THE EFFORT TO IMPROVE LEARNING ACTIVENESS USING A FIRING LINE STRATEGY IN MATHEMATICS LESSON ON THE STUDENTS OF GRADE XI

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ABSTRACT

Observation on the students of grade XI MIPA 2 at State Senior High School (SMA Negeri) 3 Bantul showed that students' learning activeness to participate in mathematics lesson was still lacking. Therefore, this study aims to improve learning activeness using a firing line strategy in mathematics lessons on grade XI MIPA 2 at SMA Negeri 3 Bantul in 2017/2018. This research is classroom action research. The action is carried out in three cycles. In this study, subjects were 31 students' of grade XI MIPA 2, 9 men and 22 women. Objects in this study were the learning activities that applied the active strategy of the firing line. Methods of data collection were the method of observation, questionnaires, interviews, and documentation. Data analysis was descriptive qualitative, and quantitative. The results showed that learning using the firing line strategy to improve students' learning activeness in each cycle has improved. The questionnaires of the learning activeness in cycle I was 53.59% (low), it increased in cycle II by 66.89% (high), and in the third cycle was 72,38% (high). The results of student observations were in the first cycle of 69,95%, it increased in the second cycle of 83.29%, and 86.90% for the third cycle. This research's success is also characterized by an average quiz that has reached the MCC (>69). The results of the quiz in cycle II were 78,33 and in the third cycle was 76,67.

Keywords: learning activeness, firing line strategy, mathematics learning.

INTRODUCTION

Mathematics education is one of the basic sciences that can add and develop domestic human resources, becoming a science field that plays an important role in advancing science and technology. Besides, mathematics education has an important role in the mastery of science that demands understanding mathematics in every student. Mathematics is an essential branch of science to be studied. Hendriana and Soemarmo (2014: 6) mention that mathematics is a living and growing discipline where truth is reached individually and through mathematical society. Mathematical authority is attached to mathematics itself; basically, mathematics is a human activity. Studying mathematics in school is expected to develop student intelligence with a pleasant classroom atmosphere. Every student who studies mathematics is expected to be able to apply its implications in everyday life. Therefore, there is a need for student activity in learning mathematics in class. Students' activeness cannot be separated from the teacher's role in realizing learning to make students active.

Based on observations about the learning activeness of students of class XI MIPA 2 in SMA Negeri 3 Bantul, learning is done in groups only certain students who dare to speak in front of the class, in solving problems not solved in groups but individually, and when ordered to come forward to present the results of the discussion still pointing at each other. Only a few students have enthusiastic questions related to material that is not yet understood. When learning occurs, students who sit in the back row ignore the teacher's explanation; some are sleepy, chatting with their seatmates. The interaction of students with teachers and students is not yet active. Many students are busy and do not work well together and discuss topics outside the lesson. Although students are active in doing activities at the KBM, they are not active in learning the material presented.

Based on the class's problems, it can be said that the activeness of student learning when presenting material in class is still lacking. Therefore, we need another learning strategy that can stimulate the activeness of student learning in the classroom. Increasing student activity in learning activities needs a change in strategy or strategies that foster an active impression. This is by the opinion of Yanuarto (2016: 99) that active is interpreted as an act of student learning in class. One alternative

strategy that can be used to increase student activity is the firing line strategy. Using this strategy, it is hoped that all students can be activated directly by discussing in the learning process.

Under the opinion of Rahma (2014: 2) that the firing line strategy helps students remember more of the lessons just learned, making students more motivated to prepare themselves before learning, discuss with friends, ask questions, share knowledge gained with their opponents. While Jawara (2013: 1042) states that the active firing line strategy can overcome student learning difficulties, reduce student boredom, and improve student learning outcomes. The firing line strategy has steps that all students in the class can shoot the students in front of (opponent) by asking questions. The opponent answers the question given within the time limit specified by the teacher. This strategy helps students remember lessons they have just learned, keeps students motivated to prepare themselves before learning, and will always be active in the learning process. Also, the firing line strategy can create a pleasant classroom atmosphere because the activity is almost playing. Physical involvement of students also increases, so students can be said to be active. The purpose of this study was to increase the activeness of learning mathematics using the Firing Line active learning strategy for students of class XI MIPA 2 Even Semester of SMA Negeri 3 Bantul, Bantul Regency, Academic Year 2017/2018.

METHODS

This type of research is Classroom Action Research. The research design in this study is as in Figure 1.

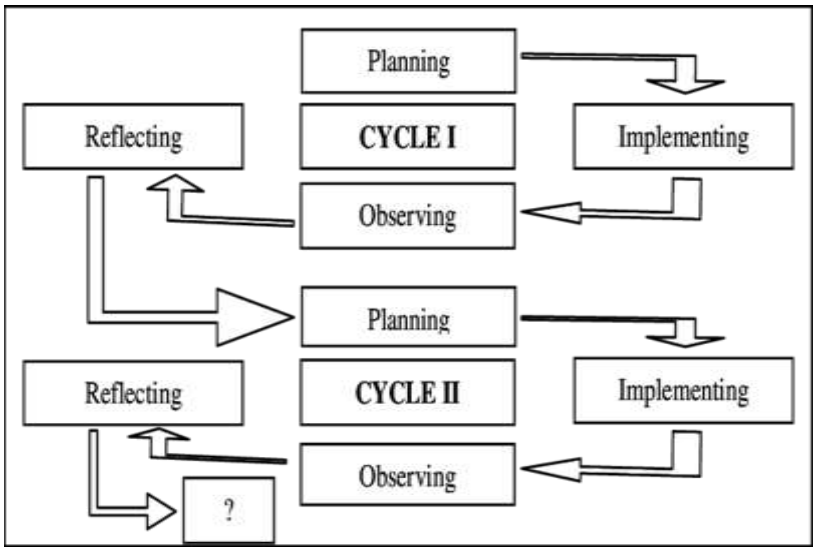

Figure 1. Research Design

Arikunto, Suharsimi (2017:42)

This study's subjects were students of class XI MIPA 2 in the even semester of SMA Negeri 3 Bantul, Bantul Regency in the Academic Year of 2017/2018 with 31 students, nine boys and 22 girls. The research object is using an active learning strategy type Firing Line on the subject of integral building. This class action research procedure consists of three cycles, with each cycle consisting of four stages. The initial activities were carried out to determine the existing problems, namely making observations in class XI MIPA 2. These observations then determined learning actions in Cycles I, II, and III with the Firing line's active learning strategies. In more detail, this class action research procedure can be described as follows.

1. **Cycle I**
   a. Planning. The planning stage begins with designing actions to be taken in the research, including:
      1) Make and prepare a learning plan that fits the learning strategy that will be used. At this stage, the researchers compiled an RPP using a Firing Line type active learning strategy, which was first consulted with the mathematics subject teachers in class XI MIPA.

2) Develop a learning seating scheme that uses the type of firing line. This was consulted with the mathematics subject teachers in class XI MIPA.
3) Make question cards and related material presented in cycle I and answer sheets.
4) Preparing research instruments, namely learning activeness questionnaires and observation sheets.
5) Make evaluation tools in the form of quiz questions that will be carried out at the end of the first cycle.
6) Prepare the documentation tool, which is the HP camera.

b. Action implementation. Researchers act as implementers of learning by the lesson plans prepared and agreed upon between the teacher and researcher. While the teacher acts as an observer for each activity carried out by researchers and students during the learning process takes place assisted by two observers. Cycle I was carried out with two meetings.
c. Observation. This stage is carried out in conjunction with the implementation phase of the action. When the action is being carried out, the action is directly observed how the process, its effect, effectiveness in overcoming the problem. At this stage, the teacher asks students to play roles according to the firing line strategy. The learning process uses a question card, observed by two observers by the indicators provided.
d. Reflection. At this stage, the researcher discusses the observations that have been obtained with the subject teacher. The researcher and the teacher examine and consider applying the Firing Line active learning strategy type. This reflection aims to find out the advantages and disadvantages that occur during learning. Teachers and researchers carry out reflections using discussion. Reflection is an important part of Classroom Action Research (CAR) and is the last step in a cycle.

2. Cycle II

In cycle II the implementation steps are the same as cycle I. Where in this cycle as an improvement in the previous cycle. Cycle II's planning and actions are based on the results of reflection in Cycle I. Suppose the objectives have been achieved in Cycle II. In that case, the research is considered complete, but if in Cycle II, it has not yet reached the objectives, then proceed to the next cycle. This study continued to the third cycle because activeness indicators, namely the interaction between students and teachers, have not reached the minimum criteria.

Data collection techniques used in this study were questionnaire, observation, and interview. The research instruments were a questionnaire, observation sheet, and interview guidelines.

1. Analysis of Questionnaire Results Data. The observations of student mathematics learning activeness were analyzed quantitatively and descriptively to provide an overview of learning activities using the Firing Line type of active learning strategies as in Table 1.

Table 1. Qualification Results Percentage of Activity Questionnaire Score

Percentage Score Obtained	Category
$80\% < P \leq 100\%$	Very high
$65\% < P \leq 80\%$	High
$55\% < P \leq 65\%$	Is
$40\% < P \leq 55\%$	Low
$0\% < P \leq 40\%$	Very low

Arikunto (2010:319)

2. Analysis of Observation Data. The observations of student mathematics learning activeness were analyzed quantitatively and descriptively to provide an overview of learning activities using the Firing Line type of active learning strategies. The formula for analyzing the percentage values of observations and student activity activeness questionnaire scores is as follows:

$$P = \frac{W}{Q \cdot R \cdot S} \times 100\%$$

Information:
P = percentage score
Q = highest score per item
R = number of items
S = number of respondents
W = number of scores from data collection

3. Analysis of Interview Data. Data from interviews with students were analyzed descriptively or explained the interviews' results based on the interview guidelines.

RESULTS AND DISCUSSION

Data on the student learning activeness questionnaire results on each indicator in cycles I, II, and III are stated in Table 2, Table 3, and Table 4.

Table 2. Percentage of Questionnaire Active Learning Students Cycle I

Indicator	Score	%	Category
Enthusiastic students in participating in learning activities	261	52,62	Low
Student interaction with the teacher	296	47,74	Low
Student-student interaction	273	55,04	Is
Group collaboration	280	56,45	Is
Student activities in groups	273	55,04	Is
Student participation in concluding the results of the discussion	271	54,64	Low
Average		53,59%	Low

Table 3. Percentage of Student Learning Activeness Questionnaire in Cycle II

Indicator	Score	%	Category
Enthusiastic students in participating in learning activities	273	65,63	High
Student interaction with the teacher	327	62,88	Is
Student-student interaction	292	70,19	High
Group collaboration	280	67,31	High
Student activities in groups	276	66,35	High
Student participation in concluding the results of the discussion	287	68,99	High
Average		**66,89**	High

Table 4. Percentage of Student Learning Activeness Questionnaire in Cycle III

Indicator	Score	%	Category
Enthusiastic students in participating in learning activities	353	73,54	High
Student interaction with the teacher	398	66,33	High
Student-student interaction	349	72,71	High
Group collaboration	350	72,92	High
Student activities in groups	358	74,58	High
Student participation in concluding the results of the discussion	356	74,17	High
Average		**72,38**	High

From Table 2, the average percentage of success is 53.59% with low criteria. Then from Table 3 obtained an average percentage of success of 66.89% with high criteria. While Table 4 obtained an average percentage of success of 72.38% with high criteria.

Data on the results of observations of student learning activeness on each indicator in cycles I, II, and III are respectively stated in Table 5, Table 6, and Table 7.

Table 5. Analysis of the Results of Observation on Student Active Learning Cycle I

	Total score	Percentage of Observation Results
Meeting 1	294	63,25%
Meeting 2	322	76,74%
Average	308	69,95%

Table 6. Analysis of the Results of Observation on Student Learning Activity Cycle II

	Total score	Percentage of Observation Results
Meeting 1	272	83,33%
Meeting 2	362	83,26%
Average	**317**	**83,29%**

Table 7. Analysis of the Results of Observation on Students' Active Learning Cycle III

	Total score	Percentage of Observation Results
Meeting 1	365	86,90%
Average	**365**	**86,90%**

From Table 5, the average percentage of analysis of student observation data obtained in the first cycle was 69.95% with moderate criteria. Table 6 shows that the average percentage of analysis data of observation of the second cycle students is 83.29% with very high criteria. Whereas in table 7, the average percentage of analysis data obtained by cycle III students was 86.90% with very high criteria.

The following results are obtained based on the interview results: 1) Positive responses from students to learning outcomes using the Firing Line learning strategy. 2) Firing Line learning strategies can improve student learning activities in the mathematics learning process.

The results of classroom action research conducted by researchers consisted of the cycle I, cycle II, and cycle III regarding mathematics learning using Firing Line learning strategies, showing an increase in students' learning activeness in mathematics learning. This can be seen from the analysis of student learning activeness questionnaires in cycle I, cycle II, and cycle III, which have increased. More will be discussed as follows:

1. Cycle I

   Learning in the first cycle shows the results of research that student learning activeness as measured through activity questionnaire with indicators: student enthusiasm in participating in learning is 52.62%; student and teacher interaction by 47.74%; student-student interactions by 55.04%; group cooperation amounting to 56.45%; student activity in groups of 55.04% and student participation in concluding the discussion results of 54.64%. Based on students' learning activeness criteria, the average percentage of indicators in cycle I fall into the low category. So, the activeness of student learning in cycle I have not met the indicators of success.
2. Cycle II

   Learning in the second cycle shows the results of research that student learning activeness is measured through activity questionnaire with indicators: student enthusiasm in participating in learning by 65.63%; student and teacher interaction by 62.88%; student interactions between 70.19%; group collaboration of 67.31%; student activity in groups of 66.35% and student participation in concluding the discussion results of 68.99%. Based on the qualifications of student learning activeness, the average percentage of indicators in the second cycle included in the high category of 66.89% so that the activeness of students in the second cycle meets the indicators of success. However, there are still indicators that have not been met, namely the interaction of students with teachers. So the researchers take the next step, cycle III. The purpose of taking the cycle is to repeat and stabilize the firing line strategy to achieve the goal. This is in line with

Suharsimi (2017) opinion that the repetition of strategy in the last cycle aims to stabilize the strategy that is being tried to obtain a clear picture.

3. Cycle III

   Learning in cycle III shows the results of research that student learning activeness as measured through activity questionnaire with indicators: students' enthusiasm in participating in learning is 73.54%; student and teacher interaction by 66.33%; student interactions by 72.71%; group collaboration of 72.92%; student activity in groups of 74.58% and student participation in concluding the results of the discussion amounted to 74.17%. Based on the qualifications of student learning activeness, the average percentage of indicators in the third cycle is very fulfilling indicators of success, namely the high category with a percentage of 72.38%.

In addition to the increase in using the questionnaire activeness, the research results on student learning activeness followed by increased student and teacher observation and supported using student interviews. Research results measured using student and teacher observation sheets have increased from cycle I to cycle III. The results of the implementation of learning refer to the opinion of Dimyati and Mudjiono (2015: 37), which states that learning is a daily activity of people. Others can also observe learning activities. Learning that occurs in individuals is a complex behavior; interaction between instructors and learners who aim. The first cycle of 69.95% (high category) increased in the second cycle of 83.29% (high category), in the third cycle increased to 86.90%. This is reinforced by the positive response from the results of student interviews on firing line strategies.

This study was also strengthened using teacher observation in learning to obtain results that match the objectives. Teachers' actions in teaching also need to be observed to quickly and satisfactorily receive knowledge from the teacher. This is in line with Suprijono (2012: 3) opinion that learning as a concept of gaining knowledge in practice is widely adopted. The teacher acts as a teacher who tries to provide as much knowledge as possible, and students actively gather or receive it. The results of teachers' observations in the first cycle that the implementation of mathematics learning is not optimal because it is still adaptable to the strategies used. Students also do not understand the steps of the strategy used very well. When playing a role, many students are confused. This makes the class not conducive, and the time allocation available is ineffective because of the delay.

Also, the use of the firing line strategy in cycle I have not been successful. In cycle II, learning is quite optimal because it has made improvements from cycle I. However, there are obstacles that the teacher does not master the class well. The teacher also gets a reprimand from the students so that they are not too fast in explaining the learning material. This is a reflection of the teacher and the supervisor. The use of a firing line strategy can work even though it is not yet smooth. However, students already understand the steps of learning when playing roles. Simultaneously, the research results in cycle III. The implementation of learning can be said to be excellent and optimal. This can be seen on the teacher observation sheet that learning is based on observation guidelines. In this cycle, the teacher's full attention is done by the teacher so that the student's learning activities run smoothly during the learning process. In the cycle III learning process, many students take notes on what the teacher explains without being directed. The activity was assisted by an observer to be covered. This is in line with Suharsimi (2017) opinion that when teaching, the teacher's attention should be full of students to indicate that students are active or not. However, there are still suggestions from the supervising teacher in this third cycle that the teacher must be more assertive. Not many students are late for class after Friday. The process of mathematics learning using Firing Line active learning strategies has been running smoothly. This can be seen from the obstacles in cycle I that have been reduced in cycle II, and the obstacles in cycle II that have been reduced in cycle III as in Figure 2.

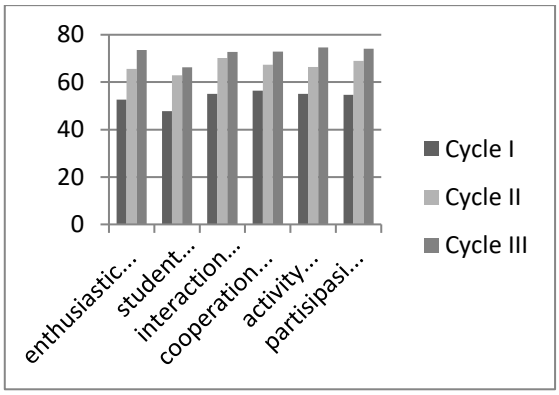

Figure 2. Graph Analysis of Student Learning Activity Questionnaire Results Cycle I, Cycle II, and Cycle III

Table 8. Analysis of Questionnaire Results for Student Learning Activity Cycle I, Cycle II, and Cycle III

Indicator	Cycle I	Cycle II	Cycle III
Enthusiastic students in participating in learning activities	52,62%	65,63%	73,54%
Student interaction with the teacher	47,74%	62,88%	66,33%
Student-student interaction	55,04%	70,19%	72,71%
Group collaboration	56,45%	67,31%	72,92%
Student activities in groups	55,04%	66,35%	74,58%
Student participation in concluding the results of the discussion	54,64%	68,99%	74,17%

Table 8 shows student learning activeness on each indicator always increases in each cycle. Overall the description above can be concluded that implementing the Firing Line type of active learning strategies can increase the mathematics learning activeness of students of class XI MIPA 2 even semester of SMA Negeri 3 Bantul in the academic year 2017/2018.

CONCLUSION

Based on the study results, it can be concluded that learning mathematics using active learning strategies Firing Line type can increase the activity of learning mathematics in class XI MIPA 2 even semester of SMA Negeri 3 Bantul in the academic year 2017/2018 on Integral material. This is evident from the analysis of student learning activeness in the first cycle of 53.59% in the low category, increased in the second cycle of 66.89% with a high category, and increased again in the third cycle 72.38% with a high category. Increased activity in cycle II and cycle III results from more than 65% indicators of success. The analysis of student observations in the first cycle of 69.95% increased in the second cycle of 83.29% increased again in the third cycle of 86.90%. The analysis results of the implementation of teacher learning from cycle I to cycle III are increasingly optimal, and many indicators are implemented. Learning test results with quizzes also marked an increase in students' learning activeness. In the first cycle, the average value of the class of 61.85 (incomplete) increased in the second cycle, with an average of 78.33 (complete). The third cycle has decreased but has been completed, which is equal to 76.67.

REFERENCES

Arikunto, Suharsimi. (2010). *Prosedur Penelitian Suatu Pendekatan Praktik.* Jakarta: Rineka Cipta.

_____. (2017). *Penelitian Tindakan Kelas.* Jakarta: Bumi Aksara.

Dimyati dan Mudjiono. (2015). *Belajar dan Pembelajaran.* Jakarta: Rineka Cipta.

Fitri, Rahma. (2014). Penerapan Strategi The Firing Line Pada Pembelajaran Matematika Siswa Kelas XI IPS SMA NEGERI 1 BATIPUH. *Pendidikan Matematika*, 3 (1), 18-22.

Hendriana, Heris dan Utari Soemarmo. (2014). *Penilaian Pembelajaran Matematika.* Bandung: Refika Aditama.

Jawara, Dirgo Sukma. (2013). Perbandingan Model Pembelajaran Aktif strategi *The Firing Line* dan *Index Card Match* terhadap Hasil Belajar Siswa pada Standar Kompetensi Menerapkan Dasar-Dasar Elektronika di SMK Negeri 1 Driyorejo Gresik. *Jurnal Pendidikan Teknik Elektro*,2(3), 1041-1048.

Suprijono, Agus. (2012). *Cooperative Learning (Teori dan Aplikasi PAIKEM).* Yogyakarta: Pustaka Pelajar.

Yanuarto, Wanda Nugroho. (2016). *Discovery Learning* dalam Mata Kuliah Teori Belajar Pembelajaran untuk Menumbuhkan Kemampuan Penemuan Diri (*Self Invention*) dan Keaktifan Mahasiswa. *AdMathEdu*, 6(1), 99.