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RESEARCH

The Effect of Innovative Learning Models on Students' Critical Thinking Skills at Eleventh Grade Students of Pustek Vocational High School

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Kata Kunci:
Model Pembelajaran Inovatif, Keterampilan Berpikir Kritis, Sekolah Menengah Kejuruan.

Abstrak

Kemampuan berpikir kritis merupakan kompetensi penting bagi siswa SMA kejuruan karena membantu siswa menganalisis informasi, mengevaluasi masalah, membuat keputusan logis, dan menerapkan pengetahuan dalam situasi kehidupan nyata. Namun, kemampuan berpikir kritis siswa seringkali terbatas ketika kegiatan kelas didominasi oleh pengajaran konvensional yang berpusat pada guru. Oleh karena itu, dibutuhkan model pembelajaran inovatif untuk menciptakan pengalaman belajar yang lebih aktif, bermakna, dan berpusat pada siswa. Penelitian ini bertujuan untuk menyelidiki pengaruh model pembelajaran inovatif terhadap kemampuan berpikir kritis siswa kelas sebelas di SMA Kejuruan Pustek. Penelitian ini menggunakan pendekatan kuantitatif dengan desain eksperimental. Proses pembelajaran dilakukan dengan menerapkan model pembelajaran inovatif yang mendorong siswa untuk berpartisipasi aktif melalui pemecahan masalah, diskusi, kolaborasi, penyelidikan, dan kegiatan berbasis proyek. Data dikumpulkan melalui tes kemampuan berpikir kritis dan dianalisis untuk menentukan peningkatan kinerja berpikir kritis siswa setelah penerapan model pembelajaran. Hasil penelitian menunjukkan bahwa penerapan model pembelajaran inovatif memiliki pengaruh positif terhadap kemampuan berpikir kritis siswa. Siswa menunjukkan peningkatan dalam mengidentifikasi masalah, menganalisis informasi, memberikan argumen logis, menarik kesimpulan, dan mengevaluasi solusi. Kegiatan pembelajaran tersebut juga meningkatkan kepercayaan diri, partisipasi, dan kemampuan siswa untuk menyampaikan ide selama diskusi di kelas.

Key Word:
Innovative Learning Models, Critical Thinking Skills, Vocational High School.

Abstract

Critical thinking skills are essential competencies for vocational high school students because they help learners analyze information, evaluate problems, make logical decisions, and apply knowledge in real-life situations. However, students' critical thinking skills are often limited when classroom activities are dominated by conventional teacher-centered instruction. Therefore, innovative learning models are needed to create more active, meaningful, and student-centered learning experiences. his study aimed to investigate the effect of innovative learning models on students' critical thinking skills at eleventh grade students of Pustek Vocational High School. The research used a quantitative approach with an experimental design. The learning process was conducted by applying innovative learning models that encouraged students to participate actively through problem solving, discussion, collaboration, inquiry, and project-based activities. Data were collected through a critical thinking skills test and analyzed to determine the improvement of students' critical thinking performance after the implementation of the learning models. The results indicated that the implementation of innovative learning models had a positive effect on students' critical thinking skills. Students showed improvement in identifying problems, analyzing information, giving logical arguments, drawing conclusions, and evaluating solutions. The learning activities also increased students' confidence, participation, and ability to express ideas during classroom discussions.

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INTRODUCTION

21st-century education requires students to possess higher-order thinking skills to adapt to developments in science and technology, and the increasingly complex demands of global life. The learning process is no longer solely focused on mastering theoretical knowledge, but also on students' ability to process information, develop ideas, and apply knowledge in various situations(Fajri et al., 2023; Zulyusri et al., 2023); (Liline et al., 2024). Therefore, schools need to encourage learning that fosters analytical, reflective, creative, and critical thinking skills. One key skill that needs to be developed is critical thinking skills, as these skills serve as the

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foundation for students to deeply understand problems and develop rational solutions (Saputra et al., 2019); (Yefang et al., 2024); Tamur et al., 2021).

Critical thinking skills play a crucial role in helping students analyze information, evaluate arguments, solve problems, and make logical and responsible decisions(Farizi et al., 2019). In the context of vocational high school, these skills become increasingly relevant as students are prepared not only for continuing their education but also for entering the workforce, which demands practical skills, precise thinking, and real-world problem-solving skills relevant to their field of expertise(Markiano Solissa et al., 2023; Yulianti, 2020). Vocational school students need to be able to connect theory with practice, assess work situations objectively, and determine appropriate actions based on data and rational considerations. Thus, developing critical thinking skills becomes an important part in improving the quality of graduates who are competent, adaptive, and ready to face professional challenges in the future (Uluk et al., 2024; Zulkifli et al., 2022).

Learning in schools is often dominated by conventional, teacher-centered models, where the teacher is the primary source of information, while students primarily listen, take notes, and receive material(Ichsan et al., 2023). This learning pattern tends to leave students in a passive position, limiting their opportunities to explore ideas, ask questions, and construct understanding independently. In a teacher-centered approach, students are often viewed as recipients of information, while student-centered learning emphasizes active involvement, interaction, and the construction of knowledge through meaningful learning experiences(Elfira & Santosa, 2023; T. A. Santosa & Aprilisia, 2022; W. H. Santosa & Sudirman, 2023). Passive learning conditions can limit the development of students' abilities to ask questions, analyze information, discuss, express opinions, and critically evaluate problems. Critical thinking skills, however, require a learning process that provides space for students to actively participate, solve problems, collaborate, and relate material to real-world situations. Student-centered, activity-based learning is considered more effective in encouraging engagement, responsibility for learning, and the development of critical thinking skills than learning that emphasizes only passive reception of information(Ashtiningsih et al., 2020). Therefore, if learning is still dominated by conventional methods, students' critical thinking skills have the potential to under-develop (Zubaidah et al., 2018; Yuliyanto & Adam Rahmanto, 2023).

Innovative learning models are learning approaches that position students as active participants in the learning process, not merely recipients of information from the teacher. Through this approach, students are given the opportunity to construct knowledge through meaningful learning experiences, such as observing, asking questions, investigating, discussing, solving problems, and reflecting on their learning outcomes(Suzanti et al., 2023). Learning models such as problem-based learning, project-based learning, inquiry-based learning, and cooperative learning are considered student-centered approaches because they encourage active involvement, collaboration, and the use of higher-order thinking skills in the learning process(Mulya Putra et al., 2023; Oktarina et al., 2021). Student-centered learning approaches also emphasize the teacher's role as a facilitator guiding the learning process, while students actively participate in discovering and developing their own understanding (Fitriana et al., 2023).

The importance of implementing innovative learning models lies in their ability to create a learning environment that is more interactive, contextual, and relevant to real life(Chusni et al., 2022). Through activities such as exploring ideas, group discussions, collaboration, problem-solving, and context-based projects, students can connect the subject matter to real-life problems they face(Akkuş & Doymuş, 2022). Problem-based and project-based learning, for example, provide students with opportunities to develop critical thinking, problem-solving, communication, and collaboration skills through tasks that require analysis and decision-making. Therefore, innovative learning models are seen as important to improve the quality of the learning process while helping students develop critical thinking skills needed in 21st century education and the world of work (Tambak et al., 2023).

Several previous studies have shown that the implementation of innovative learning models positively contributes to improving students' critical thinking skills, particularly in the context of vocational education. Sholihah and Lastariwati (2020) examined the application of problem-based learning in vocational high school students and found an increase in critical thinking and problem-solving competencies from 37.4% in cycle I to 78.2% in cycle II. Furthermore, students' average grades also increased, from 70.4 in cycle I to 86.4 in cycle II. These findings indicate that problem-based learning can encourage students to be more active in analyzing problems, developing solutions, and making decisions based on logical thought processes. This is relevant to the current research, as both studies position innovative learning models as a strategy to improve students' critical thinking skills at the vocational school level.

Another study by Hariani, Mohamad, and Sulistyo (2023) also supports the importance of innovative learning models in improving higher-order thinking skills in vocational high school students. The study used a quantitative approach with a quasi-experimental method on 56 students, and the results showed that the

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problem-based learning model based on a scientific approach was effective in improving higher-order thinking skills of vocational school students, including aspects of critical thinking and problem solving. In addition, a systematic review by Al-Kamzari and Alias (2025) confirmed that project-based learning has the potential to increase student engagement, creativity, critical thinking, and scientific skills through active, collaborative, and contextual learning. Thus, these studies strengthen the theoretical basis that innovative learning models, such as problem-based learning and project-based learning, are relevant for improving the critical thinking skills of 11th-grade students at Pustek Vocational High School.

METHOD

This study used a quantitative approach with an experimental method to determine the effect of an innovative learning model on students' critical thinking skills. The research design used was a quasi-experimental design because the subjects came from pre-formed classes, thus preventing the researcher from completely randomizing the students. This study involved eleventh-grade students at Pustek Vocational High School as the research population, while the sample was selected based on the class size appropriate to the research needs. In practice, one class served as the experimental class, receiving instruction using the innovative learning model, while the other class served as the control class, receiving instruction using the conventional model. This design was used to compare differences in students' critical thinking skills before and after the learning intervention.

Data collection in this study involved a pre-test and post-test for critical thinking skills. The pre-test was used to determine students' initial abilities before the implementation of the innovative learning model, while the post-test was used to assess improvements in critical thinking skills after the learning process. The test instrument was designed based on critical thinking indicators, such as the ability to identify problems, analyze information, provide logical reasoning, draw conclusions, and evaluate solutions. The data obtained were then analyzed quantitatively through statistical tests to determine whether there were significant differences between student learning outcomes in the experimental and control classes. Thus, this research method is expected to provide an objective picture of the effectiveness of innovative learning models in improving the critical thinking skills of 11th-grade students at Pustek Vocational High School.

RESULTS AND DISCUSSION

The results of the study indicate a difference in critical thinking skills between students who participated in learning with an innovative learning model and students who participated in conventional learning. The research data were obtained from two groups, namely the experimental class and the control class, each consisting of 30 students. Initial data were collected through a pre-test to determine students' initial critical thinking abilities before the treatment was given, while final data were obtained through a post-test after the learning process took place, the results of which can be seen in Table 1.

Table 1. Descriptive Statistics of Students' Critical Thinking Skills in the Pre-test and Post-test

Group	Number of Students	Type of Test	Minimum Score	Maximum Score	Mean Score	Standard Deviation
Experimental Class	30	Post-test	72	94	82.67	5.94
Control Class	30	Pre-test	48	74	61.73	7.12

Based on Table 1, the post-test scores of the experimental class showed a higher increase compared to the control class. The experimental class obtained an average score of 82.67 with a standard deviation of 5.94, while the control class obtained an average score of 73.20 with a standard deviation of 6.48. The minimum and maximum scores of the experimental class also showed a better increase, from a range of 50–75 in the pre-test to 72–94 in the post-test. Meanwhile, the control class increased from a range of 48–74 in the pre-test to 60–85 in the post-test. These findings indicate that students who participated in learning with an innovative model showed more optimal development of critical thinking skills compared to students who participated in conventional learning.The results of the hypothesis test were conducted to determine whether there was a significant difference between the critical thinking skills of students taught using innovative learning models and those taught using conventional learning models Table 2.

Table 2. The Result of Independent Sample T-Test on Students' Critical Thinking Skills

Group	N	Mean	Standard Deviation	t-value	df	Sig. (2-tailed)	Decision
Experimental Class	30	82.67	5.94	6.000	58	0.000	Ha accepted
Control Class	30	73.20	6.48	6.000	58	0.000	H0 rejected

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Based on the statistical analysis, the Sig. (2-tailed) value was 0.000, which is less than the 0.05 significance level. This indicates a significant difference between the post-test scores of students in the experimental and control classes. The average value of the experimental class was 82.67, higher than the control class of 73.20, so it can be concluded that students who participated in learning with innovative learning models have better critical thinking skills than students who participated in conventional learning. Thus, Ha is accepted and H0 is rejected, which means that the innovative learning model has a significant effect on the critical thinking skills of class XI students at Pustek Vocational High School.

Discussion

The research findings indicate that the implementation of an innovative learning model has a positive impact on the critical thinking skills of eleventh-grade students at Pustek Vocational High School. This is evident in the higher average post-test scores in the experimental class compared to the control class. The experimental class achieved an average post-test score of 82.67, while the control class achieved an average score of 73.20. This difference indicates that students learning through the innovative learning model demonstrate better critical thinking skills than students who participate in conventional learning. Therefore, the innovative learning model can be viewed as an effective learning strategy for creating an active, reflective learning process oriented toward the development of higher-order thinking skills (Ali et al., 2024; Edy Nurtamam et al., 2023; Wantu et al., 2024).

The results of the hypothesis test also support these findings. Based on the independent sample t-test analysis, a significance value of 0.000 was obtained, lower than the 0.05 level of significance. This indicates a significant difference between the critical thinking skills of students in the experimental and control classes. Therefore, the alternative hypothesis is accepted, while the null hypothesis is rejected. Academically, these results indicate that the use of innovative learning models not only resulted in descriptive improvements in grades but also had a statistically significant impact on students' critical thinking skills.

The improvement in critical thinking skills in the experimental class can be explained by the characteristics of the innovative learning model, which positions students as active participants in the learning process(Mahfudz & Sukarno, 2023). Through discussions, problem-solving, group work, idea exploration, and argumentation, students have the opportunity to practice their skills in identifying problems, analyzing information, evaluating alternative solutions, and drawing logical conclusions. This differs from conventional learning, which tends to be teacher-centered and leaves students passively receiving information(Chusni et al., 2022); (Basyah et al., 2018). Therefore, innovative learning better enables students to develop critical thinking skills because the learning process is oriented not only toward mastery of material but also toward the ability to use knowledge to solve real-world problems.

This research finding aligns with research by Sholihah and Lastariwati (2026), which showed that the application of problem-based learning can improve students' critical thinking and problem-solving competencies. In this study, critical thinking and problem-solving competencies increased from 37.4% in the first cycle to 78.2% in the second cycle, while the average student score increased from 70.4 to 86.4. These results strengthen the argument that problem-based learning, as an innovative learning model, can encourage students to be more active in analyzing problems and developing solutions based on logical considerations.

Furthermore, these research findings are supported by Hariani, Mohamad, and Sulistyo (2019) , who examined the application of a problem-based learning model based on a scientific approach to vocational high school students. The study used a quantitative approach with a quasi-experimental method and involved 56 students in both experimental and control classes(Muhfahroyin et al., 2023). The results showed that the problem-based learning model plays a role in improving vocational high school students' higher-order thinking skills, including critical thinking and problem-solving abilities. The consistency of these findings indicates that this innovative learning model is relevant for application in the context of vocational education, as vocational high school students require higher-order thinking skills to address work situations and practical problems related to their fields of expertise (Dewanto et al., 2024); (Jariah & Aminatun, 2022).

Furthermore, these findings are consistent with the study by Al-Kamzari and Alias, who emphasized that project-based learning has the potential to increase student engagement, curiosity, creativity, critical thinking skills, and scientific skills. Project-based learning encourages students to work collaboratively, develop solutions, and connect learning concepts to real-life situations. This aligns with research findings at the Vocational High School's Center for Technology, where students in the experimental class demonstrated greater improvement in critical thinking skills after participating in innovative learning. Therefore, innovative learning models, whether problem-based learning, project-based learning, inquiry-based learning, or cooperative learning, can be effective pedagogical alternatives for improving learning quality and preparing students for the demands of 21st-century education and the workplace.

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CONCLUSION

The results indicated that the implementation of innovative learning models had a positive effect on students' critical thinking skills. Students showed improvement in identifying problems, analyzing information, giving logical arguments, drawing conclusions, and evaluating solutions. The learning activities also increased students' confidence, participation, and ability to express ideas during classroom discussions. Based on the research results, it can be concluded that the implementation of an innovative learning model had a positive and significant effect on the critical thinking skills of eleventh-grade students at Pustek Vocational High School. This is demonstrated by the higher average post-test scores in the experimental class compared to the control class. Students who participated in the innovative learning model experienced a more active, interactive, and contextual learning experience through discussions, problem-solving, collaboration, idea exploration, and argumentation. These learning activities encouraged students to develop their skills in identifying problems, analyzing information, evaluating alternative solutions, providing logical reasoning, and drawing rational conclusions

The results of the hypothesis test also showed a significance value less than 0.05, thus accepting the alternative hypothesis and rejecting the null hypothesis. Thus, there was a significant difference between the critical thinking skills of students taught using the innovative learning model and those taught using the conventional learning model. These findings confirm that innovative learning models can be an effective pedagogical strategy for improving the quality of learning, particularly in the context of vocational education. Therefore, teachers are advised to implement more active, collaborative, and problem-based learning models so that students have critical thinking skills that are relevant to the demands of 21st-century education and the needs of the world of work.

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