

The effectiveness of the case method to improve student learning outcomes in the SMAW subject

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Abstract: This study aims to assess the effectiveness of the case method for improving student learning outcomes in the SMAW (Shielded Metal Arc Welding) subject. This research employs classroom action research. The subjects of this study are 11th-grade students majoring in Mechanical Engineering at State Vocational High School 1 Silaut, West Sumatra, Indonesia. Data collection techniques include observation sheets to assess teacher and student activities, tests to evaluate students' knowledge, and documentation to support the research. The study results indicate that implementing the case method teaching model effectively improves student learning outcomes because students are engaged and interested in learning. This is evident in the learning outcomes in cycle 1, where 64.29% of students achieved passing grades, with nine passing, while 35.71% did not pass, with five students falling short. In cycle 2, student learning outcomes improved to 78.57%, with 11 students passing, while 21.43% did not pass, with three students not meeting the passing criteria. In conclusion, the case method teaching model effectively enhances student learning outcomes in the SMAW subject.

Keywords: Effectiveness, case method, learning outcomes, mechanical engineering

1. Introduction

In the learning process, the role of educators is essential as facilitators who have many advantages and disadvantages of each learning method that will be applied to create effective learning (Ishak, 2021). Vocational High School is one type of secondary education in Indonesia that is equivalent to high school (Bunyamin et al., 2022; Jabarullah & Iqbal Hussain, 2019; Jalinus et al., 2023). Vocational High Schools have majors whose material content is prepared to prepare students to enter the professional world (Waskito et al., 2022). Qualified graduates will undoubtedly be ready to enter the world of work by the competencies they get while they are studying at vocational schools (Ramadhan et al., 2021). Vocational High School learning aims to prepare students to enter the world of work following their respective fields. The direction of Vocational High School education in Indonesia is aimed at social workers who want to develop a career to work after graduation (Ishak, 2021). Prepare students to be able to improve their quality of life, have skills and increase economic income.

At the Vocational High School level, a welding engineering expertise program offers vocational education in metal welding (Prasetya et al., 2023). This program aims to prepare students with the practical skills and theoretical knowledge needed to become a skilled and skilled workforce in welding engineering. Therefore, SMAW welding subjects are essential in this department because

many companies require skilled labour ([Jalinus et al., 2019, 2023](#)). However, many State 1 Silaut Vocational High School students have difficulty understanding the concepts in SMAW welding subjects. This is caused by a lack of student motivation, teacher skills in delivering the material, and a lack of variety in the learning models used ([Lytras et al., 2022](#); [Szymkowiak et al., 2021](#)).

Case Method Learning Model is learning based on a problem to be solved together ([Gerster et al., 2022](#); [Halimah & Sukmayadi, 2019](#); [Plummer et al., 2021](#)). The Case Method learning model is expected to make students more active in learning and increase their potential because this learning makes students able to solve problems in groups and search for learning resources independently ([Rashid et al., 2019](#)). The advantage of this Case Method learning model is that it encourages active participation from students. They have to analyze and solve problems in the context of actual cases, not just receive passive information from the teacher. The disadvantage of Case Method learning is that it is limited to existing cases, and sometimes it is difficult to find cases suitable for specific topics or subjects ([Zhao et al., 2020](#)). The availability of relevant cases can be an obstacle in applying this method.

Based on the observations of researchers who carry out educational field practices at the State 1 Silaut Vocational High School and interviews with teachers, information is obtained regarding the characteristics of class XI welding machine engineering students in SMAW welding subjects. During teaching, many students still lack discipline in the learning process, namely starting to be late during class hours, lack of cooperation in practice, lack of honesty, irresponsibility in organizing tasks and lack of activity in the teaching and learning process. Problems are also seen by teachers who usually lack communication with students and do not create an exciting classroom atmosphere. In the learning process, the teacher only uses a teacher-centred model or often speaks ([Christopher, 2022](#)) so that students only listen to what the teacher says, without any reciprocal relationship between teachers and students, so students are less enthusiastic and active in learning.

The success of the case method in Vocational High Schools also depends on certain factors. The selection of cases appropriate to the students' vocational field, the role of trained teachers in facilitating case discussions, and the availability of supportive resources are vital factors. In the context of Vocational High School, the case method can also motivate students to be more active in their learning. This study aims to determine the effectiveness of the case method learning model in an effort to improve student learning outcomes.

2. Methods

The research used classroom action research, which was applied to improve learning outcomes with specific treatments ([Yada et al., 2019](#)). Classroom Action Research includes four stages: action planning, action implementation, action observation, and reflection. The stages of the research carried out can be seen in Figure 1.

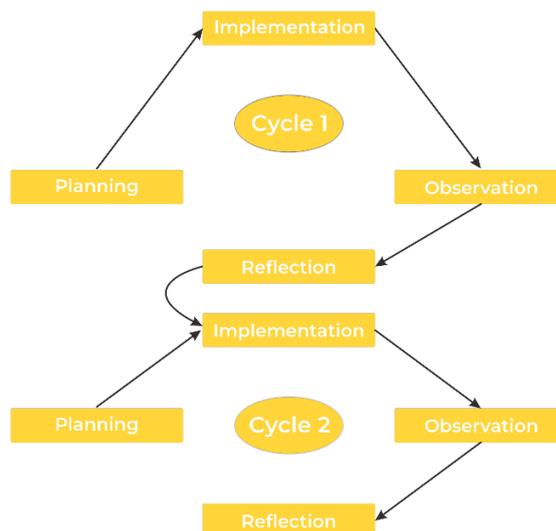


Figure 1: Diagram of the Classroom Action Research Cycle

The data needed in this study are the results of students' cognitive abilities tests after the action. The data source in this study was class XI Welding Engineering students of SMK Negeri 1 Silaut in the 2023/2024 school year, totalling 14 students. The implementation of the research began in July 2023 and continued until August 2023. The instruments in this study were ability test instruments in the form of objective tests and teacher and student observation sheets. Data on students' thinking skills were obtained by giving tests as an evaluation tool to students. The tests in this study included a pre-action test, the final test of cycle 1, and the final test of cycle 2. The effectiveness of the case method learning model can also be seen from the results of teacher and student observations. This is done to determine the increase in student activity seen from Equation 1.

$$Value = \frac{\text{value achieved}}{\text{maximum value}} \times 100\% \quad (1)$$

To analyze the success rate and percentage of student learning completeness after the learning process by giving an evaluation in the form of a written test on activities in the cycle (Chan et al., 2021). This analysis is calculated in Equation 2.

$$(P = \frac{F}{N} \times 100\%) \quad (2)$$

The improvement of students' abilities is obtained by calculating the magnitude of the gain score. The amount of N-Gain is calculated with equation 3 (Meltzer, 2002):

$$(N\text{-gain} = \frac{S_{post} - S_{pres}}{S_{maks} - S_{pre}} \times 100\%) \quad (2)$$

N-gain values are grouped into high, medium, and low categories, which are listed in Table 2.

Table 1: N-gain assessment criteria

N-gain value	Category
$G > 0.7$	High
$0.3 < g \leq 0.7$	Medium
$G \leq 0.3$	Low

Each cycle was analyzed with the help of SPSS software version 26 to test the significant level of student ability.

Data collection technique

Observations are used to determine student activities during the learning process, teacher activities that are taking action, and whether they have done so by the case method learning model, which is used as an alternative to solving the problems faced in learning SMAW Welding for XI students majoring in Mechanical Engineering at the State Vocational High School 1 Silaut. The lattice in determining the assessment of student and teacher observation assessments is presented in the following table:

Table 2: Student and teacher observation assessment sheet grids

Variables	Indicator
Student Activity Observation Assessment	Paying attention to objectives
	Listening to the explanation of the meter
	Engagement in the generation of prior knowledge
	Involvement in group formation
Teacher Activity Observation Assessment	Understand the task
	Introduction
	Core activities
	Closing

Test

The test given to students in the study was intended to determine the extent to which students mastered the subject matter after applying the Case Method learning model (Miranda et al., 2021). The following is a table of grids for assessing student knowledge learning outcomes:

Table 3: Assessment grid for student knowledge learning outcomes

KD	Subject matter
Understand the characteristics and technology of the SMAW welding machine.	a) Basic electricity of SMAW welding
	b) SMAW welding device
	c) Characteristics of SMAW welding
Understand the characteristics and selection of SMAW welding electrodes.	a) Classification and codification of SMAW welding electrodes
	b) Handling SMAW electrodes

Documentation

In carrying out the documentation method, researchers can use documents, photographs and statistical data (Meyer & Norman, 2020). Researchers use pre-test results and post-tests in each cycle and photo documentation for documentation.

3. Results and discussion

The ability to assess student learning outcomes in this study consists of pre-action, cycle one analysis, and cycle two analysis. Pre-action analysis ability is carried out before students are given

action to know the initial ability of students before being given action. Based on the research data on the learning outcomes of students in class XI Welding Engineering at SMK Negeri 1 Silaut, six students were complete in the pre-cycle, and eight students were not complete with a classical completeness of 42.86%. Meanwhile, in cycle 1, 9 students were complete, and five were not complete, with a classical completeness of 64.29%. Meanwhile, in cycle 2, 11 students were complete, and three were not complete, with a classical completeness of 78.57%. A description of the achievement of learning outcomes for each cycle is included in Table 4.

Table 4: Description of Students' Cognitive Ability

No	Completeness	Pre Cycle		Cycle 1		Cycle 2	
		Students	%	Students	%	Students	%
1	Completed	6	42.86%	9	64.29%	11	78.57%
2	Not Completed	8	57.14%	5	35.71%	3	21.43%

A comparison of the average scores of students' learning outcomes in each cycle is shown in Figure 2.

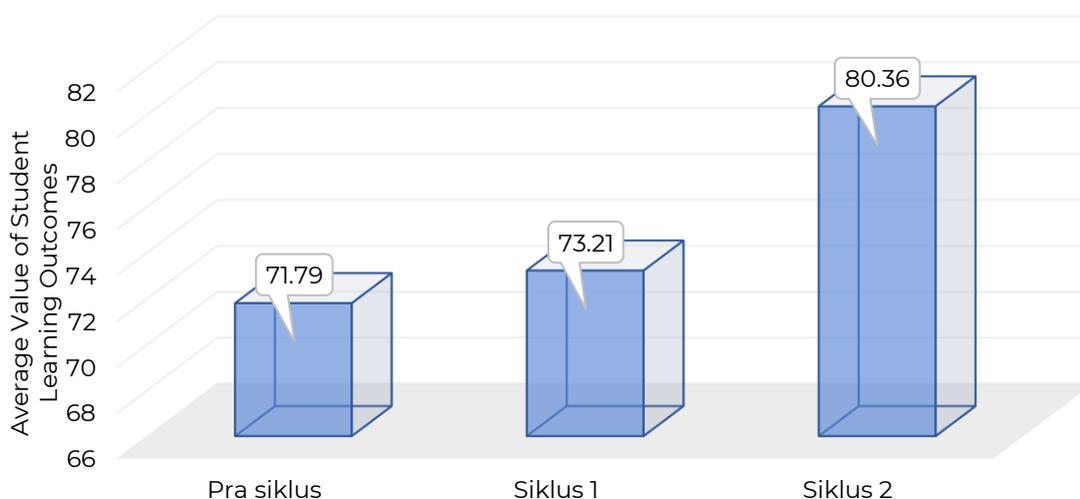


Figure 2: Comparison of Average Student Learning Outcomes in Each Cycle

In Figure 2, the pre-cycle average score is 71.79, which is still low and has not used the case method learning model. In cycle one, the average value of student learning outcomes was 73.21, which was still below. Meanwhile, in cycle two, the average value of student learning outcomes was 80.36, which had passed the success indicator of completeness.

Table 5: Description of N-gain scores in Cycle 1 and Cycle 2

Number	N-gain	Category
Cycle 1	0.60	Medium
Cycle 2	0.76	High

According to the acquisition of N-gain, there is an increase in students' abilities in cycle 1 to cycle 2 of each cycle. Based on the results of the N-gain test, the average result in cycle 1 was 0.60, which was included in the medium category, while in cycle two, the average N-gain value was 0.76, which was included in the high category. It can be concluded that there is an increase in the average value between cycle one and cycle two.

This research results from the State Vocational High School 1 Silaut in the SMAW welding subject for class XI Welding Engineering students. Research data was obtained from assessing students' cognitive results in the form of test questions totalling 20 questions per cycle. This research was carried out in two cycles. The results of the study are expected to improve learning outcomes for students to generate interest in effective learning in the world of education or provide solutions to existing problems. The instrument used by the research has passed an assessment, such as validation. Instrument validation was carried out by two validators: one smaw welding learning material expert and one media expert for student and teacher activities to make it feasible.

Applying the case method learning model in SMAW welding subjects can make students more active and increase their enthusiasm for learning. From the analysis of the validation of learning material experts and media experts, it is known that, based on the analysis of the data that has been obtained, it can be seen from both cycle one to cycle two that there is an increase in student learning outcomes. This can be seen from the average value of student learning outcomes obtained from the pre-cycle value of 71.79, then cycle 1 of 73.21 and cycle 2 of 80.36. The data shows that the average value of student learning outcomes after using the case method learning model increased from cycle 1 to cycle 2. In addition to looking at the average value, an analysis of completeness based on effectiveness was also carried out. Based on the analysis in cycle 1, the percentage value of classical completeness was 64%, which was ineffective. In cycle 2, the percentage value of classical completeness was 78% effective because it had passed the limit of the classical completeness value of 75%.

Relevant research from ([Fernandes et al., 2021](#)), "Efforts to Improve Student Learning Outcomes Through the Implementation of Case Method and Team-Based Project Learning Models in Creativity and Entrepreneurship Products Subjects with the results of research on case methods and team-based projects can increase student learning achievement. Which is known from the increase in classical completeness per cycle. Cycle I obtained a classical completeness of 65.62% with a statement that it was not optimal, Cycle II obtained a classical completeness of 71.87% with a statement that it was not optimal, and Cycle III obtained a classical completeness of 84.37% learning in cycle III was declared maximum.

4. Conclusion

Based on the research data and the results of the analysis using SPSS version 26.0, it can be concluded that classroom action research on SMAW welding subjects in class XI welding engineering at the State Vocational High School 1 Silaut is effective in efforts to improve student learning outcomes in SMAW welding subjects, namely in cycle one classical completeness of 64% and cycle 2 of 79% and effectiveness based on classical completeness in cycle one ineffective category and cycle two effective category.

Author contribution

M. Fajrin is a researcher and data collector of the effectiveness of the case method learning model; Purwantono is a provider of direction and methods in research; Irzal evaluates research methods and data analysis; Bulkia Rahim provides an evaluation of the Background of the Problem.

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Conflict of interest

No conflict of interest and approved the article for review and publication.

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