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Analysis of Problem Solving Ability and Active Activities of Students with the Application of Autograph Assisted CTL Learning Model at Private MTs PAB 1 Medan

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Abstract
This study aims to determine the level of students' mathematical problem solving ability by applying the Autograph-assisted CTL learning model, to determine the active activities of students by applying the Autograph-assisted CTL learning model, and to find out the students' difficulties in solving mathematical problems. Data obtained through data sheets of students' problem solving abilities were analyzed through a qualitative approach and the results of observations of student activities during learning activities were analyzed based on percentages. This study uses data analysis of the Miles and Huberman model, namely data reduction, data display, and conclusion drawing/verification data. The subjects in this study involved students of class VIII-1 MTs Private PAB 1 Helvetia, who were treated through the CTL learning model in the even semester of the 2021/2022 academic year, totaling 30 people. Based on the results of the study, the average level of mathematical problem solving abilities of 30 students in the high category included 2 students in the very low category, 2 students in the low category, 7 students in the moderate category, 15 students in the high category and 4 students in the very high category. Students' active activities with the application of the Autograph-assisted CTL learning model are said to be effective, because they are in accordance with the requirements of all indicators being met. Very high category students have no difficulty in solving problem solving problems. Students with sufficient criteria have difficulty in translating problems into mathematical models and difficulties in carrying out correct mathematical procedures. Meanwhile, students with very low criteria have difficulties in understanding problems, translating problems into mathematical models, determining strategies and carrying out correct mathematical procedures.
Keywords: Problem Solving Ability, Active Student Activities. CTL Learning Model, Autograph
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1. Introduction

Education is closely related to learning held in schools. Learning is one of the most important elements in the implementation of education. One of the efforts to improve the quality of education is to make innovations or new breakthroughs in the world of education, especially in learning activities that can touch certain aspects of a person so that he is able to develop his potential optimally. The essence of the purpose of mathematics education in schools is to prepare students to be able to face changing circumstances in the life of an ever-evolving world, through practice acting on the basis of thinking and high creativity. Likewise, in studying mathematics, students are required to have high creative skills and abilities in solving a problem.

The Indonesian government has made various efforts to improve the quality of teaching and improve student mathematics learning outcomes, because mathematics is a very important science in every level of education pursued by every Indonesian citizen. The government's efforts include developing curricula, providing training to teachers, completing educational infrastructure and even improving teacher welfare. Along with the development of the internet, learning strategies have shifted and various information and communication technology-based learning strategies have emerged, from e-learning models, smart classroom technology, virtual classrooms, belded learning, etc. (Fitri & Zahari, 2019).

Through good mathematics education, students can indeed obtain various kinds of provisions in facing challenges in the global era. In the 2013 curriculum itself, the use of technology in learning became something that was highly recommended. The learning process in the 2013 curriculum requires students to participate actively and provide sufficient space for students' creativity, interests, and talents (Fitri, Syahputra, and Syahputra, 2019).

In achieving competence, the implementation of the current curriculum actually requires the creation of an educational climate that allows the growth of intellectual and scientific enthusiasm for every teacher, starting from home, school, and society.

With the development of technology, it will encourage people to be more creative in developing and applying mathematics as science and technology. Along with this, it is necessary to develop creative, active and innovative mathematics learning (Fitri, 2020).

As good teachers, we certainly want our students to be able to solve math problems well. The following are some problem-solving strategies and suggestions for the learning process which are translated from Lencher in (Wardhani Sri et al, 2010), namely: (1) Making pictures or diagrams, (2) Finding patterns, (3) Making organized lists, (4) Making tables, (5) Simplifying the problem, (6) Experimenting, (7) Conducting experiments, (8) Demonstrating (acting out) the problem, (9) Moving from behind, (10) Writing equations, (11) Using deduction.

Mathematics is one of the teaching materials that tend to be difficult for students to understand. As is known, one of the characteristics of mathematics is that it has an abstract object. This abstract nature causes students to have difficulty understanding the teaching material. If the teaching materials are not understood by students, it will be impossible if students can have the creativity to solve mathematical problems that are posed to them, whether they are routine or not. Understanding mathematics is very important in learning mathematics because it will facilitate solving mathematical problems, it will even sharpen problem solving (Fitri, 2018). This can be seen from many students who have difficulty participating in classroom learning because they do not master the prerequisite material (Fitri, 2018).

In learning activities, students often experience indecision in determining whether the solution or reason he put forward is a right or wrong solution. In conflict situations that occur in connection with individual cognitive abilities, where individuals are unable to adjust their cognitive structure to the situation they are facing in learning (Fitri, Syahputra, and Syahputra, 2020).

Along with the above, the researcher conducted an interview with the teacher of Private MTs PAB 1 Helvetia regarding mathematical problem solving abilities. Based on the results of interviews by researchers with teachers of Private MTs PAB 1 Helvetia, information was obtained that in the learning process, teachers felt that students were still experiencing problems in solving problems, but teachers did not know for sure where the obstacles were. Students can only solve problems that are exactly the same as the questions that have been done before. If the question is modified, the students seem to be confused. On the other hand, the teacher also said that in the learning process the teacher had not yet fully implemented the indicators of problem solving ability. Based on the results of the interviews, it can be concluded that at MTs Swasta PAB 1 Helvetia no measurements related to problem solving abilities have been carried out so it is not yet known what difficulties are experienced by students in problem solving and how students' mathematical problem solving abilities are. Therefore, the researcher wants to see in real how the mathematical problem solving ability at Private MTs PAB 1 Helvetia is and in which indicators the problem solving ability is low.

Based on the four stages of problem solving Polya in Nurhasanh (2022), in this study, four levels of solving story problems were determined as follows:

Level 1: Students are not able to carry out the four steps of problem solving by Polya sama once (understand the problem, plan the problem, execute the problem, check return)
Level 2: Unable to understand the problem
Level 3: Students are able to carry out the stages of understanding problems, planning problems and execute the problem.
Level 4: Students are able to carry out the stages of understanding the problem, implementing the problem and check back)

The activeness of a student in participating in the learning process is not only through physical activity, but also psychological activity. Physical activity is an active activity through the limbs, while psychological activity is an active activity through the soul. Sardiman (2020) added that what is meant by learning activities are physical and mental activities. In the process of learning activities, students are required to be able to carry out activities because activity is the most important principle because learning itself is an activity, without activities it is impossible for someone to learn.

In this study, the researchers concluded that students' activities in learning mathematics include: (1) Reading/understanding (books/LAS); (2) Pay attention to the teacher's explanation; (3) Solving problems; (4) Asking questions; (5) Discussion between fellow students, (6) Discussion between students and teachers; (7) Demonstrating results/expressing opinions/ideas; (8) Take notes on matters relevant to learning activities; (9) Draw conclusions; (10) Portfolio (doing independent questions). Thus, researchers feel the need to examine how effective student activities are in learning with the CTL approach.

The CTL model has a syntax that will be carried out in the learning process according to Trianto (2018: 111) the syntax of the CTL model is:

1.Develop the thought that children will learn more meaningfully by working alone, discovering themselves and constructing their own new knowledge and skills
2.Carry out as far as possible inquiry activities for all topics taught
3.Develop students' curiosity by asking questions
4.Create a learning community both in small group and large group learning
5.Present the model as an example of learning, it can be through illustrations, models, and even actual media

6.Reflect at the end of the meeting
7.Carry out the actual assessment objectively in various ways

A number of media or technological tools that can help in the learning process in the classroom have been created. One of the media known today is software (software), one of which is Autograph software. Autograph according to Karnasih in Ramadhani & Lisma (2019), is one of the software used in learning mathematics. Autograph software is one of the media that can be used to learn about two-dimensional, three-dimensional, statistics, transformations, geometry, equations, coordinates, differentials, graphs, algebra and others.

Based on the research above, the researcher hopes that the learning taught using Autograph software through the CTL learning model can help make it easier to learn the material, researchers do the same thing as previous research using Autograph software, but the context is different, namely using the CTL learning model on the material of a two-variable linear equation system. With ordinary learning, the material is difficult for students to understand. By relying on the teacher, students sometimes rarely or forget when asked to describe or write down mathematical ideas from pictures, whereas if using Autograph students can repeatedly try and produce many examples of graphs, until finally students can draw conclusions about how the graphic images are formed. By using this software, it is hoped that it can help teachers in learning mathematics. Teachers are also expected to be able to explore more diverse software according to the subjects being taught, to develop learning strategies in the classroom. So that students are expected to know, be skilled in using computers and managing information for the learning process.

Based on the above background, the researchers tried to combine the CTL learning model with computer technology media (Autograph), to improve problem solving skills and active student activities. So that problem solving abilities and active student activities can improve the quality and effectiveness of learning. For this reason, researchers are interested in conducting research with the title "***Analysis of Problem Solving Ability and Active Activities of Students With the Application of Autograph Assisted CTL Learning Model at MTs Swasta PAB 1 Helvetia"***

2. Methods

The subjects in this study involved students of class VIII-1 MTs Private PAB 1 Helvetia, who were treated through the CTL learning model in the even semester of the 2021/2022 academic year, totaling 30 people. The object of this research is the problem solving ability and active activity of students who are treated with the CTL learning model on the subject of a two-variable linear equation system. Objects in this study, among others, can be seen from the results of students' problem solving ability tests, namely through student answer sheets, active student activities can be seen from student active activity observation sheets, and through interviews, namely transcripts of tape-recorder recordings to students and interviews with teachers.

This research is categorized into a qualitative research type where data analysis is carried out after giving a learning action. Activities in data analysis using the Miles and Huberman model, namely data reduction, data display, and conclusion drawing/verification data.

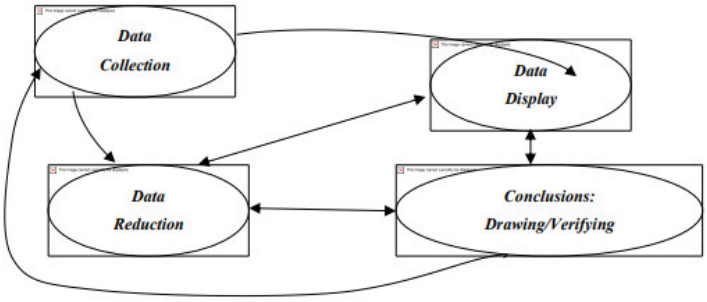

Figure 1. Data Analysis of the Miles and Huberman Model

Thus the research design with research steps as follows: (1) Field observations and preparing research proposals; (2) Validation of learning tools and testing of research instruments; (3) Implementation of learning with the CTL model and observation activities on learning activities; (4) Conducting interviews as well as data comparison (data triangulation) in which interviews are conducted on selected research samples/subjects with the consideration that the research samples/subjects can provide information in accordance with the research objectives; (5) Data analysis and research findings; (6) Report writing.

3. Result And Discussion

Students' mathematical problem solving ability is obtained based on the value of each student in completing the student's mathematical problem solving test. The mathematical problem solving ability instrument is arranged in the form of a description test with statistical material consisting of four (4) questions. The test results of the

instrument showed that the five questions were declared valid and reliable in the high category. So that the test instrument can be used to determine students' mathematical problem solving abilities.

Description of Student Problem Solving Ability

Solving test result score the students' mathematical problems obtained from 30 people were described statistically spread over 5 criteria, namely very low, low, quite high and very high. The distribution of students' mathematical problem solving abilities is presented in Figure 2.

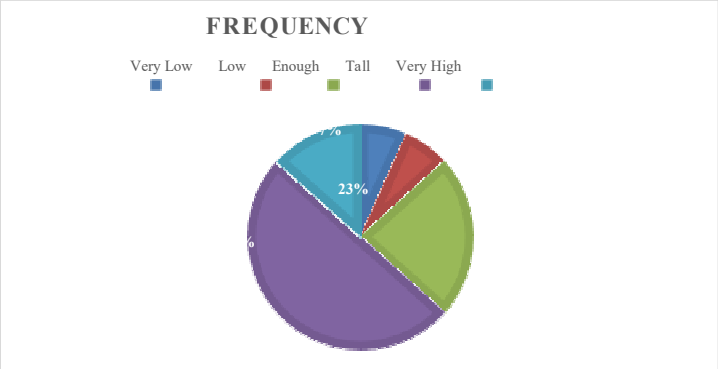

Figure 2. Diagram of Students' Mathematical Problem Solving Ability

Based on Figure 2. shows that students with mathematical problem solving abilities in the very low category are 2 people (6.67%). There were 2 students in the low category (6.67%), 7 students in the moderate category (23.33%), 15 students in the high category (50%) and 4 students in the very high category (13, 33%) people. From the description of this distribution, it can be concluded that the level of students' mathematical problem solving ability is mostly in the high category.

Based on Figure 2, the student who got the lowest score (20), in general it can be said that the student is only able to complete a maximum of 1 indicator on each question from the test given. As for students who get the highest score (92.5), in general it can be said that these students are able to complete almost all the test questions given.

Figure 2 also shows that there are 2 students who get very low scores, namely SKPM 20. In general, these results show that there are 2 students who are only able to complete a maximum of 1 indicator on each test item given correctly. From the answers made by students, it turned out that students worked on all the questions given but there were errors in solving them. So, if the student's work score is accumulated from the 4 questions given, the student gets an SKPM 20. Students who get a low score of 20 SKPM < 40 are 2 people. In general, these results indicate that there are 2 students who are able to complete 2 indicators on each question correctly. From the answers made by students, it turned out that students were able to do 2 questions correctly and the other 2 questions were done but there were errors in the completion, if all of them were accumulated, the scores obtained were in the range of 20 SKPM < 40.

There were 7 students who got a sufficient score of 41 < SKPM 60. In general, these results indicate that there are 7 students who are able to solve 2 to 3 questions correctly. From the answers made by students, it turns out that students are able to do 2 questions correctly and the other 2 questions are 83 done but there are errors in solving them, if all of them are accumulated, the value obtained is obtained are in the range of 41 < SKPM 60.

There were 15 students who got high scores, namely 61 SKPM 80. In general, these results indicate that there are 15 students who are able to solve 3 questions correctly. From the answers made by students, it turned out that students were able to do 3 questions correctly and 1 other question was done but there were errors in the solution, if all of them were accumulated, the scores obtained were in the range of 61 SKPM 80.

There are 4 students who get very high scores, namely 81 SKPM 100. In general, these results indicate that there are 4 students who are able to solve almost all the questions correctly. From the answers made by students, it turns out that students are able to work on almost all questions correctly, if all of them are accumulated, the value obtained is in the range of 81 SKPM 100. Based on this, it can be concluded that the level of students' mathematical problem solving ability by applying the CTL learning model assisted by Autograph are there 2 students with mathematical problem solving ability in very low category (6.67%). There were 2 students in the low category (6.67%), 7 students in the moderate category (23.33%), 15 students in the high category (50%) and 4 students in the very high category (13, 33%) people. From the description of this distribution, it can be concluded that the level of students' mathematical problem solving ability is mostly in the high category.

The level of students' mathematical problem solving abilities in this study were grouped into five categories, namely very high, high, moderately low and very low based on the scores obtained by each student. Based on the score data of the students' mathematical problem solving ability test results, the average score of mathematical problem solving abilities is 63.42 or it can be said that the average mathematical problem solving ability of

students is in the high category. The group of students with the 'high' level of mathematical problem solving ability has the highest proportion, namely 50%, followed by the level of mathematical problem solving ability in the moderate category, which is 23.33%, then the level of mathematical problem solving in the very high category is 13.33%, then the low category by 6.67% and very low by 6.67%. Of the 30 students who took the mathematical problem solving ability test, 15 students had a high level of mathematical problem solving ability, 7 students had a moderate level of mathematical problem solving ability, 4 students were in a very high category, 2 students were in a low category and 2 students were in a very high category. very low category.

The research data shows that students with a very high level of mathematical problem solving ability are able to complete the test questions given well. Of the 4 test questions given, 4 students were able to complete 2 test questions correctly and completely and 2 test questions correctly. This shows that students are able to understand the material being tested well in the application of the Autograph-assisted CTL learning model.

Students who have understood and mastered a number of subject matter will be able to re-express in the form of information presented, then be able to plan how to solve the problem, be able to apply it and be able to recalculate or re-check whether the answers that have been presented by the student are right or wrong.

Students with high category of mathematical problem solving ability found that most of the students had not been able to complete all the test questions given. Of the 4 problem-solving ability test questions given, 7 students were able to solve 1 question correctly and completely, while 12 students had not been able to solve 3 questions correctly and completely.

Furthermore, students in the category of mathematical problem-solving ability levels were quite found that 7 students with the category of mathematical problem-solving abilities with this category had not been able to solve 1 question correctly and completely, of the 7 students only 1 student could solve one question correctly and completely. While on the other questions, the 7 students were only able to solve 1 point out of 3 questions correctly. In addition, in this category, many students are unable to complete the points in one problem correctly and completely. Most students in this category solve problems with half answers.

Furthermore, students' mathematical problem solving abilities with low categories were 2 students. In this category it was found that students only gave a few answers to each point, where some of the scores obtained by students in this category for each point in one problem were 1. Students in this category were only able to provide information contained in the questions and worked with very few answers. .

Finally, on the mathematical problem solving ability of students with very low categories as many as 2 students. In this category, there are student answers that are worth 0, in other words in this category students are not able to solve any of the questions correctly and completely. Students are not able to provide information, plan completion, complete and recheck the answers.

Discussion

The active activities of students with the application of the Autograph-assisted CTL learning model are said to be effective, because they are in accordance with the requirements of all indicators being met. Where it is obtained that the first indicator, namely the activity of paying attention to or listening to the teacher's or friends' explanations, was obtained by 25.83%, then on the indicator of reading or understanding contextual problems in the LKPD it was obtained by 18.75%. On indicators of solving problems or finding ways and answers to problems of 23.75%, indicators discussing or asking friends or teachers are 22.00%, indicators of drawing conclusions to friends or teachers are 7.92% and indicators of student behavior that are not relevant to KBM is 3.75%.

This is reinforced by the results of research conducted by Manul, Susilo, and Fayeldi (2019) that the use of the CTL model in learning mathematics can improve students' problem-solving abilities. Students with very high category are able to solve the questions given correctly. Students with sufficient categories are able to solve problems with the correct steps but are incomplete, so they do not get the correct results. Very low category students can work on the questions given even though they only write a few answers and the final answer is wrong (Manul et al., 2019).

In addition, the results of research conducted by Hutasuhut, Karnasih, and Salayan (2020) show that there is an increase in mathematical problem solving abilities taught using the CTL model through autograph software. Furthermore, the active activities of students with the application of the Autograph-assisted CTL learning model are said to be effective, because they are in accordance with the requirements of all indicators being met.

Where it is obtained that the first indicator, namely the activity of paying attention or listening to the explanation of the teacher or friend, was obtained by 25.83%, then the indicator of reading or understanding contextual problems in the LKPD was obtained by 16.25%. On indicators of solving problems or finding ways and answers to problems of 24.1%, indicators of discussing or asking friends or teachers are 21.7%, indicators of drawing conclusions to friends or teachers are 5.83% and indicators of student behavior that are not relevant to KBM is 29.2%.

This is in accordance with the results of research conducted by Nurdalilah (2021) that the CTL model can

increase student activity where in the first cycle it is 40% less active) to 62.3% (quite active) in the second cycle and in the third cycle it increases to 87, 1% (very active). Furthermore, students with very high categories, namely, S-20 code students have no difficulty in solving problem solving problems, only S-20 runs out of time in working on the questions. S-1 has difficulty in translating problems into mathematical models. Students with sufficient criteria for S-4 and S-14 codes have difficulties in translating problems into mathematical models and difficulties in carrying out correct mathematical procedures. Meanwhile, students with very low criteria with codes S-19 and S-15 104 have difficulty understanding problems, translating problems into mathematical models, determining strategies and carrying out correct mathematical procedures.

In the process of problem solving and active student activities, many methods were developed by teachers, both through learning models, as well as innovations that were originally discovered by themselves. In this study, learning uses the Autograph-assisted CTL learning model which greatly helps students plan solutions so that they are able to solve problems related to problem solving and active activities. All are directed at the efforts of students to master competence or learning objectives. The CTL learning model is a learning concept that helps teachers relate the material they teach to students' real world situations and encourages students to make connections between their knowledge and its application in their daily lives.

Hosnan (2014) explains that contextual learning is a learning concept in which the teacher brings the real world into the classroom and encourages students to make connections between their knowledge and its application in their daily lives, while students gain knowledge and skills from a limited context, little by little. little and from the process of constructing themselves as a provision to solve problems in their lives as members of society.

This is in line with research Yulinda (2016) that CTL learning is better in improving students' problem solving abilities compared to conventional learning. Furthermore, research by Lubis (2012) that the application of the CTL learning model can increase students' activeness in learning mathematics, this can be seen from the average acquisition of student learning activities in the first cycle of 69% in the moderately active category and in the second cycle it increases to 80% with the active category.

4. Conclusion

Based on the results of data analysis and discussion in this study, several conclusions are put forward as follows:

1. The average level of mathematical problem solving ability of 30 students in the high category includes 2 students in the very low category, 2 students in the low category, 7 students in the moderate category, 15 students in the high category and 4 students in the very high category.
2. Students' active activities with the application of the Autograph-assisted CTL learning model are said to be effective, because they are in accordance with the requirements of all indicators being met.
3. The difficulty of students solving mathematical problems in the very high category students did not have difficulties in solving problem solving problems. Students with sufficient criteria have difficulty in translating problems into mathematical models and difficulties in carrying out correct mathematical procedures. Meanwhile, students with very low criteria have difficulty understanding problems, translating problems into mathematical models, determining strategies and carrying out correct mathematical procedures.

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