Identification of critical thinking: suku (supik and kulub) on electricity material in Jambi Province

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Abstract. The world of education is in line with advances of science and technology, the facilities obtained by students and the ability to teach teachers in training students to think critically are factors that influence differences in the level of critical thinking students. The purpose of this study was to determine the differences between supik and kulub critical thinking skills. The type of this research was a survey study that illustrated how differences in students’ critical thinking skills in a region of Jambi province. The participants consisted of 6 female students, commonly called "SUPIK" and 4 male students, who were usually called "KULUB". The average student involved comes from the Malay ethnic group, the native Malay ethnic group from Jambi Province. The research instrument used was a test of critical thinking skills. The results of this survey research showed the differences in the ability of supik and kulub critical thinking skills in one region of Jambi Province in learning electricity. This study has limitations because the number of samples used is so small. So, the need for further research by involving more sample and to see in more detail the causes of differences in the critical thinking abilities of supik and kulub.

1. Introduction
In this 21st century, education has an important role in producing Human Resources (HR) who have the skills needed by the workforce [1,2]. Meanwhile, the demands and curriculum development in the globalization era require educational institutions to provide useful innovations in the world of education. In the current educational approach, where students actively participate in the learning process, students need to understand new knowledge by linking it with knowledge learned in advance instead of memorizing it, and questioning knowledge. So students need to acquire high-level cognitive skills such as prediction, induction, deduction and reasoning [3]. Higher education is expected to have the expertise to become successful individuals in the world of work and social life. The development of critical thinking skills is one of the most important goals in education.

Based on the content of physics learning standards in schools, especially at the secondary school level, one of the aims is to foster scientific attitudes, namely critical thinking skills. Teachers, who are the main pillars of education, need to make changes in the learning system. Empowering students’ critical thinking skills can be done in small groups and individuals in classroom learning activities [4]. The effectiveness of learning that is still teacher-centered [5,6], is one of the factors that illustrates the suboptimal achievement of students’ critical thinking. The results showed that students with critical skills were still lacking [6 – 9].
The result of this research showed that the students who studied in experiment class had different critical thinking skills better that the students who studied using conventional model [10]. Factors that cause students' critical thinking skills less empowered are that teachers do not have good competence in designing student learning. Nowadays, it is very important for individuals to be active with critical thinking and problem solving skills. The ability to obtain information, question hypotheses, search for and contribute to new discoveries really requires thinking skills. By implementing meaningful learning it can improve students' thinking skills [11]. Increasing critical thinking skills indirectly will also improve the quality of education.

Many ways can be done to improve students' critical thinking skills. This can be done with the help of appropriate learning models [12], the use of learning models can influence learning and determine the final outcome of increasing students' critical thinking skills [13], Developing validation and inventory of physics laboratories can also improve critical thinking skills [14]. In addition, critical thinking skills can also be improved by providing interactive learning media that have been developed in many previous studies [15]. Critical thinking skills have indicators that need to be possessed by students, which include [16]: Problem Formulation, Conveying Argument, Deduction, Induction, Doing Evaluations, Making Decisions and Taking Actions.

Objectives in learning Physics are prepared to develop students' critical thinking skills within the framework of scientific process skills, using Physics knowledge in everyday life, and linking science to technology, society and the environment [3]. However, any method that can be used in striving to improve critical thinking skills is expected to provide the best contribution to the results of learning. To see the effectiveness of an effort, it is necessary to measure the level of critical thinking skills before treatment. So that it can be used as a benchmark for improvement after being given treatment or teaching materials to improve critical thinking skills. This research was conducted to see whether there were differences in the critical thinking skills of male and female students. This survey research is expected to help find solutions to improve critical thinking skills that are more appropriate in accordance with the results of the data obtained.

2. Methods
In this survey research involved one class with a total of 10 students in one of Jambi Seberang High Schools, Jambi Province. The participants consisted of 6 female students, commonly called "SUPIK" and 4 male students, who were usually called "KULUB". This sample was categorized as very little, because of COVID-19 epidemic during the data collection process. So that the expected number of respondents did not reach the target. For the age level, students who are part of this study have an average of around 17 to 18 years. The average student involved comes from the Malay ethnic group, the native Malay ethnic group from Jambi Province. The Malay Arabic tribe is a tribe owned by people from the Jambi province, specifically the Seberang Jambi region. The distance between Jambi and the centre of Jambi is about 15,3 kilometres from the city centre. Seberang Jambi is also called Seberang City because part of this region is separated by the Batang Hari river (the longest river on the island of Sumatra) from the regional capital of Jambi province. The distance map of the city of Jambi - Jambi Seberang showed in figure 1.
The research instrument used was a test of critical thinking skills. In order to implement the instrument, the design must be assessed by an education expert. In the critical thinking skills test instrument, it consists of 20 multiple choice questions along with questions about choosing answers. This assessment instrument has been used in previous studies. So, researchers adopt existing critical thinking skills tests. The material used in the preliminary study in this study is electrical material. The example item in measuring level of student skills presented in figure 2.

| No | Critical Thinking Skills Sub | Learning Indicators / Problem Indicators | Question | The answer |
|----|-------------------------------|----------------------------------------|----------|------------|
| 8  | Analyze Arguments ✔ Identifying Reasons | Learning Indicators Identifying the reasons for using closed circuit components is simple Problem Indicators Identify the reasons for using a larger voltage source in a simple circuit | Note the circuit below, a student wants to replace 9V battery with 12 volt battery | D. Because the resistance value will not change due to changes in voltage or current |

- a. To increase the current strength in lamps 1 and 2
- b. To increase the voltage on lamps 1 and 2
- c. To increase the potential difference between points in each part of the series
- d. To increase the value of resistance of lights 1 and 2
- e. To increase the number of electrons passing through lights 1 and 2 in every second

Reason ...

**Figure 2. One Example Item in Measuring Level of Student Skills**
This research used survey method in its implementation. The distribution of test instruments was carried out through Google form, this was done because the world was experiencing COVID-19 pandemic including in the province of Jambi, Indonesia. So that all school activities and the learning process are done remotely by utilizing technology, including the implementation of research in the field of education. The stages of conducting survey research are carried out from determining the research problem to making conclusions and recommendations. These 12 stages were carried out, but in the survey instrument development section, researchers did not do it. Because researchers use instruments that had been used in research conducted in previous studies.

Data analysis in this study was done by analyzing the score data obtained from the pre-test results of all samples. Then the pre-test results are also used to see the level of assessment of critical thinking skills as well as the comparison of critical thinking skills of male students (kulub) and female students (supik). Data analysis was performed using Rasch ministep software 4.3.1. Critical skills assessment instrument has been adopted from the results of previous studies, so in this study, researchers did not validate and rehabilitate the instrument.

3. Result and Discussion

In this study 10 students were used as samples from high school. The material tested to look at critical thinking skills was the electricity chapter, consisting of 20 multiple choice questions that include reasons for choosing answers. The pre-test score result showed in figure 3.

![Figure 3. Diagram Score Pre-test Result Students](image)

In Figure 3, it is shown that there are 10 students named as samples in this study, consisting of 4 male students (kulub) and 6 female students (supik). The number of items used in the instrument to measure critical thinking skills was 20 multiple choice questions that were equipped with a reason column for choosing answers. Each question has a score of 1. In Figure 3, it represents that of all students, the highest score obtained was 10 points. This indicates that the highest value of critical thinking skills was no more than 50% of the number of questions. The person statistics presented in figure 4.

![Figure 4. Person Statistics Measure Order](image)
Based on Figure 4, it shows that the average value of MNSQ infit and outfit is close to 1. Based on Rasch analysis, the MNSQ value approaching 1 was a good category. It can be seen that the results of MNSQ infit and outfit are 1.01 and 0.97. Whereas the entry number column is a description that provides information on students who get the highest critical to low critical skills score. The person map item presented in figure 5.

![Figure 5. Measured Person Map Item](image)

In Figure 5, it is explained that the left side of the figure has the top 101 and the bottom 082. The 3 numbers are the code of the respondent, with the initial 2 numbers representing the student number and the last 1 number representing the sex of the student. If the end number was 1, it implies that the student is male or kulub. Whereas if the last number number is 2, then it indicates that the student is female or supik. Students with number 101 are on the top chart compared to other students, this means that student 101 was the owner of the highest score among other students. Conversely, students with the number 082 is on the lowest graph, this means that students with that number have the lowest score than other students.

For the code to the right of the graph, such as Q1 to Q20 is the interpretation of the problem code, Q1 is problem number 1 and so on. In Figure 6 it is explained that Q11 and Q5 occupy the highest map, meaning that the questions with the code are the most difficult questions for students to work on. On the contrary, Q1 was in the lowest graph map, this indicates that questions with Q1 code were the questions that contribute the most correct scores to students, or in other words this problem was the easiest of all the questions provided.
Based on Figure 4, it shows a comparison chart between KULUB male students and SUPIK female students. The black line graph represents the KULUB chart, the red line graph represents the SUPIK chart, and the green line graph represents the graph of the problem. As can be seen, the curves in items 5 and 11 are very high, this illustrates that questions 5 and 11 are the problems with the highest difficulty level. There are several DIF biases that are captured in Figure 4 above. In question 7 there was a bias between KULUB and SUPIK in answering the question. Problem 7 is easily answered by SUPIK, but difficult for KULUB. Furthermore, on the item, refraction also occurs in question number 14, the graph shows that KULUB can answer problem number 14 correctly, while Supik is not able to answer the problem correctly. This is shown by the red line graph representing SUPIK above the question line (green) and the black line representing KULUB below the question line. The persen DIF plot showed in figure 6.

If counted there are 6 questions that do not experience bias between KULUB and SUPIK, while the other 14 questions experience various biases. This means that 14 questions from the total number of questions on the instrument show there is a difference in the ability of KULUB and SUPIK in correctly solving the problem of critical thinking assessment instruments. So, 70% of the questions given show differences in the ability of critical thinking skills between male students named KULUB and female students called SUPIK. Overall, the results of this study also show that critical thinking skills in KULUB and SUPIK still need to be improved and developed. This is in line with research conducted by Asysyifa et al and Puspita et al [17,18]. These two studies show the results of a survey that students' critical thinking skills are still in the low category, efforts need to be made to improve and develop critical thinking skills.

4. Conclusion
This research is a survey research to see the ability of students' thinking skills and comparison of critical thinking skills of male students called KULUB and female students called SUPIK. The results of the data analysis showed that there were differences in the ability of KULUB and SUPIK critical thinking skills in the Jambi province region on electricity. The difference in ability can be seen in 14 of the total number of biased questions.

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