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Abstract_: Students' critical thinking ability is one of the problems that needs serious attention, especially in the field of mathematics learning. Through Problem Based Learning assisted by the Plickers application, it is hoped that this can be a solution to overcome this problem. This research is classroom action research which consists of 2 cycles which include planning, action, observation, reflection. The data collection process takes the form of tests, observations and documentation. The subjects of this research were students in class VII C MTs. Ma'arif Ambulu numbered 26 students. The results of the research showed that students' critical thinking abilities were significant, namely in cycle I the average percentage was 57.04% (poor) and in cycle II 84.79% (good)._
Keywords: Problem Based Learning, Plickers application, critical thinking skills

INTRODUCTION

Changes in the world of education occur dynamically, especially in creating various forms of renewal or new technological innovation (Ashari et al., 2023). The use of technology in the world of education has presented a new breakthrough which is expected to increase efficiency, attractiveness, innovation and creativity in the learning process (Mariati et al., 2023). In line with developments over time, the relationship between education and technology has become inseparable because various technological innovations provide great benefits for human life, especially in improving the quality and process of education (Shoumi, 2019). With this potential, education and technology have great potential in creating learning that is efficient, inclusive, and beneficial for all aspects involved in the educational process.

Improving the quality of education certainly requires improvements to increase the active role of students. Therefore, teachers are expected to apply efficient learning models to form knowledge and skills, thereby encouraging increased ability to solve problems (Malikha, 2018). As a teacher with various roles, you are also required to be able to manage learning, guide the learning process and be able to create an optimal learning environment (Saumi & Ismaya, 2021). As a facilitator in the learning process, teachers actually provide opportunities for students to develop their abilities to be more creative and active in order to improve the quality of learning (Al Ayubi, 2018). So far the teacher's learning process still leads to conventional learning models.

In the conventional learning model, teachers are expected to be more active in speaking to convey material and students are the recipients of the material (Rohman & et al., 2023). The use of this learning model can cause students to become less active and less able to master the material presented. Therefore, teachers need to look for appropriate learning models that can encourage students to be active in the learning process (Oktavia & Harjono, 2020). Therefore, according to researchers, it is necessary to discover and apply more appropriate learning models to encourage students' active involvement in mathematics learning.

The statement above is in accordance with the pre-research interview conducted by the researcher with one of the mathematics teachers at MTs. Ma'arif Ambulu, identified a number of problems in mathematics learning. These problems include low interest and readiness of students in studying material, especially in mathematics, the dominance of

conventional learning models which tend to make students passive, lack of media used by teachers and underdeveloped critical thinking skills. The results of the interview above are in accordance with the results of pre-research activity observations carried out and it can be seen that only a few students actively answered questions from the teacher. Students also have difficulty summarizing the learning they have done. Student involvement in the learning process is still relatively low, with only a few actively participating in discussions or asking questions. Apart from that, the questions asked by students are not critical and are not problem solving. The answers given by students tend to be based on understanding and memory, without any deeper analysis of the teacher's questions. Observations made before the research showed that the teaching approach was more focused on explanations from the teacher, providing exercises from textbooks and worksheets. According to researchers, this results in a lack of development of students' abilities in critical thinking to solve problems and apply concepts learned in the real world.

The low critical thinking ability of students is one of the most urgent problems in learning, especially mathematics (Nst et al., 2019). Critical thinking ability is a very important ability in dealing with various situations, including solving mathematical problems (Nugroho et al., 2023). However, students often have difficulty developing critical thinking skills, especially in conventional learning contexts which pay less attention to this aspect (Rapi & Ganesha, 2023). In facing this problem, there is a need for innovation that applies a learning model using IT media that is currently developing. One of them is the Problem Based Learning (PBL) model which is supported by the Plickers application.

Problem Based Learning (PBL) focuses on a learning process that emphasizes problem solving, developing critical thinking skills, and involving students in ongoing learning (Fadilla et al., 2021). Apart from that, it is a learning model that can be applied and is suitable for situations where learning must be focused on the students (Syafitri et al., n.d.). In its implementation, the Problem Based Learning model refers to several stages, including: Learning orientation is directed at a problem, the teacher acts as a learning facilitator, students receive assistance in searching/solving activities, describing results, analyzing and evaluating the learning process (Hotimah, 2020). So, the application of this model can have a positive impact, especially in improving students' abilities, especially in critical thinking.

Furthermore, the Plickers application can be defined as a tool that allows teachers to present problem-based questions, collect student responses instantly via the mobile device used by the teacher, and provide direct feedback to students. It is hoped that the integration of Problem Based Learning (PBL) with the help of the Plickers application can create a more interactive, responsive and interesting learning experience for students.

Through this research, it is hoped that solutions can be found, especially in creating learning in the field of mathematics that is more dynamic, effective and inspiring in an era of education that continues to develop. Apart from that, this research is able to contribute significantly to the development of innovative mathematics learning models, especially in improving critical thinking skills at the secondary level.

METHOD

The research method used in this research is classroom action research which consists of action planning, action implementation, observation and reflection. The following is a flow chart of the research carried out. The subjects of this research were students in class VII C MTs. Ma'arif Ambulu numbered 26 students. The material used in this research is comparative material. Data collection techniques use tests, observation and documentation. Tests will be carried out at the end of each cycle, these tests are used as a way to carry out measurements and assessments, where students are given test sheets which must be done individually. The questions used in this research are problem solving questions where the

assessment is adjusted to the critical thinking ability assessment guidelines referring to FRISCO.

Table 1. Guidelines for Assessment of Critical Thinking Abilities

Category Presentation	Critical Thinking Sub Indicators
F (Focus)	Mention initial information on the given problem
R (Reason)	Mention initial information on the given problem
I (Inference)	Students are able to make appropriate conclusions
S (Situation)	Students are able to use all information appropriate to the problem.
C (Clarity)	Students are able to clarify or explain the answers they have written
O (Overview)	Students are able to check their answers again

Data analysis techniques consist of quantitative and qualitative. Quantitative data refers to the value of critical thinking abilities which from the test results are then described in percentage form. Meanwhile, quantitative data refers to the learning process carried out in an observation scheme. Quantitative data analysis techniques use a formula scale.

$$NP = \frac{R}{SM} \times 100 \%$$

Information:

NP : percentage of critical thinking abilities
R : Score obtained
SM : Maximum score with the following interpretation

Table 2. Critical Thinking Categories

Critical Thinking Criteria	Category
86%-100%	Excellent
76%-85%	Good
60%-75%	Good Enough
55%-59%	Less
0%-54%	Very Less

RESULT AND DISCUSSION

In this activity Classroom Action Research consists of planning (Planning), Action (Action), Observation (Observation) and Reflection (Reflection). Planning activities are carried out on the basis of analyzing the initial conditions of students at MTs Ma'arif Ambulu, especially in the Mathematics learning process. From the results of observations obtained, students are less active and the use of learning models and IT is still not maximally applied. Furthermore, researchers designed the Problem Based Learning learning model assisted by the Plickers application as a solution to this problem. Planning activities carried out include preparing learning devices, research schedules, and research instruments. The following is the appearance of the plickers application that has been developed.

In the implementation of action (Action) the Problem Based Learning model collaborated with the Plickers application is applied in the learning process. Furthermore, individual tests were conducted to measure critical thinking skills.

Furthermore, on the questions given, the researchers analyzed the criteria of Reason, Inference, Situation, Clarity, Overview and obtained the results in table 3 below

Table 3. Critical Thinking Ability Based on FRISCO Criteria in Each Cycle

Category Presentation	Cycle 1	Cycle 2
F (Focus)	67,30%	86,53%
R (Reason)	42,30%	79,92%
I (Inference)	50,00%	82,69%
S (Situation)	51,92%	84,61%
C (Clarity)	48,07%	80,76%
O (Overview)	82,69%	94,23%
Average Percentage	57,04%	84,79%

Based on this table, it can be seen that students' critical thinking has increased for each criterion. Next, the reflection stage was carried out to find out things that were obstacles in carrying out the research. The results of the reflection include Problem Based Learning using the Plickers application which can improve students' critical thinking skills.

In this study using FRISCO criteria in measuring students' critical thinking skills in solving the given problem solving problems. In this case the problem solving questions given using the Plickers application. Based on the results of the study, it can be seen that there is an increase in each indicator of Focus, Reason, Inference, Situation, Clarity and Overview. At the criteria level Focus increased by 19.23%. This shows that students can mention related information known and asked from the problem well. At the reason criterion increased by 37.62%, this shows that students are able to make good decisions by writing the solution steps to the problem given, at the inference level increased by 32.69% and showed that students were able to make the right conclusions. At the Situation level increased by 32.69% this shows that students are able to use all the information provided in accordance with the problem and at the clarity criterion increased by 32.69% this shows that students are able to clarify or explain the answers that have been given.

Based on these results, it can be seen that Problem Based Learning collaborated with Plickers application learning media can significantly improve students' critical thinking skills. The results of this study are supported by (Mareti & Hadiyanti, 2021) which states that Problem Based Learning learning can improve students' critical thinking skills and learning outcomes. Furthermore, research by Mita et al (2020) on the title Analysis of Critical Thinking Ability of Students Based on Frisco in Function Material in Class VIII states that there is a relationship between critical thinking ability between male and female students on FRISCO criteria

CONCLUSION

Research that applies the Problem Based Learning model combined with the Plickers application is able to improve thinking skills, especially critical thinking skills. This is evidenced by the results of tests conducted by researchers resulting in significant changes from 57.04% (less) and in cycle II 84.79% (good).

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