

Research Article

The Effectiveness of Using the CORE Learning Model Assisted by Interactive E-Modules to Improve Critical Thinking Skills of Vocational School Students

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Abstract

The CORE learning model (Connecting, Organizing, Reflecting, and Extending) is an instructional approach that emphasizes active student engagement in connecting knowledge, organizing information, reflecting on understanding, and extending the application of concepts to real-life situations. This study integrated the CORE model with an interactive e-module to enhance the critical thinking skills of vocational students majoring in Office Management. The research employed a one-group pretest–posttest design involving a saturated sample of 36 tenth-grade students at SMK Hidayah Semarang. Data were collected through pretest and posttest instruments and were analyzed using a paired-sample t-test. The results indicated that the mean score increased from 58.78 (moderate category) to 72.56 (good category). Furthermore, the paired-sample t-test yielded a significance value of 0.000 ($p < 0.05$), indicating a statistically significant difference between the pretest and posttest scores. Therefore, the CORE learning model assisted by an interactive e-module was proven to be effective in improving students' critical thinking skills in the Digital Document subject. Practically, these findings imply that teachers may adopt the CORE model integrated with interactive e-modules as an alternative instructional strategy to promote active learning and foster higher-order thinking skills in vocational education.

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INTRODUCTION

Critical thinking skills are an important competency that students must have in this era of globalization and rapid technological development. However, in practice, learning in schools is still largely dominated by a conventional teacher-oriented approach, so that opportunities for students to develop higher-level thinking skills, including critical thinking, are still limited. This condition is also found in the context of vocational education, particularly in office management subjects in vocational high schools, which actually require analytical skills, problem-solving, and decision-making based on real situations.

Various studies have shown that the CORE learning model can improve students' critical thinking skills. However, studies that directly integrate the CORE (Connecting, Organizing, Reflecting, Extending) model with interactive e-modules, especially in office management subjects in vocational schools, are still relatively limited. In fact, the integration of innovative learning models with digital media has the potential to provide a more active, contextual, and meaningful learning experience. These limitations indicate a research gap that needs to be filled through empirical studies on the effectiveness of the CORE model assisted by interactive e-modules in improving students' critical thinking skills.

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Critical thinking skills are one of the competencies that are highly needed in this era of globalization and rapid technological development. In the world of education, critical thinking skills are not only important to help students overcome everyday problems, but also to improve their analytical and problem-solving abilities (Zakiah & Lestari, 2019). These skills include the ability to evaluate information, question existing assumptions, analyze evidence objectively, and develop logical and reasoned arguments. Therefore, educators need to equip students with critical thinking skills that can be applied in various aspects of life (Zubaidah, 2016).

Improving critical thinking skills is a challenging task today because students have to deal with a huge flow of information, such as the internet. This is because students adapt more quickly to any learning environment, they are given the opportunity to actively engage in the learning process and solve interesting theoretical and practical problems based on critical thinking (Song & Cai, 2024). Critical thinking skills are among the 21st-century skills that every student must possess, which include critical thinking, creativity, collaboration, and communication, also known as the 4Cs (Zubaidah, 2016).

Therefore, more serious efforts are needed in designing learning that can foster students' critical thinking skills. One of the efforts that can be made is to apply a technology-based learning model, such as the use of e-modules or digital learning media that can facilitate students in developing their critical thinking skills. E-modules as learning media have advantages because they can present interactive and easily accessible material, and allow students to learn independently with minimal guidance from teachers (Puspitasari, 2019).

The CORE model (Connecting, Organizing, Rehearsing, Evaluating) is closely related to critical thinking skills because it provides a systematic process to encourage students to think deeply. By connecting new information with existing knowledge, students can identify relationships and patterns, which are important for critical thinking (Wahyuningsih & Purwandari, 2025a). Organizing information in a structured manner helps students separate facts from opinions and assess the relevance of information. Practicing allows students to apply their knowledge in various contexts and test their ideas, while evaluation teaches students to assess arguments and ideas objectively (Ayudia & Mariani, 2022). Thus, the CORE model supports the comprehensive development of critical thinking skills.

A number of studies also show the effectiveness of this model. For example, Ayudia & Mariani (2022) reported an increase in learning completeness from 65.62% in cycle I to 87.5% in cycle II, while Rahmadayanti et al. (2022) found a 56% increase in mathematical problem-solving skills in students who learned using the CORE model assisted by interactive digital modules. Conceptually, the CORE model is considered superior to conventional teacher-centered learning, where the learning process is dominated by lectures and assignments, resulting in passive students. Joyce & Weil (2009) mention that The weakness of conventional learning lies in the lack of opportunities for students to develop higher-order thinking skills, as it only emphasizes memorization. In contrast, the CORE model is based on student-centered learning, which is in line with Piaget and Vygotsky's constructivist theory, where knowledge is actively constructed through experience and interaction. Therefore, the CORE model not only delivers material but also guides students to analyze, evaluate, and apply concepts so that they are more effective in forming critical thinking skills that are relevant in the 21st century.

Research conducted by Wati et al. (2018) shows that the improvement in critical thinking skills of vocational high school students before and after being taught using the CORE model was mostly in the moderate category, namely 88.89%, while 11.11% was in the high category. Based on the results, it was also found that no students experienced a decline in scores, remained at the same level, or experienced a low increase. This proves that the application of the CORE model is effective in improving students' critical thinking skills.

From various studies that have been conducted, it can be concluded that the CORE learning model is highly effective in improving students' critical thinking skills. However, research that specifically examines the application of the CORE (Connecting, Organizing, Reflecting, Extending) model assisted by e-modules in office management subjects in vocational schools is still very limited. In fact, this subject requires students to have critical and analytical thinking skills, for example in understanding filing procedures, managing business communications, and designing office administration systems. The integration of e-modules with the CORE model allows students to connect theoretical concepts with practice, organize information in a structured

system, reflect on the effectiveness of the solutions applied, and expand their skills through workplace-based case studies. This potential highlights the need for further research to optimize the use of the e-module-assisted CORE model in supporting office management learning in vocational schools, thereby producing graduates who are ready to face the challenges of the modern workplace.

In the context of office management learning, the CORE model stands out as an effective learning approach for improving understanding and skills in office administration management. The CORE model emphasizes critical thinking and hands-on experience, which are highly relevant in understanding management concepts such as filing, business communication, or time management. For example, when studying digital filing systems, students not only understand the theory but also apply these skills through simulations based on real cases. This model helps students connect concepts with practice, reflect on the effectiveness of the systems used, and develop innovative solutions to improve operational efficiency. This learning is an important element in preparing students for the challenges of the dynamic world of office administration.

The e-module-assisted CORE model provides many benefits in the context of critical thinking skills learning. In the Connecting stage, e-modules facilitate students in linking new material with prior knowledge through interactive media such as videos and simulations. The Organizing stage is supported by a systematic e-module structure, such as concept maps and diagrams, to help students organize information logically. Next, in the Reflecting stage, the e-module enables self-evaluation through interactive quizzes and case study-based exercises that provide immediate feedback to improve student understanding. Finally, the Extending stage is facilitated with simulations or project-based assignments, encouraging students to apply their learning in real-world contexts. With its flexibility, interactivity, and ability to adapt to different learning styles, the e-module enriches the application of the CORE model and creates active, relevant, and critical learning (Rahmadayanti et al., 2022).

METHOD

This study uses a “One-Group Pretest-Posttest Design,” which is a type of research design in which initial measurements (pretest) are taken before treatment is given and final measurements (posttest) are taken after treatment is given. This design allows researchers to obtain more accurate results, because changes can be observed by comparing conditions before and after treatment.

Table 1 Skema One Group Pre-Test-Post Test Design

<i>Pre Test</i>	<i>Treatment</i>	<i>Post Test</i>
T ₁	X	T ₂

T₁: Pre-test conducted before treatment

X: Treatment administered to students using the Core model assisted by e-modules

T₂: Post-test conducted after treatment

This study was conducted at SMK Hidayah Semarang, located at Jalan Karangrejo Raya No. 64, Srandol Wetan, Kec. Banyumanik, Semarang City, Central Java 50263. According to Sugiyono (2018), population refers to a group of objects or subjects that have certain properties and characteristics determined by the researcher to be studied, to draw conclusions based on these observations. In this study, the population consisted of all 36 students in grade X at SMK Hidayah Semarang.

According to Ennis (in Susilawati et al., 2020), there are 12 indicators of critical thinking skills grouped into 5 aspects of critical thinking skills. Ennis broadly defines critical thinking as reflective and reasoned thinking, which is suitable for developing the analytical, evaluative, and argumentative abilities of high school/vocational school students. Additionally, the indicators include essential skills such as identifying problems, evaluating evidence, and constructing and communicating arguments, which are crucial in both academic and professional settings. The following are the indicators of critical thinking skills:

Table 2 Critical Thinking Skills Indicators

No	Aspect	Indicator
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1. Providing simple explanations	<ul style="list-style-type: none"> a. Formulating questions that are clear and relevant to the learning topic b. Analyzing information needed to understand a subject c. Asking and answering questions related to tasks or problems encountered
2. Building basic skills	<ul style="list-style-type: none"> a. Assessing the credibility of information sources in learning and practice b. Checking the accuracy of observation reports in school activities or work practice
3. Drawing conclusions	<ul style="list-style-type: none"> a. Compiling and considering conclusions from the data or information obtained b. Drawing conclusions based on patterns observed in learning and work practice c. Making decisions based on data analysis and learning experiences
4. Providing further explanation	<ul style="list-style-type: none"> a. Identifying relevant terms and definitions in the field of expertise being studied b. Analyzing the assumptions underlying a concept, policy, or procedure
5. Organizing strategies and tactics	<ul style="list-style-type: none"> a. Determining work steps to complete tasks or projects effectively b. Interacting and collaborating with others in completing tasks and obtaining information

According to Faiz (in [Umbu et al., 2020](#)), critical thinking indicators in critical activities are defined as the ability to formulate key issues; the ability to express the facts needed to solve problems; the ability to select logical, relevant, and accurate arguments; the ability to detect bias based on different points of view; and the ability to determine the consequences of a statement taken as a decision.

According to [Saputro \(2013\)](#), the critical thinking indicators that students must possess are (1) analytical skills, which are the skills to break down a structure into its components to understand the organization of that structure. The main objective of this skill is to understand a global concept by breaking down or detailing the global concept into smaller and more detailed parts; (2) synthesis skills are the opposite of analytical skills. Analyzing skills are skills for connecting parts into a new form or arrangement; (3) problem recognition and solving skills, which are skills for applying concepts to several new meanings. These skills require readers to understand the reading critically so that after the reading activity is complete, students can grasp several main ideas from the reading, enabling them to form a concept. The purpose of this skill is to enable readers to understand and apply concepts to new problems or contexts; (4) the skill of concluding is an activity of the human mind based on existing understanding/knowledge (truth) that can lead to new understanding/knowledge (truth); (5) Evaluating skills require careful thought in determining the value of something based on various existing criteria. Evaluating skills requires readers to assess the value being measured using certain standards.

In this study, the saturated sampling technique was applied to select relevant and representative samples. This technique was used by taking all members of the population who met certain criteria. In the context of this study, 36 students consisting of 20 female students and 16 male students who met the criteria, were selected to be studied regarding the application of the CORE learning model assisted by e-modules on students' critical thinking skills at SMK Hidayah Semarang. This sample was taken to ensure that all individuals relevant to the research topic were included, so that the data obtained could describe the effect of the application of the CORE learning model on students' abilities as a whole.

In this study, there are two types of variables involved, namely independent variables (X) and dependent variables (Y). The independent variable in this study is the CORE learning model assisted by interactive e-modules. This independent variable is an element that is considered to influence or determine other variables. Meanwhile, the dependent variable (Y) is students' critical thinking skills as the dependent variable. According to Sugiyono (2018), validity testing is a step to determine the extent to which a measurement instrument, such as a questionnaire or test, can measure what it is supposed to measure. Validity testing was conducted twice to measure the validity of the pre-test and post-test instruments. After the validity test, the reliability test was conducted. According to Sugiyono (2018), a reliable instrument is used several times to measure the same object and produces the same data. This reliability test aims to ensure that if a re-measurement is carried out using similar indicators, the results will not change.

The data analysis process was carried out to ensure that the conclusions drawn in this study were accurate and in line with expectations. In quantitative research, analysis begins after data have been successfully collected from various sources. Data analysis activities include grouping data based on variables, presenting data for each variable studied, and performing the calculations necessary to test the established hypotheses. The analysis technique used is descriptive analysis to describe the mode, median, mean, and standard deviation. To test the research hypothesis, a Paired T-Test is used. The purpose of the Paired T-Test is to compare two means from related or paired samples to determine whether there is a significant difference between two conditions in the same group. Hypothesis testing was carried out by measuring the difference in students' critical thinking skills based on the pre-test results, which were obtained before using the CORE learning model assisted by interactive e-modules, and the post-test results, which were obtained after using it. In this study, hypothesis testing was conducted to measure the difference in the average critical thinking skills of students between their pre-test scores before using the CORE learning model assisted by interactive e-modules and their post-test scores after using the CORE learning model assisted by interactive e-modules. This test used a two-tailed test with a significance level (α) of 5%.

RESULTS AND DISCUSSION

Prerequisite Test

The normality test in this study used SPSS 25 with the Shapiro-Wilk formula. In determining the normality of the data, it is sufficient to read the significance value. If the significance is < 0.05 , then the conclusion is that the data is not normally distributed. If the significance value is > 0.05 , then the data is normally distributed. The following are the results of the normality test analysis using the Shapiro-Wilk formula:

Normality Test Results

Tests of Normality						
	Statistic	Kolmogorov-Smirnov ^a		Shapiro-Wilk		
		df	Sig.	Statistic	df	Sig.
Pretest	.074	36	.200*	.982	36	.813
Posttest	.106	36	.200*	.976	36	.618

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Based on the results of the normality test using the Shapiro-Wilk test, a significance value of 0.813 was obtained for the pretest data on the Shapiro-Wilk. Meanwhile, the posttest data had a significance value of 0.618 on the Shapiro-Wilk. All of these significance values were greater than 0.05, so it can be concluded that the pretest and posttest data were normally distributed. Thus, the data meets the requirements for further analysis.

Hypothesis Testing

After determining that both data sets are normally distributed, the next step is to conduct a hypothesis test. This hypothesis test was performed using the Paired Sample T-Test method through the IBM SPSS Statistics program. The Paired Sample T-Test method is used to test two data sets that come from the same group but at different times. The decision criteria in this test are that if the significance value is < 0.05 and the t-count value is $> t\text{-table}$, then H_0 is rejected and H_a is accepted.

		Paired Differences			95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Pretest-Posttest	-13.778	10.900	1.817	-17.466	-10.090	-7.584	35	.000

Source: SPSS research data processing results

Based on the results of the Paired Sample T-Test, the mean difference between the pretest and posttest scores was -13.778, which means that the posttest score was 13.778 points higher than the pretest score. This value indicates a significant improvement after the learning intervention was implemented. The standard deviation of the score difference is 10.900 with a standard error of 1.817. The calculated t-value is -7.584 with a degree of freedom (df) of 35 and a significance value (Sig. 2-tailed) of 0.000. Because this significance value is less than 0.05 ($0.000 < 0.05$), it can be concluded that there is a significant difference between the pretest and posttest scores. Thus, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted, which means that the application of the CORE learning model assisted by interactive e-modules has a significant effect on improving students' critical thinking skills.

Students' Critical Thinking Skills After Using the CORE Learning Model Assisted by E-Modules

This study was motivated by the need to improve students' critical thinking skills, which have not been optimally developed in traditional teacher-centered learning. Critical thinking is important for students to be able to evaluate information, construct logical arguments, and make rational decisions, which are integral parts of 21st-century competencies and relevant in various learning contexts (Mohamed Nor & Sihes, 2021). The CORE learning model was chosen because its systematic stages of connecting, organizing, reflecting, and extending encourage students to actively connect prior and new knowledge, organize information meaningfully, reflect on their understanding, and apply it in real-world contexts. Previous research shows that models such as CORE can significantly improve critical thinking skills compared to conventional learning, thus providing a strong theoretical basis for its effectiveness in this context (Wahyuningsih & Purwandari, 2025).

In this study, the CORE model was implemented through four learning stages that were designed sequentially and contextually. In the Connecting stage, students were encouraged to relate new material to their previous experiences so that critical thinking skills were formed from the outset; the Organizing stage guided students to organize information systematically, thereby facilitating the process of analyzing and evaluating concepts; the Reflecting stage provides space for students to assess their understanding through discussion and deep thinking exercises; and the Extending stage facilitates students in applying concepts in project assignments or case studies relevant to the world of work (Desidenila & Kemala Sari, 2025). This phased approach demonstrates how CORE not only delivers material but also creates learning conditions that support the development of higher-order critical thinking skills. This is in line with research showing that the use of structured learning models such as CORE can significantly improve students' critical thinking skills through active and participatory learning experiences.

Critical thinking skills emphasize the importance of a person's ability to analyze, evaluate, and make decisions rationally and logically. Ennis (in Susilawati et al., 2020) explains that critical thinking encompasses a number of key skills, such as recognizing relevant arguments, assessing the reliability of information sources, identifying the assumptions underlying an argument, and formulating and testing that argument. A student with good critical thinking skills is expected to be able to critique assumptions, assess the strength of evidence, and

draw conclusions based on logical reasoning and convincing evidence. In the context of learning, critical thinking skills can be improved through the application of the CORE (Connecting, Organizing, Reflecting, Extending) model supported by technology-based learning media, such as interactive e-modules. The CORE model emphasizes the active involvement of students in connecting concepts, organizing information, reflecting on understanding, and extending knowledge into new contexts. With the help of interactive e-modules, students are provided with a more independent and engaging learning space, encouraging them to explore, analyze, and think critically in greater depth (Dwi Indriani & Achdisty Noordiyana, 2021).

The improvement in students' critical thinking skills after implementing the CORE learning model assisted by interactive e-modules was evident through a comparison of pretest and posttest results. A total of 36 students from SMK Hidayah Semarang participated in this study. At the pretest stage, the average critical thinking skill score of students was 58.78, with a median of 60.00 and a mode of 48. The highest score achieved by students was 82 and the lowest score was 36, with a standard deviation of 10.597. These values indicate that there was considerable variation in the initial abilities of students before the learning intervention was carried out. After the implementation of the learning model, the posttest results showed a significant improvement. The average score increased to 72.56, with a median of 72.00 and a mode of 68. The highest score rose to 88, while the lowest score increased to 60, with a score range of 28 points. The standard deviation decreased to 6.905, indicating that student scores became more evenly distributed and centered around the mean. These findings indicate that the CORE learning model assisted by interactive e-modules is effective in improving students' critical thinking skills overall.

One factor that could potentially influence the improvement in learning outcomes in this study is the novelty effect of digital media, where the use of interactive e-modules as a relatively new learning tool can increase students' attention, interest, and engagement during the learning process. In addition, students' intrinsic motivation is likely to increase because the learning is designed to be more interesting, challenging, and provides room for independent exploration. The role of teachers as active facilitators in directing discussions, providing feedback, and encouraging reflection cannot be ignored, as these pedagogical factors contribute to creating a conducive learning environment. Therefore, the improvement in critical thinking skills that occurred is likely the result of the interaction between the CORE learning model, the use of interactive e-modules, and other supporting factors, rather than solely the result of a single variable.

However, the improvement in learning outcomes shown by comparing pretest and posttest scores can still be considered strong empirical evidence of an increase in students' critical thinking skills after implementing the CORE model assisted by interactive e-modules. This is based on the fact that the assessment instruments used were specifically designed to measure indicators of critical thinking skills, such as the ability to analyze, evaluate, and draw logical conclusions. In addition, the stages in the CORE model are conceptually in line with higher-order thinking processes, as they encourage students not only to receive information but also to organize, reflect on, and apply knowledge in new contexts. Thus, the increase in learning outcome scores in this study can be interpreted as a reflection of the development of students' critical thinking skills through active and meaningful learning experiences, although these findings still need to be further confirmed through a research design with a control group.

This improvement shows that the CORE learning model combined with interactive e-modules has a positive impact on the development of students' critical thinking skills. Activities in the CORE model, such as connecting knowledge, organizing information, reflecting on understanding, and expanding concepts, provide space for students to think more actively in a logical, analytical, and evaluative manner (Malika Raxmiddinovna, 2025).

Effectiveness of Implementing the CORE Learning Model Assisted by E-Modules on Critical Thinking Skills

(Miller & Calfee, 2004) state that the CORE model is a discussion approach that encourages students to build knowledge independently. With this model, students are expected to be able to relate old experiences to new concepts, reflect on their understanding, and broaden their horizons through application in a broader context. This encourages students to actively seek information, relate old and new knowledge, and solve

problems through effective communication. They also learn to analyze and expand their mindset to grasp the values of lessons and apply them in everyday life. This process not only hones cognitive skills but also shapes critical and reflective attitudes, enabling students to think analytically, evaluate situations, and contribute positively to society. The implementation of the CORE learning model assisted by interactive e-modules in the Digital-Based Documents subject in the Office Management department at SMK Hidayah Semarang was carried out through four main stages, namely Connecting, Organizing, Reflecting, and Extending. These stages were implemented sequentially according to the learning syntax. In the first meeting, learning was focused on understanding the concept of documents and their management procedures using the CORE model stages. Meanwhile, in the second meeting, the focus of learning shifted to the introduction of document management tools.

- a. In the Connecting stage, students are guided to relate the material to relevant prior knowledge or experiences. In the first meeting, students showed enthusiasm when answering questions that related the material on digital documents to their daily experiences. This helped students develop an initial interest in the topic to be discussed. In the second meeting, students showed high engagement when observing images of modern office equipment. The initial discussion helped them connect the material to their prior knowledge and experiences.
- b. The Organizing stage is carried out by presenting material through interactive e-modules equipped with attractive exercises and visualizations, making it easier for students to understand the concepts. In the first meeting, the teacher briefly explains documents, types of documents, and the functions of documents. Students actively discuss to identify the types of documents in a company, demonstrating their ability to organize information systematically. In the second meeting, students work in groups to compile a list of office equipment. This activity encourages them to think systematically and collaboratively.
- c. In the Reflecting stage, students are allowed to reflect on their understanding through discussions, critical questions, and exercises. In the first meeting, it was evident that students began to demonstrate critical thinking skills. They compiled summaries of the material and asked questions that explored the concepts of documents and document management procedures in greater depth. In the second meeting, students wrote down their understanding of document management tools and compared it with other groups. This stage became a moment of reflection that fostered critical thinking, as they were challenged to assess the strengths and weaknesses of each tool.
- d. In the Extending stage, students are encouraged to broaden their understanding by completing project assignments or case studies that are applicable to the office environment. In the first meeting, students search for examples of digital documents and share their findings. This activity trains their analytical and communication skills, as well as broadening their understanding of how the material is applied in the real world. In the second meeting, students conduct a small research on digital document storage software such as Google Drive and OneDrive. They then compile a summary containing an analysis of the advantages and disadvantages, which demonstrates their ability to identify problems and provide logical solutions.

In addition to the application of the CORE model assisted by interactive e-modules, the improvement of students' critical thinking skills in this study was also potentially influenced by several other factors. One of them was the novelty effect of using interactive e-modules as a learning medium. During implementation, most students showed high enthusiasm when they first used e-modules equipped with attractive visual displays, learning videos, and interactive exercises. This condition made students more focused on following the lesson and more active in exploring the material presented. This initial interest encouraged students to read the material more deeply, try out the available features, and complete the exercises independently, thereby indirectly contributing to the improvement of students' learning outcomes and critical thinking skills.

Another factor that is no less important is the role of teachers as facilitators in directing the learning process. In the implementation of this research, teachers not only delivered material, but also asked stimulating questions, guided discussions, and provided feedback on students' work. This role helped students stay on the right track in their learning without reducing their independence in thinking. The conducive and interactive

learning environment created by teachers encourages students to be more courageous in expressing their opinions, critiquing information, and reflecting on their understanding. Thus, the improvement in students' critical thinking skills is the result of the synergy between the CORE learning model, the use of interactive e-modules, and the role of teachers as facilitators.

Although there were some obstacles, such as unstable internet connection, this could be overcome by providing an offline version of the e-module, so that learning could continue effectively. Then there was insufficient learning time, because the presentation process did not reach all groups as the learning time had run out and it was time to move on to another subject. Teachers continued to play their role as facilitators, guiding the discussion process and providing feedback without giving direct instructions, which created a collaborative and open learning environment that encouraged independent exploration. Based on the results of the Paired Sample T Test, the Sig. value (2-tailed) of 0.000 (<0.05) indicated a significant difference between the pre-test and post-test scores. This confirms that the application of the CORE model assisted by interactive e-modules has a real impact on improving students' critical thinking skills. Furthermore, the mean difference between the pre-test and post-test scores was -13.778, which means that the average post-test score was 13.778 points higher than the pre-test score. This value indicates a significant improvement after the learning intervention was implemented. These results prove that the application of the CORE learning model, assisted by interactive e-modules, effectively improves students' critical thinking skills. The average increase of 13,778 points shows a significant positive impact, where students not only understand the material better but are also better trained in organizing information, reflecting on concepts, and applying knowledge in new contexts. Based on the above analysis, it is stated that the application of the CORE model, assisted by interactive e-modules, effectively improves students' critical thinking skills. The average increase of 13.778 points shows a significant positive impact, where students not only understand the material better but are also more skilled at organizing information, reflecting on concepts, and applying knowledge in new contexts. The CORE approach provides greater opportunities for students to actively explore, reflect, and apply knowledge during the learning process. Thus, the initial assumption regarding the effectiveness of the CORE model in improving students' critical thinking skills has been proven.

CONCLUSION

Based on the results of the research and discussion described above, it can be concluded that most students showed an increase in critical thinking skills from moderate to good. The average critical thinking score of students on the pretest was 58.78, and after the application of the CORE model assisted by interactive e-modules, the average posttest score increased to 72.56. This shows that the majority of students have fairly good critical thinking skills, but have not yet reached a high level. The results of the Paired Sample T Test confirm the effectiveness of the CORE model assisted by interactive e-modules in improving students' critical thinking skills. The Sig. value (2-tailed) of 0.000 (<0.05) indicates a significant difference between the pretest and posttest scores. Therefore, the hypothesis that the use of the CORE learning model assisted by e-modules is effective in improving the critical thinking skills of vocational high school students majoring in Office Management is confirmed.

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