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Research Article

Development of Mathematics Teaching Materials for Junior High School Students Based on Minimum Competency

Supandi Supandi*, Lilik Ariyanto, Widya Kusumaningsih, and Rosa Septiana Indriyani

Mathematics Education, Universitas PGRI Semarang, 50125, Indonesia

ORCID
Supandi Supandi: https://orcid.org/0000-0002-3235-2970

Abstract.
The purpose of this study is to produce mathematics teaching materials for Junior High School students based on Minimum Competence Assessment and as needed by the students. This type of research is developmental research. The instrument used is the questionnaire sheet on the practicality of the teaching material and the questionnaires of satisfaction partners through Google Forms. Based on the research, it was found that the teaching material was well received and supported by the validation results of six mathematics teachers at junior high schools in Semarang. The results show that the learning tool is very useful for contextual learning.

Keywords: minimum competence assessment, mathematics learning, teaching materials, contextual, local wisdom

Corresponding Author: Supandi Supandi; email: supandi@upgris.ac.id

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1. Introduction

Math study would be more meaningful if the material provided in the teaching material contained a context in everyday life. Teaching materials with a daily context will be easier for students to understand. This makes it easier for students to understand mathematical concepts with concrete problems based on everyday life. Therefore, math learning should begin with problems that suit the student's situation and environment. Learning that emphasizes students to be able to understand a material by relating everyday problems called contextual learning [1].

Teaching materials used in learning have several advantages for students. Interesting teaching materials can make students more interested and active in class. In addition, students are more motivated by unique ways of learning by looking at different real contexts [2]. Students can better understand learning that takes problems in real contexts. The teaching materials used can also give students opportunities to collaborate, think critically, and improve their problem-solving and creative skills [3].

Students' ability in contextual thought makes information in material easily understood by students. Application of contextual learning can make students better understand learning in everyday living conditions. Such research is in accordance with the context in this study [4], it is necessary for each teacher to prepare a learning model related to the context of students' lives. This is so that students can accumulate new knowledge based on the abilities the students have in their daily lives.

Indonesian government policies in school studies have adopted Minimum Competency Assessment (we call AKM) in substitution of the National Exam. The implementation of assessments is performed on all levels of basic levels to the upper middle level of the degree. The AKM designed to encourage the implementation of innovative learning oriented towards the development of reasoning skills and not focusing on rote memorization [5]. The purpose of the assessment is to measure the results of student cognitive learning that includes competency of literacy and numeration. As a challenge of the 21st century that requires better literacy and numeracy skills [6]. In addition, assessment is done to assess the achievement of student learning. This is done to make improvements in classroom learning activities for teachers. So students would more easily master the expected learning content with a consideration of the level of learning achievement owned [7].

The competence measurement of literacy and numeration in the Minimum Competence Assessment divide into several cognitive levels of each competence assessment. The cognitive process of literacy includes information-finding activities, interpretation and integrating, and doing evaluations and reflections [8]. The cognitive levels on numeration are knowing (knowledge and understanding), applying, and reasoning [9]. As for the content contained in numeration consisted of numbers, algebra, measurement and geometry, and data and uncertainty. Context shows the aspect of life or situation for the content used. Context associated in assessment is personal, scientific, and social culture.

In the preparation of the AKM needs to take note of the thoroughness of the terms of problem making. The problems presented are various. These are multiple choice, complex double choice, match, short statements, and essay or description. Each of these types has its own set of provisions in the making. Teachers should have greater ability to reconstruct the assessment. The issue is not necessarily a difficult one either. However, it can be created with quite difficult questions and need reasoning.

The matter of AKM should be served with multiple context stimulus. The stimulus presented in the matter is so that students can understand the information presented

in stimulus to answer the question asked. The stimulus presentation may be descriptions, graphs, tables, and illustrations. In literacy and numeration measurement requires contextual and informative stimulus. In addition, stimulus should have an educative, inspiring, and new value.

The AKM conducted in the middle of the class at each secondary school level is identified for the needs of students in mastering the material. Thus, overall it can improve the quality of national education and expect graduates with a good level of material mastery. Literacy and numeracy competencies which are the objectives of assessment in the AKM have poor results in Indonesia. According to research conducted by [10], this occurs when the teaching materials designed in learning are not in accordance with what is needed by students. So, in this case the researcher wants to be able to strengthen the ability of Indonesian students by developing literacy and numeracy skills in solving assessment questions.

Teachers play an important role in innovating in conducting learning designs in the classroom by using teaching materials as a form of increasing teacher pedagogic competence [11-12]. As needed in the design of teaching materials in this study, which is based on the AKM. With this teaching material, it is hoped that it can help teachers to be able to improve the numeracy skills of junior high school students by using the example questions presented. The development of teaching materials can be linked to the local wisdom of the local environment. Learning by linking local wisdom contains positive values related to social society. This can help students to better understand the environment and problems that occur around. The ability of teachers to develop teaching materials is very important, especially related to local environmental conditions. Thus, the development of teaching materials based on local wisdom is important to be given to students.

2. Method

This type of research used RND. The product produced in this study is the teaching material in discussing the AKM.The subject of the study is 6 Mathematics Teacher at Semarang City Junior High School. The study was conducted by providing a questionnaire with direct charging and through Google form. In addition, researchers also held a forum group discussion with 6 research subjects. It was called into question after the discussion of the group forum activities. In this study the data used is in the form of material and stimulus about the development of the teaching materials based on AKM based resource that has been previously validate by some junior high math teachers.

3. Result and Discussion

The study used 6 subjects to quantify the practicality of a teaching materials based on AKM students of junior high school. The teaching materials developed include the reference book “Inspiration of The AKM based on The Local Wisdom-based Competence” and a media application Data collection is done by spreading offline questionnaire to 6 subjects. Assessments used in research include reading, language, difficulty levels, and material suitability. Assessments is done by 5 scale division, that is 5 (very suitable), 4 (accordingly), 3 (adequately sufficient), 2 (less appropriate), and 1 (not appropriate). Based on the results of questionnaire spread to 6 subjects in this study is as follows.

3.1. Language Assessment

Assessment on the language aspect is obtained that the aspect is in accordance with the aspects assessed in it. The language used in the sentence is made in accordance with the right reference and does not refer to the issue of ethnicity, religion. Sentences are made effectively so that students can understand the intent of the reading easily. In addition, the presentation of data and questions is made as simple as possible so that students can understand correctly the intent of the questions and data presented.

3.2. Difficulty assessment

Assessment on the aspect of difficulty level is obtained that the aspect is in accordance with the assessment criteria. The questions presented in the book have been adjusted to the level of difficulty at the junior high level. In addition, the literacy and numeracy aspects presented in the book are made to make it easier for students to understand. This is evidenced by including informative figures and tables on the stimulus in each domain. In addition, the figures and tables presented are in accordance with the issues being raised. Also, the creation of a AKM stimulus is made with the student’s ability level.

3.3. Readability assessment

The results of the questionnaire given to 6 subjects were obtained that the readability aspect was in accordance with the aspects assessed in it. Sentences contained in the AKM book can make it easier for students to read and understand the meaning

of sentences well. In addition, the use of words contained in the book is written in accordance with the target of the book so that it can be understood by junior high school students. The pictures presented in the book are made as clear as possible so that students can easily understand the meaning of the pictures. In addition, the table presented in the book is made as clear as possible accompanied by captions on the table. The portion of figures and tables presented is in accordance with what is needed for the topic of the material in the book. This is tailored to the needs of images or tables in each stimulus discussion in each domain. The results of one of the subject's questionnaire fillings on the readability aspect is presented in Table 1.

Table 1: Results of Filling in the Readability Aspect Questionnaire.

Assessed aspects	Scale				
	1	2	3	4	5
Readability					
The words used are appropriate to the age of the student so that it can be understood by the student				V	
Clear sentences that make it easier for students to read and understand				V	
The image presented is clear and not blurry					V
The portion of the image presented is appropriate (not too much and not too little)					V
The captions on each image presented are clear and useful					V
The images presented attract readers				V	
The images presented are able to help students' imagination in understanding the problem				V	
The reference of the image presented is clear					V
The table presented is clear and not opaque					V
The portion of the Table presented is appropriate (not too much and not too little)					V
The information on each table presented is clear and useful				V	
The table presented attracts the reader				V	
The table presented is able to help students' imagination in understanding the problem				V	
The table references presented are clear				V	

4. Material Suitability

Assessment on the suitability aspect is obtained that the aspect is in accordance with the assessment criteria. The components in the Minimum Competency Assessment (AKM) regarding literacy and numeracy contained in the book are adapted to the context

of junior high school students. The material contained in the book is divided into 4 domains, including numbers, algebra, measurement and geometry, as well as data and uncertainty. Each material is equipped with questions and stimulus. The Stimulus AKM listed in the book adheres to the local wisdom of Semarang City. In addition, the creation of stimuli is tailored to each topic of discussion. Also, figures and tables are created according to the topic on each domain. This can be seen in **Table 2**.

Table 2: Results of Filling in the Conformity Aspect Questionnaire.

Assessed aspects	Scale				
Conformity	1	2	3	4	5
Problems in the form of *open-ended* problems				V	
The material used for the problem is a number pattern				V	
Literacy and numeracy according to the student's context					V
Literacy and numeracy according to one of the materials: Numbers, Measurement and Geometry, Statistics and Chance, Algebra					V
AKM stimulus in accordance with the local wisdom of Semarang City					V
AKM stimulus in accordance with the topic of the problem					V
Images presented according to the topic					V
Table presented according to the topic					V

Making a reference book for AKM requires accuracy and thoroughness in the preparation of material. In addition, the preparation of teaching materials requires more attention in the preparation of editorials and determining the hierarchy of material in the book. So that the existence of assessment reference books as teaching materials can help teachers and students in understanding assessment problems easily. The input provided by the compilers of reference books can be used as material for improvement so that the book can be arranged properly and can be useful teaching material for teachers in exploring the AKM questions. The display of the book can be seen in **Figure 1.**

The stimulus questions in the AKM teaching materials are prepared as a driver of student creativity in solving assessment questions. This can stimulate students' mathematical ability in solving AKM problems. The local wisdom of Semarang City is used in making stimulus questions on AKM as a form of variation so that students can find out the details of the condition of Semarang City. The application made as teaching material developed in this study also pays attention to the condition of local wisdom in Semarang City. The local wisdom is summarized more interestingly so that students can understand the stimulus easily. In addition, the display presented in the application

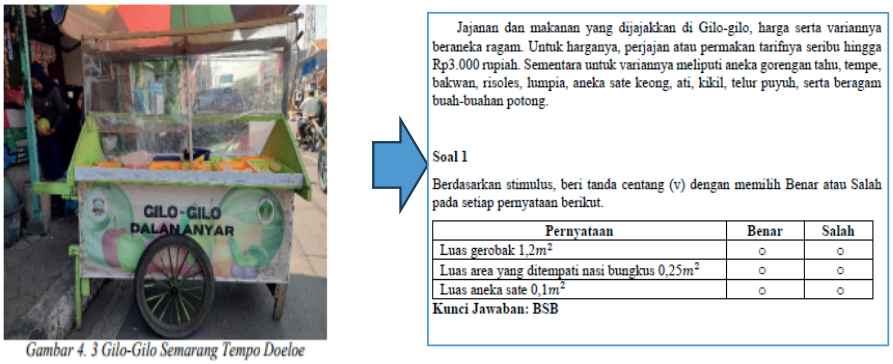


Figure 1: Display of AKM Book.

is also made more colorful so that students can be more interested in learning about the AKM.This can be seen in **Figure 2.**

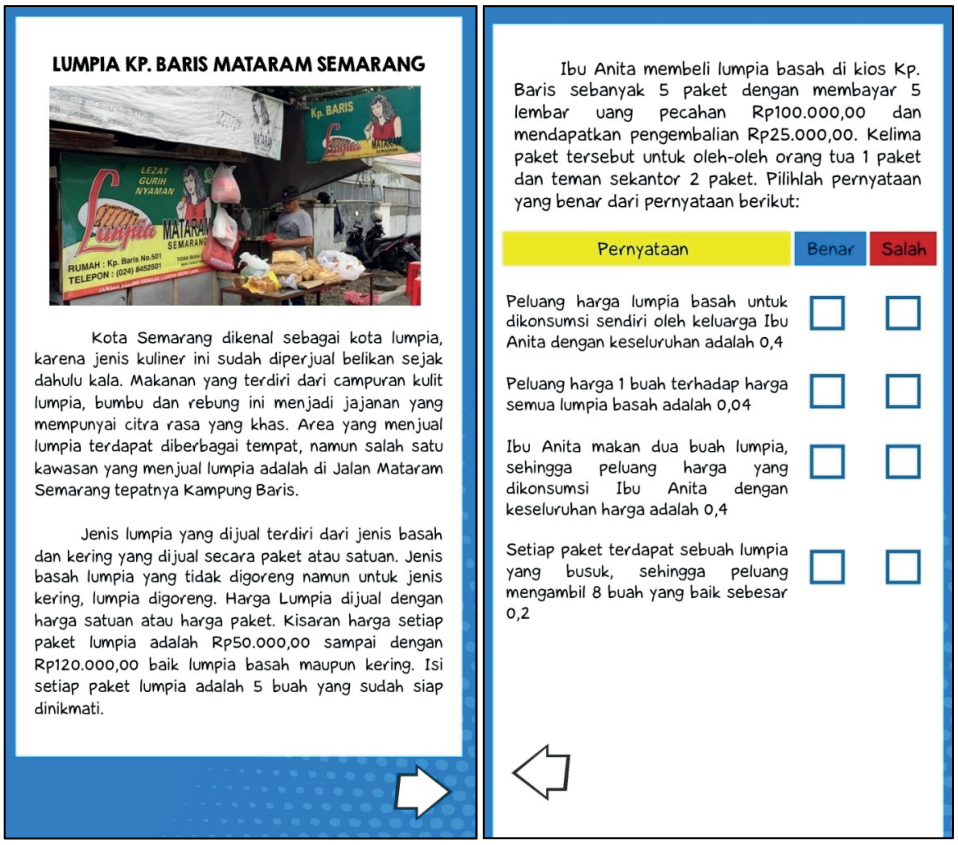
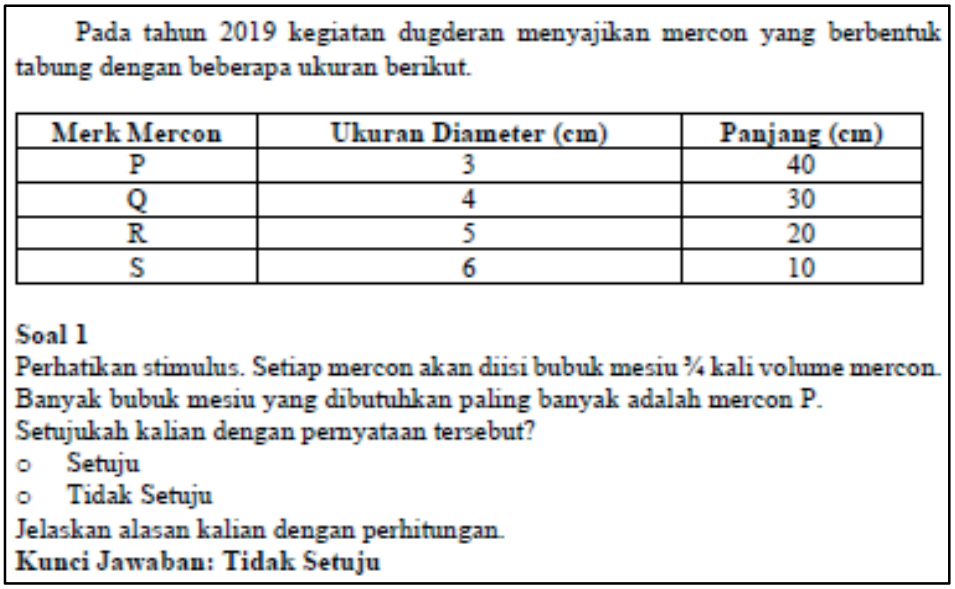


Figure 2: Display of Minimum Competence Assessment Questions Based on Local Wisdom in Semarang City.

The preparation of the AKM application as one of the teaching materials developed in the research was made as interesting and informative as possible based on the local wisdom of Semarang City. Students can play as well as learn within the app. The application also provides a game that features several introductory stimuli on AKM questions with local wisdom. So that students can easily understand the problems

given by being associated with the environmental conditions of Semarang City. The use of application-based teaching materials can also be said to be an innovation in the development of teaching material media by integrating today's technology [13].

Local wisdom associated in the development of teaching materials that are in accordance with the socio-cultural environment is needed in this era [14]. This is because character education that should be instilled in students is often only considered ordinary and often underestimated. The local wisdom provided can be in the form of value and non-value form [15]. Local wisdom in the form of value in this teaching material is for example the "Dugderan" tradition which is carried out to commemorate the entry of the month of Ramadan. While local wisdom in the form of non-values such as historical buildings, the potential of an area, traditional food that will add love to students in the midst of globalization. The "Dugderan" activity as local wisdom in the form of values listed as stimuli in the book can be seen in **Figure 3.**



Pada tahun 2019 kegiatan dugderan menyajikan mercon yang berbentuk tabung dengan beberapa ukuran berikut.

Merk Mercon	Ukuran Diameter (cm)	Panjang (cm)
P	3	40
Q	4	30
R	5	20
S	6	10

Soal 1
Perhatikan stimulus. Setiap mercon akan diisi bubuk mesiu ¾ kali volume mercon. Banyak bubuk mesiu yang dibutuhkan paling banyak adalah mercon P.
Setujukah kalian dengan pernyataan tersebut?
- Setuju
- Tidak Setuju

Jelaskan alasan kalian dengan perhitungan.
Kunci Jawaban: Tidak Setuju

Figure 3: Display Stimulus of "Dugderan" Activities in the AKM Book.

Based on the search results, there are several studies that link local wisdom with student teaching materials. Research conducted by [16] shows that ethnomathematics-based teaching materials are able to provide knowledge about social and cultural values that exist in the community. In addition, these teaching materials are able to arouse students' curiosity and increase students' knowledge by providing varied questions.

5. Conclusion

The preparation and presentation of material in books requires better alignment so that students can understand the intent easily. Some things in the discussion of the material contained in the book were found to be irrelevant to the domain discussed for junior high school students. Therefore, material improvements are made so that the material listed can be relevant to the level of understanding of junior high school students. In addition to the material, the preparation and presentation of questions contained in each stimulus are made with the consistency of each form of existing questions. The question forms contained in the AKM include multiple choice, complex multiple choice, matchmaking, short filling, and essay or description. The stimulus is adjusted to the material in each domain. Stimulus is made by avoiding some information related to the promotion of a brand listed in the book. In addition, stimulus is used to be able to clarify the discussion on each domain. This is evidenced by the provision of stimulus in each material discussed in the AKM book.

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