available. Third, the implementation of the curriculum in Junior High School of Kendari city materializes on the results of the implementation of the learning of mathematics in the classroom showing the students haven't been able to develop his thinking ability in maximum. The students don't have the habit of reading while thinking and work, the completion level of the problem students are still at the stage of counting skills, students also are less accustomed to resolving a matter that relates to mathematical connections, and problem-solving properly.

The need of developing learning materials above gave rise to a characteristic of the materials. First, load the stages of guidance metacognitive approach. This approach is based on the approach to IMPROVE the Mavrech and initiated by Kramarski [13]. In the method of IMPROVE, there are three important components, namely: metacognitive questioning, cooperative learning, and the provision of systematic feedback-corrective's. Second, the presentation of the content material contains mathematical literacy level is medium, namely levels 3 and 4. In the presentation of the content material starting from the sample question, student activities, exercises, and competence form the problem leads to mathematical literacy level is medium. Third, the learning experience in accordance with the charge study curriculum 2013 is happening in Indonesia. Charge the student learning experience on the teaching materials will be developed include the grade 8th Junior Hig School i.e. Pythagoras Theorem, Circles, Boundary Side, Statistics, and Opportunity. This material must have corresponded to 2013 curriculum study on charge applicable to the Junior High School in Kendari city.

The results of the needs analysis and study characteristics of the teaching materials i.e. the breed teaching materials literacy mathematical nuanced. After the preparation of the finished materials is continued by validation of teaching materials by the validator (expert material and media experts) to validity teaching materials are obtained. A recap of the results of the validator materials is presented in Table 1. The results of the validation of teaching materials by the validator indicates that learning materials literacy mathematical nuanced have criteria very valid having regard to the very suggestion of improvement from the validator. The next stage, namely the assessment of students against the product materials. The results of the now overall student response show that 78.30% students have a good response to product teaching materials literacy mathematical nuanced. Recapitulation of every aspect of student response can be seen in Table 2.

| No | Validator | Average | Criteria |
|----|-----------|---------|----------|
| 1  | Expert    | 3.65    | Very Valid |
| 2  | Material  | 3.69    | Very Valid |
| 3  | Media     | 3.50    | Very Valid |
| 4  | Expert    | 2.90    | Valid     |
|    | Total Average | 3.44  | Very Valid |

| Aspect | Percentage | Total Average |
|--------|------------|---------------|
| Interest | 78.74%    | 78.30%        |
| Material | 75.72%    |               |
| Language | 80.46%    |               |

Overall teaching materials developed in this research have been eligible to be implemented in mathematical learning, especially in 8th grade Junior High School in Kendari city.

5. Conclusion
The conclusion of this research is the availability of mathematics teaching materials that match the needs and characteristics of the students, as well as the preparation of mathematics literacy materials nuanced to be implemented widely in the junior high school grade 8th schools.

Acknowledgments
With the full flavor of the sincerity of the author to present a thank you to the team of Ministry of Research, Technology and Higher Education of the Republic of Indonesia who has funded this research

References and Notes
[1] Stacey K 2011 Journal on Mathematics Education 2(2) 95-126
[2] The Ministry Department of national education 2011 The results of the Assessment instruments, learn math JUNIOR learn from PISA and TIMMS II-1
[3] IEA. Towards Equity and Excellence Highlights from TIMSS 2011 The South African perspective
[4] The Agency's Research and development 2011 The report of the results of the PISA 2009
[5] Abdul Majid 2005 The Planning Of Learning: Develop Standards Of Competence Of Teachers 173
[6] AndiPrastowo 2011 The Creative Guide Makes Innovative Learning Materials 16
[7] Sungkono 2009 The magazine Scientific learning 1(5) 49
[8] OECD 2009 Learning Mathematics for Life A View Perspective From PISA
[9] The OECD 2010 Draft 2012 PISA Assessment Framework
[10] Borg the WR and Gall M D 1983 Educational Research an Introduction I
[11] Ahmar A S and Rahman A, 2017 Development of teaching material using an Android Glob. J. Eng. Educ. 19, 1
[12] Arsyad N Rahman A and Ahmar A S, 2017 Developing a self-learning model based on open-ended questions to increase the students’ creativity in calculus Glob. J. Eng. Educ. 19, 2 p. 143–147
[13] Mevarech Z and Kramarski B1997 British Journal of Educational Psychology 67 425-445