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## THE DEVELOPMENT OF LEARNING SET MATERIAL COMPARISON USING INDONESIAN REALISTIC MATHEMATICS EDUCATION (PMRI) TO DETERMINE THE ABILITY OF STUDENTS REPRESENTATION

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### Abstract

This research is purpose to produce the learning set which oriented Indonesian Realistic Mathematics Education (PMRI) approach in comparison material that valid, practice, and have potential effect for students grade VII in Junior High School 8 Lahat. This research is a development research which implemented in two stages, Preliminary study, and Formative study. The subject of this research are 26 students grade VII in junior high school 8 Lahat. Data was collected by walk trthough, observation, and test. The conclusion of this reseach is the learning set that produced are valid, practice, and have potential effect that the mathematical representation capability students grade VII are good in making equation or mathematics expression, and using words or written teks for making a problem situation.

**Keywords:** *PMRI. Representation ability, valid, practice, potential effect, Comparisons*

### INTRODUCTION

Nowadays, the aims of learning mathematics is not only focus to upgrade the cognitive assessment of students, but also can upgrade the ability of (1) mathemathical communication; (2) mathemathical reasoning; (3) mathematical problem solving; (4) mathemathical connection; (5) mathematical representation; that's all are mathematics competency standards based of Principles Standards for School Mathematics (NCTM-AS, 2000).

One of the mathematics standards competency is representation ability. Krebs (In Oktaviani, 2011;18) said, there are three reasons, why the representation is one of mathematics standards competency, they are:

1. Student will able to making and using representation ability to manage, write down, and communicating their ideas.
2. Student can develop one of mathematics representation that can use with specific purpose flexibly and appropriately.
3. Students can using representation to make a model and interpret the social physical of mathematics.

But, based of interview with the teacher of mathematics that teach in grade VII at junior high school 8 Lahat, the student's ability of mathematics representation is not good enough. To solve that problem, teacher better choose the learing method that can help students to develop their representation ability. It's suitable with Kompetensi Inti Guru no 2.2 inPeraturan Mentri Pendidikan Nasional Nomor 16 Tahun 2007 that: "Menerapkan berbagai pendekatan, strategi, metode, dan teknik pembelajarab yang mendidik secara kreatif dalam mata pelajaran yang diampu".

Indonesian Realistic Mathematics Education (PMRI) is one of curriculum implementation approach that suggested to implicated at all level of education. The development research that have done by Fuadiah (2009) which produce the prototype like Lesson plan and Students workbook based of PMRI and Armanto's Research that produce a prototype about local strategics and plot in topics multiplication and determination conclude that learning process which using PMRI can applied in the class and repaired Student's learning outcome, attitude, and interest. Then, Zulkari in national mathematics conference 2011, PMRI can implementing the characters education in every subject using story or another learning model.

Comparisons, is one of material in Passing Competences Standards for student grade VII Junior high School. This material is one of material that can determine the students's representation ability, because in this material, founded some indicators operational of representation. Comparisons also material that always found in National Test as contextual problem. Then, to solve the problem, students must be able to determine the solution of the problem step by step.

This research is purpose to: (1) Produce the learning set that based of PMRI yang that valid and practise (2) To know the potential efect from depelop learning set which focus to Student's mathematics representation ability.

## RESEARCH METHOD

This research using development research type formative evaluation (Zulkardi; 2002). It implemented in January 19th and 22nd 2013. Subject of this reseach are 26 students grade VII junior high school 8 Lahat that involved in learning process which using PMRI. During the learning process which using PMRI approach, someone who act as the teacher is the teacher who regularly teaching mathematics in their class, and have been trained to teach using PMRI approach.

### The Procedure of Developing the Learning Set

Thera are two process that have done in this reseach to produce the learning set that consist of Lesson Plan, Student Worksheet, Evaluation Problem, and Assessment rubric. They are preliminary and formative study (Zulkardi; 2002).

Low resistance to revision → High resistant to revision

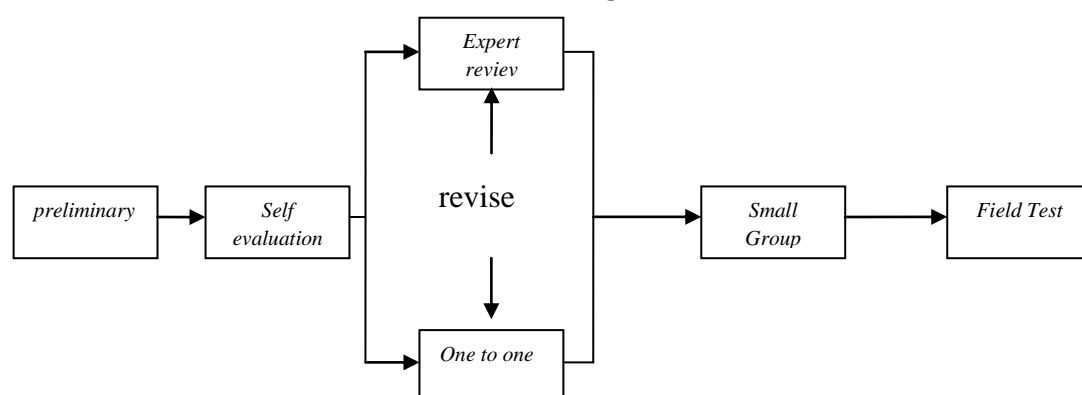


Figure 1. The plot of design formative research (Tessmer in Zulkardi, 2002)

1. Preliminary. This part is consist of: Prepare and designing (prototyping). Prototyping is consist of three cycle with the third cycle as a product.
2. Formative Study. This part are consist of Self Evaluation; Expert Review, One to one, Revision, Small Group, Revision, and Field Test;

### Collecting and Analyzing Data

In this research, data was collecting by:

3. Observation. There are two kind of observation. First, student observation that implemented by five observer to 26 student grade VII. Then the second observation is management learning process using PMRI approach by teacher. After observing, the data that collected was analize to conclude student's activity and participation at learning process, and conclude how far PMRI approach was applied.
4. Document. The document is consist of video of learning process. The video is use to know the student's oral mathematics representation ability that shown in learning process.
5. Test. Test is using to know the potential efect that consist of writing mathematics representation ability that shown from student worksheet and evaluation problem which done by students. Then students worksheet and evaluation problem is correcting using the assessment of representation ability sheet and assessment rubric.
6. Interview. Interview is using to know the reason that caused why the mathematics rerpresentation ability is not appear in some students.

The scors of mathematics representation ability was design with range 0-75 and converted into the category of representation capability. The scoring system of mathematics representation ability was design as this table:

Table 1 The Scoring System of Mathematics Representation ability

Deskriptor that appear	Scors
0	1
1	2
2	3
3	4
4	5

(modification from Ilma, R. Dkk. 2010)

To converting into the category of mathematics representation capability, use the following table:

Tabel 2: Category of Students mathematics representation capability

Scors	Category
60 - 75	Sangat Baik
40 - 59	Baik
20 - 39	Cukup
0 - 19	Kurang

(modification from Ilma, R. Dkk. 2010)

## RESULT AND DISCUSSION

### Description the Result of Development Learning Set.

There are two important part of this research, are preliminary and formative study. In preliminary researcher implemented the pleriminary prepaaration as analyze the curriculum in material comparisons for student grade VII. Then, researcher design first prototype, that prototype are not only adapted with the purpose of learning, principles of PMRI, and characteristics of PMRI but also adapted with the principles of designing the learning material, in order to optimally gided student to archieving Basics Competence (KD) and Standards Competence (SK) that has been established.

The formative study part with by self evaluation, expert review, one to one, small group, dan field test. First prototype was produce are validated by the expert which adapted from content, construct and language. After that, go on with one to one. In one to one, a teacher and two students requested to answer students worksheet and evaluation problem that designed and give coment and suggestion for the prototype. The result of validation, coment, and suggestion are using as guidelines to revision the prototype to make second prototype.

The draft of second prototype was tested in small group. This group are consist of six students. The student are requested to solve the problem in worksheet and problem evaluation, and also requested to give coment of second prototype. The comment of the student was using as guidelines to design the third prototype, that being the last prototype (product).

### Description of Potential Effect That Appear

After the product ready, the next step is field test. The learning set in third prototype was tested to the research's subject, that 26 students grade VII Junior High School 8 Lahat. During the learning process, student's activity was giving attention. In the last session of learning, student requested to doing the evaluation problem.



Figure 2. Student using the model of in problem that display in the students worksheet



Gambar 3. A student represent his group to explain their answer of the problem in the student worksheet.



Gambar 4. Student doing evaluation problem

Figure 2 and 3 Show the students activity during the learning process, and picture 4 show student's activity when doing evaluation problem.

Learning process is according to the lesson plan that produce. When learning process is on going the researcher is act as the observer and give attention to the teacher that applied PMRI approach. In observation sheet, there are some point that show the characteristics of PMRI approach. From the calculate, found that PMRI approach was applied until 78,2%.

Student worksheet was done by group of students, one group is consist of six students. Then, the result of student worksheet is presenting in front of the class and given some comment from another group. The evaluation problem was done by student individually.

During the learning process, researcher, teacher, and three observers give attention to student's activity, then collecting data, they are pictures and video about learning process. Then, the data was analyzing. From the analyzing of dokumentation data, found that students mathematics representation ability was appear when they do their worksheet.

After students finished their problem evaluation, the result of their works was analyzing. It's purpose to know the mathematics rapresentation ability of writing. The

analyze was done based of the assessment sheet of mathematics representation ability. This table show the result of students mathematics representation ability.

Table 3 Frequency Distribution of Students Mathematics Representation Ability

Interval scor	Frekuensi	Persentase	Category
60 - 75	6	23%	Amat Baik
40 - 59	11	42,2%	Baik
20 - 39	9	37,8%	Cukup
0 - 19	0	0%	Kurang
<b>Mean</b>	46,52		Baik

From that table, we know that the result of mathematics representation ability from 6 (23%) students was in "Sangat Baik" category, from 11 (42,2%) students was in "Baik" and 9 (37,8%) students was in "Cukup" category. Mean of 26 students mathematics representation ability was in "Baik" Category.

Based on the development of first prototype, second prototypem and third prototype, the result of development prototype can descibe:

Valid, it's show from the assessment of validator that judge this prototype are good and suitable with three criteria, they are good from the content, constuct, and language.

Practise, it's look from field test that all of students can use this learning set well. The result of revision based of comment from teacher and students judge that prototype is prectise to be product.

Have the potential effect, from the learning process based PMRI, looks that students activity when they do their act is very good. The result of assessment of students mathematics representation ability was in "Baik" category.

Based from the result of test, suggestion from the expert, attention from the first until the last prototype, and the result of field test, it's can conclude that the development of learning set based PMRI are valid, practise and have the potential effect, they are mathematics representation ability in making equation or mathematics expression, and using words or written teks for making a problem situation.

## CONCLUSION AND SUGGESTION

### Conclusion

This research was produce the learning set in material comparison which consist of lesson plan, students worksheet, problem evaluation, and assessment rubric. Based of the result of field test in 26 students grade VII junior high school Lahat, it can conclude that:

1. The learning set that produce in this research are valid and practise.
2. The result of field tes in 26 students grade VII junior high school 8 Lahat show this learning set have the potential effect, they are the mathematics representation ability in making equation or mathematics expression, and using words or written teks for making a problem situation.

### Suggestion

Based of the result from this research and the conclusion, then reseacher suggest that:teacher is expecting to use this learning set as a kind variety in learning mathematics. The next researcher is expecting use this result of reseach as a preference to design a better learning set based of PMRI. School is expecting to support the teacher to also develop learning set based of PMRI to upgrade students ability of mathematics competition.

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