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THE EFFECT OF CHATGPT-BASED CONSTRUCTIVIST LEARNING MODEL ON OBSERVATION REPORT TEXT WRITING SKILLS

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Abstract

The importance of observation report text writing skills among vocational students cannot be underestimated, as it is a basic competency that supports the development of their academic literacy. However, at SMK Negeri 2 Pekanbaru, several obstacles were found such as low student motivation and lack of time for effective learning, which hindered the mastery of observation report text writing skills. This study aims to explore the effect of ChatGPT-based Constructivist Learning model in improving observation report text writing skills. Using mixed methods with sequential explanatory design, this study involved 68 students who were divided into experimental and control groups. The results showed that the ChatGPT-based Constructivist Learning model significantly improved the skill of writing observation report text compared to the conventional method. Qualitative data analysis also supported the quantitative findings that students and teachers faced challenges in digital literacy such as difficulties in understanding the user interface or how to interpret the feedback provided. However, this technology has great potential to improve writing skills if implemented well. This study concludes that the integration of ChatGPT-based Constructivist Learning model in learning can improve observation report text writing skills, although habituation in utilizing digital literacy is needed so that it can be implemented effectively and continuously.

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INTRODUCTION

In the continuously evolving digital era, knowledge and information technology have significantly impacted various aspects of life, including the field of education (Chen et al., 2020; Hopcan et al., 2023; Lameras & Arnab, 2022; Pham & Sampson, 2022). One of the most prominent technological advancements is the emergence of artificial intelligence, which offers a variety of innovative solutions to support the learning process (Ifenthaler & Schumacher, 2023; Liu et al., 2022; Tang et al., 2023). A popular application of artificial intelligence is ChatGPT, a language model developed by OpenAI. ChatGPT can respond to questions and provide relevant information based on user requests. This application can be used as a medium to enhance students' writing skills (Imran & Almusharraf, 2023; Zou & Huang, 2023).

The Constructivist Learning model is a teaching approach that emphasizes active learning processes where students construct their own knowledge through experiences and interactions with the learning environment. Constructivist theory, pioneered by Jean Piaget and Lev Vygotsky, suggests that learning is an active and dynamic process (Affandi & Tantra, 2022; Sharma & Sharma, 2021). Through the Constructivist Learning model, students build meaning and understanding through direct experiences and reflection. This approach differs from traditional teaching models, which tend to be teacher-centered, where students are

considered passive recipients of information (Morel, 2021; Muganga & Ssenkusu, 2019; Sharma & Sharma, 2021).

The integration of the Constructivist Learning model with ChatGPT offers significant potential in enhancing students' writing skills. ChatGPT functions as a supportive tool that facilitates active learning processes, provides instant feedback, and helps students develop ideas and writing structures (Beck & Levine, 2023). Through interaction with ChatGPT, students can engage in constructive dialogue. They can explore various perspectives, receive writing suggestions, and obtain further explanations regarding relevant grammar and vocabulary (Lin & Schmidt, 2023). This process not only enriches the learning experience but also enables students to learn independently and take initiative in overcoming writing challenges.

One of the essential skills students need to master is the ability to write observation report texts (Nurrokhma, 2021; Octarini & Noveria, 2023). This skill is crucial to develop because it encompasses various competencies, such as the ability to observe carefully, accurately record information, and compose clear and systematic reports. The process of writing an observation report involves not only writing skills but also the abilities to analyze and synthesize data (Charlina et al., 2022; Charlina & Rasdana, 2022; Hasminur et al., 2023; Putri et al., 2021). Therefore, innovative and effective approaches to teaching observation report writing are highly needed.

However, at SMK Negeri 2 Pekanbaru, there are several problems faced in developing the skill of writing observation report text. One of the main obstacles is that students often find it difficult to start writing, develop ideas, and compose systematic sentences. As a result, many students produce reports that are incomplete or do not meet the standards and linguistic rules of observation report text. In addition, the limited time given for learning to write observation report texts in class is also an inhibiting factor. Teachers often do not have enough time to provide detailed and individualized feedback to each student, so the writing improvement process becomes less effective.

In addition to motivation and time issues, many students and teachers are not yet tech-savvy, particularly in utilizing ChatGPT. The lack of understanding and skills in using this application prevents most of them from leveraging this technology to support writing observation report texts. On the other hand, most teachers are also not accustomed to integrating technology-based learning models into the teaching process, highlighting the need for specific ideas to optimize the application of ChatGPT in writing instruction. Students who are less exposed to technology tend to feel awkward and confused when interacting with ChatGPT. Teachers, as the primary facilitators of learning, also require deep understanding and practical skills in using ChatGPT to teach students more effectively. These limitations demand comprehensive and structured solutions to improve students' writing skills through the application of more modern and interactive learning models.

Several studies have conducted similar research related to the application of Constructivist Learning model. AL-Ghazo & Al-Zoubi (2018) revealed that Constructivist Learning can improve writing skills. In line with Abdelwahab (2022), the use of the Constructivist Learning model can improve students' critical writing skills. Constructivist Learning model emphasizes the active involvement of students in the learning process, this learning model is able to facilitate the development of writing skills through a collaborative approach, where students can share ideas and evaluate the results of their writing in groups (AL-Ghazo & Al-Zoubi, 2018; Shehadeh, 2011; Wu et al., 2023).

According to previous studies, there has been no research specifically integrating the Constructivist Learning model with ChatGPT. Most prior research has focused on the general use of ChatGPT technology in education, but none have explored the unique potential of ChatGPT within the context of constructivist learning (Ajlouni et al., 2023; Alshahrani, 2023;

Cai et al., 2023; Karakose & Tülübaş, 2023; Zheng, 2023). Thus, this implementation not only paves the way for new applications of educational technology but also makes a significant contribution to academic literature and practical pedagogy. This research is expected to be pioneering in combining theoretical approaches with advanced technological applications, providing new insights into how ChatGPT can be used to support more effective and meaningful teaching and learning processes.

This study aims to explore the impact of the ChatGPT-based Constructivist Learning model on students' skills in writing observation report texts. Specifically, the research will examine how the integration of ChatGPT into the learning process can assist students in developing their writing skills, as well as how students respond to the use of this technology in their learning. The study is expected to make a significant contribution to the development of more effective and innovative teaching methods for enhancing students' writing skills, particularly in writing observation report texts. Additionally, the results are anticipated to provide insights for educators and education policymakers on the potential and challenges of integrating ChatGPT technology into the learning process.

RESEARCH METHOD

Research Design

This study employs a mixed methods approach using a sequential explanatory design. The sequential explanatory design aims to explore findings from the quantitative approach and expand them with data from the qualitative approach (Creswell & Clark, 2018; Lee, 2019; Stephan, 2024). The quantitative approach will be used to measure improvements in students' skills in writing observation report texts before and after the intervention using the ChatGPT-based Constructivist Learning model. Meanwhile, the qualitative approach will be utilized to gain in-depth insights into students' experiences and perceptions of using ChatGPT in their learning.

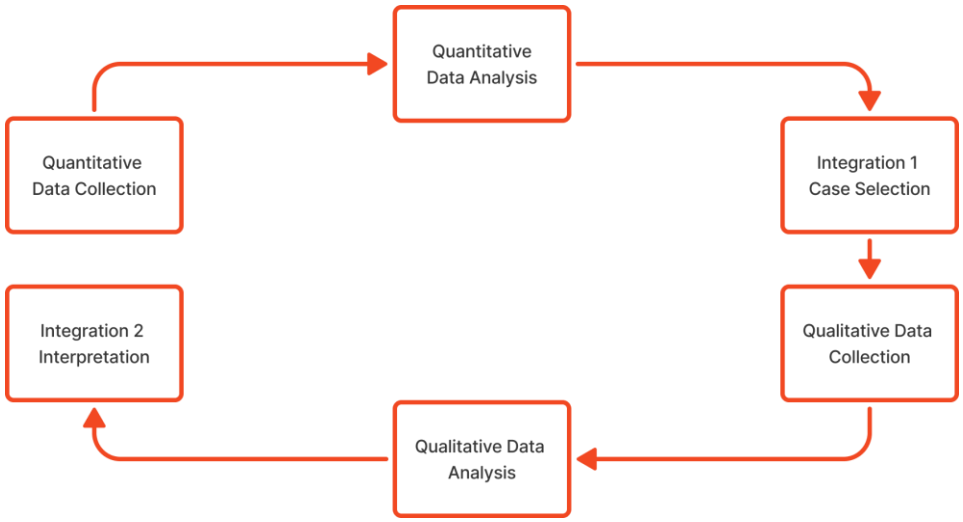

Figure 1. Sequential Explanatory Mixed Method Design
(Stephan, 2024)

Research Participants

This study involves students from the X Chemical Engineering class at SMK Negeri 2 Pekanbaru, consisting of 5 classes with a total of 180 students. The research sample is determined using purposive sampling, a technique where the researcher selects individuals or groups with specific characteristics relevant to the research objectives (Campbell et al., 2020; Wu-Suen et al., 2014). Some considerations in sampling this study include the variation of

students' writing skills, so that the sample includes students with various levels of writing ability; the availability of access to technology, considering the use of technology-based learning media is an important part of this study; and students' readiness to participate in using various learning media that will support the implementation of constructivist learning models. Therefore, the study includes 34 students from X Chemical Engineering-2 as the experimental group receiving the ChatGPT-based Constructivist Learning model treatment, and 34 students from X Chemical Engineering-5 as the control group receiving conventional model treatment.

Instruments

This study used an instrument of performance test of observation report text writing skills and semi-structured interviews. The performance test instrument has been validated by experts to ensure accuracy and conformity with the research objectives. From the results of expert validation, it was stated that the instrument had met the content validity criteria, where each indicator and sub-indicator used was relevant to the research objectives. The expert also stated that the instrument was suitable for use because it had a high level of accuracy in measuring students' writing skills and was consistent in its application in learning situations. The performance test was given after the intervention of the ChatGPT-based Constructivist Learning model in the experimental class and the intervention of the conventional model in the control class. The indicators of the performance test assessment used in this study are described as follows.

Table 1
Performance Test Assessment Instrument for Writing Observation Report Text Skills

No.	Indicator	Sub-Indicator
1.	Structure of observation report text	a. General statement b. Section description c. Description of benefits d. Conclusion
2.	Language rules of observation report text	a. Nouns b. Verb c. Adjective d. Definition sentence e. Description sentence f. Classification sentence g. Simplex sentence h. Complex sentence
3.	Creativity and originality	a. Creativity b. Originality of writing
4.	Quality of Observation	a. Accuracy in observing b. Completeness of data observed

Upon the completion of the learning process in both the experimental and control classes, the researcher conducted semi-structured interviews with the teachers to explore their experiences with ChatGPT in the context of teaching. These interviews aimed to gather in-depth insights into how the teachers perceived and utilized ChatGPT while implementing learning activities, particularly focused on teaching students to write observation report texts. To guide the discussion, several key components were addressed during the interviews. These included the integration of ChatGPT into the classroom, its perceived benefits in enhancing the learning experience, the challenges teachers faced during its implementation, and the responses of students to the use of ChatGPT. These topics were selected to provide a comprehensive understanding of the practical implications of using AI tools like ChatGPT in

educational settings, shedding light on both its potential advantages and the difficulties encountered in real-world teaching environments.

Data Analysis

This study produces quantitative data obtained from the performance test of observation report text writing skills and qualitative data from the results of interviews. Quantitative data was collected to objectively measure students' writing skills after the treatment, while qualitative data was obtained to provide deeper insights into teachers' experiences in using ChatGPT when implementing learning skills in writing observation report text. Quantitative data analysis in this study was conducted with the aim to determine the effect of ChatGPT-based Constructivist Learning model on students' observation report text writing skills. The initial step involves descriptive statistical analysis to provide an overview of the data distribution, including mean, median, mode, and standard deviation of students' writing skills test results. Subsequently, data analysis includes normality and homogeneity of variance tests to ensure the data meet the assumptions required for performing an independent sample t-test. Once these assumptions are met, an independent sample t-test is conducted to compare the average writing skills scores between the experimental group using the ChatGPT-based Constructivist Learning model and the control group using conventional teaching methods.

Analysis of the qualitative data from the interviews involved a process of coding and categorization to identify key themes that emerged from the teachers' answers. This qualitative data provided deeper insights into teachers' experiences of using ChatGPT as part of the learning process. The coding process began with a thorough reading of the interview transcripts to understand the context and content of the teachers' answers. After that, the researcher identifies keywords, phrases, or sentences that indicate certain concepts or phenomena, then groups them into relevant categories. This qualitative data provides rich context and details that cannot be obtained from quantitative data. Qualitative data can explain why and how, as well as what factors contribute to the effectiveness of using ChatGPT in learning. Thus, this qualitative data analysis complements the quantitative findings and provides a more comprehensive understanding of the effect of ChatGPT-based Constructivist Learning model on students' observation report text writing skills.

RESEARCH FINDINGS AND DISCUSSION

Data Description

This study involves two different classes: the experimental class, which receives the treatment of the ChatGPT-based Constructivist Learning model, and the control class, which receives the conventional teaching model. Both classes are tested and assessed based on the instruments prepared by the researcher. The results of the observation report writing skills from both classes are presented in the following table.

Table 2
Data Description

		Experiment	Control
N	Valid	34	34
	Missing	0	0
Mean		78,53	64,56
Std. Error of Mean		1,871	1,973
Median		80,00	65,00
Mode		70a	65
Std. Deviation		10,908	11,505
Variance		118,984	132,375

	Experiment	Control
Range	40	50
Minimum	55	40
Maximum	95	90
Sum	2670	2195

a. Multiple modes exist. The smallest value is shown

Based on the data description, the results of writing observation report skills from the experimental and control classes show a significant difference. The average writing skill score for students in the experimental class, which used the ChatGPT-based Constructivist Learning model, is 78,53, which is higher compared to the control class using conventional methods with an average score of 64,56. This shows that on average students in the experimental class get better learning outcomes than the control class. Additionally, the median score for the experimental class is also higher (80,00) compared to the control class (65,00), indicating that most students in the experimental class have better writing skills. The standard deviation for the experimental class (10,908) is slightly smaller than that of the control class (11,505), suggesting that the score variability in the experimental class is more homogeneous. This data indicates that the application of the ChatGPT-based Constructivist Learning model improves students' writing skills compared to conventional teaching methods.

Tests of Normality

To meet the assumption of normal distribution, the writing skills test data for observation report texts in this study needs to undergo a normality test. The normality test aims to ensure that the data from both groups follow a normal distribution, allowing the independent sample t-test to be conducted validly. The normality test is performed using the Kolmogorov-Smirnov test, with the condition that if the p-value from the normality test is greater than 0,05, the data is considered to be normally distributed. The results of the normality test will provide a solid foundation for proceeding with descriptive and inferential statistical analysis, ensuring that the conclusions drawn from this study are based on data that meets the required basic assumptions.

Table 3
Tests of Normality

	Kolmogorov-Smirnov[a]			**Shapiro-Wilk**		
	Statistic	df	Sig.	Statistic	df	Sig.
Eksperiment	0,135	34	0,119	0,921	34	0,017
Control	0,140	34	0,089	0,965	34	0,336

a. Lilliefors Significance Correction

The results of the normality test using the Kolmogorov-Smirnov test show that the p-value for the experimental class is 0,119 and for the control class is 0,089. Both values are greater than 0,05, indicating that the data from both groups follow a normal distribution. Therefore, it can be concluded that the writing skills test data for observation report texts in both the experimental and control classes meet the assumption of normality. This means that the independent sample t-test can be conducted validly, ensuring that the conclusions of the study are based on data that meets the required basic assumptions.

Tests of Homogeneity of Variances

Homogeneity of variance testing is conducted to ensure that the variance of data from both groups, namely the experimental class and the control class, is equal or homogeneous.

This test is crucial because the independent sample t-test assumes that the variances of the compared groups should be the same. The homogeneity test is performed using Levene's test, with the condition that if the p-value from Levene's test is greater than 0,05, the variances of the two groups are considered homogeneous.

Table 4
Tests of Homogeneity of Variances

		Levene Statistic	**df1**	**df2**	**Sig.**
Value	Based on Mean	0,006	1	66	0,937
	Based on Median	0,008	1	66	0,931
	Based on Median and with adjusted df	0,008	1	64,623	0,931
	Based on trimmed mean	0,006	1	66	0,941

The results of the homogeneity of variance test using Levene's test show that the p-value based on the mean is 0,937, which is greater than 0,05. This indicates that there is no significant difference in variance between the experimental and control classes. Therefore, the variance of data from both groups is considered homogeneous, allowing the independent sample t-test to be conducted under the assumption that variances between groups are equal.

Independent Sample T-Test

Hypothesis testing is conducted to determine whether there is a significant difference in observation report writing skills between students in the experimental class using the ChatGPT-based Constructivist Learning model and students in the control class using conventional methods. The results of the independent sample t-test analysis in this study are presented as follows.

Table 5
Independent Sample T-Test

	Levene's Test for Equality of Variances		**t-test for Equality of Means**						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	0,006	0,937	5,138	66	0,000	13,971	2,719	8,542	19,399
Equal variances not assumed			5,138	65,813	0,000	13,971	2,719	8,542	19,400

The results of the independent sample t-test indicate a significant difference in observation report writing skills between students in the experimental class using the ChatGPT-based Constructivist Learning model and students in the control class using conventional methods. The calculated t-value is 5,138 with df = 66, which is greater than the critical t-value of 1,6682, and the Sig. 2-tailed value is 0,000, which is less than 0,05. This indicates a significant difference at a 95% confidence level. The mean difference in writing skills between the two groups is 13,971, with a 95% confidence interval ranging from 8,542 to 19,399. This suggests that the use of the ChatGPT-based Constructivist Learning model has a significant positive impact on students' writing skills compared to conventional methods.

Teacher Perception of ChatGPT

The teachers' perceptions of using ChatGPT in this study were obtained from semi-structured interviews and are classified as qualitative data. These qualitative findings provide deeper insights into how teachers experience and utilize ChatGPT in the learning process. The results of the semi-structured interviews are presented as follows.

Table 6
Teacher Perception of ChatGPT

No.	Questions	Teacher Perception
1.	How do you integrate ChatGPT into teaching observation report writing skills?	As a teacher, I integrate ChatGPT into learning as an interactive tool to provide explanations and direct examples related to the material being studied. I ask students to interact with ChatGPT during writing practice sessions, where they can ask questions, request clarifications, and receive instant feedback on their writing. Additionally, I use ChatGPT to present various observation scenarios that students can use as a basis for writing their reports.
2.	What benefits do you see from using ChatGPT in helping students write observation report texts?	The main benefit I have observed is an improvement in students' understanding of the structure and content of observation report texts. ChatGPT assists students by providing clear and detailed explanations of each section of the report, as well as relevant examples. Additionally, students are more motivated and engaged in learning because they can interact with advanced and responsive technology. Instant feedback from ChatGPT also helps students quickly correct their mistakes and learn from them.
3.	Are there any challenges or obstacles you faced while using ChatGPT in teaching?	One challenge I face is the limited digital literacy among some students, which makes it difficult for them to use ChatGPT effectively.
4.	How do students respond to the use of ChatGPT in writing observation report texts?	Overall, students' responses have been very positive. They feel supported by ChatGPT as it provides additional explanations and examples tailored to their needs. Some students have even reported feeling more confident in writing observation report texts after interacting with ChatGPT.
5.	How can you ensure that students do not solely rely on ChatGPT but continue to develop their writing skills independently?	A major challenge for teachers is ensuring that students do not solely rely on ChatGPT but continue to develop their writing skills independently. To address this challenge, I will integrate ChatGPT with an approach that encourages active student engagement in the writing process. I will teach that ChatGPT should be used as a tool for revising and refining texts, not for drafting initial drafts. To support the development of independent writing skills, I will provide writing exercises without technological assistance, hold class discussions, and offer constructive feedback regularly.

Discussion

The research results underscore a notable difference in students' observation report writing skills between those in the experimental class, who employed the Constructivist Learning model with the aid of ChatGPT, and those in the control class, who followed conventional instructional methods. This difference is evidenced by a t-value of 5.138, with degrees of freedom (df) = 66, which exceeds the critical t-value of 1.6682. The significance value ($p = 0.000$) further confirms this difference at a 95% confidence level, indicating the effectiveness of the Constructivist Learning approach supplemented by technology. These quantitative findings validate the premise that incorporating interactive tools like ChatGPT into educational methodologies can significantly improve students' writing capabilities.

The enhancement in writing skills observed in the experimental group aligns with a body of research supporting the efficacy of the Constructivist Learning model in fostering students' writing development. Al-Ghazo and Al-Zoubi (2018) and Wu et al. (2023) similarly found that constructivist-based teaching methods enhance writing skills through active student engagement and the construction of knowledge. This approach is rooted in constructivist theory, which posits that students learn more effectively when they are active participants in the learning process, engaging in problem-solving, collaboration, and reflection. The active role of students in constructing their knowledge through interaction with tools like ChatGPT is supported by the theoretical frameworks of educational researchers such as Fitria et al. (2021), Laskar and Bhattacharjee (2022), and Pundir and Surana (2016). They emphasize that learning is most effective when students can engage meaningfully with content, build upon their prior knowledge, and receive feedback in real-time.

The integration of ChatGPT into the Constructivist Learning model serves as an example of using technology as a cognitive tool that facilitates deeper learning. ChatGPT provides students with immediate and detailed feedback on their writing, which enables them to revise and refine their work more efficiently. This process supports the constructivist view that knowledge is constructed through continuous interaction with the learning environment, as noted by Ahn (2012), who stressed the importance of social interaction and cognitive tools in students' cognitive development. The use of such tools allows students to engage in metacognitive practices—reflecting on their thought processes and understanding—while also receiving guided instruction in areas such as structure, coherence, and language use in writing observation reports.

The research results provide concrete evidence of the improvement in writing skills among students who used ChatGPT as part of their learning process. The mean difference in writing skills between the experimental and control groups was 13.971, with a 95% confidence interval ranging from 8.542 to 19.399. This substantial difference indicates that the students in the experimental group not only outperformed those in the control group but also experienced a greater enhancement in their ability to write observation report texts. This aligns with previous studies that have demonstrated the value of technology in enhancing students' writing abilities. Mills et al. (2023), for instance, observed that technological tools like ChatGPT can improve both the quality of students' writing and their ability to engage in critical thinking. This study corroborates these findings by showing that students who had access to an interactive AI tool were better equipped to produce higher-quality written work compared to their peers in the control group.

In addition to the quantitative data, qualitative feedback from teachers reinforced the positive impact of ChatGPT in the learning process. Teachers observed that the integration of ChatGPT not only helped students grasp the structure and content of observation report texts more clearly but also increased their motivation to engage with the writing process. The motivational benefits of using interactive technologies in education are well-documented in the literature. Ali et al. (2023), Gilson et al. (2023), and Sallam (2023) highlight that technology-enhanced learning environments can foster greater student engagement, motivation, and sustained interest in academic tasks. ChatGPT, by providing immediate feedback and personalized suggestions, created a dynamic learning environment where students could engage more deeply with the writing process, thereby enhancing both their cognitive and motivational involvement in the learning task.

Moreover, teachers reported that the instant feedback provided by ChatGPT was particularly beneficial for improving the quality of students' writing. Students were able to receive timely suggestions on how to improve their drafts, which enabled them to make revisions in real-time. This process not only streamlined the revision process but also helped students internalize important writing conventions and techniques. The clear guidance

provided by ChatGPT on the key elements of observation report writing—such as structure, clarity, and analytical depth—was instrumental in improving students' overall writing quality. This dual cognitive and motivational support suggests that integrating tools like ChatGPT in the classroom can have far-reaching benefits in enhancing academic skills.

Despite the positive outcomes, the study also highlighted several challenges associated with the use of ChatGPT in educational settings. One significant challenge reported by teachers was the issue of digital literacy. Some students, particularly those less familiar with digital tools, struggled to use ChatGPT effectively. For these students, difficulties in navigating the user interface or interpreting the feedback provided by the tool created barriers to maximizing the benefits of the technology. Lo (2023) and Zhu et al. (2023) similarly identified digital literacy as a key factor influencing students' ability to engage effectively with educational technologies. This suggests that additional efforts are needed to provide students with the necessary digital literacy skills to make optimal use of advanced learning tools like ChatGPT. As Fakhrudin and Haryanto (2023), Latumahina et al. (2023), and Nikou and Aavakare (2021) have argued, adequate digital literacy is essential for ensuring that all students can benefit from technology-enhanced learning environments.

The findings from this study provide strong empirical support for the positive impact of the ChatGPT-based Constructivist Learning model on students' writing skills. The significant improvements in the experimental group, combined with the qualitative feedback from teachers, demonstrate the potential of integrating AI tools like ChatGPT into educational practices. However, the study also highlights the importance of addressing challenges such as students' digital literacy to ensure that all learners can benefit equally from these technological innovations. Future research should continue to explore how technology can be effectively integrated into different educational contexts and identify strategies for overcoming the barriers associated with its use. This study contributes to the growing body of literature supporting the integration of technology in education and suggests that AI tools can play a pivotal role in enhancing academic skills like writing.

CONCLUSION

This study shows that the application of ChatGPT-based Constructivist Learning model significantly improves students' observation report text writing skills compared to conventional methods. The Sig. 2-tailed value of 0,000 < 0,05 confirms the significant difference at the 95% confidence level. This finding is in line with constructivist theory and technology-based learning, especially ChatGPT, can improve students' writing skills. However, there are challenges related to digital literacy that need to be addressed to maximize the effectiveness of using technology in learning. Overall, the findings imply that the integration of ChatGPT in the Constructivist Learning model has great potential to improve students' writing skills, but there is also a need for digital literacy training for students. Schools and educators need to design training programs that support mastery of digital technologies to ensure that all students can make effective use of these tools. In addition, the results support the importance of using interactive technologies in education, which can improve the quality of learning and student engagement. Further research is needed to explore broader implementation methods and solutions to ChatGPT-related challenges.

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