



Improving Students' Mathematics Learning Outcomes with the Geogebra Assisted Active Index Card Match Method at the Third Grade SMP Negeri 3 Kolaka

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Abstract

The aim of the study was to improve the learning outcomes of Mathematics through the Geogebra-assisted Active Index Card Match method for students in class VIIIC of SMP Negeri 3 Kolaka. This type of research is classroom-based action research that is conducted collaboratively between teachers, observers, and researchers with research procedures that include planning, implementation, observation, and reflection. The type of data obtained are quantitative data from the results of learning tests and qualitative data through observation sheets. This research was conducted at SMP Negeri 3 Kolaka from 2 to 28 May 2019 in class VIIIC with a total of 26 students. The results of the study refer to the Minimum Completeness Criteria (KKM), that is, 80% of the students obtained a score of 68. The average score of the initial test results is 49.67. After the evaluation of the first cycle of action, the classic completeness reaches 50.00% (mean value 67.12%). This means that the first cycle of action increased from the daily test results of students. According to the results of the second cycle of action tests, the classic completeness was 80.77% (the average value was 76.30). It can therefore be concluded that the Geogebra Active Index Card Match assisted learning method can improve the learning outcomes of Mathematics for the students of class VIIIC of SMP Negeri 3 Kolaka.

Keywords: AICM method, Geogebra and learning outcomes

A. Introduction

The development of science and technology is increasingly rapid and influences increasingly fierce global competition. Quality human resources must be well prepared in order to be able to compete in the global world. Therefore, improvements are planned, effective and efficient.

Information and communication technologies, especially computers, are currently playing an increasingly important role in the educational process. The quality of education today badly needs the central role of the computer (Rahadyan et al., 2018). The use of information technology in learning leads to changes in the tradition or culture of learning. The use of IT in learning can be an independent learning system (independent of the instructor) or also combined with a direct learning process (face to face in class) which is based on the presence of the teacher. The learning model or the learning resource that is related to ICT and which is now becoming the concern of the world of education is the learning model based on ICT (information, communication and technology) (Isman, 2016).

Mathematics as a global scientific field that lives in nature without borders. Its existence is very necessary and life continues to develop in accordance with the demands of human needs, because there is no human activity or behavior that can be separated from mathematics. Mathematics has become a queen as well as a servant for the other sciences, because in its development mathematics has never depended on the other sciences. But mathematics always renders services to the various branches of science to develop, both in the form of theory and application (Kamarullah, 2017). In addition, mathematics teaches regularity, an organized structure, mathematical concepts are hierarchical, structured and systematic (Hasratuddin, 2014).

Mathematics is a subject that is taught at the elementary, middle school/MT, high school, and university levels. This subject provides students with dispositions to understand and use mathematics in everyday life. Mastery of this subject should be well understood so that students do not face difficulties when studying other subjects (Sirajuddin & Arsyad, 2019).

Less meaningful math learning makes students they believe that learning mathematics is just a set of rules that must be memorized and practiced. In addition, the negative attitude of students translates into students' lack of interest and motivation to learn mathematics. Finally, math is just a bane in the classroom. This is the reality of math learning that cannot be underestimated, especially by math teachers (Wahyu & Mahfudy, 2016).

Based on the results of observations with the teachers of the SMP Negeri 3 Kolaka class, especially the VIIIC class with 26 students, 4 shortcomings were found, namely: (1) the teacher presented the material using the masterful method; (2) the teacher actively conveys the material and has not seen the use of media in the learning process; (3) students rarely question the teacher about the subject taught by the teacher; (4) some students still joke and pay less attention to the teacher's explanation. This discrepancy has resulted in the average completeness of students' daily test scores in math subjects of odd-numbered semesters for the 2018/2019 academic year, there are still many students whose learning scores are low and below the standard value of the minimum completeness criteria, which is 68. A solution to solve the problems encountered by the students is that the researchers will apply one of the learning methods, namely the Active Index Card Match method using learning materials, namely the Geogebra application. The selection of learning methods and materials should be able to improve the good learning outcomes of students, because in learning mathematics, students must be given a method and use different learning materials than before. According to (Nabillah & Abadi, 2019) low math learning outcomes that cause low level of student learning in math, many factors influence it.

Active Index Card Match is a fun learning method that invites students to be active in the learning process. Students can pay attention to material, ask questions, listen to descriptions, move around to find pairs of cards, and solve problems. The Geogebra app is a computer application that can be used in math learning.

Index card matching active learning is an active learning method, where this activity is learning that allows students to pair up with other students and give quiz questions to their friends. (Silberman, 2013) found the Active Index Card Match method to be an active and fun

way to review the subject. The Active Index Card Match learning method can promote student cooperation in answering questions by matching the cards in their hands. This learning process is more interesting because it seeks partners while learning about a concept or topic in a pleasant atmosphere. One of the advantages of this model is that students seek partners while learning about a concept or topic in a pleasant atmosphere (Asnimar, 2017). Students of this method have to perform many tasks. They must use their brains, examine ideas, solve problems and apply what they learn. Thus, this method can accustom students to actively participate in class so that students' activities increase. Active Index Card Match learning method can train students' mindset because with this method, students are trained in their thinking speed to learn a concept or topic by finding a suitable card and then discussing search results of pairs of cards that have been matched by students with their partners and other students. By discussing with his partner, the student will better understand the concepts of the subject studied. Because this learning takes place in a pleasant atmosphere, it can be expected to increase students' enthusiasm and activity in learning.

GeoGebra can work as a learning medium, a tool for creating teaching materials and solving mathematical problems. Students can construct their own math problems and solve them using GeoGebra. Where GeoGebra makes math more interactive and interesting (Faradisa, 2018). Combining the Active Index Card Match method with GeoGebra software can increase student interest and learning outcomes. GeoGebra has many advantages including having full installations and this software is freely available as it is open source and can be downloaded for free from www.geogebra.org or if joined in the GeoGebra user forum, one of which is www.geogebra.com/forum. Knowing that there are many accesses to GeoGebra, you can easily and flexibly use it as a learning medium (Hadi et al., 2018).

B. Methodology

This research is a type of classroom action research (CAR). Including the type of applied research that involves researchers actively and directly in the field to collect data according to the problem and the object of research is the classroom learning process.

The research was conducted from 2 to 28 May 2019 at SMP Negeri 3 Kolaka class VIIIC in the even semester of the academic year 2018/2019. The subjects of this study were students of class VIIIC of SMP Negeri 3 Kolaka in the even semester of the academic year 2018/2019 which included 26 students, 14 boys and 12 girls.

Experts come up with research plans with different graphs, but generally there are four steps as follows:

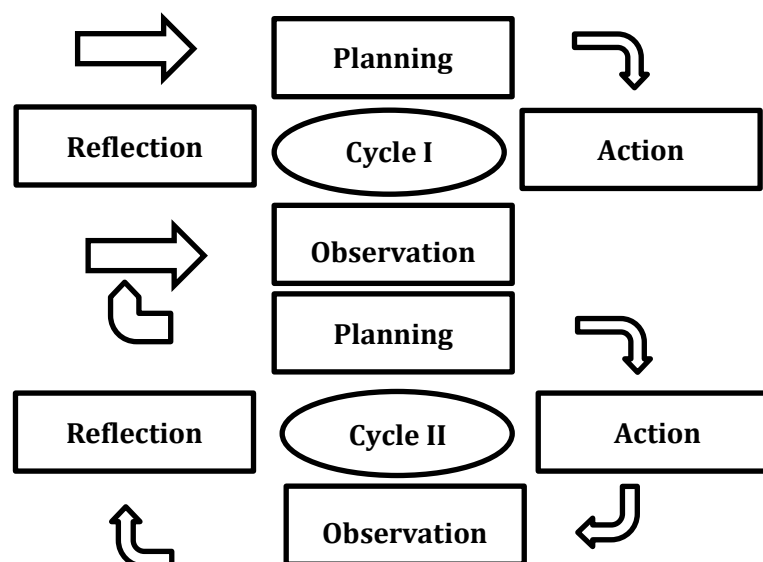


Figure 1. Classroom Action Research Flow (Arikunto, 2010)

This classroom action research (CAR) procedure took place in two cycles, namely, each cycle took place during 3 meetings consisting of 2 times the teaching and learning process plus 1 cycle test. In line with the nature of action research in the classroom, second cycle research is the implementation of improvements over the shortcomings of the first cycle and each cycle consists of 4 stages, namely planning, action, observation, evaluation and reflection.

Cycle I Overview

1. Planning

The activities carried out in this planning stage are as follows: a) make initial observations in the class where the study is carried out learning tools at each meeting consisting of a learning implementation plan and student activity sheets; b) create small groups for learning purposes using the Active Index Card Match method; c) make an observation sheet to observe the learning process.

2. Action

The first cycle took place over 3 meetings, the first meeting until the second meeting was allocated to the teaching and learning process, and the third meeting to the implementation of the final test. The actions carried out are the following, in the initial activities: 1) the teacher can open the lesson, motivate the students and transmit the learning objectives to be achieved; 2) verify student attendance; 3) divide the students into groups of 2 people; 4) convey the title of the discussion topic, then explain while giving motivation to learn; 5) reminiscing material with everyday life. In basic activities: 1) the teacher presents information about the subject to be taught; 2) the teacher gives examples of material related to everyday life; 3) the teacher gives problems to each group for discussion; 4) the teacher designates each group of students to present the results of the discussion according to the tasks that have been given; 5) The teacher gives the opportunity to ask students who do not understand. Final activity: 1) students conclude on the subject that has been taught 2) give homework.

3. Observation and Evaluation

At the observation stage, the things that were observed were: 1) attendance of students at each meeting; 2) students attentive to the discussion of the student's subject matter who respond to the teacher's oral questions; 3) students who ask questions about things that are not yet clear; 4) students answering questions on the blackboard; 5) graduating students. At the end of the first cycle, an evaluation was carried out which aimed to determine the effect of the implementation of the learning action according to the Active Index Card Match method on the learning outcomes of mathematics. The results of the implementation of the action will be evaluated by giving a test at the end of the cycle.

4. Reflection

Reflection takes place at the end of each cycle. The results obtained at the observation stage were collected, as well as the results of the pupils' learning tests. The results of the analysis of the first cycle serve as a reference for the researchers to plan the next cycle, so that the results obtained during the following cycle are in line with expectations and are better than those of the following cycle.

Overview of Cycle II

The steps followed in this cycle are generally the same as the activities that were carried out in the first cycle, correcting the shortcomings that exist in the first cycle according to the results of the reflections that were carried out in the first cycle. The main objective of cycle II is to strive to correctly apply the Active Index Card Match method so that the learning results of the students can improve properly.

The percentage obtained from the test of student learning outcomes can be determined by the mastery of classical learning, i.e. a class is said to have succeeded in achieving mastery of learning if at least 80% of the number of students in a research class scored 68 so it can be said to have passed. In terms of results, there is an increase in students' mathematics learning outcomes after the application of the GeoGebra-assisted Active Index Card Match method which is marked by an increase in the mastery of classical mathematics learning among students pupils of class VIIIC of SMP Negeri 3 Kolaka from cycle I to cycle II. According to the minimum completeness criteria of the SMP Negeri 3 Kolaka, students are deemed to have completed their learning if they have achieved a minimum score of 68 out of an ideal score of 100 and classical completeness has been achieved if they have obtained a score of 80% of the total number of students who have completed individual learning. At the process level, namely the ability of teachers to manage classes and students' activities in effective learning if the average observed during the learning process from the meetings of two cycles is included in the high category, namely 80 %.

C. Findings and Discussion

Description of cycle I and cycle II assessment results

Descriptive analysis of student achievement scores after applying learning involving the Geogebra-assisted active record matching method. The cube and block materials are as follows:

Table 1. Statistics of student scores on Cycle I and Cycle II tests

Statistik	Cycle I	Cycle II
Subject	26	26
Ideal Score	100	100
Average Score	67,12	76,30
Highest Score	93,75	95,00
Lowest Score	37,50	44,06

After student test scores are grouped into five categories, the frequency and percentage distribution is obtained as follows:

Table 2. Frequency and percentage distribution of cycle I test results

Interval	Category	Frequency	Percentage (%)
$0 < N \leq 39$	Very Low	1	3,85
$40 < N \leq 54$	Low	3	11,54
$55 < N \leq 69$	Enough	10	38,46
$70 < N \leq 84$	High	6	23,08
$85 < N \leq 100$	Very High	6	23,08
Total		26	100%

Based on Table 2 above, it appears that there are 3.85% of students who are in the very low category, 11.54% of the students are in the low category, 38.46% are in the moderate category, 23.08% of students are in the high category, and 23.08% of student learning outcomes are in the very high category. This shows that the skill level of the students is still lacking. Also, according to the average undergraduate test score score which is 67.12. If he is converted on a scale of five, he is in the sufficient category. This means that the average achievement score of students in Class VIIIC SMP Negeri 3 Kolaka after implementing learning involving Geogebra-assisted active index card matching method on cube and block hardware is in the sufficient category.

Frequency and percentage distribution for Cycle II, as follows:

Table 3. Distribution of Frequency and Percentage of Scores of Cycle II Test Results

Interval	Category	Frequency	Percentage (%)
$0 < N \leq 39$	Very Low	0	0
$40 < N \leq 54$	Low	1	3,85
$55 < N \leq 69$	Enough	6	23,07
$70 < N \leq 84$	High	11	42,31
$85 < N \leq 100$	Very High	8	30,77
Total		26	100%

Based on table 3, it appears that there are 0% of students who are in the very low category, 3.85% of students who are in the low category, 23.07% of students who are in the moderate category, 42.31% of students who are in the high category category, 30.77% of student learning outcomes are in the very high category. This shows that the ability level of the students has increased. In addition, the average final mark of the cycle II test results, which is 76.30, converted on a scale of five, is in the upper category.

Based on classical cycle II student observation data, it was found that discussion activities in study groups discussing problems posed by the teacher were actively carried out by all students, student activities asking or answering questions and presenting the results of discussions. on the basis of the tasks that had been given experienced the development of student activity. Indeed, the Geogebra-assisted Active Index Card Match learning method is no longer something new, so students can easily adjust the learning process according to the implementation steps of the method. Geogebra-assisted Active Index Card Match learning,

increasing student activity every time different encounter between Cycle I and Cycle II.

Based on the results of the observations of the Cycle I and Cycle II teachers, it was found that the teaching and learning activities implemented by the Cycle I teachers had not all been carried out correctly, this was due to the process of adjusting the character and condition of the students who were diverse, resulting in the delivery of the learning stages not being carried out effectively according to expectations. Meanwhile, in the second cycle, the teaching and learning activities that were not implemented in the first cycle could be carried out correctly, because the teacher had made improvements to the shortcomings of the first cycle so that the process planned teaching and learning can be carried out effectively and well.

Reflection Cycle I and Cycle II

Towards the end of the undergraduate meeting, progress was shown, this is seen by the increasing number of students paying attention to the lessons presented. In cycle II, pupils' attention and activity progress. The self-confidence of the students showed an increase, which was seen at each meeting, the students always worked on the well-given (LKS) questions, and the students were able to use the Geogebra application to check the answers to the questions. LKS questions that were well given, on Cube and Block material. By asking questions (LKS), students' abilities are also more pronounced and the Geogebra app is very helpful for students in the teaching and learning process, so that students' understanding of the subject matter increases also.

Based on the results of the research that has been analyzed, it can be seen that the results of student assessments after giving the completed questions have increased. This can be seen from the increase in average student score during this research, it means that the applied learning methods and materials are capable of improving student learning outcomes, and there is fewer students with low scores. The average student learning outcome score when converted to a benchmark assessment on a scale of five is in the high criteria i.e. 76.30, at the start it was in the sufficient criteria, namely 67.12. This shows that student learning outcomes in mathematics are increasing.

This research is said to be successful after the completion of the second cycle because it has reached the predetermined performance indicators. After the second cycle, the student's score increased with an average score of 76.30 with a classic learning completeness of 80.77, while in the first cycle, the students could only obtain a average score of 67.12 with a classic completeness of 50.00 based on the results of observations and evaluation, the researcher was stopped at cycle II, because the success indicator for this of 67.12 with a classic completeness of 50.00 based on the results of observations and evaluation, the researcher was stopped at cycle II, because the success indicator for this researcher was met with the achievement of The performance indicators of 80% for this researcher, or 80.77%, is said to be complete, that is to say that the researcher's objectives have been achieved.

Applying the Active Index Card Match method assisted by Geogebra can make students not be lazy, be more enthusiastic. In this way, students can focus more on paying attention to the lessons and be active in monitoring the teaching and learning process in the classroom, as this can make it easier for them to solve the problems posed, if the material is understood. In addition, it can make students and their friends want to study together if they have learning difficulties. In addition, the application of learning using the Geogebra app also makes it much easier for students to understand the material of cubes and blocks, which helps improve student learning outcomes for the classroom VIIIc SMP Negeri 3 Kolaka.

E. Conclusion

Based on the results of the analysis, it can be concluded that the implementation of learning through the application of the Geogebra-assisted active plug matching method can improve the learning outcomes of students in the class. VIIIc SMP Negeri 3 Kolaka for the academic year 2018/2019 on Cube and Block Material. This is illustrated by the increase in student learning outcomes obtained from action test results in each cycle, as shown by the results of the assessment of the first cycle of actions, the classical provisions have not not achieved i.e. 50.00% or as many as 14 students who did not finish out of 26 students who scored ≤ 68 with an average score of 67,12. Since the test results of the first cycle had not yet reached the passing indicator, it was continued until the second cycle. According to the results of the evaluation of the second cycle of tests, we obtain a classic completeness of up to 80.77% or up to 21 students

with a complete score of 26 students who obtained a score of ≥ 68 with a value average of 76.30. The implementation of the second cycle of actions met the predetermined success indicators, namely $\geq 80\%$ of the students obtained the mark of ≥ 68 .

G. References

- Arikunto, S. (2010). *Prosedur Penelitian Suatu Pendekatan Praktik*. Rineka Cipta.
- Asnimar. (2017). Penerapan Metode Pembelajaran Index Card Match untuk Meningkatkan Hasil Belajar Penjaskes Siswa Kelas V SD Negeri 002 Batu Bersurat. *Jurnal PAJAR (Pendidikan dan Pengajaran) Program Studi Pendidikan Guru Sekolah Dasar FKIP Universitas Riau*, 1(2), 208–216.
- Faradisa, M. (2018). Penggunaan Aplikasi Geogebra pada Pembelajaran Matematika Materi Poligon dan Sudut Sebagai Sarana Meningkatkan Kemampuan Siswa. *Jurnal EQUATION Teori dan Penelitian Pendidikan Matematika*, 1(September), 166–172.
- Farida, N. (2014). *Abstraksi Dan Alat Peraga Maya*. October, 1–11. <https://doi.org/10.13140/2.1.5013.5049>
- Hadi, M. S., Fattah, A. H., & Rizta, A. (2018). Penggunaan Geogebra Terhadap Hasil Belajar Matematika Materi Program Linier. *Indiktika : Jurnal Inovasi Pendidikan Matematika*, 1(1), 65. <https://doi.org/10.31851/indiktika.v1i1.2236>
- Hasratuddin. (2014). Pembelajaran Matematika Sekarang dan yang akan Datang Berbasis Karakter. *Didaktik Matematika*, 1(2), 30–42. <https://doi.org/10.24815/jdm.v1i2.2059>
- Isman, M. N. (2016). Pemanfaatan Program Geogebra Dalam Pembelajaran Matematika. *Jurnal Matematika Dan Pendidikan Matematika*, 5(1), 10–19.
- Kamarullah, K. (2017). Pendidikan Matematika di Sekolah Kita. *Al Khawarizmi: Jurnal Pendidikan dan Pembelajaran Matematika*, 1(1), 21. <https://doi.org/10.22373/jppm.v1i1.1729>
- Nabillah, T., & Abadi, P. A. (2019). Faktor Penyebab Rendahnya Hasil Belajar Siswa. *Prosiding Seminar Nasional Matematika dan Pendidikan Matematika Sesiomadika*, 2(3), 659–663.
- Rahadyan, A., Hartuti, P. M., & Awaludin, A. A. R. (2018). Penggunaan Aplikasi Geogebra dalam Pembelajaran Matematika di Sekolah Menengah Pertama. *Jurnal PkM Pengabdian kepada Masyarakat*, 1(01), 11. <https://doi.org/10.30998/jurnalpkm.v1i01.2356>
- Silberman, M. L. (2013). *Active Learning: 101 Cara Belajar Siswa Aktif*. Nuansa Cendikia.
- Sirajuddin, S., & Arsyad, N. (2019). Pengaruh Sikap Pada Pelajaran Matematika Terhadap Hasil Belajar Matematika Siswa. *Pedagogy: Jurnal Pendidikan ...*, 4(1), 13–19. <http://journal.uncp.ac.id/index.php/Pedagogy/article/view/1434>
- Wahyu, K., & Mahfudy, S. (2016). Sejarah Matematika: Alternatif Strategi Pembelajaran Matematika. *Beta Jurnal Tadris Matematika*, 9(1), 89. <https://doi.org/10.20414/betajtm.v9i1.6>