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Analysis of critical thinking ability of class X senior high school students

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Abstract: Students' critical thinking abilities influence the development of cognitive, affective and psychomotor abilities. Students who have critical thinking ability are able to analyze a problem so they can make decisions. The aim of the research is to determine and describe the initial critical thinking abilities of class X students at MA Nurul Huda, Central Java. This research is quantitative research based on critical thinking ability tests. The instrument used is a test sheet in the form of multiple-choice questions which contains indicators of critical thinking abilities. The results of the research are critical thinking abilities which are categorized into five, namely very good, good, sufficient, low, and very low. Based on data analysis, it is known that the initial critical thinking ability of grade X MA Nurul Huda Central Java students for very good, good, sufficient, low, and very low categories is 0%, 4,54%, 31,82%, 50%, and 13,64%. Therefore, it can be concluded that the critical thinking ability of class X students at MA Nurul Huda, Central Java, is low and needs to be improved.

Keywords: Critical thinking, cognitive development, prior ability

Abstrak: Kemampuan berpikir kritis siswa berpengaruh terhadap perkembangan kemampuan kognitif, afektif, dan psikomotor. Siswa yang memiliki kemampuan berpikir kritis mampu menganalisis suatu permasalahan sehingga dapat menetapkan suatu keputusan. Tujuan penelitian adalah mengetahui dan mendeskripsikan kemampuan awal berpikir kritis siswa kelas X MA Nurul Huda, Jawa Tengah. Penelitian yang telah dilakukan merupakan penelitian kuantitatif yang didasarkan pada tes kemampuan berpikir kritis. Instrumen yang digunakan adalah lembar tes dengan bentuk soal pilihan ganda yang memuat indikator kemampuan berpikir kritis. Hasil penelitian berupa kemampuan berpikir kritis yang dikategorikan menjadi lima, yaitu sangat baik, baik, cukup, rendah, dan sangat rendah. Berdasarkan analisis data diketahui bahwa kemampuan awal berpikir kritis siswa kelas X MA Nurul Huda, Jawa Tengah pada kategori sangat baik, baik, cukup, rendah, dan sangat rendah masing-masing sebesar 0%, 4,545, 31,82%, 50%, dan 13,64%. Oleh karena itu, dapat disimpulkan bahwa kemampuan berpikir kritis siswa kelas X MA Nurul Huda, Jawa Tengah adalah rendah sehingga perlu ditingkatkan.

Kata kunci: Berpikir kritis, perkembangan kognitif, kemampuan awal

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INTRODUCTION

The rapid changes in science and technology have been evident in the 21st century. Information and communication systems are also experiencing rapid development. According to (Fuadah et al., 2023), technological developments in the 21st century have a major impact on various aspects of human life, one of which is education. The existence of advances in technology, information and communication requires people to improve their quality of thinking. Improvement in thinking can be achieved through education. The education system is inseparable from learning. According to Rahman et al. (2022), education creates a learning process that seeks to enable students to be active in developing their potential so that students have the spirituality, self-control, personality, intelligence, morals and skills needed in society.

The use of conventional learning in the learning process should be avoided.. Conventional learning is a learning process that is carried out monotonously and verbally in delivering material, namely using lectures or centered on the teacher (Fahrudin et al., 2021). The conventional learning has several characteristics, namely the material is delivered to students without considering student needs, learning activities in the form of assignments, the learning process is passive because students only listen to the teacher, and usually learning occurs slowly (Bawamenewi et al., 2024). The conventional learning process that facilitates students' understanding without considering students' thinking skills needs to be abandoned. Critical thinking (CT) is one of the high-level thinking skills that students must have because it affects cognitive, affective, and psychomotor development.

The research conducted by Changwong et al. (2018) in Thailand showed that in 2015 students' logical thinking and analysis ability had a low average of 36.5%. Moreover, the results showed that 2.09% of the research subjects were able to pass the evaluation of logical thinking and analysis skills. In Thailand, CT is a must-have for citizens to face the knowledge-based economy. The low CT ability is not only experienced by students in Thailand, but low CT ability is also possessed by Indonesian students. The CT ability of students and teachers in Bogor city are in the low category (Ekamilasari et al., 2021). Students' CT ability are still low at all levels of education, namely primary school, junior high school, high school, and university (Mursidah et al., 2023). The research conducted by Septiany et al. (2024) shows that the CT ability of high school students are divided into three categories, namely very low, low, and medium. About half of the total research sample was in the very low category, while the other half was divided into the low and medium categories. According to the results of interviews conducted with several students and teachers at MA Nurul Huda, Central Java, it can be seen that students still have difficulty solving problems that require students to clarify, analyze, and determine or decide on a conclusion.

Students must have CT ability. The ability to think critically is one of the higher order thinking ability needed in the development of 21st century skills (Novitasari et al., 2024; Rahardhian, 2022). Students need CT ability to solve a problem. According to Suriati et al. (2021), CT is the ability needed to test the accuracy of the information obtained so that a conclusion obtained from the information can be trusted. Therefore, students who have CT ability can make decisions in solving problems effectively and efficiently. The CT ability can be interpreted as the ability to analyze based on logical reasoning, so that someone who has CT ability does not simply accept or reject information but the information will be examined, analyzed, and evaluated first before being accepted or rejected (Susanti et al., 2019). The CT ability is the ability to think someone who is supported by reliable arguments, therefore teachers are responsible for improving students' CT ability (Kusuma et al., 2018). The CT ability plays an important role in developing student potential, working on assignments, knowing the solution to the problem at hand, and drawing conclusions.

In education, CT ability is an essential ability that must be possessed by students. students who have CT ability will have high curiosity, so that students' interest in something will increase through CT (Elsabrina et al., 2022). Students who have CT ability can master the concepts learned in learning better and be able to apply these concepts to real situations. Students can use CT ability to solve problems in learning, for example, tests at the end of

material delivery. According to Ariadila et al. (2023), CT ability can help students in facing life challenges where students are able to see problems from different perspectives and find the best solution.

Students who have CT ability are able to analyze and evaluate the information obtained. Therefore, CT ability is the process of analyzing, evaluating, determining solutions and conclusions to a problem at hand. CT ability can be developed through a well-planned learning process. The researcher conducted preliminary research to find out and describe the initial ability of CT possessed by MA Nurul Huda class X students, Central Java. The initial analysis of CT ability possessed by grade X students of MA Nurul Huda, Central Java can be used by teachers at the school in making appropriate learning innovations. This research needs to be done before MA Nurul Huda grade X students are given treatment that is expected to improve CT ability. In addition, the results of the study can be used as a sample to describe the CT ability possessed by students, so that the policies and learning processes that can provide a positive influence on students' CT ability can be determined.

METHOD

The research conducted was quantitative research which aims to describe the initial ability of CT. According to Syahroni (2022), research that is quantitative involves the use of numerical data, beginning with data collection, analysis of the data, and presentation of research findings. The subjects of the research were class X students of MA Nurul Huda, Central Java, totaling 22 students.

Researchers utilize the data collection technique to gather research data. Data collection is a very important stage in research, data collection that is in accordance with the research will produce high credibility data and vice versa (Yasin et al., 2024). The technique of data collection used in research is a test. The tests used in this study are CT ability tests that contain 5 indicators of CT ability and are in the form of multiple choice with a total of 10 questions, so that each indicator of CT ability has 2 questions. According to Ennis (2011), the indicators in CT ability are as follows:

Table 1: Indicators of CT ability

No.	Indicator	Description
1	Basic clarification	▪ Formulating a question ▪ Analyzing an argument ▪ Asking and answering clarifying questions
2	The bases for a decision	▪ Considering the credibility of a source ▪ Observing and considering observations
3	Inference	▪ Making deductions and considering the results of deductions ▪ Making induction and considering the results of induction ▪ Making and considering value decisions
4	Advanced clarification	▪ Identifying terms and considering definitions ▪ Addressing unstated assumptions
5	Supposition and integration	▪ Considering and thinking through logically, other premises, reasons, assumptions, positions, and proposals ▪ Combining other skills and dispositions in making and defending a decision

The CT ability of research subjects is known from the test scores obtained by students. Before test questions were given to research subjects, researchers conducted content validation related to the questions used to 2 validators. The validation results showed that the CT ability test was feasible to use with minor revisions. Once the test questions were revised by the researcher and declared feasible by the validator, the test questions could be tested on the research subjects to determine the initial CT ability possessed by the research subjects.

The data analysis technique used was to determine the score of each student's initial CT ability, then determine the average score of the research subject's initial CT ability. The CT ability score of each student is known by using the following formula:

$$\text{Score obtained} = \text{Total correct answers} \times 10 \quad (1)$$

The average score of CT ability is calculated using the following formula:

$$\text{Average score} = \frac{\text{Total score obtained}}{\text{Total students}} \quad (2)$$

According to the scores obtained by students and the average score, researchers can categorize the CT ability of research subjects according to the categories shown in Table 2.

Tabel 2 Interval score for each category of CT ability

Interval Scor	Category
80 – 100	Very Good
60 – 79	Good
40 – 59	Good Enough
20 – 39	Less
< 20	Very Less

Source: (Damopolii et al., 2022)

Furthermore, researchers calculated the percentage of the number of students who got high, medium, and low categories using the following formula:

$$\text{Percentage of each category} = \frac{\text{Total students in each category}}{\text{Total students}} \times 100\% \quad (3)$$

In addition, researchers also calculated the percentage of students who gave correct and incorrect answers for each CT ability indicator. This was done to find out the easiest and most difficult indicators of CT ability for students in class X MA Nurul Huda, Central Java.

RESULTS AND DISCUSSION

The test data collection technique was given to the research subjects using Google form. The CT ability test score was calculated using Formula 1 and the average CT ability score was calculated using Formula 2 as shown in Table 3.

Table 3. Scores obtained on the CT ability test

Emerging Score	Frequency	Emerging Score × Frequency
10	3	30
20	7	140
30	4	120
40	4	160
50	3	150
60	1	60
Total	22	660

The results of calculations carried out using Formula 2 show that the average score of CT ability owned by MA Nurul Huda class X students, Central Java is 30. In addition to the average score of CT ability, the test results show the lowest and highest scores as shown in Figure 1.

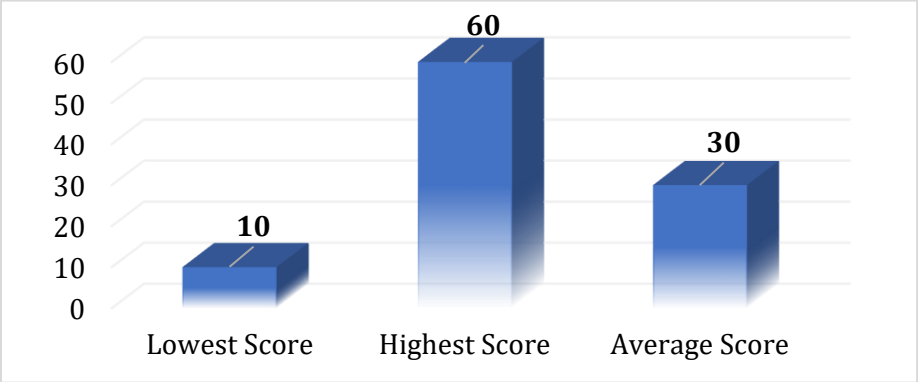

Fig. 1. Lowest, highest, and average scores of CT ability tests

According to Figure 1, it is known that the lowest score and the highest score of the CT ability test owned by class X MA Nurul Huda students, Central Java are 10 and 60 respectively. The results of the CT ability test can be categorized according to the categories shown in Table 2. The percentage of each category of CT ability is shown in Figure 2.

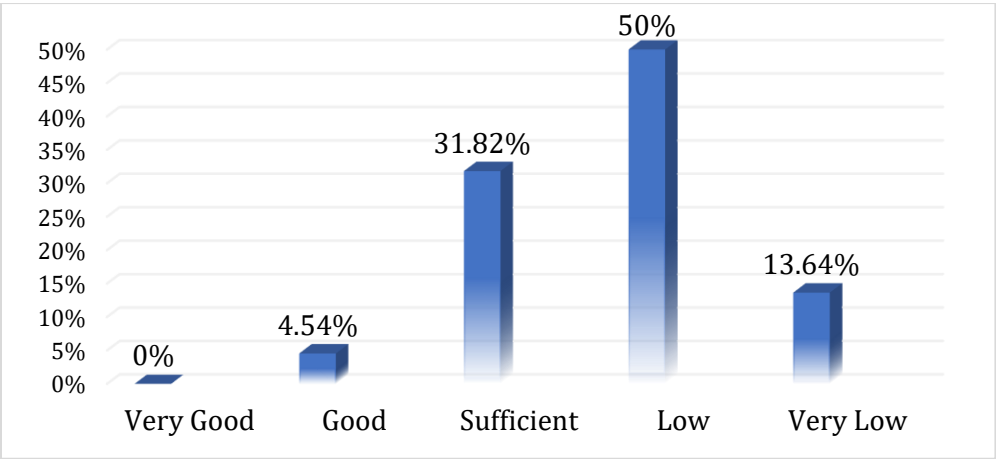

Fig. 2. Percentage of each category of CT ability test results

The Figure 2 shows that there are no grade X students of MA Nurul Huda, Central Java who have excellent CT ability category. Half of the total number of grade X students of MA Nurul Huda, Central Java have CT ability in the low category. The percentage of students in class X MA Nurul Huda, Central Java who get good and sufficient categories are 4.54% and 31.82% respectively. Based on the results of the CT ability test in class X MA Nurul Huda there are 13.64% who get a very low category. The results showed that the CT ability possessed by MA Nurul Huda class X students were still low and needed to be improved. These results are in accordance with research that has been conducted (Benyamin et al., 2021), namely the CT ability of grade X students has a low category. The results of the research conducted show that CT ability in the aspects of interpretation, analysis, inference, explanation, and regulation has a low category. However, the CT ability in the evaluation aspect has a medium category.

The CT ability of grade X students of MA Nurul Huda, Central Java can be analyzed based on the percentage of students giving correct answers for each indicator of CT ability. Figure 3 shows the percentage of correct and incorrect answers given by the research subjects on each indicator of CT ability.

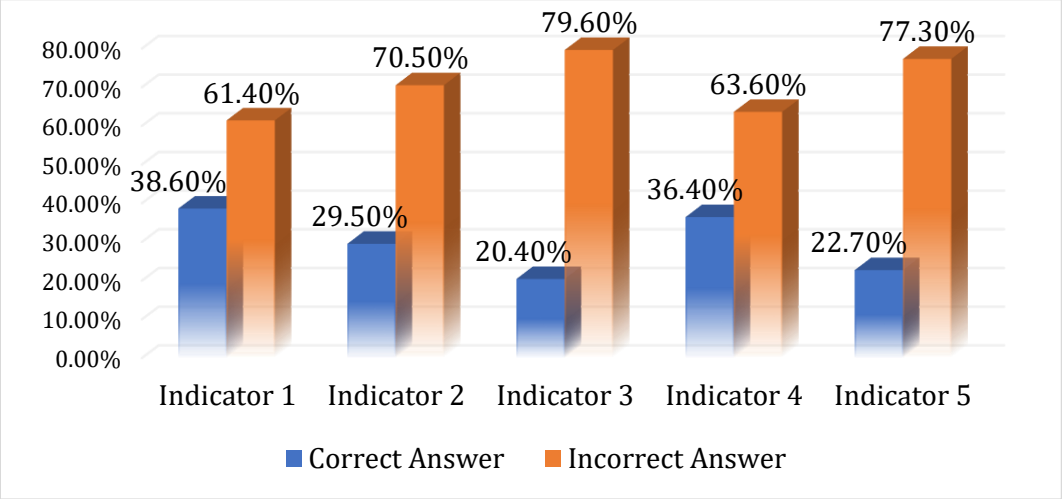

Fig. 3. Percentage of correct and incorrect answers on each indicator of CT

Based on Figure 3, the percentage of correct answers for indicators 1 – 5 of CT ability were 22.7% – 38.6%, respectively. On the other hand, the percentage of wrong answers for indicators 1 – 5 of CT ability were 61.4% – 79.6%, respectively. The indicator of CT ability that received the highest percentage of correct answers was basic clarification, while the indicator of CT ability that received the lowest percentage of correct answers was inferring. In the basic clarification indicator, research subjects are required to make questions that are in accordance with the reading in the problem and analyze opinions that are in accordance with the pictures in the problem. Meanwhile, the CT ability indicator of inferring requires research subjects to compile and consider the value of a decision based on the pictures and information given in the problem.

The second indicator of CT ability, namely providing reasons for a conclusion requires research subjects to consider the credibility of a source and observe and consider the results of observations. The fourth indicator of CT ability is further clarification where the indicator

asks the research subject to identify terms and consider definitions that are in accordance with the information in the problem. The fifth indicator of CT ability, namely conjecture and integration, asks the research subject to consider and think logically about the conjecture that will occur according to the information given in the problem.

All indicators of CT ability given in the test have not been able to be answered correctly by students of class X MA Nurul Huda, Central Java optimally. This is indicated by the percentage of correct answers given by the research subjects, which is below 40%. Therefore, grade X students of MA Nurul Huda, Central Java are still weak in solving problems that require the application of CT ability and an effort is needed in the learning process to improve CT ability in grade X students of MA Nurul Huda, Central Java.

The results of this study are in accordance with research conducted by Priyadi et al. (2018), namely the CT ability of class X students of public high schools in Palalawan Regency is still low because students are able to complete the calculations given in the problem but cannot relate it to existing concepts in everyday life. Therefore, a study is needed to find out the causes of students' low CT ability and the development of learning treatments that can improve students' CT ability.

CONCLUSION

The results of the research and discussion can be concluded that the CT ability of grade X students of MA Nurul Huda, Central Java in the academic year 2024/2025 is still low and needs to be improved. The indicator of CT ability that gets the largest percentage of correct answers is basic clarification, while the indicator of CT ability that gets the lowest percentage of correct answers is concluding. CT ability is one of the abilities that must be possessed by students, so further research is needed to find out the right treatment in the learning process that can improve CT ability.

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