

# IMPLEMENTATION OF REALISTIC MATHEMATIC EDUCATION APPROACH TO IMPROVE ACTIVITIES AND STUDENTS' LEARNING OUTCOMES IN SMAN 1 SEI SUKA

Mutia Basra<sup>1</sup>

<sup>1</sup>Student, Post Graduated, Universitas Negeri Medan, Medan, Indonesia

## ABSTRACT

*This study aims to determine the improvement of students' learning outcomes and activities by applying RME approach. A class action research is done to meet its goal. It was conducted in SMAN 1 Sei Suka in the even semester in 2013/2014 academic year. The subjects were students of class X-Msc-3 SMAN 1 Sei Suka. The object of this research was the application of RME (Realistic Mathematic Education) learning approach. Various tests and observations were used as research instrument to find out students learning outcomes and to observe their learning outcomes and activities when RME learning approach was applied. The finding of this research showed that the learning outcomes had increased.*

**Keywords:** - Realistic Mathematic Education, Learning Activities, Learning Outcomes

## 1. INTRODUCTION

Indonesia has been facing classic issues of education quality at this time. In fact, comparing to other countries Indonesia has a very alarming quality of education especially in mathematics subject. Based on the research of TIMSS (Trends In international Mathematics Science Study) conducted by Michael O. Martin, Pierre Foy and Alka Arora in 2011 (Michael,2012;420) states that: 'Indonesia is at the rank 38th out of 45 countries for mastery lessons in mathematics. In fact, the score (386) is far below Singapore (611) and Malaysia (440) while the standardisation of TIMSS Scale Centrepoint is 500. The result which showed the low quality of learning from students' learning outcomes in mathematics reflected a number of students' learning difficulties.

One of the factors that lead students to low learning outcomes is most students think that mathematics is a difficult and boring subject. Mulyoni Abdurrahman (2003:252) states that: "of the many fields of study that are taught in school, math is a field of study that is considered the most difficult by both students who have learning difficulties and who have no problems in learning". In addition, the learning model used by teachers in the classrooms does not vary, they apply a teacher-centered classroom model which make teachers dominating while students are only watch and sit from their desk without doing proper activities which lead them to be creative. This triggers students to dislike mathematics.

In learning, students should do some activities as in Sardiman's suggest (2011:97): in learning, activities should be applied, students need to be active, without activities learning process will not properly take place". So, teachers are expected to be a facilitator for students to be active in the learning process. While Rusman (2011:323) states: ' learning will be more meaningful if students are given the opportunity to participate in various activities so that students are able to actualize their abilities inside and outside the classroom". In other words, students are not only expected to listen to the teacher's explanations, watch, take notes, and answer teacher's question but also to be active in the learning activities and to be dominant in the classroom.

For this matter, it is suggested that teachers need to design a mathematical trick that packed into an interesting and comprehensible lesson which brings students enjoying the learning. One of the learning models that can be used by teachers is Realistic Mathematic Education (RME) which is students are directed in realistic learning and actively participate during the lessons. Gravemeijer (1994: 82) revealed: "Realistic mathematics education is rooted in Freudenthal's interpretation of mathematics as an activity". Gravemeijer expression above shows that the realistic mathematics learning developed based on the view of Freudenthal who claimed mathematics is as an activity. In addition, Gravemeijer (1994: 91) stated that: "Mathematics is Viewed as an activity, a way of working. Learning mathematics means doing mathematics, of the which everyday life problem solving is an essential part". Gravemeijer explained that using mathematics in learning and working is important in our lives to solve our daily-lives problems too.

The material taught statistical learning model Realistic Mathematic Education (RME) will allow students to understand the concept of statistics. Due to the approach of RME, statistics taught in a different way in which students are taught in the context of daily lives. Besides, this model is able to make students active in the classroom, so they not simply to receive material from the teacher.

## 2. METHOD

This type of research is the Classroom Action Research. This study was conducted in one of the classes X SMAN 1 Sei Suka, Batubara district, North Sumatra in the even semester of the academic year 2013/2014. Subjects in this study were students of class X-MSc-3 SMA Negeri 1 Sei Suka, Batubara district, North Sumatra, which numbered 33 in the even semester of the academic year 2013/2014. The object of this research is the application of the approach RME (Realistic Mathematic Education) on the statistical material in SMA Negeri 1 Sei Suka District, North Sumatra academic year 2013/2014. This study was conducted in two cycles and each cycle was consisting of three meetings. The criteria for the average observational studies are:

**Table – 1:** Criteria for Learning Process

Score	The Learning Process Criteria
0-1.1	Very bad
1.2 -2.1	Bad
2.2-3.1	Good
3.2-4.0	Very good

In this research, activities such as visual, listening, oral and mental were observed during learning process in the school. This can be seen in this table below:

**Table – 2:** Criteria for Student Activity

Number	Activities	Criteria
1.	Listening	Listening to the teacher's explanation, listening to his pair's explanation
2.	Reading	Reading students book, LAS and other learning resources which are relevant to the subject matter.
3.	Writing	Relevant writing learning process activities include: - Writing down teacher's explanation: students feel necessary to write down teacher's explanation from the board, books, friends and summaries or his teacher's conclusions. - Resolving problems freely: when students figure out solutions for the problems both individually and in groups. - Working on activity sheet: when students are actively completing problems on the paper.
4.	Discussion/ asking friends	Students interact with each other in solving problems both when they find concept and do LAS.
5.	Discussion/ asking teachers	Discussion/asking-answering between students and teacher include: - Responding to a teacher's questions: it is when students verbally answer teacher's questions, Asking or giving alternative solutions to problems, and suggesting notion on a new concept or pattern. - Asking the teacher: it is when students ask about subject matters, ensure his ideas and aspirations are relevant,

		propose some ways to resolve problems.
6.	Doing things irrelevantly	Doing things that are not relevant to learning process such as teasing friends and leaving the classroom.

The complete criteria for determining the percentage achievement of ideal time student activity is presented in this table.

**Table – 3:** Criteria for determining the achievement of ideal time student activity

Number	Category aspects	Ideal time	Tolerant interval PWI	Criteria
A	Listening/paying attention to teacher's explanation/friends	25% from total time	(20% 30%)	Three points out of a,b,c,d,e should be met and c & d must be fulfilled.
B	Reading student books, LAS	15% from total time	(10% 20%)	
C	Writing down teacher's explanation, taking notes from text books or friends, completing tasks on LAS, summarizing group-work tasks.	30 % from total time	(25 % 35%)	
d.	Discussing/asking and answering among students, and between students and teacher.	30% from total time	(25% 35%)	
E	Doing irrelevant things in learning process.	0% from total time	(0% 5%)	

**Table – 4:** Categories of student learning outcomes as follows:

Level of mastery	Criteria
90 % - 100%	The ability is very high
80- 89%	The ability is high
65%- 79%	The ability is moderate
55%- 64%	The ability is low
0% -54%	The ability is poor

It is considered complete if the learning mastery is 65%, while it is completed if a group of class has 85% of classical completeness percentage.

### 3. RESULTS AND DISCUSSION

This research was conducted in SMA Negeri I Sei Suka. The result was conducted in class X-MSc-3 to 33 students. On Wednesday, May 14, 2014, the researcher gave an early test to all students in grade X-Msc-3. Initial given test aimed to determine whether the students mastered the prerequisites material for statistics lesson that would be taught by researcher. After initial test carried out, there were 10 students who could not complete the tasks given so that the researcher repeated the same material to students until the whole students were able to complete it. When they mastered it, the researcher continued the statistics material that she would teach.

Based on the pre-study observation, it was found that students learning outcomes were still very low. The result showed, from 33 students, students with poor learning mastery level were 23 students(69.7%), 3 students (9.09%) had a low mastery level, 5 students (15.5%) achieved moderate level, and 2 students (6.06%) achieved a high category. There were no students who achieved a very high category. The average percentage of this initial test is 39.39% (very low). While students at the level of completeness learning is 7 (21,21%) and there were 26 (78.79%) for incomplete learning category. It was also shown students' learning activity was low as there was none of the categories fulfilled. Students tended to listen to teacher explanations and do irrelevant things in learning process.

In the pre-study, researcher conducted observations of learning process by using RME indicators and the result showed that learning process performed by the teacher did not suitable for the RME approach.

#### *Cycle 1*

Based on the observation done to the learning process, it is found that in some meetings such as the first, the second, and the third, teacher had already well implemented with sequential values 2.32, 2.62, 2.723.

Activities of students had increased, could not be considered ideal, with the result: a) the percentage of students listening to teacher activity/ friend did not meet the ideal criteria, namely 31.95% of the total overall time in the learning process should ideally range between 20% to 30 %, b) the percentage of students in reading activity (students' books or other reading sources for learning takes place) had fulfilled the ideal criteria, namely 10.51% Of the total overall time in the learning process. C) percentage of students in writing activity (taking the teacher's explanation/ friends, doing LAS and make a summary) had fulfilled the ideal criteria, namely 26.81% of the total overall time in the learning process. D) percentage of activity students discuss/ask his friend and student activity discuss/ask teacher had not fulfilled ideal criteria for only 6.2% and 1.75% (total 7.95%) of the total overall time in the learning process, which ideally between 25% to 35%. E) the percentage of the activity of students doing things that are not relevant to the learning had not fulfilled the ideal category is 22.77% of the total overall time in the learning process, which ideally ranges from 0% to 5%.

Students learning outcomes after the implementation of RME had increased from the pre-study observation. Based on the learning outcomes, there are 2 students with very high category, in which there were no students with this category in the pre study. There are seven students (21,21%) with high category in which there were only 2 students (6,06%) with this category. Furthermore, there are 14 students (42,42%) with medium category in which there were only 5 students (15,15%) with this category. Students with low category had decreased from 23 students (69,7%) to only 2 students (6,06%). Other than based on the total students, increasing also can be seen based on the average test score, namely 71,91 in which it was 39,39 in the pre-study. From the result of the completeness of students learning outcome, it can be seen that there are 23 students (69,7%) have completed on the learning process and there are 10 students (30,2%) have not completed, so the class has not been said as complete.

### **Cycle II**

Based on the observation of the learning process, the result showed that there is an increasing learning process to better level in session IV, V and VI increased with sequential values are 3.23, 3.26 and 3.65, which come down to 'very good' criteria.

Learning activities acquired are as follows: a) The percentage of students listening to the teacher/friend activity had fulfilled the ideal criteria namely 23.79% of the total time of learning process. b) The percentage of students reading activity (students books or other reading sources when learning process is taking place) had fulfilled the ideal criteria namely 15.1% of the total time of learning process. c) The percentage of students writing activity (taking notes of the teacher's explanation/friends, doing LAS and make a summary) had fulfilled the ideal criteria namely 29.67% of the total time of the learning process. d) The percentage of students discussing activity/asking his friend and students discussing/asking the teacher had fulfilled the ideal criteria, respectively 8.04% and 18.68% (total 26.72%) of the total time of the learning process. e) The percentage of students activity of doing things that are irrelevant to the learning process is still at ideal category, namely 4.73% of the total time of the learning process.

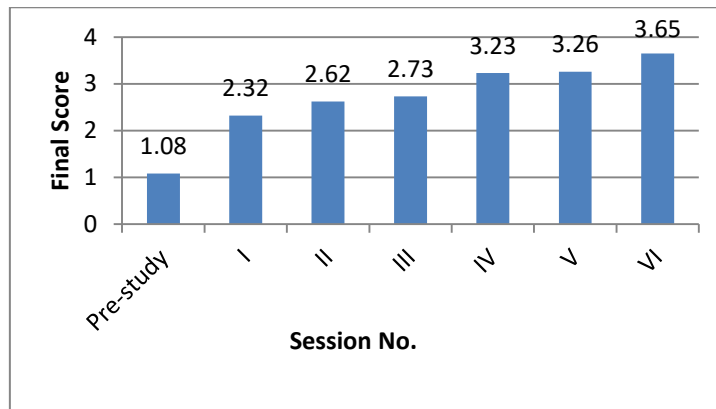
The research showed the students' mastery level on Statistics subject that five from 33 students (15.15%) have a very high mastery level, eight of 33 students (24.24%) have a high mastery level, 17 of 33 students (51.51%) have a moderate mastery level and three students (9.09%) students have a low mastery level. However, none of the students has very low mastery level. The level of mastery learning refers to the criteria of mastery learning on Statistics subject. There are 30 of 33 students (90.91%) have achieved mastery learning, while three students (9.09%), have not achieved the level of mastery learning.

Observations on the learning process have been carried out in every session. From the observation (based on the realistic approach), at the pre-study, teachers teach students away from RME learning approach, which is in a very bad category with score 1.08. However, after the actions has undertaken, the calculation showed that the learning process that teachers delivered in Cycle I (Session I, II and III) is already well implemented with score sequentially 2.32, 2.62 and 2.73. These criterias were said as good but there are some learning activities that are in bad categories, namely:

- Stage of classroom management on handling students' behaviors
- Stage of student engagement in learning by applying 4 steps of realistic mathematics learning
- Stage of student involvement on asking and answering questions, expressing ideas, or giving opinion, on asking friends in group if they do not understand
- Stage of closing skills

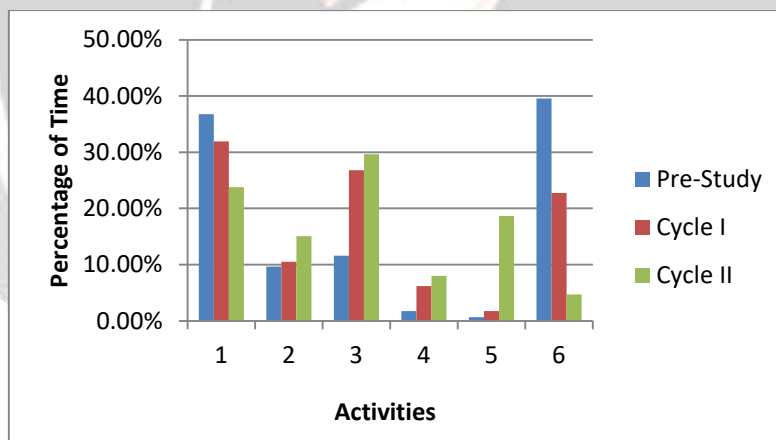
As for Cycle II (Session IV, V and VI), the result showed respectively 3,23, 3,26 and 3,65 with very good criteria and all aspects have met all criteria. It can be concluded that in this study, implementation of RME

approach on learning Statistic subject is going well. The graphic below shows the result of observation on learning process.



**Chart -1:** The Result of Observation on Learning Process

For students activities, they did not meet the PWI (Percentage Ideal Time), whereas in Cycle I, they have started to increase, but cannot be said as ideal. This is because activities that most dominated in this cycle are activity of listening/observing teacher’s or friend’s explanations (31.95% of total instructional time) while activity of students discussing with their friends and teachers only 6.2% and 1.75%. Besides, some students performed activities that are not relevant to the learning (22.77%) which mean that these activities do not meet the PWI (Percentage Ideal Time). However, in Cycle II, students activity for listening/observing teacher’s or friend’s explanations has been reduced to 23.79% of the total time of learning. Activity of discussing with their friends and teachers already met PWI which is 8.04% and 18.68%. Overall, students learning activities in Cycle I I have not met the ideal category and in Cycle II, after doing actions to make students more active, it has met the expected results that the students activities have fulfilled the ideal category.



**Chart -2:** Increased Students Activity

Based on the test in Cycle I and Cycle II, many students have completed in learning from the pre-study to test II and continue to be increased. At the beginning, in the pre-study, there were only seven students with learning completeness (21,21%). Then in Cycle I, it was increased to be 23 students (69,7%) but it had not fulfilled the classical completeness percentage (PKK). In Cycle II it was increased to be 30 students (90,91%) and it can be said that the class is complete because it had fulfilled the classical completeness (PKK). This has been reinforced by the increasing of students average score from the pre-study observation, which was only 39,39. In cycle I it was increased to be 71,91 and in Cycle II it was increased to be 78,82. It can be concluded that students learning process of Statistics subject at class X-MSc-3 by applying RME (Realistic Mathematic Education) approach has been completed and successful. It can be seen on the charts below:

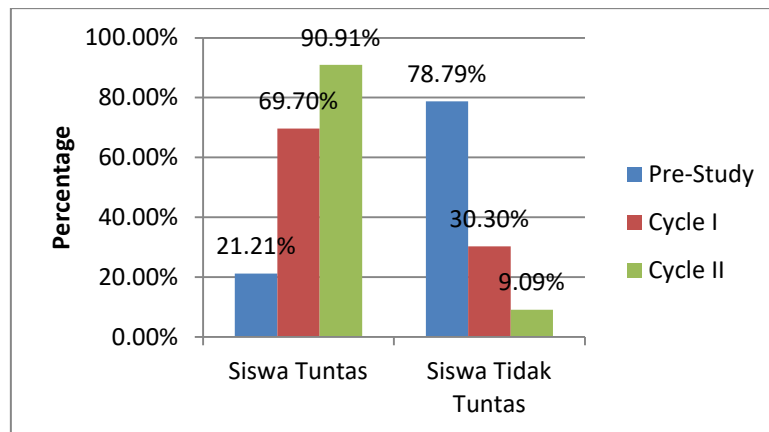


Chart -3: Level of Students Learning Completeness

The total of students with very low mastery level had decreased from the pre-study, namely from 23 to 2 students. And in cycle II, none of the students have very low mastery level. Moreover, the total of students with medium mastery level had increased from 5 to 14 students in test I and to 17 students in test II. Even though there are still three students (9,09%) that have low mastery level, in general, the mastery level of this class had fulfilled medium category. It can be seen from the percentage of mastery level, namely 51,51%, which can be seen on the graphics as follows:

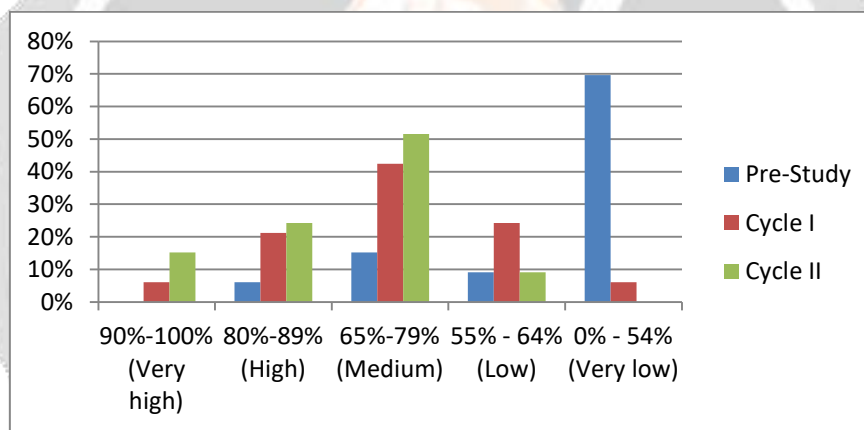


Chart -4: Students Mastery Level

#### 4. CONCLUSION

Based on the result and the discussion, it can be concluded as follows:

1. The learning process carried out to increase students activities and outcomes by implementing RME (Realistic Mathematic Education) approach on Statistics subject at class X SMAN 1 Sei Suka Academic year 2013/2014 in the pre-study was still very bad. However, in Cycle I the learning process had increased even though there are things that haven't fulfilled the criteria. In Cycle II, teachers are more active to motivate students, give direction, observe students one by one and communicate with students about the learning subject. These are done to anticipate weaknesses in Cycle I in which students do things that are irrelevant to learning subject and the low activity of asking/discussing between students and teacher as well as students and students. Besides, researcher changes students group in order to make learning process more efficient.
2. Realistic Mathematic Education (RME) approach can increase students learning activity on Statistics subject at class X SMA N 1 Sei Suka T.A 2013/2014. This can be seen based on the observation carried out. In the pre-study, students activities were still very bad in which none of the activities are fulfilled the percentage of ideal time (PWI). Meanwhile, in Cycle I, students activities had increased but haven't fulfilled the ideal category because the percentage of discussing with teacher/friend activity and listening acticity have not fulfilled the ideal time (PWI). In Cycle II, students activities have fulfilled the ideal category because all of the activities have fulfilled the ideal time percentage (PWI).
3. RME (*Realistic Mathematic Education*) approach can increase Statistics subject on class X SMA N 1 Sei Suka Academic Year 2013/2014. This can be seen based on the total of students who have

completed the learning process. In the pre-study there are only 7 students who have completed the learning process (21,21%). In Cycle I it had increased to be 23 students (69,7%), and in Cycle II it had fulfilled the percentage of classical completeness (PKK), that is 30 students (90,91%). In other words, the class is said to be complete.

## 5. REFERENCES

- [1] Abdurrahman, (2003), *Pendidikan Bagi Anak Berkesulitan Belajar*, Rineka Cipta, Jakarta
- [2] Daryanto, (2013), *Inovasi Pembelajaran efektif*, Yrama Widya, Bandung
- [3] Daryanto, (2010), *Belajar dan Mengajar*, Yrama Widya, Bandung
- [4] Dimiyati, (2006), *Belajar dan Pembelajaran*, Penerbit Rineka Cipta, Jakarta.
- [5] Hamalik, O., (2005), *Proses Belajar Mengajar*, Bumi Aksara, Jakarta.
- [6] Hudojo.H, (2005), *Pengembangan Kurikulum dan Pembelajaran Matematika*, Universitas Negeri Malang, Malang
- [7] Sardiman, A.M., (2010), *Interaksi dan Motivasi Belajar Belajar Mengajar*, Rajawali Pers, Jakarta.
- [8] Slameto, (2010), *Belajar & Faktor – Faktor yang Mempengaruhi*, Rineka Cipta, Jakarta
- [9] Sukardi, (2009), *Evaluasi Pendidikan*, Bumi Aksara, Jakarta.
- [10] Trianto, (2007), *Model Pembelajaran Inovatif Berorientasi Konstruktivistik*, Kencana, Jakarta

