

AN ANALYSIS OF REALISTIC MATHEMATIC APPROACH EFFECTIVENESS TO IMPROVE STUDENTS' VISUAL THINKING ABILITY

Lilis Arini¹, Edy Surya²

¹ College student, Graduate Program School in Mathematics Education, State University of Medan, Indonesia

² Lecturer, Graduate Program School in Mathematics Education, State University of Medan, Indonesia

ABSTRACT

This research aims to know whether mathematics realistic approach is effective to improve visual thinking ability. This research is done in the even semester on 2016/2017 Academic Years with 38 students. The method used in this research is descriptive analysis. In the I test students' visual ability result was 60,52% and then in the II test students' visual ability improved with mean as big as 80,45%. Can be seen in the II test students' visual thinking ability can be thought used mathematics realistic approach.

Keyword : *Mathematics Realistic Approach, Visual Thinking*

1. PRELIMINARY

According to Jennings and Dunne (Maslihah, 2012:2) said that, many students experience difficulties in applying mathematics in the real life. "It caused difficult mathematics for the students because in the learning it is less-meaningful, and the teacher in his/her learning in the class does not relate with the scene that's had by the students and the students less-given a chance to re-find mathematics ideas. Relating real life experience, students' with their mathematics ideas in learning at class is very important to do because mathematics is meaningful.

1.1 Mathematics Realistic Approach

Mathematics Realistic Education (RME) is developed and introduced by Deutch Freudenthal Institution first since 1970s, called *Realistic Mathematics Education (RME)*. A principle underlies this learning is very influenced by Hans Freudenthal for mathematics looking that mathematics is a human process related with reality. Freudenthal stated that students can't be seen as done mathematics passive receiver. Mathematics learning with realistic approach also give an opportunity to the students to be active to construct mathematics view.

In finishing a problem is started from imaginable problem by the students, students are given a free to find their own strategy, and the teacher guides the students to finish the learning slowly. The definition of RME according to Gravemeijer (Fauzan, 2002: 34) is:

Realistic Mathematic Education is rooted in Freudenthal's interpretation of mathematics as an activity. Freudenthal takes his starting point in the activity of mathematicians, whether pure or applied mathematicians. He characterizes mathematical activity as an activity of solving problems, looking for problems and organizing a subject matter – whether mathematical matter or data from reality. The main activity, according to Freudenthal, is organizing or mathematizing.

The core of Gravemeijer is Realistic Mathematic Education (RME) is developed from Freudenthal view stated that mathematic is an activity. The activity covers an activity to find a problem, organize relevant material, making mathematic model, finishing the problem, organizing new ideas and new understanding based on the context. The activity according to Freudenthal is called mathematical. As human activity, mathematic relates with real world. *guided reinvention and progressive mathematization, (2) didactical phenomenology, and (3) self developed models.*

Teffers (Wijaya, 2012 : 21) formulated 5 principles of (RME), namely:

1. Penggunaan Konteks Context usage
2. The model usage for students' construction
3. The exploitation of students' construction
4. Interactivity
5. Interrelatedness

Mathematic learning process by using RME is a learning process in accordance with the characteristic and principles of realistic learning. The steps in realistic mathematic education activities are:

1. Understanding contextual problem
2. Finishing contextual problem
3. Comparing or discussing the answer
4. Concluding

1.2 Visual Thinking

According to Surya (2013 : 113) the difficulty having by the students is when they understand, drawing the diagram, reading the graphic correctly, formal mathematic concept understanding, and mathematic problem finishing. According to Surya, E (2010 : 3) “*Visual Thinking* is an active mind and analytic process to understand, interpret, imagine, and describe as a goal that can be used, and sophisticated as verbal thinking”.

According to Zhukovskiy V.I & Pivovarov D.P (2008 : 150) in his writing titled *The Nature of Visual Thinking* that “visual thinking is an un verbal mind set and permit someone to see something abstract and than be an scientific translation”. Next, Zhukovzky (2008 : 9) said that the information gotten of someone can not be delivered by other people directly without presenting the information in to structure form clearly. Visual thinking is an abstract mind into a scientific mind and is a cognitive bridge between verbal mind and practical activity between word and activity (Zhukovzky, 2008:150).

Sword K.L (2005:8) stated some excellence of visual thinking, they are:

1. By visual thinking, the information gotten is processed instantly and by looking picture only
2. Visual thinking can help to deliver the problem and how to solve the problem
3. By using visual thinking, object or process can be seen to the clearer and creative point of view to another minder, this is because of creative process combine awereness of the problem, collecting the information, developing the idea, planning and producing a finishing of a problem.

According to Lavy (2006 : 25-32) visualization has an important rule to develop the mind and mathematic understanding and in transition to think abstract which relate with the problem solving. Visualization can help the students to state a problem by using their own language. Visualization helps the students also in representing and building a concrete model for the information that's stated in mathematic problem.

According Scristia (2014:58) the Indicator of Visual Thinking Ability is as below:

Table -1: The Indicator of Visual Thinking Ability

Indikator	Indicator Description
<i>Looking & Seeing</i>	Identify geometry based on the display intactly and classify geometri based on the same characteristic.
<i>Imagining</i>	Painting or drawing of representation and information that's still abstract and combine it with new experience, by using the knowledge before to conclude the pattern, or make a certain kind from the represent data given.
<i>Showing & Telling</i>	Explaining what can be seen and gotten and communicate it or make a comment and represent the effort to consummate and identify the form of information given.
<i>Representation</i>	Presenting the problem in visual form as picture, grafic, diagram or words that can help to relate and communicate to finish the problem.

While according to Chi, M (2013 : 113) visual thinking ability can be seen from the ability for: (1) understanding the algebra and geometri as alternative language (2) adding certain informaton from the diagram (3) presenting and interpret problem as a grafic (4) drawing and using the diagram as a help of problem solving (5) understanding mathematic transformation visually (6) for attanding in mind a representation from visual picture.

2. RESEARCH METHOD

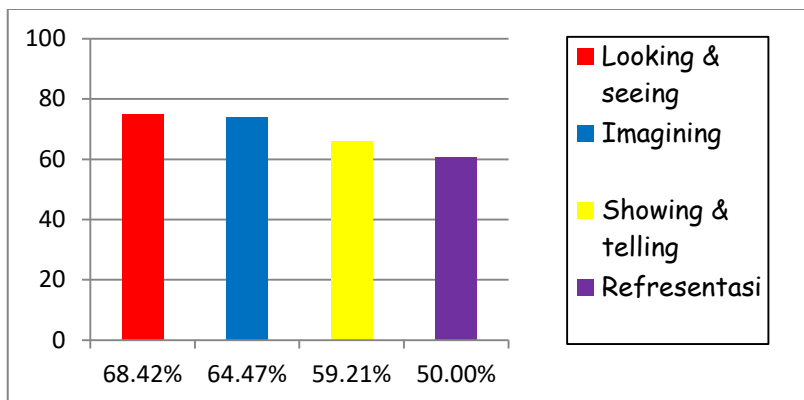
This research was done in SMP Negeri 1 Bukit Bener Meriah 2016 /2017 Academic Years. The instrument in this research was test. visual thinking ability test was given after the learning. Analysis data technique using descriptive analysis, which analized mathematic realistic approach to improve students' visual thinking ability. The ability aspect was reviewed from the indicaror of visual thinking ability. The sample in this research was VIII-A students consist of 38 students. And than for the minimum completement criteria was 75% (Permendiknas No.5 Year 2015).

3. RESERCH RESULT

The data which's described in this part was the data from test I and II to improve visual thinking ability improvement.

No	The indicator observed	Percentage (%)
1	<i>Looking & seeing</i>	68,42%
2	<i>Imagining</i>	64,47%
3	<i>Showing & telling</i>	59,21%
4	<i>Representation</i>	50,00%
Average		242,1%
Mean		60,52%

Table -2 : The Observation Result of Students' Visual Thinking in Test I

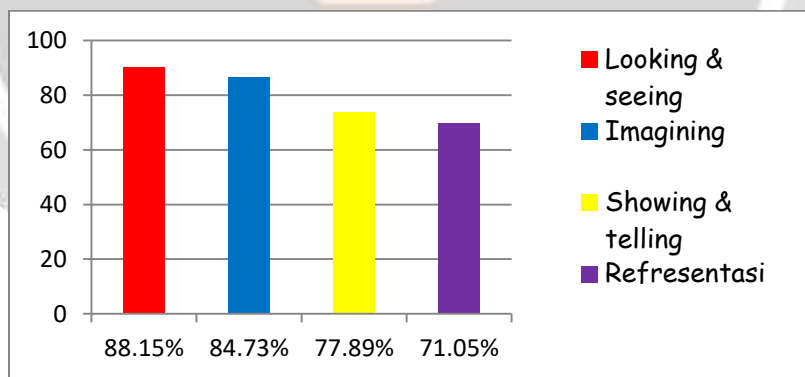


Grafic -1 : The Observation Result of Students' Visual Thinking in Test I

Can be seen from the table and grafic showed that visual thinking ability level in Test I. In the indicator looking & seeing was 68,42%, imagining was 64,47%, showing & telling was 59,21%, and representative was 50,00%. So, from all indicators observed have gotten mean percentage as big as 60,52% and did not reach KKM yet. And than in test II, from test can be seen the improvement of studnets' visual thinking ability as follow:

No	Indicator observed	Percentage (%)
1	<i>Looking & seeing</i>	88,15%
2	<i>Imagining</i>	84,73%
3	<i>Showing & telling</i>	77,89%
4	<i>Representation</i>	71,05%
Average		321,82%
Mean		80,45%

Tabel -3 : The Observation Result of Students' Visual Thinking in Test II



Grafic -2 : The Observation Result of Students' Visual Thinking in Test II

From the table and grafic of the above it can seen that the visual thinking abilities of students on test II increase. On indicator looking & seeing 88,15%, imagining 84,73%, showing & telling 77,89%, and representation 71,05%. From test I and II then of all the indicators was obtained an overall average percentage of 80.45% has been reached KKM.

4. RESEARCH DISCUSSION

The application of mathematic realistic approach can be an effort in improving students' visual thinking ability in learning mathematic. Brunner said that children develop in 3 steps development, namely enactive, iconic, and

symbolic. Brunner regarded that learning invention based on the knowledge actively by human (Trianto, 2009). Vygotsky emphasized in social aspect from learning.

According to Dickinson and friends (2010) concluded “*This is as further evidence that pupils taught an RME based curriculum are more able to make sense of their mathematics, both in achieving answers and in reasoning why they feel they are correct.*” Uzel and Uyangor (2006) concluded, *from the study it is proved that pupils have a positive attitude towards mathematics after realistic mathematics education is used.*

Chi said that, “*The study shows that students can produce imagination images that play a significant role in the problem-solving process. As such, a process of visualisation allows an articulation between representations to produce another representation that could help students to solve given problems*”.

4. CONCLUSION

Based on test I and II can be concluded that students' visual thinking ability by using mathematic realistic approach having improvement. meningkat.

5. REFERENCES

- [1]. Chi, M. 2013. *Engineering Students Visual Thinking Of The Concept Of Definite Integral*. Global Journal Of Engineering Education, Volume 15, Number 2
- [2]. Depdiknas. 2015. Kurikulum Tingkat Satuan Pendidikan. Jakarta : Depdiknas
- [3]. Dickinson, P., Eade, F., Gough, S., Hough, S. 2010. Using Realistik Mathematics Education With Low to Middle Attaining Pupils Secondary Schools, *Proceedings Of The British Congress For Mathematics Education*.
- [4]. Fauzan, A., Plomp, T., Gravemeijer, K. 2013. The Development of an RME based Geometry Course for Indonesian Primary Schools. In T. Plomp, & N. Nieveen (Eds.). *Educational Design Research – Part B: Illustrative cases* (pp. 159-178). Enschede, the Netherlands: SLO.
- [5]. Gravemeijer, K. 1994. *Developing Realistic Mathematics Education*. Utrecht: Freudenthal Institute.
- [6]. Lavy, I. 2006. *Dynamic Visualization and The Case of Stars In Cages*. *Proceedings 30th Conference Of The International Group For The Psychology Of Mathematics Education*, vol 4. Pp. 25-32. Prague : PME
- [7]. Maslihah, S. 2012. Pendidikan Matematika Realistik Sebagai Pendekatan Belajar Matematika. Jurnal PHENOMENON, Volume 2 Nomor 1
- [8]. Scristia. 2014. *Meningkatkan Kemampuan Mathematical Visual Thinking dan Self-Efficacy Siswa Smp Melalui Metode Discovery Learning* Universitas Pendidikan Indonesia | Repository.Upi.Edu | Perpustakaan.Upi.Edu
- [9]. Surya, E. 2010. *Peningkatan Representasi Visual Thinking Matematika Siswa SMP N 11 Medan Dengan Melatih Ketrampilan Menggambar Dan Pendekatan Kontekstual*. Medan : Universitas Negeri Medan
- [10]. Sword, K, L. 2005. *The Power Of Visual Thinking*. Gifted and Creative Services Australia
- [11]. Trianto. 2009. *Mendesain Model Pembelajaran Inovatif-Progresif*. Jakarta: Kencana.
- [12]. Uzel, D. & Uyangor, S.M. 2006. Attitudes of 7th Class Students Toward Mathematics in Realistic Mathematics Education. *International Mathematical Forum*. 1 No. 39, 1951-1959.
- [13]. Wijaya, A. 2012. *Pendidikan Matematika Realistik*. Yogyakarta : Graha Ilmu
- [14]. Zhukovskiy V, I & Pivovarov D, P. 2008. *The Nature Of Visual Thinking*. *Journal Of Siberian Federal University*. Humanities & Social Sciences, Vol 1, P : 149-158