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Analysis Of Students' Critical Thinking Skills in Work And Energy Materials at SMA PGRI Betung

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Abstract: Researchers conducted a study entitled analysis of students' critical thinking skills on work and energy material at SMA PGRI Betung. The type of research used is descriptive quantitative which aims to describe the critical thinking skills of high school students. The researcher chose this method because in order to get an overview of mastery students critical thinking skills. This research was conducted in the even semester of the 2021/2022 school year. The research subjects were 10th grade high school students consisting of 11 students. The results of research on critical thinking skills are produced through the provision of test instruments, namely pretests and posttests. The results obtained produced the lowest value in the aspect of critical thinking skills (KBK)the 3rd is 48.50 with a moderate presentation value. The highest value is in aspect critical thinking skills (KBK)5th at 72.73 with the high category. Critical thinking skills are also seen from the n-gain value. The result of the n-gain value is 0.44 which is in the moderate category. Therefore the category of critical thinking skills by looking at the results of the n-gain value produces an image to students that critical thinking skills must be improved. Educators must design physics learning to be even better so that it can change the skills of students. So that a change in learning design can change students and be trained in performing critical thinking skills. Increasing critical thinking skills will make students even better at learning.

Keywords: Critical thinking skills, work and energy.

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INTRODUCTION

Education still has a relatively low quality in Indonesia and has new challenges in the era of the industrial revolution 4.0. According to Sundari and Sarkity (2021)the industrial revolution has a very important role in order to have qualified educational graduates and be able to face the challenges of this industrial revolution. Therefore it is important to aim at education in Indonesia. In order to improve the quality of education in Indonesia, skills are formed in the 21st century.

The 21st century is education that develops skills in students, namely critical thinking skills. Critical thinking skills make students able to solve a problem in an effective way (Priyadi, et al, 2020). However, in reality in Indonesia students' critical thinking skills are still low, especially in science material (Rosidin, et al, 2019).

According to ministry of Education and Culture No. 65 of 2013skills in k-13 namely reasoning and presenting. Such activities are a reflection of critical thinking skills. So that it can support student activities in the learning process. Critical thinking skills can help students know how to understand themselves, and the world, and socialize. With critical thinking skills, students can analyze and draw conclusions appropriately (Kurniyasari, ddk, 2019).

However, in fact research Laila, et al (2015) produce data that the occurrence of low critical thinking skills. This happens because educators are too fast in delivering material during learning. Thus, educators do not pay attention to students' critical thinking skills. Students basically already have a skill, namely critical thinking skills during learning activities. But this sometimes does not develop because educators do not provide stimulation to students so they can have critical skills. Therefore educators must be able to design learning activities that can make students have critical thinking skills. The cause of low student skills is that the questions given tend to only test student memory. So that questions that train students' critical thinking skills are less available (Kusuma, et al,

Problems often occur in the world of education, namely ability critical thinking skills, especially during physics learning activities. the results of interviews at SMA PGRI Betung, namely that only 35% were able to express opinions during physics lessons. Therefore the writer is interested in analyzing students' critical thinking skills. research objectives in order to produce an analysis of students' thinking skills.

Science learning is not just a fact and concept but a process of searching and discovery. The process of searching and finding is a student's critical thinking skills. The purpose of science lessons is to improve students' thinking skills, one of which is critical thinking skills.

Physics learning is currently still centered on educators which means that students have not been facilitated in the development of critical thinking skills. The inability of students to lack critical thinking skills is caused by students who tend to only memorize physics formula equations and end up working on problems without understanding the material first. This causes students to find it difficult to understand the material. The difficult material in the interview results is effort and energy. Work and energy materials are materials that can be seen in their application in everyday life (Purwanto & Winarti, 2016; Koes, et al, 2015; Setyadi and Komalasari, 2012).

The current curriculum on physics is an improvement in developing students' critical thinking skills. With critical thinking skills, students can use their intellect in a

rational way of thinking through observation, analysis, and also reasoning in decision making.

The results of the explanation above, the researcher aim to find out the critical thinking skills currently owned by students. Therefore researchers conducted research that aims to find out the description of mastery students critical thinking skills. So the researchers took a study entitled "Analysis of students' critical thinking skills on work and energy materials at SMA PGRI Betung".

METHOD

The research method used by researchers in this study is descriptive quantitative. This method, it aims to investigate a condition or situation whose results will be presented in this study (Arikunto, 2010). The researcher chose this method because in order to get an overview of mastery students critical thinking skills.

Research Subject

The research subjects were SMA PGRI Betung Class X students in the even semester of the 2021/2022 academic year with a total of 11 students.PGRI SMA students as research subjects because the results of the interviews found that there were still students who did not have critical thinking skills.

Data Collection Instruments

The data collection techniques in this study are:

a. Interview

According to Erinawati (2016)Interview is an information tool that is used to obtain information from sources regarding the desired problem either verbally, directly or indirectly. Interviews were conducted by researchers with the aim of producing initial data on research so that they could support the research background that researchers wrote. The interview instrument used was structured in which the instrument was in the form of written questions and each respondent was given the same question, then the researcher recorded the results of the interview questions.

b. Test Instruments

Test instrument is a series of questions that is a tool to measure the abilities, knowledge, and skills of individuals or groups (Permata, et al, 2019).In this study, researchers used a test instrument in the form of multiple choice consisting of 13 questions. multiple choice questions can contribute to the results of student learning scores for a higher level of thinking (Culli Nana, 2011). The instruments used are in accordance with the indicators of critical thinking skills.

Table 1. Critical Thinking Skills Indicators

No	Aspect	Indicator
1	Giving a simple explanation	Question analysis Focused on questions Ask and answer a challenging question
2	Development on Basic Skills	Consider credibility Observation and consideration of the results
3	Conclude	Making deductions and considering the results of deductions Making induction & consideration of induction results Making and judging value decisions
4	Making further explanations	Defining the term, consider understanding Identification
5	Strategy and tactics	The act of a decision Interact with other individuals.

(Ennis, 1985)

Data Analysis

Data analysis was obtained through test instruments. The test instrument was analyzed according to the students' answers to a question. The results of the data obtained were analyzed in the following way:

1) Giving a score to each answer of the test instrument, based on a predetermined score
2) Giving the total score of the test instrument for each student based on indicators of critical thinking skills
3) Determination of pretest and posttest test scoreson students' critical thinking skills. The formula for the pretest and posttest scores according toSusilawati, et al (2020)as follows:

$$\text{Nilai} = \frac{\text{Skor yang diperoleh}}{\text{Skor maksimal}} \times 100$$

4) Determination of the results from the calculation of the formula above is converted according to the category following:

Table 2. Criteria pretest and posttest on KBK

Value Intervals	Category
81 - 100	Very high
61 - 80	Tall
41 - 60	Currently
21 - 40	Low
0 - 20	Very low

(Kalambo, 2021)

5) After determining the results of the calculation, proceed to calculate the n-gain value with the formula:

$$n - gain = \frac{Postest - Pretest}{Nilai\ maksimum - Prestest}$$

(Marlina, 2018)

RESULT AND DISCUSSION

Students' critical thinking skills are measured using multiple choice test results. The questions are given an assessment score according to the scoring rubric in the assessment. The results of the students' posttest scores consisted of 12 indicators and 5 aspects of critical thinking skills (CBC). The results of the assessment can be seen in the following table:

Table 3. Posttest score results

KBK indicator	KBK results	Category
KBK 1	72,3	Tall
KBK 2	36,37	Low
KBK 3	81,82	Very high
KBK 4	45,46	Currently
KBK 5	72,73	Tall
KBK 6	54,56	Currently
KBK 7	45,46	Currently
KBK 8	45,46	Currently
KBK 9	54,56	Currently
KBK 10	63,64	Tall
KBK 11	63,64	Tall
KBK 12	90,91	Very high

The results of data analysis based on tables 3 above has variations ranging from the lowest at 36.37% to the second critical thinking skills indicator. The highest value is 90.91% with the twelfth indicator. The low results of students' posttest scores were due to the lack of students' ability to analyze which led to a lack of representation in problem solving.

The solution that can be done to improve students' ability to analyze is that students are given an understanding of the concept, an interesting explanation so that students can or want to manage it. Another solution to improving student skills is to give students the habit of looking for an equation by providing an integrated understanding of concepts (Arini & Juliadi, 2018; Suryani, et al, 2016).

Table 4. KBK Test Results Based on KBK Aspects

No	KBK aspect	Number of Question Items	Student Presentation	Category
1	Gives a basic explanation	3 Problem	63.50	Tall
2	Build basic skills	2 Problem	59,10	Currently
3	Inference	3 Problem	48.50	Currently
4	Make further explanations	1 Problem	54,56	Currently
5	Strategy and tactics	3 Problem	72,73	Tall
	Average Percentage		59,68	Currently

Based on the table above, it can be seen that the categories owned are medium and high. The highest score in the aspect of critical thinking skills is 72.73% in the high category. The lowest result 48.50% is in the moderate category. The results of N-gain can be seen as follows:

Table 5. N-gain results

Research Result Data	Average	N-Gains
Pre-test	254,1	0.44
Post-test	762.3	

The value of the n-gain above is obtained in the category of critical thinking skills by looking at the results obtained 0.44 which is in the moderate category. So from these results it shows that students' critical thinking skills have an increase in effort and energy material.

Explanation of KBK Aspects I

The I aspect of critical thinking skills consists of 4 questions. Students consisting of 11 people were able to answer the first question correctly overall. It can be seen from the first question in Figure 1 that all students can answer correctly, as follows:

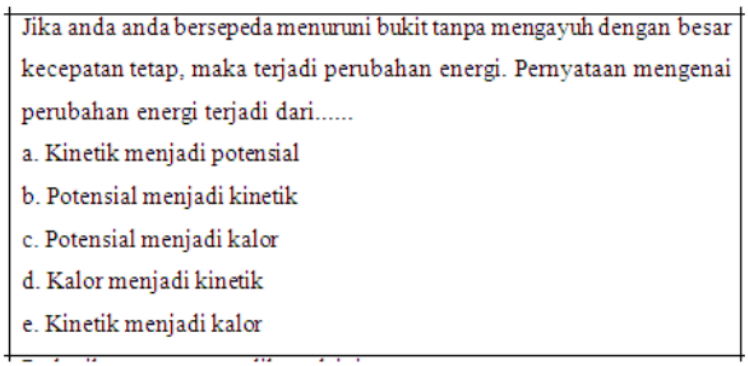
Jika anda anda bersepeda menuruni bukit tanpa mengayuh dengan besar kecepatan tetap, maka terjadi perubahan energi. Pernyataan mengenai perubahan energi terjadi dari.....
a. Kinetik menjadi potensial
b. Potensial menjadi kinetik
c. Potensial menjadi kalor
d. Kalor menjadi kinetik
e. Kinetik menjadi kalor

Figure 1. KBK Question No. 1 on KBK I Aspects

The question above in number 1 can be seen that it has easy question criteria on indicators focusing questions. So that all students are able to answer correctly. The second question was only 5 students who answered correctly, the third question was bigger than the second question, namely 9 students who were able to answer correctly. While the fourth question has the same number of questions in the second with 5 students who answered correctly. The results of the percentage of students' posttest scores in KBK I amounted to 63.50%.

KBK Aspects Explanation II

The second critical thinking skill has two questions. The first question has the correct answer consisting of 5 students with a percentage score posttest of 45.46%. The

second question, 8 students answered the posttest score correctly at 72.73%. The average value of the KBK aspect is 59.10% in the moderate category.

Explanation of KBK Aspects III

The aspect of critical thinking skills is an aspect of concluding which is called inference. The inferenceis defined as an action to draw conclusions based on logical reasons. The aspect consists of 3 questions, which in the third aspect produces a low average value of 48.50% in the medium category.

Explanation of KBK Aspects IV

This aspect is the 4th aspect, which is to make further explanations. Of the 5 aspects of critical thinking skills, only the 4th aspect has 1 question with a moderate category value which produces a percentage value of 54.56%. Questions on this 4th aspect resulted in correct answers to 6 students with a total of 11 students.

Explanation of KBK Aspects V

The 5th aspect is strategy and tactics which consists of 3 questions. This aspect produces the highest score with a percentage value of 72.73%. This resulted in the greatest value because the three questions yielded correct answers with a total of 7 students in questions no. 10 and 11. Meanwhile, question no. 12 yielded correct answers from 10 students. The following can be seen in question number 12 which produces the most correct answers in this 5th aspect:

Seorang peloncat indah dengan berat 640 N meloncat dari sebuah papan menara yang memiliki ketinggian 10 m dari permukaan air. Jika peloncat mendorong papan luncur sehinnga ia meninggalkan papan dengan kelajuan awal 2 m/s tentuan kelajuan peloncat itu saat berada pada ketinggian 5 m diatas permukaan air?

a. 10,2 m/s
b. 10,4 m/s
c. 10,5 m/s
d. 10,6 m/s
e. 10,7 m/s

Figure 2: Problem No. 12 on KBK V Aspects

CONCLUSION

The results of the research conducted by the researchers found that students' critical thinking skills in the subject matter of effort and energy had low skills. These results were obtained from the pretest and posttest. on critical thinking skills it can be seen that it produces the lowest posttest score on the 3rd KBK aspect of 48.50 with a

moderate presentation value. The highest value is in the 5th KBK aspect of 72.73 in the high category. This research produces an image to students that critical thinking skills must be improved. Educators must design physics lessons so that students are trained in performing critical thinking skills.

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