Influence of the contextual teaching and learning model against student learning outcome

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Abstract. Physics learning, in general, is still not appropriate to apply the model, including material that must be practiced, so that students have difficulty remembering the material that has been studied. The right learning model and in accordance with authentic assessment is CTL. This study aims to determine the effect of the CTL model on student learning outcomes in wave material at Senior High School 1 Baitussalam Aceh Besar. Research with quasi-experimental research methods, the form of nonequivalent control group design, collected data through test questions. The results showed that the learning outcomes of students obtained tcount > t table is 3.164 > 1.70. The high category N-Gain results reached 95% for the experimental class and 55% for the control class. It can be concluded that there is an influence of the CTL model in physics learning on student learning outcomes. This shows that the CTL model has a significant influence on physics learning in wave material at Senior High School 1 Baitussalam.

1. Introduction
Education in Indonesia is currently faced with the era of free trade for the ASEAN region or known as the ASEAN economic community (MEA), thus the people of Indonesia must be prepared to face the challenges of the global economy. The impact of the global economy is on several sectors, one of which is the education sector. The education sector is required to be able to produce quality human resources (HR), not only students but also needed educators who are experts and professionals [1].

Based on the education sector, Indonesia applies the 2013 curriculum as a substitute for KTSP. Science learning listed in the 2013 curriculum is an integrated learning process developed as an integrative science subject, namely as applicative oriented education, developing thinking skills, curiosity and developing caring, and responsible attitudes [2].

One of the integrated subjects of science is physics lessons at the high school level. Physics is one of the science lessons that requires teachers to activate students in the learning process, one of them is by conducting experiments. This is in accordance with the opinion of Sumaji [3] that studying physics aims to improve students' thinking skills so that they are not only capable and skilled in the field of psychomotor, and not just an expert on memorization. As a physics science product, it consists of various systematically organized facts, concepts, principles, laws, and theories that form a body of knowledge.
Based on preliminary observations in Senior High School 1 Baitussalam in Aceh Besar District, it was found that there were several physics subject teachers who still routinely used the lecture method in the teaching and learning process in each subject, including material that had to be practiced. One of the materials that need to be applied in a practicum in the learning process is waves. One reason teachers do not teach with the experimental method is due to the lack of mastery of tools and experiments about laboratories. Setting time and conditioning learning correctly is another obstacle for the teacher.

Automatically the motivation of students in learning will decrease because bored learners just listen and record what the teacher conveyed. Lack of motivation also affects the decline in learning outcomes [4,5] where students who are less motivated in learning will find it difficult to remember the material that has been delivered by the teacher. Students who cannot remember the lesson well will not be able to answer the lesson well.

This, of course, is not profitable for students, because some of each subject matter in physics is practicum or experiment. One of the learning models suitable for the 2013 curriculum and in accordance with authentic assessment is Contextual Teaching and Learning (CTL). Suprijono [6] argues that CTL is one of the learning approaches that link the content of lessons with the daily environment around students, so that it will make learning more meaningful (meaningful learning) because students know the lessons learned in class will be useful in life daily. CTL is a learning model that can improve students' motivation and learning outcomes. According to Sharif [7] motivation is an impulse that can cause a person or student to be moved to do something because they want to achieve the goal they want or get satisfaction with their actions.

According to Suryawati, et al [8] contextual learning has six elements, namely formulating, observing, expressing, combining, communicating, practicing, successfully increasing students' abilities in terms of problem-solving and critical thinking. However, it does not have a significant impact on students' scientific attitudes for both contextual and conventional groups. According to Yulianti, et al [9] contextual learning assisted by jigsaw puzzle competition is able to significantly increase student interest and learning outcomes. CTL learning also succeeded in increasing student motivation and learning achievement [10].

Increased motivation of students in learning, then definitely improves learning outcomes [11,12]. Motivated students will usually be serious in learning and will continue to look for answers to what has not been understood. The results of Marwanto's research, et al [13] that the CTL learning model can improve learning outcomes. Handini's, et al [14] the results of the study showed that there was an increase that reached the target in the application of CTL in style material. This proves that CTL can be applied in science learning.

2. Method
This study uses a quasi-experimental research method, with the form of nonequivalent control group design, that is by using two classes. The study was divided into three stages, namely 1) the preparation stage; 2) the stage of conducting research, and 3) data analysis and conclusions based on the formulation of the problem to answer the research objectives. The research instrument is in the form of test questions to measure student learning outcomes before and after learning. The test used the type of summative test which aims to determine/measure the achievement of learning outcomes of students of Senior High School 1 Baitussalam after learning with the CTL model on wave material, which then determines the graduation rate. Learning outcomes test questions are arranged based on cognitive domains, namely: knowledge (C1), understanding (C2), application (C3), analysis (C4), synthesis (C5) and evaluation (C6).

The normality of the data was carried out by the Liliefors test, assuming that the study sample was under 30 (n ≤ 30), with the testing criteria:
- Reject H₀ : L_{maximum} > L_{table}, Test data is not normally distributed, and
- Accept H₀ : L_{maximum} ≤ L_{table}, Test data is normally distributed.

The homogeneity test uses the F-Test, by comparing the variants of the initial test, the final test of the experimental class and the control class. If F count < F table (the second variant of the group is homogeneous), with the Testing criteria:
Reject $H_0 : F_{\text{count}} \geq F_{\text{table}} (0.05; dk1; dk2)$, (data of the two classes are not homogeneous), and Accept $H_0 : F_{\text{count}} < F_{\text{table}} (0.05; dk1; dk2)$, (the data of the two classes are homogeneous).

Hypothesis testing uses $t$-tests because the number of sample members in this study is the same ($n-1 = n-2$) and homogeneous variants ($\sigma_1^2 = \sigma_2^2$), so the $t$-test formula can be used both for separated, and pool variants, with testing criteria:

- Reject $H_0 : t_{\text{count}} \leq t_{\text{table}}$, there is no difference between the two classes, and
- Accept $H_0 : t_{\text{count}} > t_{\text{table}}$, there are differences between the two classes

The N-Gain calculation in this study is a change in ability possessed by students after the following learning on wave material. The gain obtained is normalized by the difference between the maximum score and the pre-test score. Changes that occur before and after learning are calculated using the Index-Gain formula.

3. Result and Discussion

Based on the criteria, the learning outcomes of students consist of 3 aspects, namely cognitive, affective and psychomotor. The learning outcomes referred to in this study are only on the cognitive aspect which consists of 6 domains with Bloom's taxonomic cognitive domain level, limited to the level of knowledge domain (C1), understanding (C2), application (C3), analysis (C4), synthesis (C5) and evaluation (C6). Learning outcomes of students for each cognitive domain in full can be seen in Table 1.

| No | Ranah | Cognitif Taxonomy | Experiment (%) | Control (%) |
|----|-------|-------------------|---------------|-------------|
|    |       | Bloom             | High | Medium | Low | High | Medium | Low |
| 1  | C1 (Knowledge) | 85 | 5 | 10 | 65 | 10 | 25 |
| 2  | C2 (Understanding) | 80 | 15 | 5 | 60 | 25 | 15 |
| 3  | C3 (Application) | 80 | 5 | 15 | 55 | 25 | 20 |
| 4  | C4 (Analysis) | 75 | 25 | 0 | 60 | 35 | 5 |
| 5  | C5 (Synthesis) | 80 | 10 | 10 | 65 | 20 | 15 |
| 6  | C6 (Evaluation) | 75 | 15 | 10 | 40 | 20 | 40 |

Table 1. explains that the increase in student learning outcomes in each of Bloom's taxonomy cognitive domains is experimental class and control class. In the experimental class in the cognitive knowledge field (C1) the high category score reached (85%), in the cognitive domain of understanding (C2) the high category score reached (80%), in the cognitive domain of application (C3) the high category score reached (80%) , in the cognitive domain of analysis (C4) the high category score reached (75%), in the cognitive realm of synthesis (C5) the high category value reached (80%), and in the cognitive evaluation domain (C6) the high category score reached (75%).

Improved learning outcomes of control class students in the cognitive knowledge (C1) high category values reached (65%), in the cognitive domain of understanding (C2) high category values reached (60%), in the cognitive domain of application (C3) high category values reached (55%), in the cognitive domain of analysis (C4) the high category score reached (60%), in the cognitive realm of synthesis (C5) the high category score reached (65%), and in the cognitive evaluation domain (C6) the high category score reached (40%). Increasing the learning outcomes of experimental and control class students in terms of the pretest-posttest in detail can be seen from the difference in pretest scores with the posttest scores obtained by students before and after learning with the CTL model. The percentage of N-Gain learning outcomes of students is classified into three categories, namely low, medium and high, in detail can be seen in Table 2.
4. Conclusion

There is the influence of the CTL model on student learning outcomes. The results of testing the hypothesis obtained t count > t table is 3.164 > 1.70. The high category N-Gain results reached 95% for the experimental class and 55% for the control class. This shows that the CTL model has a significant influence on physics learning in wave material at Senior High School 1 Baitussalam.
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