

# Impact of Indonesian Realistic Mathematics Approach to Students Mathematic Disposition on Chapter Two Composition Function and Invers Fungsi in Grade XI IA-1 SMA Negeri 4 Padangsidempuan

<sup>1</sup>Adek Safitri, <sup>2</sup>Edy Surya, <sup>3</sup>Edi Syahputra, <sup>4</sup>Maruli Simbolon

State University of Medan (UNIMED) North Sumatera, Indonesia

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**Abstract:** This research purpose to find the impact of realistic mathematic education approach through student mathematic disposition. This reasearch are using pre-experiment research design with cluster random sampling technique. This research held in SMA Negeri 4 Padangsidempuan with all the students in grade XI IA even semester 2011/2012. There are 5 classes with 163 students. For research purposes sampling taken from XI IA with 31 students. Intrument for this research are using validated survey. Pre-test are given before running the RME and pre-test after RME applied. Learning activities using realistic Mathematic Approach delivering significantly impact through students mathematic disposition. This condition showed by t-test that come from  $t_{test} = 9,8$  and  $t_{tabel} = 2,042$ . Those data are qualified for hyphoteses. The hyphoteses state if  $t_{test} \geq t_{tabel}$  means  $H_0$  rejected and  $H_1$  approved. From the result showed that there are a significant impact from Indonesian Realistic Mathematics Approach to students mathematic disposition on chapter two composition function and invers fungsi in grade xi ia-1 sma negeri 4 Padangsidempuan.

**Keywords:** Realistic Mathematics Education Approach, Mathematics Disposition.

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## I. INTRODUCTION

The increase of science today has been impacted to various action from government to improve the quality of learning activities at school. One of the action is giving sertification for the teacher. This activity purpose to motivated teachers to have pedagogy competency, personality, professional and social competency that has been tested and approved. Teachers sertification also purposes to optimizing the learning activity. By providing extra facilities like improve the learning tools and materials like a library. The increase of Mathematic also increase just like science has been mentioned earlier. Scientist keep improving the concepts that has been exists for long time. The scientist also find some new concepts regarding the increase phase. Mathematic function itself as the queen of science has brought mathematic to every science improvement, increase, steps and phase. Therefore, mathematic can used in every single kind of science. Also it has brought mathematic as a primary subject that should learn and understand by students. This is accordance with the common goal of mathematics at the school level is to prepare students to be able to face changing circumstances in life. Hasratuddin (2015) [1]

Mathematic orientation based on formulation has to be abandoned. Method of learning session of mathematic must be focuss on exploration and mathematic investigation. Teaching methode by exploration and investigation will bring a new students habit and behaviour. A new behaviour to use the science in order to solved various mathematic tasks. Therefore, mathematic disposition will also increase and increase as well. If the way of people think are use mathematical logic and also deliver appreciation for mathematic puposes are occur consistently, accumulatively mathematic disposition will increase well. As conclusion, the mathematic disposition is a strong pretension, awareness, tendency, and dedication from students itself to think and do as mathematic as well.

Mathematic teachers should be more creative in presenting the subject matter, because many consider math is difficult. Mathematics is considered difficult because it is not concrete, so that students find it difficult to learn. This is evident from the analysis *Programme for International Student Assesment* (PISA) on 2012 which measures the literacy skill of reading, mathamtics and sciences student aged 15 years old in SMP/MTs/SMA/MA/SMK, obtained a score of Indonesia on mathematical ability is 375 from the average score of 494. These result demonstrate mathematical ability of students in Indonesia is still below the International standards (Result in Focus, OECD, 2013:5) [2].

Innovation are expected in mathematic learning activities. It is not only purposes to mastery in understanding subject, reasoning, problem solving, communicating but also to improve students mathematic disposition. One of innovation that expected able to improve the mathematic disposition is mathematic learning approach. Mathematic learning approach is the way teachers face during the learning and teaching activities. This approach purposes to makes the subject or mathematic cocept are acceptable to students. Therefore, writer try touse realistic mathematic education (RME) approach in learning and teaching activities.

## II. MATHEMATICAL DISPOSITION

According to the National Council of Teachers of Mathematics (NCTM:2000) [3] disposition is not only referring to the attitude but the tendency to think and act in a positive manner. Disposition of students mathematics is the manifestation in the way of how they solve their problem in mathematic assignments with confidence, a desire to a desire to explore alternative ways, diligence and interest, as well as a tendency to reflect on their own thinking. Disposition of mathematics is more than just enjoy math. Students may enjoy math but do not reflect the attitude and positive action as well as the way of thinking that is expected. The evidence of mathematics disposition reflected from the written test like, homeworks, development projects, and journal or presentation. Students also could provide the information about students mathematics disposition.

Disposition mathematical have a seven components (NCTM:2000), as for the seven components were as follows, (i) sel confident in using mathematics, (ii) flexibility in working mathematics (doing mathematics), (iii) persistent and tenacious in doing or completing mathematical tasks, (iv) have curiosity in doing mathematics, (v) reflect on the way of thinking, (vi) appreciate the applications of mathematics, and (vii) appreciate the role of mathematics. The mathematic disposition of the components contained in the above mathematical competence in the affective domain the objectives of mathematics education by having respect for the usefulness of mathematics in the life that is curious attention, and interest in studying mathematics, and a tenacious attitude and have self confidence in problem solving.

Students who already have a high mathematical disposition will tend to continuously reflection in the way they ask and answered questions worked on the problems and approach their newfound. As evidence of the disposition of mathematics can be seen demonstrated in the written exercises students like home assignments, project development and journals or presentation by the students also can provide valuable information regarding the disposition of mathematics student. Such as individual or group presentation project regarding the solution of a problem or proving a theorem can be used as evidence how great the need for students to be diligent and steadfast in doing the task and non try alternative methods to solve problems. Safitri (2015) [4]

So, we can conclude that the disposition of mathematics namely the desire, tendency, awareness and a strong dedication to the student or big students to think and act in doing mathematics.

III. REALISTIC MATHEMATICS EDUCATION

Realistic mathematic education (RME) approach come from contextual issues, in this situation student as 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. With those kind of characteristics, Indonesian realistic mathematic approach has a good prospect to applied. It is good among structurealis, empiric, or mechanical approach. Expectation dan optimism that RME is the answer to the problem of mathematic approach in Indonesia.

Realistic mathematics education is a education approach has developed more than 40 years in the field of sciences and mathematics. *Activities from a unit to develop student understanding of logarithms are used to exemplify the RME design principle of progressive formalization. Starting from contexts that elicit students' informal reasoning, a series of representations and key questions were used to build connections between informal, pre-formal and formal representations of mathematics. Student and teacher comments from the pilot of this unit in a College Algebra course at a U.S. community college suggest this approach may benefit students who have been underserved by traditional approaches to mathematics instruction.* Webb (2011) [5]

Webb expect that RME expected to obtain the following results: "At the heart of RME is the didactical construct of progressive formalization. The "process of going from the concrete to the abstract" has been espoused in education psychology literature in the United States for at least a century (cf. Dewey, 1910) and can be traced back to 18<sup>th</sup> century education-related writings in Europe (e.g., Rousseau, Pestalozzi, Froebel, Montessori, etc.). Yet, RME offers more than a way to support student transition from the concrete to the abstract. RME instructional sequences are conceived as "learning lines" in which problem contexts are used as starting points to elicit students' informal reasoning. That is, the context is a source for new mathematics."

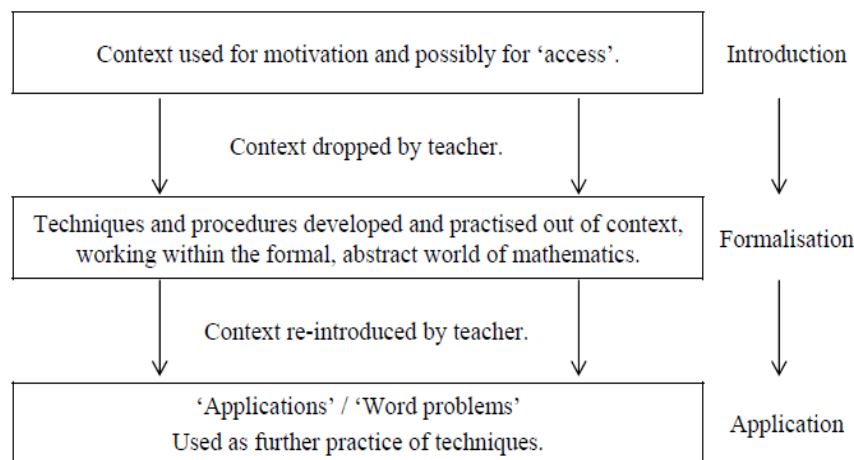


Figure 1. Scheme of Realistic Mathematics Education (RME)

Explanation above describe that RME is competent to improve the understanding of mathematic, computation ability, and student problem solving ability. With various characteristic of RME Gravameijer (2010) [6] like:

1. Guided discovery through a progressive process of mathematic:

Guided discovery Ahmadi (2011) [7] is a learning activity that involve whole students capacity of thinking to locate and investigate something systematically, critically, logically, and analitically. And finally students able to formulate their discovery with fully of confident.

2. Using a didactic phenomenon:

Didactical phenomom concept Suprijono (2009) [8] is a phenomom / concept that helping teachers to associate between theory an real world situation that encourage students to build the assosiation between knowledge they had and the application in their real life as a family member or a society member.

### 3. Personal modelling by students:

Personal modelling by students is a bridge for students from the real situation to a concrete situation or from informal mathematics to formal mathematics. Means, students create their own model to solve a problem. Firstly, students will develop a familiar model. By generating and formalisation, the model will become a unity gradually.

While five of the main principles of RME are: (a) Utilization of contextual issues (b) Utilization of progressive mathematics model (c) Utilization of construction result of students (d) interactivities (e) the association among mathematics concepts.

By Paul Dickinson and Sue Hough (2012) [9] RME give effect *“Teachers using RME report that it enables more students to understand mathematics and to engage with it. However, it is not easy to measure the effectiveness of a way of teaching, particularly when its aims are not quite the same as those in conventional classrooms. (RME places more emphasis on understanding and problem solving).”*

The study Palintusa (2013) [10] found that: *1) Achievements and enhancement of students' critical mathematical thinking skills who were treated with by realistic mathematics education is better than students' skills were treated by conventional mathematics education. The differences are considered to: a) overall students, b) the level of early math skills, and c) schools' level; 2) Quality of students' character who were treated by realistic mathematics education is better than students' character who were treated by conventional mathematics education. The differences are considered to: a) overall students, b) the level of early math skills, and c) schools' level.*

This study Arsaythamby (2014) [11] showed that *Mathematics activities for those who were taught using IRME are higher than for those using the conventional approach. The results showed that IRME approach is being practised in Aceh, but not completely. The higher percentage of activities suggests that the Aceh Education Office expands the implementation of IRME in all primary schools so that learning of Mathematics is more effective.*

RME also expected to encourage and raise students' mathematical disposition. According to the National Council of Teachers of Mathematics (NCTM) disposition is not only referring to the attitude but the tendency to think and act in a positive manner. Disposition of students mathematics is the manifestation in the way of how they solve their problem in mathematics assignments with confidence, a desire to explore alternative ways, diligence and interest, as well as a tendency to reflect on their own thinking. Disposition of mathematics is more than just enjoy math. Students may enjoy math but do not reflect the attitude and positive action as well as the way of thinking that is expected. The evidence of mathematics disposition reflected from the written test like, homeworks, development projects, and journal or presentation. Students also could provide the information about students mathematics disposition.

Therefore, the association between RME and students mathematics disposition is students disposition will be appear and increase faster if mathematics problem are based on the real life because mathematics disposition also demanded to applied the mathematics in to real life. Real life and mathematics are associated each other.

One of the hardest chapter for students is about the function of two composition and function of inverses. How to understanding the function and how to apply them to real life. Both chapter are lesson they learn today. They consider the topic was not useful for everyday life so it does not need to be studied. Therefore, the researchers took the topic of a composition of two functions and inverse function as research material.

## IV. RESEARCH METHODE

### 1. Population and Samples:

population was all students of class XI XI IA SMA Negeri 4 Padangsidimpuan. The sample was selected through cluster random sampling technique that is class XI XI IA SMA Negeri 4 Padangsidimpuan

### 2. Research design:

This is a pre experimental research. Pre-experimental research is research that does not have control class. There is only one class to concern of for researchers. Pre-experimental study was conducted to determine whether the mathematics disposition of class XI XI IA SMA Negeri 4 Padangsidimpuan increased after using RME learning base. This research will using a quantitative approach.

### 3. Research Instrument:

The instrument used in this research is survey to learn the result of mathematics disposition of class XI XI IA SMA Negeri 4 Padangsidimpuan. Pre test ar conducted before the research begin in the class.

### 4. Data Analytics Technique:

Data obtained from the score of students before and after applying RME. Data calculated from the score the students get from the experiment. Data processing begins by conducting requirement test of statistic that needed for normality test and t-test as one of inferencial statistic technique that taken to get the general conclusion.

## V. RESEARCH RESULT

Research conducted in SMA Negeri 4 Padangsidimpuan by taking a sample of the class is class XI XI IA SMA Negeri 4 Padangsidimpuan as an experimental class consisting of 31 students. This study uses a Indonesian Realistics Mathematic Education (RME) Approach. The main objective of this study was to determine the effect of applying Realistics Mathematic Education Approach through studen mathematic disposition.

**Table 1 : Comparison Value *Pretest* and *Posttest* Students in Class XI IA-1 SMA N 4 Padangsidimpuan**

Nu.	Student's Name	Pretest Value	Posttest Value	Gain (d) ( <i>posttest</i> - <i>pretest</i> )	$d^2$
1	AIL	60	85	25	625
2	AAS	60.6	84.38	23.78	565.488
3	AT	70	81.25	11.25	126.563
4	ATjg	65	75	10	100
5	BML	70	75	5	25
6	DR	60	85	25	625
7	EA	77.5	88.13	10.63	112.997
8	HT.N.S	80	84.38	4.38	19.1844
9	IMRP	75	82.5	7.5	56.25
10	IWH	75	82.5	7.5	56.25
11	JH	66.9	90	23.1	533.61
12	MSH	65	75	10	100
13	MSS	65	75	10	100
14	MSN	75	75	0	0
15	MYT	62.5	87.5	25	625
16	NRNS	64.4	87.5	23.1	533.61
17	NSS	66.3	88.75	22.45	504.003
18	Nni	75	81.25	6.25	39.0625
19	NS	80	87.5	7.5	56.25
20	OKDM	65	75	10	100
21	RMWT	65	84.38	19.38	375.584
22	RA	75	80	5	25
23	RARS	76.3	80	3.7	13.69
24	RH	65	75	10	100
25	RAH	60	75	15	225
26	RSD	60	75	15	225
27	SJS	70	80	10	100
28	TAH	60	75	15	225
29	YSS	70	80	10	100
30	YP	75	90	15	225
31	ZMS	75	84.38	9.38	87.9844
Sum		2129.5	2524.4	394.9	6605.53

**1. Result test of Mathematic Disposition from experiment class:**
**Table 2 Result test of Mathematic Disposition from experiment class**

Eksperiment Class	Maxsimal Score	$X_{max}$	$X_{min}$	$X_{average}$	DS	t- Tes
Pretes	160	80	60	69	6,2	9,8
Postes	160	90	75	79	5	

From table above, we can conclude that the average of mathematic disposition increase before and after the RME is higher. Means, the increase are significantly happen.

**2. Description of mathematic disposition test from experiment class:**

As shown in the table 1 above, the result of mathematic disposition test from experiment class, highest score from pre-test is 80, lowest score is 60, average score is 69 and deviation standard is 6,2. Fro, post- test the highest score is 90, lowest score is 75, deviation standad 5 and t-test 9,8

From this description may indicate that there is an increased disposition of mathematics students in the experimental class.

## VI. DISCUSSION OF RESEARCH

Observing result of the research that has been stated above, Indonesian Realistic Mathematics Approach has significantly effect to students mathematic disposition. Theorically, learning with realistic mathematics has several advantages as follows:

1. To change the students behaviour become more interest with mathematics
2. RME gives problem that related with real life situation and informal learning
3. Students are challenged and excited about doing tasks, because of as many games, pictures / symbols that can help making mathematics easier.
4. RME provide a clear explanation and operational understanding to students. Learning process is the main most of all.
5. RME combines the advantages of variety of learning approaches..

For further discussion about the result of reasear are based on normality test and t-test from incresing data of mathematic disposition on experiment class XI IA SMA Negeri 4 Padangsidimpuan. T- value is 9,8 with significances score 0.000. T-table could shown from statistic table in significances  $0.05:2 = 0.025$  ith (df)  $n-1$   $31-1 = 30$ . Result are obtained for t- table 2.042. therefore, t-value 9,8 are higher than t-table 2.042.

If  $t_{value} \geq t_{table}$  , Ho rejected

Jika  $t_{value} \leq t_{table}$  , Ho accepted

Based on significancies

If significancies  $>0,05$  Ho rejected

If significancies  $<0,05$  Ho accepted

Because the score of  $t_{value} \geq t_{table}$  ( $9.8 \geq 2.042$ ) and significantion  $< 0.05$  ( $0.000 < 0.05$ ), Ho rejected. Thus, we can conclude that there are differences in the average scores between before and after RME. Significant level in this research was 95%, inferences can be trusted by 95% and error possibilities 5%.

This may imply that there is a significant influence from Indonesian Realistic Mathematics Asproach through student mathematic disposition in chapter two fungsi composition and invers composition in class XI IA SMA Negeri 4 Padangsidimpuan. This research shows that RME has higher score for mathematic disposition in class XI XI IA SMA Negeri 4 Padangsidimpuan. And this is also applied for general.

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### VII. CONCLUSION

Based on this research we can conclude that relevant to this research :

1. Students are more active in the learning process by using RME than without using RME (traditional approach)
2. Mathematic disposition in class XI IA SMA Negeri 4 Padangsidempuan.increase after using RME. It shown from the average score comparison from pre-test and post –test. Average before RME 70.00 and after RME 78.95
3. Hypothesis result shown that the application of RME for students mathematic disposition are better after using RME . means, there are a significant influences in applying RME to students mathematic disposition class XI IA SMA Negeri 4 Padangsidempuan.

### VIII. SUGGESTIONS

Based on conclusion above, there are several suggestion related with this research:

1. For teachers, suggested for teacher to change the teaching methode and strategy/ approach. Using RME are reccommended
2. For students, suggested to become more active in learning process and improve the mathematic disposition.
3. For head of school principal, to suggest teacher to use RME .and student can associates the theory or mathematic formulation and learning to real life.

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