Promoting junior high school students’ active learning using concrete object demonstration in line and angle topic

A Khomeni, S Prabawanto
Departemen Pendidikan Matematika, Sekolah Pascasarjana Universitas Pendidikan Indonesia, Jl. Dr. Setiabudi No. 229, Bandung 40154, Indonesia

*Corresponding author: khomeniayatollah91@upi.edu

Abstract. This research aims to implement students’ active learning through the demonstration method of concrete objects in the line and angle topics in Junior High School. This was a Class Action Research implemented to 40 students at 7th grade of MTsN Batang Toru. The data collection techniques were carried out by observation and distribution of a questionnaire. The data analysis technique used the analysis of Miles and Huberman models with three stages, namely data reduction, data display, and drawing conclusions. This research used three cycles to obtain the desired results. The results of the observation during the learning process showed the observations of the first cycle in the first meeting, student activity was 34.82%, and that in the second meeting was 42.33%. Furthermore, the students’ activeness in the second cycle of the first meeting was 51.5%, and that in the second meeting was 63.83%. The third cycle of the first meeting was 74.16%, at the second meeting was 85.16%. A questionnaire indicated that students’ activeness during the first, second and third cycles were 44.16%, 64.16% and 84.33%, respectively. It can be concluded that the activeness of students in the line and angle topics in mathematics lessons using the concrete object demonstration method had increased as expected.

1. Introduction
Mathematics becomes one of the subjects that must be studied in every level of education, not only at elementary, but also in middle and high school level. That has the purpose of forming the mindset of students. In addition, mathematics is also widely applied in various fields of life. Therefore, mathematics learning is very important to give to students [1].

Many things need to be considered in mathematics learning to achieve better achievement and better outcomes, one of which is student learning activeness. Mathematics learning requires an ability, so students can think actively when mathematics learning takes place. Learning will be effective if students are directly involved in formulating and solving problems, thus providing more learning experiences. Thomas M. Risk in [2] said that experience may be obtained if students are active in the environment. Student learning activities are classified into several parts, including 1) visual activity; 2) oral activity; 3) listening activities; 4) motion activity; 5) writing activity [3]. One study that shows the importance of active learning is a study conducted by [4] which have the results statement that there is a significant influence between learning activeness towards students' mathematics learning achievement. The active learning of mathematics is also able to improve student learning outcomes, this is indicated by the results of the study [5] that states student learning activeness has a significant influence on student learning outcomes. The results of other studies also showed that there was a significant effect between activeness towards student learning outcomes [7]. The same thing was shown
by research [8] that there was an influence of students whose activity was high on mathematical learning outcomes compared to students with moderate and low activity. Observations and interviews which conducted by researchers at the MTsN Batangtoru in South Tapanuli Regency in class VII-4 showed that the level of students learning activity in mathematics learning were still relatively low. One of the contributing factors is the use of inappropriate learning methods. The teacher has tried to overcome this problem, but has not been able to achieve learning activity as expected. Based on the students' less active learning problems in mathematics, researcher designed a learning method that was able to increase students' activeness learning of mathematics through concrete object demonstration method. The demonstration method is a learning method by showing and shown. With demonstration, the process of student acceptance of the lesson will be more memorable in depth, so students form understanding well and perfectly, besides students can also observe and pay attention to what the teacher shows during the lesson, in addition students are also actively involved when they participate directly in demonstrate it. [9]. Demonstration method according to [10] is a method by presenting learning material through demonstrating and showing students how the process and situation actually happened or just an imitation. The purpose of teaching using the demonstration method is to show how the process of occurrence of an event in accordance with teaching materials, as well as how to achieve it and the ease of students in understanding the teaching and learning process [11]. Whereas concrete objects are actual objects that help in providing real experiences for students and can attract students' interest and attention, so they are more enthusiastic in the learning process. The use of concrete objects also has advantages where students can have the opportunity to learn directly through the use of real objects.

2. Methods
This type of research is Classroom Action Research (CAR) with a cycle model that is carried out collaboratively between teachers and researcher [12]. The subjects of this research were students of class VII-4 in MTsN Batangtoru amounting to 40 students. With the details of 20 male students and 20 female students. The research instruments used were observation sheets and questionnaires. Data analysis in this study uses three ways, namely data reduction, data presentation, and drawing conclusions. Reduction of data obtained in the field is written in the form of a checklist which contains indicators of activity (Table 1). Display data describes the data that has been organized into meaningful, namely data analysis activities in the form of compilation or merging some information that gives the possibility of drawing conclusions. Drawing conclusions means concluding the results of research.

| Indicators          | Observed Aspects                      |
|---------------------|---------------------------------------|
| Visual Activeness   | a. Reading                            |
|                     | b. Observing                          |
| Oral Activeness     | a. Asking                             |
|                     | b. Responding                         |
|                     | c. Discussing                         |
|                     | d. Presenting the results of the discussion |
| Listening Activeness| a. Listening the presentation         |
|                     | b. Listening the discussion            |
|                     | c. Listening teacher                  |
| Motion Activeness   | a. Drawing                            |
|                     | b. Making props                       |
|                     | c. Demonstrating concrete objects media|
| Writing Activeness  | a. Writing                            |
|                     | b. Writing reports                    |
|                     | c. Completing student worksheets      |
3. Result and Discussion

The research was conducted through observation and distribution of questionnaires. Observations were carried out at each meeting, the distribution of questionnaires were conducted at each last meeting of each cycle. The grid of observation sheets and questionnaires are adjusted to the indicators of learning activeness. This research has increased in each cycle and the cycle in this research ended in third cycle because it had achieved the desired activeness (Table 2). Based on students’ activities in the learning process, increases from each meeting was evident (Table 3). The results of this research in the first cycle, second cycle and third cycle of the overall activeness of mathematics learning students experienced an increase.

| Table 2 | The percentage of increasing of students mathematics learning activeness which seen from the type of activeness observed in each meeting. |
|---|---|---|---|
| Activeness | First Cycle | Second Cycle | Third Cycle |
| | I | II | I | II | I | II |
| Reading | 40% | 45% | 50% | 55% | 67.5% | 85% |
| Observing | 27.5% | 37.5% | 42.5% | 52.5% | 65% | 87.5% |
| Asking | 20% | 35% | 45% | 60% | 67.5% | 77.5% |
| Responding | 22.5% | 32.5% | 40% | 55% | 65% | 72.5% |
| Discussing | 37.5% | 45% | 50% | 62.5% | 80% | 87.5% |
| Presenting the result of discussion | 20% | 30% | 45% | 60% | 65% | 72.5% |
| Listening the presentation | 42.5% | 47.5% | 52.5% | 75% | 82.5% | 97.5% |
| Listening discussion | 42.5% | 47.5% | 55% | 72.5% | 82.5% | 95% |
| Listening teacher | 52.5% | 67.5% | 72.5% | 87.5% | 100% | 100% |
| Drawing | 22.5% | 35% | 45% | 57.5% | 62.5% | 72.5% |
| Making props | 50% | 60% | 72.5% | 77.5% | 90% | 90% |
| Demonstrating concrete objects media | 37.5% | 45% | 62.5% | 70% | 80% | 85% |
| Writing | 45% | 52.5% | 60% | 60% | 82.5% | 90% |
| Writing reports | 27.5% | 30% | 45% | 57.5% | 70% | 80% |
| Completing student worksheets | – | 25% | 35% | 50% | 55% | 85% |

| Table 3 | Increasing the activeness of students' mathematics learning which seen from the type of activeness observed in each last meeting of each cycle |
|---|---|---|---|---|
| First Cycle | Second Cycle | Third Cycle | Increasing Activeness from First Cycle to Second Cycle | Increasing Activeness from Second Cycle to Third Cycle |
| | | | |
| 44.16% | 64.16% | 84.33% | 20% | 20.17% |

The results of the observation during the learning process showed that in the observation of first cycle, the first meeting, students activeness were 34.82%, and in the second meeting were 42.33%. Second Cycle at the 1st meeting increased to 51.5%, and the second meeting increased to 63.83%. Third Cycle at the first meeting, increased to 74.16%, and at the second meeting increased to 85.16%. Then, the results of the questionnaires showed that the first cycle reached 44.16%, the second cycle reached 64.16% and the third cycle reached 84.33% (Table 3).

4. Conclusion

Based on the results of observations of the first cycle at the first meeting of student activeness by 34.82%, the second meeting the average activity of students was 42.33%. While the second cycle of the second meeting was 51.5%. At the second meeting of the second cycle increased by an average of 63.83%, because the achievement of activeness has not been reached then continued to cycle III. In the
third cycle the first meeting the average activity of students was 74.16%, the second meeting of the third cycle with an average of 85.16%.

5. References
[1] Team MKPBM 2001 Strategi Pembelajaran Matematika Kontemporer (Bandung: jurusan Pendidikan Matematika FPMIPA UPI)
[2] Rohani A 2004 Pengelolaan Pengajaran Rineka Cipta
[3] Daryanto & Rahardjo M 2012 Model pembelajaran inovatif (Yogyakarta: Gava Media)
[4] Achdiyat M and Lestari KD 2016 Prestasi Belajar Matematika Ditinjau dari Kepercayaan Diri dan Keaktifan Siswa di Kelas Formatif: Jurnal Ilmiah Pendidikan MIPA 6 1
[5] Ramlah R Firmansyah D and Zubair H 2015 Pengaruh Gaya Belajar dan Keaktifan Siswa Terhadap Prestasi Belajar Matematika (Survey Pada SMP Negeri di Kecamatan Klari Kabupaten Karawang) Majalah Ilmiah SOLUSI 1 3.
[6] Paulins VA and Moeller GJ 2017 Implementing and evaluating a student success initiative (SSI) to support enhanced and active learning in a merchandising mathematics course International Journal of Fashion Design, Technology and Education 10 1 pp.8-15.
[7] Alimuddin H 2017 Pengaruh Keaktifan Belajar Siswa Melalui Penerapan Model Pembelajaran Kooperatif Tipe Team Assisted Individualization (Tai) Terhadap Hasil Belajar Matematika Siswa Kelas VII SMP Negeri 4 Satap Bungoro Histogram 1 1 pp.61-74..
[8] Sari IM and HW S 2016 Pengaruh Strategi Think Pair Share Dan Numbered Heads Together Terhadap Hasil Belajar Matematika Ditinjau Dari Keaktifan Siswa.
[9] Ramadhan N and Surya E 2017 The Implementation of Demonstration Method to Increase Students’ Ability in Operating Multiple Numbers by using Concrete Object International Journal of Sciences: Basic and Applied Research (IJSBAR) 34 2 pp.62-68.
[10] Sanjaya W 2006 Strategi pembelajaran berorientasi standar proses pendidikan (Jakarta: kencana prenada media)
[11] Clarke D 2011 Do demonstration lessons work?. Australian Primary Mathematics Classroom 16 2 pp.12-14.
[12] Arikunto S 2010 Prosedur Penelitian Suatu Pendekatan Praktik (Jakarta: Rineka Cipta)