

## The Impact of the Covid-19 Pandemic on the Critical Thinking Skills of High School Students

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**Abstract:** This research is a descriptive research that aims to describe students' critical thinking skills in chemistry during the Covid-19 pandemic. The Covid-19 pandemic carried out online learning, then transferred to limited face-to-face learning. The research sample was taken from a Mataram City High School consisting of 9 classes XI and XII. Determination of the sample is determined as much as 30% of the population (10 people from each class). Sampling was chosen randomly (draw lots) in each class. The research data is in the form of a chemical bond material description test whose validity and reliability have been tested. Data were analyzed descriptively in the form of percentages. The results of the analysis of students' critical thinking values show various categories, namely the percentage of class XI is lower than class XII. Overall the highest obtained by students is in the less category. Likewise, class XI is lower than class XII in terms of indicators of critical thinking. A more detailed explanation is presented in this article.

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### Introduction

The Covid-19 pandemic in Indonesia has changed the learning process by implementing online learning to reduce transmission of the Covid-19 virus. Over time, the latest 4 Ministerial Joint Decrees (SKB) were issued that education units are required to hold limited Face-to-Face Learning (PTM) due to restrictions on physical activity between teachers and students and a reduction in subject time allocation. The condition of the Covid-19 pandemic which still limits educational activities, although in this case limited PTM has been implemented, certainly greatly influences teachers in implementing and developing students' critical thinking skills due to limited learning activities and difficulties in controlling students and readjustment after online learning. In addition, the purpose of studying science is to develop critical thinking in solving and analyzing everyday problems (Solikhin, et al, 2021). So, the importance of applying critical thinking to students.

Ennis (2011) revealed that critical thinking skills are directed and clear processes such as problem solving, analysis, decision making and drawing conclusions based on relevant information. Critical thinking skills are skills that really need to be honed and applied in chemistry learning, where learning involves more than just understanding concepts, but also

applying knowledge to everyday life problems (Agustiana & Miterianifa, 2019). Ennis (2013) explains that the indicators of critical thinking are divided into several indicators, namely, 1) elementary clarification, which describes the formulation of the problem; 2) basic support, namely being able to present facts that are appropriate for solving a problem; 3) inference, namely being able to conclude and determine opinions that are logical, relevant and appropriate; and 4) strategies and tactics, namely being able to determine the effect of a statement on a decision. The importance of critical thinking for students because this skill allows students to act logically and determine the best choice for themselves.

Each student has different critical skills. Developing students' critical thinking in learning is the goal of school education. However, in reality, teaching and learning activities in schools do not encourage students to develop critical thinking. Based on the results of interviews with high school chemistry teachers in Mataram City, online learning, which was implemented for the first time, had an impact on students. This is evidenced by the low student learning outcomes and the majority did not pass the KKM. This is because during the Covid-19 pandemic, students only relied on the teacher to receive information, had difficulty understanding the material and had difficulty answering questions that required reasoning.

The observation results also found that the teacher is the center of learning and students only get theory and hoard information without any implementation. Students tend to be passive during the learning process and do not have critical thinking skills trained. Especially for new students in 2021, who have experienced online learning from the start until now face-to-face learning has been limited as a new rule during the pandemic. In contrast to the previous grade level, which had experienced offline learning before the outbreak of the Covid pandemic. Therefore, researchers want to measure the extent to which students' critical thinking levels are at different levels as an effect of the pandemic.

Based on the above, the purpose of this review is to describe the level of students' critical thinking skills using test instruments to find out how learning impacts during the Covid-19 pandemic.

## Research Method

This type of research is quantitative research with a descriptive method that aims to describe the object or topic under study according to what it is (Samsu, 2017). The research population consisted of 284 students covering 4 classes XI and 5 classes XII IPA at one of Mataram City Public High Schools. The sample was selected by random sampling through a draw by giving equal rights to each subject to be sampled (Malik, 2018). Sampling was selected 30% of the total population or 10 students from each class totaling 90 students, namely 40 students in class XI IPA and 50 students in class XII IPA.

Data collection was carried out using a chemical bond material description test. The material was chosen because it includes class X material that has been studied by class XI and XII. The test was made based on critical thinking indicators according to Ennis (2013). The indicators that are measured are elementary clarification, basic support, inference, strategies and tactics. Test the validity of the instrument, namely the content validity test by the lecturer and the empirical validity test conducted outside the research sample of 34 students. Based on the empirical validity test, it was found that out of 9 questions, only 6 questions were said to be valid. As for the reliability test, the value of  $r_{11}$  is obtained which has the criteria of "high" item reliability. Further research data were analyzed using descriptive methods based on student scores and critical thinking indicators. The results of

critical thinking instrument tests were analyzed using the percentage value formula to determine the score of critical thinking skills (Purwanto, 2010). Here's the formula:

$$NP = \frac{R}{N} \times 100$$

Information :

NP = The percentage value sought (%)

R = Total score obtained by students

N = Maximum total score

The criteria for the category of critical thinking skills are presented in Table 1. As follows (Purwanto, 2010):

**Table 1. Criteria for The Category of Critical Thinking Skills**

Skor (%)	Criteria
81-100	Very good
61-80	Good
41-60	Enough
21-40	Not enough
0-20	Very less

## Result and Discussion

### Result

The results and discussion contain scientific research findings and discussions. Write down scientific findings obtained from the results of research that has been done but must be supported by adequate data. The scientific findings referred to here are not the results of the research data obtained. The scientific findings must be explained scientifically including: What scientific findings were obtained? Why did that happen? Why are trend variables like that? All these questions must be explained scientifically, not only descriptive if necessary supported by adequate scientific basis phenomena. In addition, it should also be explained in comparison with the results of other researchers who are almost the same topic. The results of the research and findings must be able to accommodate the research objectives in the introduction.

The results of the critical thinking skills test obtained by students of class XI and XII IPA as a whole were then analyzed by calculating the percentages and grouped into the category of critical thinking skills. The following categories of critical thinking skills results can be seen in Table 2.

**Table 2. Category of Students' Critical Thinking Skills**

Category	Number of	Percentage	Number of	Percentage
	students XI		students XII	
	IPA		IPA	
Very good	2	5%	6	12%
Good	4	10%	7	14%
Enough	6	15%	9	18%

Not enough	15	37,50%	21	42%
Very less	13	32,50%	7	14%
Amount	40	100%	50	100%

The distribution of the percentage scores obtained by students in a number of varied categories found that overall for grades XI and XII both obtained the highest percentage in the category that was lacking. The research results of Repo and Hyytinen (2017) show that the challenges faced by students in developing critical thinking skills are building arguments, utilizing and processing available reference sources. Especially in the Covid-19 pandemic learning which applies limited PTM where active participation of students is still lacking in understanding and mastering the subject matter (Pernatah, et al, 2022).

The recapitulation of the percentage value of critical thinking skills based on indicators of critical thinking skills can be seen in Table 3.

**Table 3. Percentage Value Based on Indicators of Critical Thinking Skills**

Percentage value	Elementary clarification	Basic support	Inference	Strategies and tactics
XI IPA	23,3%	20,8%	40%	54,167%
XII IPA	44,4%	27,3%	47%	74,67%

Based on Table 3 explains the percentage value of each indicator of critical thinking skills has various categories. The percentage value obtained by class XII IPA on all indicators is higher than the percentage value for class XI IPA. The percentage values for the highest indicators obtained by class XI and XII IPA are on strategy and technical indicators respectively 54.167% and 74.67%. The percentage values for the lowest indicators were obtained by class XI and XII IPA, namely the indicators of building basic skills, respectively 20.8% and 27.3%.

## Discussion

The results of the research in Table 3 show students' critical thinking skills in each indicator. Based on research by Wayudi, et al (2020) that someone who has critical thinking skills can be observed from the attainment of several indicators of these critical thinking skills. The highest indicators were obtained, namely indicators of strategies and tactis, followed by indicators of inference, indicators elementary clarification and the lowest, namely indicators of basic support. Class XII IPA has a higher percentage score for all indicators compared to class XI IPA. This happened due to the learning activities experienced by students, where class XI IPA had implemented learning during the pandemic from the start. This is reinforced by Anggraeni and Giantman (2022) that learning before the Covid-19 pandemic was better than during the Covid-19 pandemic. In line with the results of interviews with teachers that learning during the Covid-19 pandemic students are more passive and less able to study independently.

The achievement of critical thinking skills on indicators of elementary clarification in class XII is 44.4% higher than class XI which is 23.3%. This indicator directs students to make a list of questions related to the Lewis structure of H<sub>2</sub>CO compounds and answer questions related to the tendency of ionic charges formed by an element. The results of the study showed that it was difficult for students to check the correctness of the Lewis structure,

so that the answers to the list of students' questions were still not completely correct. In addition, students are still unable to explain differences in ionic charge tendencies, in this case ionic bonds and metallic bonds, so the indicators provide simple explanations showing poor results. Rahmawati (2016) in her research shows the percentage of students is not good at making problem formulations. This happens because in learning students are accustomed to memorizing. Students are still not used to analyzing the statements in the questions first. In addition, during the Covid-19 pandemic which made it difficult for teachers and limited teachers in controlling learning when students were working on questions (Zakaria, et al, 2021).

The second indicator is basic support. The percentage obtained in class XI is 20.8%, which is lower than class XII, which is 27.3% and is included in the less category. This indicator asks students to provide arguments against claim statements related to the characteristics of ionic compounds. It can be seen that the majority of students are still mistaken in distinguishing the characteristics of a salt solution which is only a conductor of electricity and not generates electricity. Students tend to have difficulty explaining in full and linking existing theories. Adinda (2021) in research shows that the category is lacking, that students are less able to provide reasons that can support the arguments students convey. Students' low ability to convey arguments is due to the learning process during the Covid-19 pandemic which still emphasized memorization and understanding of the material. Students' critical thinking processes can be trained with various considerations of sources of information learned so that they can think independently.

The indicator inference, namely being able to conclude and choose arguments that are logical, relevant and accurate. The percentage value of class XI is 40% lower than class XII which is 47%. Students are asked to draw conclusions to choose the type of bond that will be broken when there is a change in the water phase. Based on student research in drawing conclusions from existing statements is good enough. Wayudi, et al (2020) in their research that some students have been able to identify a problem presented in the problem. Johnson (2009) reveals that critical thinking allows students to ensure their choices and draw intelligent conclusions by analyzing their own thoughts. According to Fakhriyah in (Ridho, 2020) that the ability to conclude can be honed in the teaching and learning process to conclude a concept that has been studied in problem solving.

The last indicator is strategies and tactics. Strategies and tactics indicators include the highest percentage value and the percentage value obtained by class XII is 74.67% higher with a quite large difference compared to class XI with a percentage of 54.167%. This could be due to the fact that class XII had more experience in practice and face-to-face meetings before the Covid-19 pandemic than class XI. According to Anggraeni and Giantman (2022) the learning of the Covid-19 pandemic has had an impact on practical subjects. This strategies and tactics indicator requires students to determine actions to separate salt from impurities based on the characteristics of ionic compounds. Based on the research conducted, it was found that the results of essay tests on strategy and technique indicators were in the good category which stated that students' critical thinking in considering and analyzing problems arising from experience was better able to be analyzed by students.

Each student has different critical thinking skills. The results of the overall analysis show that the level of critical thinking skills at SMAN Kota Mataram during the Covid-19 pandemic is still lacking. Students' critical thinking skills are lacking due to several factors. One of them is the implementation of learning that has experienced a change in the online transition and then limited PTM which is of course a problem and difficulty for teachers and



students in readjusting. In addition, the impact of the Covid-19 pandemic in schools is that there is a reduction in time allocation which results in students being passive because they only get theory from the teacher without trying to find other sources of information so that they are not used to being faced with exercises or discussions that focus on critical thinking skills. In line with research by Kartimi & Liliarsari (2012) that the application of critical thinking requires exercises or activities that develop critical thinking, so students know questions that focus on developing critical thinking. This is confirmed by Vong and Kaewurai (2017) in Adinda (2021) that students' critical thinking skills increase when appropriate and relevant teaching methods are used. Especially in learning about the Covid-19 pandemic, which does not rule out the possibility for students to get used to applying critical thinking skills to a problem.

### Conclusion

Based on the results of research and discussion, the conclusion is that the level of chemical critical thinking skills of high school students in Mataram City is included in various categories and overall the highest is obtained by students belonging to the less category. In addition, based on the percentage values of all indicators, the percentage of class XI is lower than class XII. This is the impact experienced by students who tend to be passive during the learning process of the Covid-19 pandemic so that students cannot develop critical thinking skills properly. Actions that can be taken to overcome this are by getting used to applying critical thinking exercises to students and appropriate learning methods.

### Recommendation

Researchers provide suggestions for the continuation of this research, namely: factors causing a lack of critical thinking skills during the Covid-19 pandemic learning and actions to overcome the causes of a lack of critical thinking skills.

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