

## Developing Mathematic Learning Material for 5<sup>th</sup> Grade of Elementary School Based on Traditional Games of Riau Province

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### Abstract

The analysis of mathematic text book for 5<sup>th</sup> grade of elementary school showed that it had some limitation in term of concept, media, and language. This book is developed based on traditional games of Riau. In addition to introduce mathematics this book can also help local government to socialise traditional games that rarely known by the children nowadays. This research used Research and Development method with a model of Plomp. The study was started by analyzing mathematic elementary school textbooks that is used in 5<sup>th</sup> grade of elementary school and develop a new mathematic learning material based on traditional games of Riau. Traditional game used were *gasing*, *besimbang*, *guli*, *congkak*, *setatak*, and *ligu*. The development of mathematic learning material were conducted by: 1)Analyzing basic competence and main competence of 2013 curriculum that match with traditional games of Riau; 2)Collecting and designing learning material content; 3)Developing mathematic learning material; 4)Testing, evaluating, and reviewing the mathematic learning material for 5<sup>th</sup> grade based on traditional games of Riau. Object of this research was 30 students of 5<sup>th</sup> grade in elementary school. Product of this research is mathematic learning material which contain learning activities in mathematic that match with traditional games of Riau. The result of expert assessment showed that mathematic learning material based on traditional games of Riau is valid with an average score of 3.38. Based on the result of experiments to 30 students in 5<sup>th</sup> grade of elementary school, it can be concluded that mathematic learning material has practicalty from the achievement and response of quetioner with theaveragerating score of 93%. The textbook as the product of this research can be used as supplement book in teaching mathematic in 5th grade of elementary school.

Keywords:mathematic student textbook, traditional games of Riau, Research and Development

### INTRODUCTION

Science and technology development in Indonesia is quite rapidrecently, it makes a good skill in this area is needed to compete and exist in a competitive period. Building knowledge about mathematic is one of many ways to compete nowadays. Mathematic as the foundation of science is really important to be learned. Therefore, the Ministry of National Education requires that all students to learn mathematics . The purpose of learning mathematics is to give students experience, critical thinking, systematic, logical, creative, and insightful. These are inline with the purpose of learning mathematics in school, namely (1) students can apply knowledge of mathematics; (2) students can solve the mathematical problem; (3) students can easily communicate their ideasmathematically; and (4) students valued the usefulness of mathematics. (DEPDIKNAS, 2006)

According to Sadikin (2010) there are several factors that has a good impact to reach the goal of mathematics learning. These factors are: the teacher, the learner, the learning environment, and learning devices. Learning device is a set of media used by teachers and students in the learning process in the classroom. Learning device must be prepared before running the class(Suhadi, 2007). Learning device includes the lesson

plan (RPP), Student Book (BS), Teacher Handbook (BPG), achievement instrument, Student Activity Sheet (LKS), and other learning material.

Learning materials all types of materials that are used to assist in the implementation of learning activities in the classroom. Educational material play a very important role in learning process, it representation of the notes to the class teacher. The description of teacher explanation should be submitted by teachers in teaching material. Thus, teachers will also be able to reduce the explanation activity (Zulkarnaini, 2009). Learning materials is also one of the factors that influence learning outcomes. A good learning material will make students curious and interested on them. Good learning material will also bring students to understand the lesson and obtain the satisfactory learning achievement.

Based on observations of mathematic learning material (mathematics books) of 5<sup>th</sup> grade and discussion with some teachers teaching at 5th grade, researcher found that teaching materials has some shortcomings in various aspects. These limitation are as follows:

(1) Language Aspect.

The mathematic books used for learning material are using high difficulty level language, this situations inhibits students to understand the learning material. They use monoton sentences, they even sometimes use foreign term that are difficult to be understand by elementary students. They should use proper language instead of informal language to make the book easy to be understood.

(2) Display Aspect.

The available mathematic learning material of elementary school of 5<sup>th</sup> grade has some diadvantage in term of display aspect such as:

(a) The font types being used is not attractive. Most of the mathematics learning materials for elementary school use the same font, which is Times New Roman. This font is less attractive and monoton as quickly bored students in the use of teaching materials. Wuryanto (2010) said that teaching material can use another font that is more attractive, but still has a good readability, such as Comic Sans MS, Bradley Hand ITC Amerina Bt, and so on.

(b) The font size is not suitable for the reader. Some mathematical learning materials use font that are too small or too large. The letters will reduce the level of readability. Wuryanto (2010) argues that the appropriate font used in the learning materials for primary school student is 14pt.

(c) Mathematics learning materials for primary school do not display photo or picture properly. It is difficult for students to understand the content of the book because the appearance of learning material less attractive. Abdur Rahman (2003) states that the image has an important role in adding to the beauty of the display learning material. As mention by (Djono 2010) children are more interested to use colourfull learning material with picture instead of using serial of text within learning material.

(3) Content Aspects

Other than language and display aspect, mathematic learning materials also has some limitation related to material content itself. Disadvantage of material aspects are:

(a) Based on the researcher investigation, founded that some mathematical teaching materials for primary school does not present as require by curriculum. Prerequisite material is given only as conscious perception. Presumably required material fully reflected in the manual. This caused the book difficult to understand by the student.

(b) The material or content in the curriculum is too abstract for the children. Piaget (1970) stated that learning for primary school will be more meaningful when children are presented by means of concrete objects operation. Learning by use the reference concrete objects will help children understand abstract symbols.

Based on observations, research on mathematics teaching materials for elementary school 5<sup>th</sup> grade, it's necessary to revise the mathematics learning materials. Revision carried out on three aspects, namely, the material, language and appearance. This improvement is useful to optimize the learning material in elementary school level in mathematics.

Educational materials that meet the criteria of the three aspect which are aspects of language, media and materials will interest student to use it. Instructional material content not only about develop for the the material itself. The materials may contain activities to practice in the learning process. Such activities may include experimental, practical, observation, and games.

According to Cahyo (2012) elementary school-aged children tend to play than to learn, so it is a good idea to invite them to learn while playing. Using strategy children will not get bored and make them curious about learning. This will give the impression that mathematic is important and the purpose of mathematic is actually around them.

The game usually played by kids is electronic games which are using internet connection, such as Playstasion, Ipad, Iphone, PSP (Playstation Portable), Nintendo and others. The game in this media sometimes have negative effects (Sudharmâ, 2013) because the children are able to access the site without limiting access. The children sometimes can not filter the information obtained from internet. Sometime the information that they access should not be consumed by their age. Modern game makes traditional games that are generally play in the field with friend is less known to the children who prefer to play electronic games.

The traditional folk game in this study is a traditional game of Indonesia, having full of virtue and Indonesian characters (Martini, 2008). This traditional game is often played together by children. It will be a socializing media to help them not to be a loner. The traditional folk game also has educational elements and mathematical concepts. For example, congklak game, a game played by two players using a congklak board as a medium and having concept of addition and subtraction (Roza et al, 2012).

Based on these problems, researchers have an idea to solve those conditions through this study titled: "The development of mathematical learning materials based on traditional games of Riau region for 5<sup>th</sup> grade of elementary school". The traditional games that used are: congklak, setatak, guli, ligu, besimbang and gasing.

The purpose of this study is to produce a mathematic learning material based on the traditional games of Riau which is valid and practical to use by 5<sup>th</sup> grade of elementary school students.

## METHODS

This study was implemented in Elementary school of 163 Pekanbaru for second semester of the academic year 2013/2014. It began on May 2014. The subjects of this study were 5<sup>th</sup> grade students of elementary school of 163 Pekanbaru. The number of students was 30 students which consist of 20 girl students and 10 boy students. This study is development research which had purpose to develop or enhance an existing product. The development research of this learning unit refers to a general education development models Plomp (Plomp, 2012), which consists of five phases. Those phases

are: (1) the initial research, (2) design, (3) phase realization/construction, (4) stages of testing, evaluating and revising, and (5) implementation.

(1).The initial research

The purposes of initial phase of investigation are: (a) to analyze the content of the fifth grade elementary school mathematics on curriculum 2013. This phase includes the analysis of Basic Competency (KD) and Core Competency (KI). Competency-based curriculum 2013 was designed in four interconnected groups, namely the religious attitude (KI 1), the social attitude (KI 2), knowledge (KI 3), and the application of knowledge/skill (KI 4). On this stage, researcher matched KD 3 to KD 4, then matched them with KD 2, and (b) to analyze the appropriateness of teaching materials of 5<sup>th</sup> grade elementary school with KD and KI as a reference for the preparation of concepts.

(2) Design phase

Based on this initial phase, the researcher designed the mathematical teaching materials based on the traditional games of Riau. The following activities of this phase are:

(A) The design of educational material structures

The structure of the material consists of:

(1). The cover



(2). The instructions present about the instruction how to use the book,



Picture 2. Instruction how to use the book

(3). Traditional games,

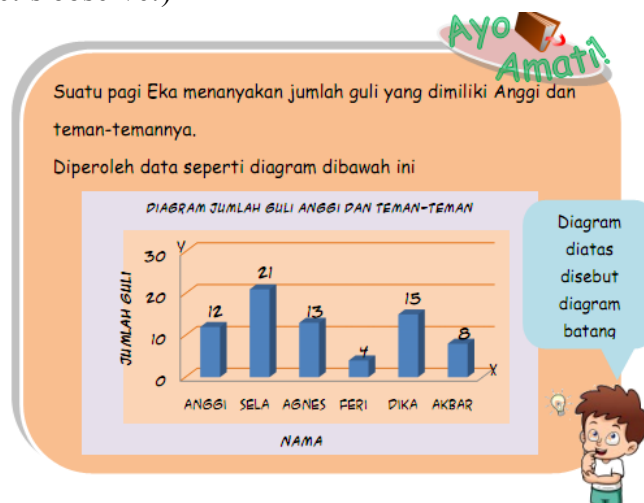


Picture 3. Traditional games

(4). Subjects material.


The learning material is designed in 6 sections, they are: (a) Observation, (b) questioning Part (c)Exercise section, (d)Discussion section, (e)Playing section,(e) Summary Section

a) Observation (let’s observe!)



This material is made by using microsoft power point 2007. It will lead students to observe their surrounding before learning the material.

b) Part of asking question (let’s do)




**AYO KERJAKAN !**

Untuk lebih memahami hubungan antar kuantitas, coba kamu ubah jumlah guli yang dibeli ibu dalam satuan kuantitas yang tepat.

Satuan kuantitas yang tepat untuk guli adalah Lusin.

120 buah guli = (... : ...) lusin  
= ... lusin

Jadi jumlah guli yang Ahmad dan teman-temannya miliki adalah ... lusin



Picture 5. Let’s observe

This is an activity to make students doing the question about the material.  
 c) Exercise section (let's exercise)

**Ayo Berlatih**

2. Coba kamu data 5 orang temanmu yang pernah bermain guli, catat berapa kali mereka memenangkan permainan guli pada tabel dibawah ini!

No	Nama	Menang
1		
2		
3		
4		
5		

Siapa temanmu yang paling sering menang?  
 Siapa temanmu yang paling sering kalah?

Picture 6. Let's exercise

In this part, student will be lead to answer the question by themselves.  
 d) Discussion section

**Ayo Diskusikan**

1. Dara dan Faiz sedang bermain guli. Dara ingin membidik guli Faiz. Jarak guli Dara dan Faiz yaitu 50 cm. Gambarkanlah jarak guli tersebut dengan menggunakan skala 1 : 10 !

**Jawaban**

Diskusikanlah Soal disamping bersama teman sebangkumu!



Picture 7. Let's discuss

In this section, students will be lead to answer question which is more difficult than the question in let's exercise by doing a discussion with other students.

e) Playing section (let's try)

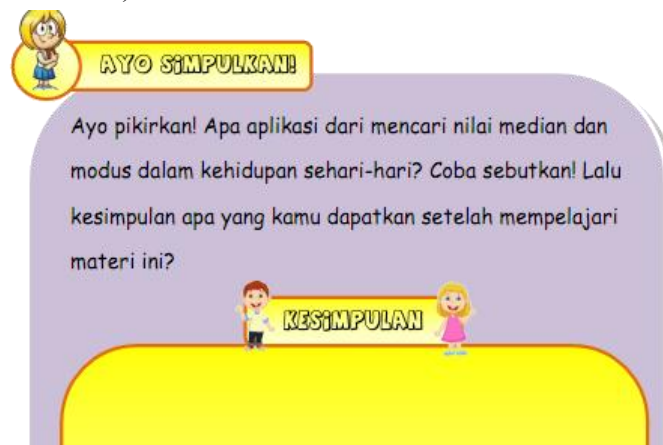
**AYO LAKUKAN!**

**AYO BERMAIN GASING!** Ajak sepuluh orang temanmu bermain gasing. Catat perolehan waktunya! Lalu tentukanlah modus dan median dari data yang kamu peroleh! Catat hasilnya, dan laporkan kepada gurumu. Mari belajar sambil bermain ...

Picture 8. Let's try!

This activity will lead students to play traditional games about mathematic material with other students.

f) Summary section (let's summarize)



Picture 9. Let's summarize

This activity will lead students to make a conclusion about the material.

(B). The collection of material (material collection)

Collecting material is all materials which are needed to produce the learning materials, including mathematics 5<sup>th</sup> grade text book, articles of traditional folk games of Riau which are related mathematical concepts, drawings and photos of the game.

3). Realization phase

In this phase, the researcher made learning materials about student activity which has designed in designing phase. These materials are designed by using easy language in order to help students to understand on using materials.

4). Testing, evaluation and review phase

In this evaluation phase, researcher evaluated the learning material about mathematic analysis in traditional games of Riau. The results will be analyzed and used as a basis for the revision of the first prototype.

The prototype which has been reviewed by experts will be revised by the researcher, then the prototype will be tested in a small study which consist of five students in small groups in order to get response data. The data were obtained and analyzed as a prototype review of learning material. After the prototype is revised, it will be re-tested again to observe the response of students and the practical aspects of media on a big group which consist of 30 students. If the level of the practical aspects and the reaction of students to learning materials is considered to be good, researcher will make the prototype become a text book. But if the media is considered not to be good enough, it will be revised again.

The data in this study were collected through two sources: the experts and the students. The data collection instruments that used in this study are:

1. Validity instrument

Validity instrument of this study was the development of a validation sheet which is used to gather information about the validity of the mathematical learning materials based on traditional games of Riau that will be filled by the experts.

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## 2. Practical Instrument

Practical instrument of this study was a questionnaire feasibility of mathematical learning materials based on traditional folk games that will be given to students to determine the level of the practical aspects of learning material. This data would be analyzed by researcher.

Data analysis consisted of the analysis of the data sheet validation by experts and the results of the questionnaire data which filled by students. Researchers analyzed data from sheet of validation and questionnaire in order to find the disadvantages from learning material. The results of these data can be used as a plan to the next cycle.

Techniques of data-analysis that used in this study is a descriptive analysis, based of calculating the index of each indicator validation from learning material. Validity of the device is determined by the results of the validation by experts.

## RESULTS AND DISCUSSION

Validation process is performed on three aspects by validator, such as the material aspect, the media aspects, and aspects of the language. Validators are experts in mathematic elementary school.

Based on the validation results of the data analysis by the researcher of mathematical learning materials based on traditional folk games of Riau for 5<sup>th</sup> grade of elementary school, researcher found that the average rate for the validity of learning materials based on the material aspects is 87%. It is in high category. From the aspect of media, these learning materials are also in the high category. The average of validator score is 85% and the average percentage score obtained from the aspect of language is about 80%, a degree validity in high category.

The average percentage of validator evaluation results based on three aspects, material, language, and the media is 84%. It means that mathematic learning material based on traditional games of Riau is ready to use in 5<sup>th</sup> grade of elementary school in Riau province.

The practicality of mathematic learning material based on traditional games or Riau province is test for 5<sup>th</sup> grade student of elementary school. The level of mathematical learning materials based on the practical aspects of traditional folk games to the 5<sup>th</sup> grade of elementary school obtained from the questionnaire responses and feasibility. Based on the results of questionnaire, we can conclude that the material had good practical level with the average percentage of the results of the questionnaire reaches more than 93%. This result show that course materials can be used for target students.

The students stated that they can use the learning materials because the good explanation of material is easy to learn, the display of learning material is also very attractive and the language is easy to understand. Respondents also stated that learning materials made their motivation to learn become increasing. They also added that the images and texts were quite clear and interesting. Learning the teaching material is more fun than the usual mathematic text book. From the results of the questionnaire responses and the feasibility of the teaching materials, it can be concluded that the mathematical teaching materials based on the traditional folk games Riau region for 5<sup>th</sup> grade of elementary school has valid and practical to be used as a supplement learning material.



## CONCLUSIONS AND RECOMMENDATIONS

### A. Conclusions

This research has a product of mathematic learning material based on traditional games of Riau province for 5<sup>th</sup> grade of elementary school. The making of mathematic learning material were conducted by: 1)Analyzing basic competence and core competence of curriculum 2013which matched with traditional games of Riau; 2)Collecting and designing learning material content; 3)Developing mathematic learning material; 4)Testing, evaluating, and reviewing the mathematic learning material for 5<sup>th</sup> grade based on traditional games of Riau. These learning materials is also through the process of validation by experts and twice trial to observe the level of practical aspects. The result of expert assessment showed that mathematic learning material based on traditional games of Riau has already been valid with an average value of 3.38. Based on the result of experiments to 30 students in 5<sup>th</sup> grade of elementary school, it can be concluded that mathematic learning material has been practical from the achievement and response questionnaire with theaveragerating score of 93%.

### B. Recommendations

The textbook as the product of this research can be used as supplement book in teaching mathematic in 5<sup>th</sup> grade of elementary school in Riau province. The use of folkgame in learning material not only help student to understand the mathematics subject but also help the children to learn more their culture. In curriculum 2013 the learning material in elementary is delivered in thematis approach this folkgames can also be used for other subject in this approach.

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