Implementation of the example/non-example learning model to improve learning outcomes in the basics of building design, modeling and information subject

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Received: 25 Jun 2025; *Revised:* 24 Sep 2025; *Accepted:* 07 Oct 2025

Cite this https://doi.org/10.24036/jptk.v8i4.47223

Abstract: This study aimed to examine the effectiveness of the Example/Non-Example cooperative learning model in improving student learning outcomes in the subject Fundamentals of Design, Modelling, and Building Information (DPIB) for Grade X students at SMK Negeri 1 Percut Sei Tuan during the 2024/2025 academic year. The research was driven by low student achievement, with over 50% failing to meet the school's minimum passing grade of 70, highlighting the need for more engaging and student-cantered learning strategies. The Example/Non-Example model was chosen for its potential to foster critical thinking through visual analysis and collaborative learning. This research employed Classroom Action Research (CAR), consisting of two cycles with the stages of planning, action, observation, and reflection. The participants were 31 Grade X DPIB students. Data was collected using validated multiple-choice tests with 22 items in Cycle I and 23 items in Cycle II. The findings revealed an increase in the average score from 75.51 in Cycle I to 80.96 in Cycle II, representing a 26.08% improvement. These results indicate that the Example/Non-Example model is effective in enhancing student achievement and can serve as an alternative instructional strategy for improving competency attainment in vocational subjects.

Keywords: cooperative learning model; example/non-example learning model; learning outcomes; action research

1. Introduction

Vocational education plays a pivotal role in preparing students with industry-relevant competencies to meet the demands of the 21st-century workforce. However, many vocational schools continue to struggle with passive learning environments, which hinder the development of critical thinking and problem-solving skills, skills highly emphasized in modern education frameworks (Darling-Hammond et al., 2020; Rahmawati et al., 2025). The integration of active learning strategies, such as cooperative learning, has been widely acknowledged as an effective approach to increase student engagement and improve learning outcomes, especially in technical and practice-oriented subjects (Talkhan et al., 2025).

Despite the proven benefits of cooperative learning models, limited research has examined their application in the context of Building Modelling and Information Design (DPIB) subjects in vocational high schools in Indonesia (Sihite et al., 2024). The subject requires not only theoretical understanding but also visual-spatial reasoning, which is often underdeveloped in conventional lecture-based teaching. Previous studies have mostly focused on general cooperative models without specifically investigating the use of the Example/Non-Example model, which encourages

visual analysis and collaborative learning through image-based scenarios (Arfandi et al., 2022). Furthermore, recent studies tend to overlook the integration of this model with vocational content that demands high visual interpretation, such as technical drawing or building design (Chen et al., 2025; Nguyen et al., 2022; Zhai et al., 2024).

This study aims to fill that gap by implementing the Example/Non-Example cooperative learning model in the DPIB subject, particularly for Grade X students at SMK Negeri 1 Percut Sei Tuan. The novelty of this research lies in applying a visually driven, discussion-based model within a technical vocational context, addressing the specific needs of students who struggle with abstract drawing concepts. Through a Classroom Action Research (CAR) approach, this study evaluates the impact of the model on student learning outcomes, providing empirical evidence that supports its implementation in vocational education. Given the urgency to improve student competency in vocational programs, especially in fields aligned with industrial design and construction, this study contributes to the ongoing discourse on pedagogical innovation in technical education. The findings are expected to inform educators and curriculum developers in adopting more effective, student-cantered instructional strategies.

2. Methods

This research is a Classroom Action Research (CAR). Classroom Action Research plays a very important and strategic role in improving the quality of learning. In this study, the subjects were students of Grade X DPIB at SMK Negeri 1 Percut Sei Tuan, consisting of one class with a total of 31 students. The research was conducted in collaboration with the subject teacher of Fundamentals of Design Modelling and Building Information. Classroom Action Research (CAR) has several characteristics, including:

a. It is based on instructional problems faced by educators.
b. It involves collaboration in its implementation.
c. The researcher is also a practitioner who engages in reflection.
d. It aims to improve or enhance the quality of instructional practices.
e. It is conducted through a series of steps carried out in multiple cycles

The procedure for conducting Classroom Action Research (CAR) includes identifying the focus of the problem, planning the action, implementing the action followed by observation, interpretation, and analysis, as well as reflection. If necessary, a follow-up action plan is developed in the subsequent stage.

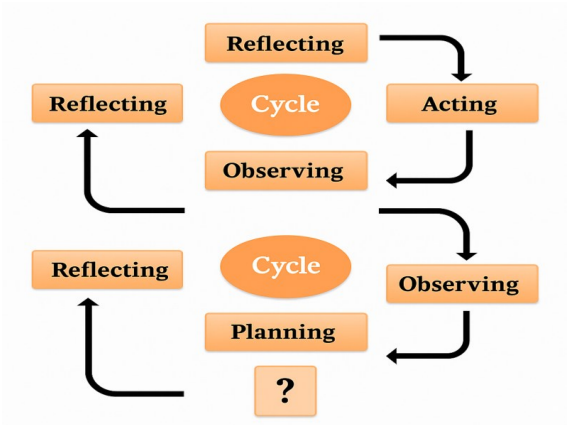

Figure 1. Classroom Action Research (CAR) flowchart

Research Stages:

1) Initial observation stage

Before conducting the Classroom Action Research (CAR), the researcher first carried out observations of the learning process and outcomes that have been implemented and obtained at the school so far. This step is necessary to identify the learning problems occurring in the teaching process of Grade X DPIB, especially regarding the use of the Direct Instruction learning model.

2) Action planning stage

The researcher implemented improvements in the learning process based on issues identified from the initial observations and the evaluation of the Direct Instruction method, where students' learning outcomes were still considered low and did not meet the Minimum Mastery Criteria (KKM) set by the school. Therefore, the researcher aimed to improve this by conducting learning using the Example Non-Example Cooperative Learning Model combined with the use of interactive media. This approach intends to facilitate students in understanding the lesson material and to increase their focus and interest during the learning process.

3) Action implementation stage

The implementation of the learning improvement was conducted in two cycles, with each cycle carried out in one meeting. Each cycle consisted of four stages: a) planning, b) action, c) data collection (observation), and d) reflection (analysis and interpretation).

4) Research procedure

The implementation of actions carried out by the researcher in two cycles can be described in the following table 1.

Table 1. Implementation stages of cycle I research

Planning stage
Preparatory activities to be carried out in this research include: • The teacher prepares the Teaching Module, Learning Competencies (CP), and Lesson Plan (ATP). • Preparing the list of previous student learning outcome scores, sources, and other teaching materials. • Developing written guiding questions (stimulators) before the learning process begins, multiple-choice post-test questions for the end of the lesson, and answer sheets or keys for the post-test.
Implementation stage
At this stage, the teacher carries out the learning process according to the previously designed module, which involves implementing the Example Non-Example Cooperative Learning Model. The steps for conducting the learning process using this model are as follows: **A. Initial activities** • Opening the lesson, which includes greeting, prayer, taking student attendance, motivating students, asking several questions to stimulate students' understanding (stimulators) of the material, and explaining an introduction to the material to be delivered.

B. Main activities

- Presenting an overview of the learning model to be delivered by the teacher, namely the Example Non-Example Cooperative Learning Model.
- Dividing the class into several groups and balancing the groups by placing students with high, medium, and low knowledge abilities in each group so that each group has a similar level (using previous student learning outcome scores).
- Implementing the Example Non-Example Cooperative Learning Model.
- The teacher presents the material to be studied while preparing several images to be displayed using the Canva application according to the learning objectives.
- After the teacher displays the images to the students, the teacher gives students the opportunity to analyze the images together with their group members.
- Once the students finish their discussions, the teacher directs each group to write down the results of their image analysis discussion on paper.
- The teacher gives each group the chance to present their discussion results in front of the class alternately with other groups.
- The teacher allows other groups to provide suggestions or ask questions to the presenting group, comments on the students' discussion results, and then explains the material according to the learning objectives.

C. Closing activities

- Providing reinforcement of the material by the teacher and making a summary.
- Distributing questions as an assessment of students' understanding.
- Closing the session with a greeting.

Observation stage

The teacher and researcher fill out observation sheets with the aim of obtaining information about the implementation of the learning process carried out from the beginning to the end of the lesson.

Reflection stage

- The teacher analyzes and reviews the results of the observations and the tests administered.
- The teacher and researcher develop an improvement plan for the next cycle; if the target has not been achieved, the action continues to the next cycle.

Implementation stages of cycle II research:

- The implementation of Cycle II is based on the reflection results from Cycle I. Therefore, the observations serve as material for reflection, and the reflection results from Cycle I will be used as a reference for improving the learning process in Cycle II.
- Reflection is useful to determine the level of success and failure. If the learning process in Cycle I is unsatisfactory, where the learning outcomes are still low, the main purpose of Cycle II is to improve the weaknesses that occurred in Cycle I.
- The implementation of actions in Cycle II aims to determine whether the desired targets have been achieved, thus this action cycle serves to prove whether there has been a change and improvement in learning outcomes after students received the intervention in Cycle I.
- If the target is not achieved in Cycle II, further actions will be carried out in subsequent cycles.

5) Data collection techniques

The data collection techniques used by the researcher include Observation, Learning Outcome Tests, and Documentation.

6) Instrument test trial

The study uses four methods, including: test validity, reliability test, difficulty index, and discrimination power.

The classroom action research was conducted by the researcher with the assistance of the teacher of Basic Design Modelling and Building Information subject for Grade X, Mrs. Dra. Hapsah Nasution, by applying the Example Non-Example learning model. The following is the implementation of the research actions carried out on Grade X DPIB students at SMKN 1 Percut Sei Tuan. This learning research was conducted in two cycles: Cycle I was conducted over two meetings, and Cycle II was also conducted over two meetings. Each cycle consisted of four stages, namely: planning, implementation, observation, and reflection.

Table 2. Indicators of learning outcome achievement in cycle I

A/Y	Score	Number of students	Percentage (%)	Predicate	Category
2024/2025	<70	8	25.81	D	Not competen
	71–80	15	48.39	C	Moderately competen
	81-90	5	16.13	B	Competen
	90-100	3	9.67	A	Highly competen
Total		**31**	**100**		
Mastery				**74.19**	
Not Mastery				**25.81**	

Based on the data, there are several students who have not yet reached the minimum passing grade (KKM), indicating that the learning outcomes are not yet successful or optimal. Therefore, the implementation of Cycle II is necessary to improve learning outcomes more optimally.

Table 3. Indicators of learning outcome achievement in cycle II

A/Y	Score	Number of students	Percentage (%)	Predicate	Category
2024/2025	<70	2	6.45	D	Not competen
	71–80	5	16.13	C	Moderately competen
	81-90	11	35.48	B	Competen
	90-100	13	41.94	A	Highly competen
Total		**31**	**100**		
Mastery				**93.55**	
Not Mastery				**6.45**	

Out of the ideal score of 100, the students' average score was 80.96, which means they fall into the competent category, and the mastery percentage was 93.55%, indicating that all students have achieved classical completeness. Therefore, the students' learning outcomes can be considered successful, and the research was concluded at Cycle II.

3. Results

This classroom action research was implemented in two cycles involving Grade X students of the DPIB (Design, Modelling, and Building Information) program at SMK Negeri 1 Percut Sei Tuan. The goal was to evaluate the effectiveness of the Example/Non-Example cooperative learning model in improving student learning outcomes. Each cycle included the stages of planning, implementation, observation, and reflection. The results of both cycles are presented and analysed as follows:

Results of cycle I

In the first cycle, the learning process was carried out by applying the Example/Non-Example model with reference to selected visual materials relevant to the topic of orthographic projection. The teacher provided illustrated examples that students analysed individually and then discussed in groups. A summative assessment in the form of a multiple-choice test (22 validated items) was administered to measure cognitive learning outcomes. The assessment results showed that 22 out of 31 students (70.96%) achieved the Minimum Mastery Criterion (KKM) score of 70, while 9 students (29.03%) did not meet the minimum standard. The average class score was 75.51. Although most students met the expected learning outcomes, observations and reflections indicated several learning challenges: a) Some students were passive during group discussions, b) The instructions for analysing the examples were not always clear, c) Time management during group presentation was suboptimal. These reflections led to improvements in the learning design for Cycle II, particularly in providing more structured guidance during analysis and reinforcing group collaboration through clearer role distribution.

Results of cycle II

In Cycle II, revisions were made to the learning implementation based on the weaknesses identified in Cycle I. Improvements included clearer explanation of visual materials, assignment of group roles, time allocation adjustment, and the use of more varied example illustrations to stimulate discussion. A new summative assessment using 23 validated multiple-choice items was administered at the end of Cycle II. The results showed a significant improvement: a) 27 out of 31 students (87.09%) successfully reached or exceeded the KKM, b) Only 4 students (12.90%) failed to meet the mastery criterion, c) The average class score increased to 80.96, indicating improved comprehension and retention of the material. Classroom observations in Cycle II also reflected higher levels of engagement, more active group discussion, and improved peer collaboration. Students demonstrated greater confidence in analysing images, explaining concepts, and drawing conclusions based on the visual materials provided.

Table 4. Comparative analysis between cycles

Aspect	Cycle I	Cycle II	Difference
Average Score	75.51	80.96	+5.45 points
% Students Achieving KKM	70.96%	87.09%	+16.13%
% Students Not Achieving	29.03%	12.90%	-16.13%

In terms of percentage increase, there was a 26.08% overall improvement in student performance. This confirms that the instructional model not only facilitated better understanding of technical content but also fostered collaborative learning, which contributed to greater academic achievement. The results from both cycles suggest that the Example/Non-Example cooperative

learning model is an effective instructional approach in vocational learning environments, especially when teaching abstract, visual-spatial concepts such as orthographic projection and technical drawing. By integrating visual analysis with structured peer discussion, students were able to process complex information more effectively, leading to measurable gains in learning outcomes.

4. Discussion

The results of this study indicate that the implementation of the Example/Non-Example cooperative learning model significantly improved student learning outcomes in the subject Fundamentals of Design, Modelling, and Building Information (DPIB). The increase in the average score from 75.51 to 80.96, representing a 26.08% improvement, reflects the model's effectiveness in helping students understand visual and technical material. This finding aligns with the study by Arfandi et al. (2022), which showed that the Example/Non-Example model enhances students' creativity and analytical thinking in visual-based vocational learning. Similarly, Hikmah et al. (2015) reported that the application of this model increased student engagement and comprehension in vocational high school construction-related subjects. Latifah & Purwantoyo (2025) also found that learning strategies incorporating visual media and group discussion, core features of the Example/Non-Example model, were effective in developing students' critical thinking and technical understanding, particularly in technical drawing lessons.

Moreover, this study supports the findings of Yatna et al. (2025), who emphasized that cooperative learning strategies are highly relevant in vocational education settings, as they promote active participation and strengthen students' conceptual understanding through peer interaction. Thus, the results of this study not only corroborate previous research but also contribute new insights by applying the Example/Non-Example model specifically in DPIB learning at vocational schools, a context that remains underexplored in existing technical education literature. With applying the Example Non-Example learning model to improve student learning outcomes in the Basic Technical Drawing element, this study shows that the average student learning score reached the minimum mastery criterion (KKM) and the classical mastery percentage was 93.55%, which serves as an indicator of the study's success. This study used learning outcome tests with multiple-choice questions, where Cycle I consisted of 22 questions and Cycle II consisted of 23 questions. The distribution of data on the improvement of learning outcomes of Grade X DPIB students at SMK Negeri 1 Percut Sei Tuan from Cycle I to Cycle II can be seen in the following Figure 2.

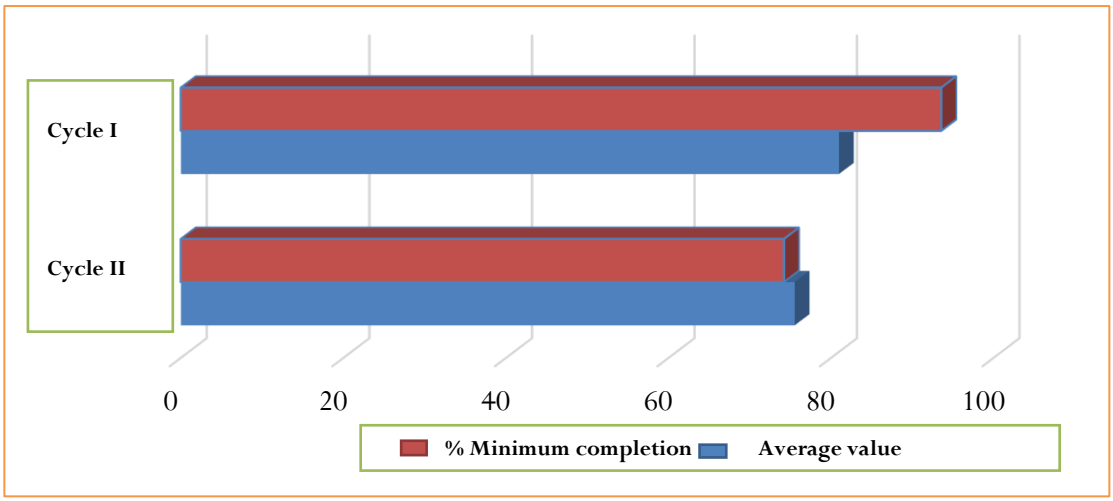

Figure 2. Graph of comparison of student learning outcomes in cycle I & II

Based on the analysis of research data and graphs of cycle I and cycle II, the application of the Example/Non-Example learning model to the learning outcomes of class X DPIB students can improve. The results of the study showed an increase, where the learning outcomes in cycle I were 74.19% with the number of students who completed 23 out of 31 students and in cycle II it became 93.55% with the number of students who completed 29 out of 31 students. These results can be concluded that the implementation of the cooperative learning model of the example non-example type can improve student learning outcomes in the subject of fundamentals of building modeling and design information.

5. Conclusion

This study has demonstrated that the Example/Non-Example cooperative learning model can effectively enhance students' academic performance in vocational education, particularly in the subject Fundamentals of Design, Modelling, and Building Information (DPIB). The model encouraged visual analysis and peer collaboration, which are essential for mastering abstract and technical content in drawing-based subjects. Its application in classroom settings led to improved student engagement, comprehension, and learning outcomes. The findings imply that incorporating visually oriented, discussion-based learning strategies can be a powerful pedagogical alternative in vocational high schools, especially in fields that demand spatial reasoning and collaborative problem-solving. For practitioners, this suggests the importance of aligning teaching models with the cognitive characteristics of vocational learners. However, this study was limited to a single school, one subject area, and a relatively small sample of Grade X students. The implementation also focused solely on short-term outcomes without assessing long-term retention or transfer of skills. Future research could expand by applying the model across different vocational subjects, grade levels, and schools. Additionally, mixed methods approach involving classroom observations and interviews are recommended to gain deeper insights into student learning behaviours and the instructional process. Based on the results of this study, the Implementation of the Example/Non-Example Type Cooperative Learning Model to Improve Learning Outcomes in the Basics of Building Modelling and Information Design Subjects for Class X DPIB Students at SMK Negeri 1 Percut Sei Tuan can produce better learning outcomes in their fields, especially for Basic Engineering Drawing Elements.

Author's declaration

Author contribution

Kinanti Wijaya: Contributed to the research design, guided the development of the concept, provided supervision, and reviewed and approved the manuscript. **Elza Melany Simatupang**: Contributed to the research activities and was responsible for the design, data collection, data analysis, and writing of the manuscript.

Funding statement

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Acknowledgements

The authors would like to thank all those who have assisted in this research.

Conflict of interest

There is no conflict of interest in this research.

Ethical clearance

This research was conducted with the approval of the principal of SMK Negeri 1 Percut Sei Tuan. Informed consent was obtained from all participating teachers and students, as well as the parents or guardians of the students. The study strictly followed ethical guidelines to ensure confidentiality, voluntary participation, and the protection of all subjects involved.

Data availability

Data supporting the findings of this study are available from the corresponding author upon reasonable request.

AI statement

There are no AI-generated sentences in this article. AI is only used to improve readability and grammar.

Publisher's and Journal's note

Universitas Negeri Padang as the publisher, and the Editor of Jurnal Pendidikan Teknologi Kejuruan state that there is no conflict of interest towards this article publication.

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