Improve learning outcomes on physics lesson in vocational high school 1 Magelang

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Abstract. This research aims to improve learning outcomes for students. This research was implemented in 2 cycles; at each cycle, there planning, implementation, observation, and reflection. The result of this research is showed that the inquiry method could improve learning outcomes for the student at Vocational High School 1 Magelang on physics lesson. That improved are showed from the amount of score student was obtained; at the first cycle is 2320; meanwhile, at the second cycle are improve and become 2510. During the 1st cycle, the average score was obtained by students is 72.5. During the 2nd cycle, the average obtained was 78.75. In a case of percentage, students who can reach minimum standard criteria are improved too, at the 1st cycle in the amount of 40.6% and improved become 68.75% in the 2nd cycle. This is showed that the implementation inquiry method is proved that can improve learning outcomes for students.

1. Introduction
Education is a learning process that aims to make students have skills, personalities and intelligence that are useful for society, nation and state [1]. Vocational secondary education is education at the secondary education level that prioritizes the development of students' abilities to carry out certain types of work. Higher Education aims are the development of the potential of students to become human beings who believe and fear God Almighty and have noble, healthy, knowledgeable, capable, creative, independent, skilled, competent, and cultured for the benefit of the nation, produced graduates who master the branches of Science and Technology to meet national interests and increase national competitiveness [2].

In an effort to adapt to the demands of the world of work, the education system frequently changes the curriculum. The 2013 curriculum is an educational curriculum currently used at Vocational High school 1 Magelang. This curriculum focuses on student activeness (student-centred), where students are educated to be disciplined, responsible, creative, innovative, problem solvers, collaborators, have high curiosity, high self-confidence. This curriculum is also a refinement of the student's mindset from passive to active-seeking. Active student learning is further strengthened by the scientific approach learning model [3]. Physics is included in the class X class. Physics subject is the basic subject in class X, majoring in engineering at Vocational High school 1 Magelang.

Based on preliminary observations made at Vocational High school 1 Magelang, most of the teaching and learning process of theoretical subjects still uses conventional methods or lectures. This method causes learning to be inactive or only occurs in one direction, namely teacher to student. Collaborative learning can provide opportunities to lead to process success learning [4]. As a result, many students pay less attention and don't understand the material given. Research conducted by Navis
[5] states that teacher teaching performance and interest in learning have a positive and significant effect on learning achievement. Meanwhile, Arif [6] shows that there is a positive relationship between learning styles and learning activeness on learning achievement. From the above opinion, it can be seen that the learning methods applied by the teacher can affect learning outcomes and student learning activeness. Making learning media that is interesting is very important because as a tool to clarify the learning material that is conveyed by teachers to students [7]. A study on improving engineering mechanic module in vocational high school showed that there was a significant increase in achievement in the experimental group students after using improved learning media [8]. The other study on the development of job sheet practice shield metal arc welding assisted augmented reality showed that students interested in using the modern learning media [9]. In the learning process, there are several active learning methods (student-centered) that can be applied, one of which is the inquiry learning method.

Based on this, the researcher decided to conduct classroom action research using the inquiry method to improve student learning outcomes. In the inquiry method, students can learn actively and creatively to seek knowledge [10]. The advantages of the inquiry learning method, according to Sanjaya [11], include a learning model that emphasizes the development of cognitive, affective, and psychomotor aspects in a balanced manner so that learning will be more meaningful, inquiry provides space for students to learn in accordance with their learning style in accordance with the development of modern learning psychology. Ricky [12] has applied the inquiry method to improve student learning outcomes, which shows an increase in student learning outcomes and student learning activities by 29%. From the various explanations above, the application of this method is expected to improve student learning outcomes and student activity in the learning process and solve problems independently.

2. Methods
This research is a classroom action research that describes the entire process of cause and effect from the start of the treatment until the impact of the treatment. The research subjects used in this study were 32 students of class X-MA Vocational High School 1 Magelang. The data collection technique used in the study was to use tests, observation, and documentation. The test given was in the form of multiple-choice questions in cycles 1 and 2, which the students had to complete at a predetermined time. Meanwhile, observations in the learning process are carried out by observing student activities during the learning process using the inquiry method. Documentation data carried out in this study are photographs of the learning process that occurs.

This research procedure is carried out in two cycles, but if in two cycles, the goal has not been achieved, then it will be continued until the goal is achieved. In each cycle, there are planning, implementation, observation, and reflection activities. In the validity test, researchers used an expert judgment test. According to Sugiyono [13], after the instrument is constructed regarding the aspects to be measured based on a certain theory, then it is consulted with an expert. Furthermore, after the instrument is said to be valid, the instrument can be tested on students. The data analysis technique in this study used a qualitative descriptive analysis. The qualitative descriptive analysis is used to obtain the calculation of the mean percentage of student test results when the action is taken.

3. Results and Discussion
The results of the actions taken in cycle 1 showed an increase in student learning outcomes in class X-MA. The number of grades increased from 1530 to 2320, so that the average increased from 47.81 to 72.5. Students who complete the minimum completeness criteria (MCC) also increase from initially there are no students completing MCC, increasing to 40.6% of students completing MCC. However, students who complete the MCC are still less than 60% of the number of students in the class. This can be seen in table 1.
Student learning outcomes are not only seen from the results of the pretest and posttest scores, but also from several aspects of the attitude value shown in the learning process. This is necessary to determine the pros and cons of the learning process that has been carried out.

The acquisition of the attitude value on the responsibility aspect that was raised by the students was 79%. This can be seen from the seriousness of students following the ongoing learning process. The value achieved by students in the aspect of cooperation is 70%. This occurs when students collect information together in solving problems that have been given. There is also a tolerance value shown by students in this process when there are differences of opinion between students, which is 71%. In the presentation process, there is a visible value of confidence. The score that has been shown in this aspect is 77%. The honest attitude shown by students in the process of doing the test was quite good, with a score of 69% but still needs to be improved. The value of student attitudes shown in the learning process can be seen in table 2.

| Attitude   | Score |
|------------|-------|
| Responsible| 79%   |
| Cooperation| 70%   |
| Tolerance  | 71%   |
| Confidence | 77%   |

Although there was an increase in the results of the student ability test, action research class has not been declared successful because it hasn't met the success criteria; namely, 60% got a value ≥ 75. So proceed to the second cycle.

The results of the actions taken in cycle 2 showed an increase in student learning outcomes in class X-MA, the number of grades increased from 1600 to 2510, so that the average increased from 50 to 78.75. The percentage of students who completed the MCC also increased from 12.5% to 68.75%. Thus the achievement indicator has been fulfilled; namely, 60% got a score of more than 75 MCC. The results of cycle two tests can be seen in table 3.

| Information     | Pretest | Post-test | Difference |
|-----------------|---------|-----------|------------|
| Total value     | 1600    | 2510      | 910        |
| Average         | 50      | 78.75     | 28.75      |
| Lowest score    | 20      | 60        | 40         |
| Highest score   | 80      | 100       | 20         |
| Completed MCC   | 12.5%   | 68.75%    | 56.25%     |
| Not completed MCC| 87.5%  | 31.25%    | 56.25%     |
The acquisition of the attitude value on the responsibility aspect that was raised by students was 90%. This can be seen from the seriousness of students in following the ongoing learning process. The value achieved by students in the aspect of cooperation is 84%. This occurs when students collect information together in solving problems that have been given. There is also a tolerance value shown by students in this process when there are differences of opinion between students, which is 83%. In the presentation process, there is a visible value of confidence. The score that has been shown in this aspect is 86%. The honest attitude shown by students in the process of doing the test is quite good, with a score of 84%. The value of student attitudes shown in the learning process can be seen in table 4.

| Attitude     | Score |
|--------------|-------|
| Responsible  | 90%   |
| Cooperation  | 84%   |
| Tolerance    | 83%   |
| Confidence   | 86%   |

From the data obtained, it can be made a comparison of the results between cycle one and cycle 2. The posttest results in cycles 1 and 2 have increased both in the class average and the percentage of students who meet the km. In cycle one, the class average obtained was 72.5, while in cycle two, it was 78.75. In the percentage of students who meet the MCC increase, in cycle one, it was 40.6%, while in cycle two, it was 68.75%. A comparison of values can be seen in table 5.

| Information         | Post-test 1 | Post-test 2 | Difference |
|---------------------|-------------|-------------|------------|
| Total value         | 2300        | 2510        | 190        |
| Average             | 72.5        | 78.75       | 6.25       |
| Lowest score        | 50          | 60          | 10         |
| Highest score       | 90          | 100         | 10         |
| Completed MCC       | 40.6%       | 68.75%      | 28.15%     |
| Not completed MCC   | 59.4%       | 31.25%      | 28.15%     |

Comparisons can also be seen from the increase in the value of the indicated student attitudes during the learning process. Attitude values responsibility that the student shows on cycle 1 is 79%, while in cycle two increased to 90%. The acquisition of work value and students also increased by 14%. This matter seen from the acquisition of the value of cooperation at cycle 1 is equal to 70%, and cycle 2 is equal to 84%. This increase is the result of improvements to the previous cycle. Equity students are able to lift students who have not to understand to be more understanding about the material studied.

| Attitude        | Cycles 1 | Cycles 2 | Difference |
|-----------------|----------|----------|------------|
| Responsible     | 79%      | 90%      | 11%        |
| Cooperation     | 70%      | 84%      | 14%        |
| Tolerance       | 71%      | 83%      | 9%         |
| Confidence      | 69%      | 84%      | 15%        |

Based on the values obtained by the X-MA class of Vocational High School 1 Magelang after taking action using the inquiry method in each cycle, it is seen that there is an increase in learning outcomes. This increase shows that students understand the material being studied. Students are also enthusiastic about taking part in learning because they are directly involved and active during learning. This is different from before the action is taken, it can be said that it has not got maximum results. This
can be seen from the number of students who scored below KM and the number of students who took part in remedial.

With an increase in student learning outcomes in class X-MA in physics at Vocational High School 1 Magelang, it can be said that the application of the inquiry method has been proven to improve student learning outcomes.

4. Conclusion

Based on the results of the research and discussion that has been described, it can be concluded that the inquiry method is carried out by providing an initial description of the material to be studied. In this case, the researcher uses video media - instructional videos. Furthermore, giving problems to students. These problems are solved by students by discussing in teams or in groups. In this case, the researcher or teacher acts as a facilitator who encourages and verifies the results of student discussions so that students can continue to dig deeper into the problems they face. The problems that have been solved are then presented or presented. In this case, the researcher builds a conducive learning atmosphere so that two-way communication can run well. In the next step, the researcher provides conclusions regarding the material that has been studied and provides reflection as a form of evaluation of the learning process. The inquiry method can improve student learning outcomes in physics learning activities in class X-MA at Vocational High School 1 Magelang with the material of regular straight motion and circular motion in the first cycle and Newton's law in the second cycle. The increase in learning outcomes can be seen from the acquisition of total student scores; in cycle one, it was 2320, while in cycle two, it increased to 2510. In cycle one, the average score of students obtained was 72.5. In cycle 2, the students' average score obtained was 78.75. The percentage of students who achieved MCC also increased in cycle one by 40.6% and increased to 68.75% in cycle 2. With an increase in student learning outcomes of class X-MA in physics subjects at Vocational High School 1 Magelang, it is said that the application of the inquiry method is proven to improve student learning outcomes.

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