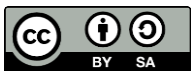
IDEAS

Journal of Language Teaching and Learning, Linguistics and Literature

ISSN 2338-4778 (Print)
ISSN 2548-4192 (Online)

Volume 13, Number 1, June 2025
pp.146 - 172



Issued by English study program of IAIN Palopo

The Effect of Quillbot on The Eleventh-Grade Students' Writing Skills and Academic Integrity at Senior High School

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Received: 2024-09-06 Accepted: 2025-03-17
DOI: 10.24256/ideas. v13i1.6177

Abstract

This study examines the effect of QuillBot on eleventh-grade students' writing skills and academic integrity. This quantitative study addresses three main questions: 1) Is there any simultaneous significant effect of the use of the QuillBot on eleventh-grade students' writing skills and academic integrity? 2) Is there any significant effect of the use of the QuillBot on eleventh-grade students' writing skills? and 3) Is there any significant effect on the use of the QuillBot for eleventh-grade students' academic integrity? Data were collected through writing tests and academic integrity questionnaire, with analysis conducted using MANOVA. The findings indicate that QuillBot significantly affects students' writing skills by enhancing clarity, coherence, and accuracy. Furthermore, QuillBot influences academic integrity by promoting ethical writing practices, such as proper paraphrasing and plagiarism detection. The study concludes that QuillBot is a valuable tool for writing skills and maintaining academic integrity in educational settings when it is used responsibly and under supervision. Recommendations are provided for educators on integrating QuillBot into their teaching strategies to maximize its benefits while minimizing potential misuse.

Keywords: *Academic integrity; Quillbot, Writing Skills*

Introduction

In the context of language learning, writing is recognized as a particularly challenging skill to acquire and refine. It reflects an individual's ability to effectively articulate and convey ideas in written form (Song & Song, 2023). According to Maulidina and Wibowo (2022), writing encompasses several components, including theory, methodology, grammar, structure, and conceptualization of ideas. Apart from that, Rany et al., (2021) highlighted that students must follow four

ISSN 2338-4778 (Print)
ISSN 2548-4192 (Online)

crucial steps to produce successful writing: pre-writing, drafting, revising, and editing. Based on these definitions, writing is viewed as a complex skill involving a comprehensive internal process and numerous elements to consider.

In Indonesia, writing proficiency remains a significant challenge for students. A study by Suryani et al. (2023) revealed that only 35% of high school students meet the national writing competency standards, with most struggling with grammar and idea organization. Similarly, Prasetyo (2022) found that 60% of students rely heavily on direct translations from their native language, leading to awkward phrasing and coherence issues. Based on these definitions, writing is viewed as a complex skill involving a comprehensive internal process and numerous elements to consider.

In EFL classrooms, students often struggle to express their ideas in writing due to grammatical errors (Asnas & Hidayanti, 2024; Budjalemba & Listyani, 2020; Fauzani et al., 2018; Pratama, 2020). Grammar is perceived as intimidating for many students (Yuliawati, 2021), leading to reluctance in writing when they feel their grammatical skills are inadequate. Additionally, there is a growing issue of students substituting writing with copying and pasting others' work which leads to acts of plagiarism (Clarin & Baluyos, 2022; Rodhiya & Hermilia, 2020; Rustan & Thaha, 2023). Clarin and Baluyos (2022) also argued that students frequently just copy and paste contents from the sources they found instead of voicing their ideas using their own words. Plagiarism constitutes a violation of academic integrity, undermining the intellectual value of written work.

In addition to grammatical issues and academic integrity violations, the effectiveness of writing instruction also significantly influences students' writing development. A total of 70% of Indonesian high school students find writing lessons monotonous, with limited opportunities for interactive learning (Farahsani & Rini, 2023;Amyatun & Kholis, 2023). This is often linked to how effectively teachers implement their instructional strategies in classroom activities (Rashid et al., 2022). A prevalent issue is that writing instruction is frequently delivered through unengaging methods, with a heavy focus on the teacher as the central figure and limited opportunities for students to express their ideas (Febriani et al., 2023).

Despite the government's efforts to design a curriculum that encourages student-centered learning, this issue remains common in classrooms (Retnaningrum et al., 2023). Additionally, many students become bored during writing lessons because teachers rely on conventional methods that do not inspire their desire to write (Solhi et al., 2024). Therefore, it is evident that teachers play a role in students' lack of interest in writing due to the inadequacy of strategies they currently employ.

As discussed above, students face challenges in writing due to grammatical errors, academic integrity violations, and uninteresting instructional strategies. A solution is needed to address these issues. Previous studies have demonstrated how incorporating technology into language instruction can develop students' potential and enhance their language proficiency. Research by Akbarani (2024) and Ginting et al., (2023) indicated that the use of artificial intelligence (AI) has a significant impact on language learning by providing automated feedback, error correction, and contextual vocabulary suggestions. AI holds great potential in English language teaching, enhancing the learning process and experience (Asmara & Kastuhandani, 2024; Syahnaz & Fithriani, 2023). Through personalized instruction, quick feedback, and immersive language practice, artificial intelligence (AI) can improve the English language learning experience.

QuillBot is a powerful artificial intelligence tool that significantly aids in enhancing students' writing skills (Fitria, 2021;Kurniati & Fithriani, 2022;Mohommad et al., 2024; Nurmayanti & Suryadi, 2023). Specifically, Ho (2023) noticed that QuillBot offers paraphrasing, grammar checking, summarization, and co-writing features that assist students in improving sentence structure and clarity. Ho (2023) also emphasized that students produce better writing when they use QuillBot during the writing process. QuillBot allows students to avoid plagiarism by paraphrasing content, producing more organized text, and avoiding the need to start from scratch or copy and paste from other people's work. Furthermore, Kurniati and Fithriani, (2022) also agreed that time and effort are well spent using QuillBot since it can help students write better. These studies indicate that implementing QuillBot is highly beneficial for enhancing students' writing skills, particularly in improving grammar, structure, and mechanics, as well as preventing plagiarism.

Previous studies have focused on assessing QuillBot's effectiveness in improving students' writing abilities. Those researchers have suggested incorporating QuillBot into EFL classes to support the teaching and learning process, especially in writing. They also recommend further research on various aspects of QuillBot's use. However, Asmara and Kastuhandani (2024), Kurniati and Fithriani (2022), as well as Marzuki (2023) have noted the potential for students to become overly reliant on QuillBot, which may affect their academic integrity. As AI tools become more integrated into education, it is crucial to investigate their long-term impact on students' independent writing skills and ethical writing practices. This issue warrants further investigation to understand the impact of QuillBot on students' academic integrity. Furthermore, most studies on QuillBot have focused on undergraduate students, with limited research on its use at the high school level. To fill the gap in those related studies, the current study examines the effects of QuillBot on specific aspects of writing skills and academic integrity. Three research questions need to be answered:

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1. Is there any simultaneous significant effect of the use of the QuillBot on eleventh-grade students' writing skills and academic integrity?
2. Is there any significant effect of the use of the QuillBot on eleventh-grade students' writing skills?
3. Is there any significant effect on the use of the QuillBot for eleventh-grade students' academic integrity?

Method

Research Design

This study employed a quantitative approach. According to Sugiyono (2015), quantitative research is a methodology grounded in positivism, used to examine populations and samples. It involves statistical and quantitative data analysis to test formulated hypotheses. This research approach is typically structured using a deductive-inductive process, beginning with the conceptual framework, theoretical study, research understanding, factual issues, and hypothesis-based solutions. Therefore, a quantitative study serves as a method to test hypotheses.

The research design adopted is quasi-experimental which aims to examine the effect of treatment on students' writing skills and academic integrity. In this quasi-experimental research, two groups are involved: the experimental group and the control group. The experimental group received treatment using the independent variable (X) namely, QuillBot, while the control group used the conventional learning methods typically employed by the teacher such as using a textbook, Google Translate, and the internet. This study used a pre-test and post-test-only control group design, where both groups were given a pre-test before the treatment and a post-test afterward.

Research Setting, Population, and Sample

The setting of this study was SMA Negeri 2 Singaraja. This school is a public school located on Srikandi Street, Baktiseraga Village, Buleleng District, Buleleng Regency, Bali Province. To determine the research sample, cluster random sampling was used as a sampling technique. The population consists of all eleventh-grade students at SMA Negeri 2 Singaraja, who are naturally grouped into classes (XI.A, XI.B, XI.C, XI.D, XI.E, XI.F, XI.G, XI.H, XI.I, and XI.J). The study population was 364 eleventh-grade students. The researcher identified these classes as clusters and randomly selected two of them through a lottery to represent the sample. The result of the lottery showed that XI.B and XI.C were the samples of this research. To determine which group would be the experimental group and which would be the control group, a lottery was administered again. The result showed that XI.B was the control group, and XI.C was the experimental group. Each group

consisted of 38 students.

Research Instrument

In collecting the data, this study involved two research instruments: writing tests and a closed-ended questionnaire for academic integrity. The writing tests were developed based on the research design, which used pre-test and post-test-only control groups. The writing tests (pre-test and post-test) measured the student's ability to make a good analytical exposition and a descriptive text based on the predetermined topic. In addition, the closed-ended questionnaire was distributed to assess eleventh-grade students' understanding, attitudes, and behaviors related to academic integrity. The questionnaire was developed based on the theoretical and empirical study in a Likert four-point range. The instrument focused on the six fundamental values of academic integrity, namely honesty, trust, fairness, respect, responsibility, and courage. The statements in the questionnaire were divided equally across the six fundamental values of academic integrity and the total number of statements in the questionnaire was 42.

Data Validity and Reliability of The Instrument

Content Validity of the Instrument

The content validity of writing tests (pre-test and post-test) and the academic integrity questionnaire were tested using Gregory's Formula proposed by Nurkancana and Sunartana (1992). Additionally, the academic integrity questionnaire was treated by an empirical validity and reliability process. The tabulation of the Gregory's Formula and the criteria are presented below:

Table 1. Gregory's Formula

Tabulation Result		**Expert 1**		**Notes**
				A: Expert 1 and Expert 2 do not agree
		Irrelevant	Relevant	B: Expert 1 agrees; Expert 2 does not agree
Expert 2	Irrelevant	A	B	C: Expert 1 does not agree; Expert 2 agrees
	Relevant	C	D	D: Expert 1 and Expert 2 agree

Criteria:

Range	Quantitative Data
0.8 – 1.00	Very high validity
0.6 – 0.79	High validity
0.40 – 0.59	Intermediate validity

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ISSN 2548-4192 (Online)

0.20 – 0.39 Low validity
0.00 – 0.19 Very low validity

The result of the content validity of the writing tests and questionnaire is presented below:

Table2. The Pre-Test Result of Experts' Judgment

		Expert 1	
		Irrelevant	Relevant
Expert 2	Irrelevant	A = 0 items	B = 0 items
	Relevant	C = 0 items	D = 4 items

Content Validity = $\frac{D}{A+B+C+D}$

$$\frac{4}{0+0+0+4} = 1.00$$

The calculation showed that the pre-test's content validity was 1.00, which was categorized as very high validity. This meant that the pre-test content validity was very high and met the content validity test criteria.

Table 3. The Post-Test Result of Experts' Judgment

		Expert 1	
		Irrelevant	Relevant
Expert 2	Irrelevant	A = 0 items	B = 0 items
	Relevant	C = 0 items	D = 4 items

Content Validity = $\frac{D}{A+B+C+D}$

$$\frac{4}{0+0+0+4} = 1.00$$

The calculation showed that the post-test's content validity was 1.00, which was categorized as very high validity. This meant that the post-test content validity was very high and met the content validity test criteria.

Table 4. The Questionnaire Result of Experts' Judgment

		Expert 1	
		Irrelevant	Relevant
Expert 2	Irrelevant	A = 0 items	B = 0 items
	Relevant	C = 1 items	D = 41 items

Content Validity = $\frac{D}{A+B+C+D}$

$$\frac{41}{0+0+1+41} = 0.98$$

The calculation showed that the content validity of the questionnaire was 0.98, which was categorized as a very high validity. It meant that the post-test content validity was very high and met the content validity test criteria. Although the content is valid, it should be revised in the item of the questionnaire number 22.

Reliability Test of Academic Integrity Questionnaire

The reliability test result of the academic integrity questionnaire is presented as follows:

Table 5. Reliability Test of Academic Integrity Questionnaire

Reliability Statistics

Cronbach's Alpha	N of Items
.851	42

All items in the questionnaire are reliable because Cronbach's Alpha value is greater than 0.06 (0.851 > 0.06). In addition, the value of Cronbach's Alpha is also greater than 0.80 (see Table 3.9), which means that the academic integrity questionnaire is categorized as very reliable and preferable to be used.

Research Procedure

The first step of the procedure was selecting the research population. The population for this current research was recruited from a senior high school, had an English lesson in the class, had internet access, students were allowed to bring their mobile phone, and students could operate a laptop or computer. Therefore, the population was eleventh-grade students at SMA Negeri 2 Singaraja. The following step was dividing the research sample into two groups, called the experimental group and the control group through a lottery. Before giving treatment to students in the experimental and control groups, the researcher gave a pre-test to students. After providing the pre-test, the sample in both groups were treated based on the arrangement during eight times of treatment. The control group was treated as the teacher's usual strategies in teaching writing such as using a textbook and internet. Meanwhile, the experimental group was treated using artificial intelligence namely QuillBot. Then, the researcher gave a post-test to students two weeks after treatments.

This research was conducted in 8 meetings. Each meeting took 90 minutes in class, which consisted of 10 minutes for preparing students (opening activity), 70

ISSN 2338-4778 (Print)
ISSN 2548-4192 (Online)

minutes for delivering materials (main activity), and 10 minutes for closing the class. Both experimental and control groups studied the same topic, including the material of Descriptive Text and Analytical Exposition Text. Although the study contents were the same, the activities of the two groups were different. The control group mostly used a textbook and the internet while the experimental group combined the textbook and the use of QuillBot. Students in the experimental group used the premium version of the QuillBot to access all features and optimize the results. The treatment in both groups in producing writing was arranged based on the chapter books and learning objectives.

Results

Descriptive Statistical Analysis

Based on the research design, the data in this study were categorized into four, including 1) pre-test data on students' writing skills (A1Y1 and A2Y1), 2) post-test data on students' writing skills (A1Y1 and A2Y1), 3) pre-test data on students' academic integrity (A1Y2 and A2Y2), and 4) post-test data on students' academic integrity (A1Y2 and A2Y2). A1 is for the experimental group, and A2 is for the control group. The data in the form of mean score, minimum, and maximum scores were calculated based on the criteria proposed by Nurkancana and Sunartana (1992) as follows.

Table 6. Categories of Descriptive Statistical Analysis

Score	Criteria
(Mi +1.5 Sdi) < X	Very Good (VP)
(Mi + 0.5 Sdi) ≤ X < (Mi +1.5 Sdi)	Good (P)
(Mi – 0.5 Sdi) ≤ X < (Mi + 0.5 Sdi)	Fair (SP)
(Mi – 1.5 Sdi) ≤ X < (Mi – 0.5 Sdi)	Poor (N)
X < (Mi – 1.5 Sdi)	Very Poor (VN)

1. *Pre-Test Data on Students' Writing Skills (A1Y1 and A2Y1)*

The data on students' writing skills in the experimental group (A1Y1) is presented in Table 7, and the data on students' writing skills in the control group (A2Y1) is presented in Table 8.

Table 7. Pre-Test Data on A1Y1

Pre-Test (A1Y1)	
Mi = $\frac{1}{2}$ (75 + 52.5)	Sdi = $\frac{1}{6}$ (75 – 52.5)
Mi = $\frac{1}{2}$ (127.5)	Sdi = $\frac{1}{6}$ (22.5)
Mi = 63.75	Sdi = 3.75
Data Calculation	
Calculation	**Criteria**
[63.75 + 1.5 (3.75)] < X **69.375 < X**	Very Good (VP)
[63.75 + 0.5 (3.75)] ≤ X < [63.75 + 1.5 (3.75)] **65.625 ≤ X < 69.375**	Good (P)
[63.75 – 0.5 (3.75)] ≤ X < [63.75 + 0.5 (3.75)] **65.625 ≤ X < 65.625**	Fair (SP)
[63.75 – 1.5 (3.75)] ≤ X < [63.75 – 0.5 (3.75)] **58.125 ≤ X < 65.625**	Poor (N)
X < [63.75 – 1.5 (3.75)] **X < 58.125**	Very Poor (VN)

Table 8. Pre-Test Data on A2Y1

Pre-Test (A2Y1)	
Mi = $\frac{1}{2}$ (72.5 + 60)	Sdi = $\frac{1}{6}$ (72.5 – 60)
Mi = $\frac{1}{2}$ (132.5)	Sdi = $\frac{1}{6}$ (12.5)
Mi = 66.25	Sdi = 2.083
Data Calculation	
Calculation	**Criteria**
[66.25 + 1.5 (2.083)] < X **69.374 < X**	Very Good (VP)

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[66.25 + 0.5 (2.083)] ≤ X < [66.25 + 1.5 (2.083)] **67.291 ≤ X < 69.374**	Good (P)
[66.25 – 0.5 (2.083)] ≤ X < [66.25 + 0.5 (2.083)] **65.208 ≤ X < 67.291**	Fair (SP)
[66.25 – 1.5 (2.083)] ≤ X < [66.25 – 0.5 (2.083)] **63.125 ≤ X < 65.208**	Poor (N)
X < [66.25 – 1.5 (2.083)] **X < 63.125**	Very Poor (VN)

2. *Post-Test Data on Students' Writing Skills (A1Y1 and A2Y1)*

The data on students' writing skills in the experimental group (A1Y1) is presented in Table 9, and the data on students' writing skills in the control group (A2Y1) is presented in Table 10.

Table 9. Post-Test Data on A1Y1

Post-Test (A1Y1)	
Mi = $\frac{1}{2}$ (95 + 80)	Sdi = $\frac{1}{6}$ (95 – 80)
Mi = $\frac{1}{2}$ (175)	Sdi = $\frac{1}{6}$ (15)
Mi = 87.5	Sdi = 2.5
Data Calculation	
Calculation	**Criteria**
[87.5 + 1.5 (2.5)] < X **91.25 < X**	Very Good (VP)
[87.5 + 0.5 (2.5)] ≤ X < [87.5 + 1.5 (2.5)] **88.75 ≤ X < 91.25**	Good (P)
[87.5 – 0.5 (2.5)] ≤ X < [87.5 + 0.5 (2.5)] **86.25 ≤ X < 88,75**	Fair (SP)

[87.5 – 1.5 (2.5)] ≤ X < [87.5 – 0.5 (2.5)] **83.75 ≤ X < 86.25**	Poor (N)
X < [87.5 – 1.5 (2.5)] **X < 83.75**	Very Poor (VN)

Table 10. Post-Test Data on A2Y1

Post-Test (A2Y1)	
Mi = $\frac{1}{2}$ (85 + 70)	Sdi = $\frac{1}{6}$ (85 – 70)
Mi = $\frac{1}{2}$ (155)	Sdi = $\frac{1}{6}$ (15)
Mi = 77.5	Sdi = 2.5
Data Calculation	
Calculation	**Criteria**
[77.5 + 1.5 (2.5)] < X **81.25 < X**	Very Good (VP)
[77.5 + 0.5 (2.5)] ≤ X < [77.5 + 1.5 (2.5)] **78.75 ≤ X < 81.25**	Good (P)
[77.5 – 0.5 (2.5)] ≤ X < [77.5 + 0.5 (2.5)] **76.25 ≤ X < 78,75**	Fair (SP)
[77.5 – 1.5 (2.5)] ≤ X < [77.5 – 0.5 (2.5)] **73.75 ≤ X < 76.25**	Poor (N)
X < [77.5 – 1.5 (2.5)] **X < 73.75**	Very Poor (VN)

3. Pre-Test Data on Students' Academic Integrity (A1Y2 and A2Y2)

The data on students' academic integrity in the experimental group (A1Y2) is presented in Table 11, and the data on students' academic integrity in the control group (A2Y2) is presented in Table 12.

Table 11. Pre-Test Data on A1Y2

Pre-Test (A1Y2)	
Mi = $\frac{1}{2}$ (155 + 115)	Sdi = $\frac{1}{6}$ (155 – 115)

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Mi = $\frac{1}{2}$ (270)	Sdi = $\frac{1}{6}$ (40)
Mi = 135	Sdi = 6.66
Data Calculation	
Calculation	**Criteria**
[135 + 1.5 (6.66)] < X **144.99 < X**	Very Good (VP)
[135 + 0.5 (6.66)] ≤ X < [135 + 1.5 (6.66)] **138.33 ≤ X < 144.99**	Good (P)
[135 – 0.5 (6.66)] ≤ X < 135 + 0.5 (6.66)] **131.67 ≤ X < 138.33**	Fair (SP)
[135– 1.5 (6.66)] ≤ X < 135 – 0.5 (36.66)] **125.01 ≤ X < 131.67**	Poor (N)
X < [135 – 1.5 (6.66)] **X < 125.01**	Very Poor (VN)

Table 12. Pre-Test Data on A2Y2

Pre-Test (A2Y2)	
Mi = $\frac{1}{2}$ (157 + 112)	Sdi = $\frac{1}{6}$ (157 – 112)
Mi = $\frac{1}{2}$ (269)	Sdi = $\frac{1}{6}$ (45)
Mi = 134.5	Sdi =7.5
Data Calculation	
Calculation	**Criteria**
[134.5 + 1.5 (7.5)] < X **145.75 < X**	Very Good (VP)
[134.5 + 0.5 (7.5)] ≤ X < [134.5 + 1.5 (7.5)] **138.25 ≤ X < 145.75**	Good (P)
[134.5 – 0.5 (7.5)] ≤ X < 134.5 + 0.5 (7.5)] **130.75 ≤ X < 138.25**	Fair (SP)
[134.5– 1.5 (7.5)] ≤ X < 134.5 – 0.5 (7.5)] **123.25 ≤ X < 130.75**	Poor (N)

X < [134.5 – 1.5 (7.5)]	Very Poor (VN)
X < 123.25	

4. Post-Test Data on Students' Academic Integrity (A1Y2 and A2Y2)

The data on students' academic integrity in the experimental group (A1Y2) is presented in Table 13, and the data on students' academic integrity in the control group (A2Y2) is presented in Table 14.

Table 13. Post-Test Data on A1Y2

Post-Test (A1Y2)	
Mi = $\frac{1}{2}$ (162 + 140)	Sdi = $\frac{1}{6}$ (162 – 140)
Mi = $\frac{1}{2}$ (302)	Sdi = $\frac{1}{6}$ (22)
Mi = 151	Sdi = 3.66
Data Calculation	
Calculation	**Criteria**
[151 + 1.5 (3.66)] < X	Very Good (VP)
156.49 < X	
[151 + 0.5 (3.66)] ≤ X < [151 + 1.5 (3.66)]	Good (P)
152.83 ≤ X < 156.49	
[151 – 0.5 (3.66)] ≤ X < 151 + 0.5 (3.66)]	Fair (SP)
149.17 ≤ X < 152.83	
[151– 1.5 (3.66)] ≤ X < 151 – 0.5 (3.66)]	Poor (N)
145.51 ≤ X < 149.17	
X < [151 – 1.5 (3.66)]	Very Poor (VN)
X < 145.51	

Table 14. Post-Test Data on A2Y2

Post-Test (A2Y2)	
Mi = $\frac{1}{2}$ (160 + 115)	Sdi = $\frac{1}{6}$ (160 – 115)
Mi = $\frac{1}{2}$ (275)	Sdi = $\frac{1}{6}$ (45)
Mi = 137.5	Sdi = 7.5
Data Calculation	

ISSN 2338-4778 (Print)
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Calculation	Criteria
[137.5 + 1.5 (7.5)] < X **148.75 < X**	Very Good (VP)
[137.5 + 0.5 (7.5)] ≤ X < [137.5 + 1.5 (7.5)] **141.25 ≤ X < 148.75**	Good (P)
[137.5 – 0.5 (7.5)] ≤ X < 137.5 + 0.5 (7.5)] **133.75 ≤ X < 148.75**	Fair (SP)
[137.5– 1.5 (7.5)] ≤ X < 137.5 – 0.5 (7.5)] **126.25 ≤ X < 133.75**	Poor (N)
X < [137.5 – 1.5 (7.5)] **X < 126.25**	Very Poor (VN)

Table 15 and Table 16 represent the results in Table 7, Table 8, Table 9, Table 10, Table 11, Table 12, Table 13, and Table 14.

Table 15. Descriptive Statistical Analysis Result for Y1

Aspects	Y1 (Writing Skills)					
	Mean (X)		Score Total			
			Pre-test		Post-test	
	Pre-test	Post-test	min	max	min	max
A1	64.28	88.91	52.5	75	80	95
A2	63.75	76.20	60	72.5	70	85
Criteria based on Mean (X)						
Pre-Test			Post-Test			
A1Y1		A2Y1	A1Y1		A2Y1	
Poor		Poor	Good		Poor	

Table 16. Descriptive Statistical Analysis Result for Y2

Aspects	Y2 (Academic Integrity)					
	Mean (X)		Score Total			
			Pre-test		Post-test	
	Pre-test	Post-test	min	max	min	max
A1	135.30	153.55	115	155	140	162

A2	**131.24**	**137.37**	112	157	115	160
Criteria based on Mean (X)						
Pre-Test			**Post-Test**			
A1Y2		**A2Y2**	**A1Y2**		**A2Y2**	
Fair		**Fair**	**Good**		**Fair**	

Based on Table 15, the pre-test results for both the experimental and control groups indicate that the students' writing skills were initially poor. This suggests that the initial writing skills in both groups were comparable. However, the post-test results show that the writing skills in the experimental group improved to a good level, while the control group's performance remained poor. The comparison of the mean scores indicates that students taught using QuillBot (experimental group) achieved higher writing skills than those taught using conventional learning methods (control group).

According to Table 16, the pre-test results for both experimental and control groups show that the students' academic integrity was initially fair, indicating similar starting points for both groups. The analysis of the data distribution for the pre-test and post-test reveals that the mean score of the experimental group improved from fair to good after the intervention. In contrast, the mean score of the control group remained at fair level in both the pre-test and post-test. Thus, it can be concluded that the academic integrity of students in the experimental group improved more than that of the control group.

Prerequisite Test

After performing a descriptive statistical analysis, prerequisite tests were conducted before proceeding with the MANOVA test. These prerequisite tests included the normality test, homogeneity test, linearity test, and multicollinearity test.

1. *Normality Test*

The multivariate normality test using the Mahalanobis distance, indicated that the data were normally distributed. This was evident from the scatter plot, which tended to form a straight line and the Sig. (2-tailed) value was below the standard threshold of 0.05. The scatter plot result and the correlation table are presented as follows.

ISSN 2338-4778 (Print)
ISSN 2548-4192 (Online)

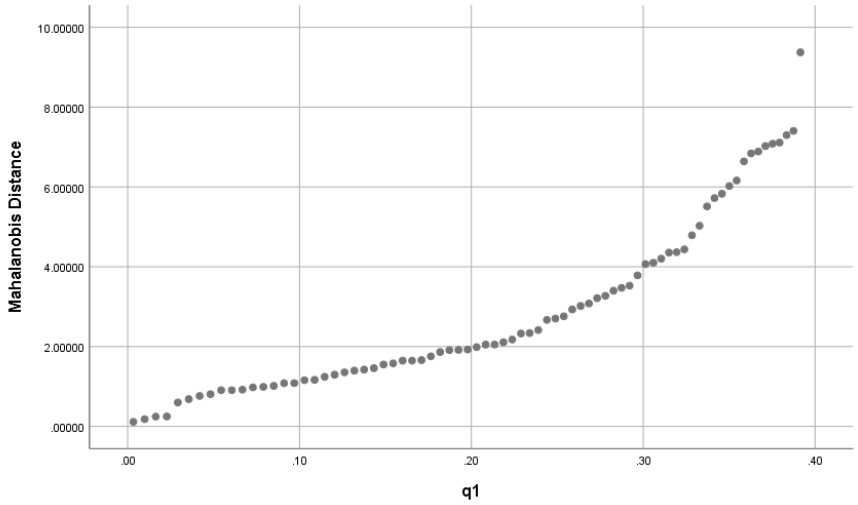

Figure 1. The Scatter Plot of The Multivariate Normality Result

Table 17. Correlation Results

Correlations

		Mahalanobis Distance	q1
Mahalanobis Distance	Pearson Correlation	1	.926**
	Sig. (2-tailed)		.000
	N	76	76
q1	Pearson Correlation	.926**	1
	Sig. (2-tailed)	**.000**	
	N	76	76

**. Correlation is significant at the 0.01 level (2-tailed).

2. Homogeneity Test

After knowing the data were normally distributed, then the next is the homogeneity test. Below is the result of the homogeneity test of the variance-covariance matrix using Box's M.

Table 18. Homogeneity Test of Variance-Covariance Matrix with Box's M

Box's Test of Equality of Covariance Matrices[a]	
Box's M	**7.456**
F	1.188
df1	6
df2	39675.170
Sig.	**.309**

Table 18 shows that the value of Sig. is 0.309, which is greater than 0.05 (0.309 > 0.05) with the Box's M value of 7.456. Therefore, it can be concluded that the variance-covariance matrix of the dependent variable is homogenous.

3. *Linearity Test*

The covariable linearity test evaluates whether the relationship between the independent and the dependent variable is linear within each group. As stated by Pallant (2011), the assumption of covariable linearity in relation to the dependent variable involves establishing a linear relationship between each pair of dependent variables and follows a straight-line pattern. Figure 2, Figure 3, and Figure 4 show the linearity test on the dependent variable.

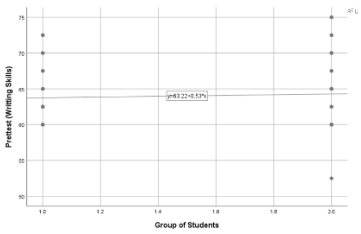

Figure 2. Scatter Plot for Linearity Test of Pre-Test Writing Skills

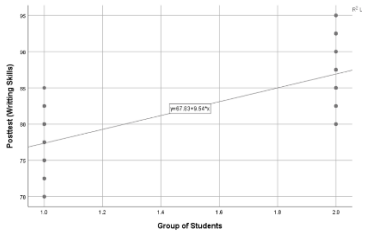

Figure 3. Scatter Plot for Linearity Test of Post-Test Writing Skills

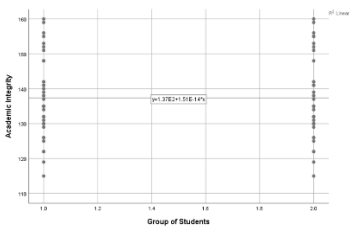

Figure 4. Scatter Plot for Linearity Test of Academic Integrity

The assumption of linearity is met since the scatter plots indicate linear relationships between the dependent variables, namely writing skills and academic integrity, and the independent variable (use of QuillBot). Therefore, it is appropriate to proceed with MANOVA, which assumes linear relationships among the variables.

4. *Multicollinearity Test*

The last prerequisite test is the multicollinearity of inter-dependent variables which can be assessed from the Tolerance and VIF values.

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Table 19. Collinearity Diagnostics

Collinearity Diagnostics

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions (Constant)	Pre-test (Writing Skills)	Post-test (Writing Skills)	Academic Integrity
1	1	3.987	1.000	.00	.00	.00	.00
	2	.006	25.933	.00	.06	.62	.34
	3	.005	28.143	.01	.52	.05	.52
	4	.002	49.930	.99	.43	.33	.14

a. Dependent Variable: Group of Students

The result of Table 19 shows that the Eigenvalue of the current research data is 0.002, which is less than 10, and the condition index is 49.930, exceeding 30. According to Pallant (2011), although the condition index is greater than 30, multicollinearity issues do not always occur if there is no very small Eigenvalue. By considering both factors, it can be concluded that the data does not exhibit multicollinearity issues, as the small Eigenvalue suggests that the relationship between the independent variable and with dependent variables is not strong enough to cause significant multicollinearity.

In summary, since the data in this research are normally distributed, homogeneous, and free from multicollinearity, the One-Way MANOVA test can be conducted.

Hypothesis Testing

The hypothesis test was conducted using a One-Way Multivariate Analysis of Variance (MANOVA). In this case, the One-Way MANOVA test is used to determine the effect of using QuillBot on students' writing skills and academic integrity. The table below shows the result of the One-Way MANOVA test.

Table 20. Multivariate Test

Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	**Sig.**	Partial Eta Squared
Group	Pillai's Trace	.570	31.799[b]	3.000	72.000	**.000**	.570
	Wilks' Lambda	.430	31.799[b]	3.000	72.000	**.000**	.570
	Hotelling's Trace	1.325	31.799[b]	3.000	72.000	**.000**	.570
	Roy's Largest Root	1.325	31.799[b]	3.000	72.000	**.000**	.570

Table 20 indicates that the four p-values are below 0.05, suggesting a significant effect of the independent variable on the dependent variables. The data reveals an F-value of 31.799. Therefore, **there was a simultaneous significant difference effect of QuillBot on the eleventh-grade students' writing skills and academic integrity in SMA Negeri 2 Singaraja.**

The second and third hypotheses are addressed using analysis of variance (Between-subject effect). The results of the analysis are presented in Table 9.

Table 21. Test of Between-Subject Effects

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	**Sig.**	Partial Eta Squared
Group	Pre-test (Writing Skills)	5.263	1	5.263	.254	.616	.003
	Post-test (Writing Skills)	1729.030	1	1729.030	94.443	**.000**	.561
	Academic Integrity	.000	1	.000	.000	**.000**	.000
Error	Pre-test (Writing Skills)	1533.224	74	20.719			
	Post-test (Writing Skills)	1354.770	74	18.308			

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ISSN 2548-4192 (Online)

	Academic Integrity	9585.684	74	129.536		

The result in Table 21 shows that the Sig. value of 0.000 for the post-test group (writing skills) indicates a significant effect of QuillBot on students' writing skills. There was a statistically significant effect on the students' writing skills after using QuillBot if compared to the pre-test scores. Therefore, **the use of QuillBot had affected eleventh-grade students' writing skills of SMA Negeri 2 Singaraja.** In addition, based on Table 16, the Sig. value of 0.000 for academic integrity reveals a significant effect of QuillBot on students' academic integrity. Therefore, t**he use of QuillBot had a considerable effect on the eleventh-grade student's commitment to academic integrity**, resulting in either an improvement or a shift in their behavior concerning academic integrity.

Discussion

The MANOVA analysis revealed a significant simultaneous effect of QuillBot on both writing skills and academic integrity among eleventh-grade students at SMA Negeri 2 Singaraja. This highlights QuillBot's dual impact, improving students' technical writing skills while reinforcing ethical writing practices. Previous studies also confirm the positive effect of QuillBot on students' writing performance (Amanda et al., 2023;Amyatun & Kholis, 2023; Mohammad et al., 2024; Syahnaz & Fithriani, 2023). QuillBot as an advanced tool for automated writing evaluation helps students identify grammatical errors and overcome paraphrasing challenges (Nurmayanti & Suryadi, 2023;Syahnaz & Fithriani, 2023). Its features, including translation, paraphrasing, summarization, grammar checking, and plagiarism detection, support users in improving writing quality. Moreover, QuillBot significantly enhances writing skills and academic integrity by promoting originality and preventing plagiarism through its features (D'Arcy et al., 2022; Kurniati & Fithriani, 2022; Latifah et al., 2024).

The improvement in both areas can be attributed to QuillBot's multifaceted capabilities. Research by Nurmayanti and Suryadi, (2023) confirms that QuillBot provides real-time feedback, enhancing students' writing competence. As a Natural Language Processing (NLP) AI tool, QuillBot uses deep learning models and machine algorithms to analyze, generate, and modify human language (Jaladara et al., 2023). These modes allow QuilBot to paraphrase, summarize, and check grammar without altering the original meaning of the text. Additionally, its plagiarism detection feature promotes academic integrity by encouraging originality (D'Arcy et al., 2022). This aligns with Bretag (2020), who emphasized the role of such technologies in fostering academic integrity. By using QuillBot's paraphrasing feature, students learn to rephrase complex texts while preserving

their original meaning (Ho, 2023). Consequently, students who engage deeply with their learning process and understand the importance of academic integrity are more likely to achieve better academic results (Zhang & Deng, 2021). Thus, QuillBot not only enhances writing skills but also supports academic integrity by encouraging the production of original, well-paraphrased content.

The univariate analysis within the MANOVA revealed a significant effect in the writing skills of eleventh-grade students at SMA Negeri 2 Singaraja after using QuillBot. The effect was evident in aspects such as grammar, sentence structure, and paraphrasing. QuillBot helps students by offering suggestions for grammar, vocabulary, and paraphrasing. Kessler and Bikowski (2021) highlighted that technology-based tools providing immediate feedback can assist in learning writing. QuillBot serves not only as an assistive tool for completing assignments but also as a stimulus for generating well-constructed sentences. This is relevant with AbuSa'aleek (2021) who emphasized the role of technology in guiding students' cognitive engagement in the classroom. As an AI, QuillBot stimulates human cognitive tasks like learning and problem-solving, thereby enhancing students' cognitive abilities and writing skills (Li et al., 2023).

From a pedagogical perspective, these findings suggest that integrating QuillBot into the writing curriculum should be accompanied by structured teacher guidance. This approach helps ensure that students use the tool as an aid for developing writing competence rather than as a substitute for critical thinking. However, potential challenges include students' overdependence on AI-generated suggestions, which might impede the development of independent writing skills.

In this study, the researcher limits the use of QuillBot to writing instruction. In other words, the researcher only allows students to use QuillBot as a tool to stimulate and generate ideas, vocabulary, and sentences. The researcher prohibits students from directly copying the paraphrased or translated results from QuillBot. The students utilized all the features available in QuillBot to complete their writing tasks. In this case, QuillBot's paraphrasing feature encourages students to rethink and rephrase sentences. This aligns with Latifah et al. (2024) who found that paraphrasing tools enhance writing skills by increasing lexical diversity and sentence variety. By offering various word choices and sentence structures, QuillBot helps students practice paraphrasing effectively, deepening their comprehension of the material (Patel & Rao, 2023). Furthermore, Marzuki et al. (2023) noted that students can complete writing tasks more efficiently with the instant feedback provided by tools like QuillBot which allows them to focus on content development. It also mentioned how digital writing tools enhance students' productivity and efficiency. Incorporating QuillBot in writing classes improves grammar, enriches vocabulary, and enhances paraphrasing skills and writing efficiency.

ISSN 2338-4778 (Print)
ISSN 2548-4192 (Online)

This study found a significant difference in the academic integrity of eleventh-grade students in SMA Negeri 2 Singaraja who used QuillBot. QuillBot provides students with tools to practice these principles more effectively through its paraphrasing and plagiarism-checking features. Patel and Rao (2023) noticed that the paraphrasing feature of QuillBot helps students achieve greater clarity and originality in their writing. The feature successfully prevents plagiarism and increases the originality of writing (Latifah et al., 2024). Apart from those matters, QuillBot encourages students to express ideas in their own words even though they use QuillBot assistance to stimulate their minds (Akbarani, 2024). Previous studies conducted by Bretag et al. (2018) and Jaladara (2023) also emphasized that access to paraphrasing tools, when used correctly, can reduce the temptation to copy text directly from sources. Consequently, it helps uphold integrity by empowering students to produce well-paraphrased content. By fostering proper paraphrasing skills, QuillBot supports students in maintaining academic integrity.

For example, instances where students utilized QuillBot's paraphrasing feature resulted in marked improvements in originality, as evidenced by lower similarity index scores in plagiarism detection software. Such concrete examples underscore the tool's role in promoting ethical writing practices.

The use of QuillBot encourages students to engage in ethical writing practices. In the classroom activities, QuillBot was used as a stimulating tool by students to produce sentences. This indicates that the structured use of QuillBot ensures that students use the tool as a learning aid rather than a shortcut. As supported by Kurniati and Fithriani (2022), technologies, particularly QuillBot, can have a significant impact on student's academic integrity when used as a supportive tool under appropriate teacher guidance.

Besides, students who are aware of tools that offer plagiarism detectors and paraphrasing features are more likely to write with integrity. Students may avoid typical potential risks like plagiarism, which frequently arises from challenges with paraphrasing or synthesizing information (Fudge et al., 2022). D'Arcy et al. (2022) also highlighted that students who used plagiarism detection showed a higher awareness of ethical writing practices. Similarly, Jaladara (2023) indicated that educational technologies that provide constructive feedback on writing processes contribute to fostering a culture of academic integrity.

QuillBot's real-time feedback and suggestions help students understand the importance of originality. Furthermore, QuillBot provides an opportunity for students to self-check their work before submission, ensuring that they adhere to academic integrity standards. The integration of QuillBot for eleventh-grade students at SMA Negeri 2 Singaraja has a significant effect on students' academic integrity. By providing resources for proper paraphrasing, real-time feedback, and

plagiarism checkers, QuillBot helps students internalize ethical writing practices and understand the importance of academic integrity.

It is important to acknowledge some limitations of this study. The sample was drawn from a single institution, which may limit the generalizability of the findings. Additionally, potential biases such as self-selection of participants and varying levels of prior exposure to digital tools might have influenced the result.

In light of these findings, several recommendations for future research emerge. Researchers should consider longitudinal studies to examine the sustained impact of QuillBot on independent writing skills; explore its effects across diverse educational settings, and assess strategies to balance AI assistance with the cultivation of critical writing abilities. Furthermore, exploring teacher perceptions and intervention strategies could provide deeper insights into optimizing AI tool integration in the classroom.

Conclusion

This quantitative study investigated the effect of QuillBot on eleventh-grade students' writing skills and academic integrity. The study revealed that QuillBot has a simultaneous significant effect on both students' writing skills and academic integrity. The use of QuillBot supports students in improving their writing while promoting awareness of academic integrity. Additionally, the results indicate a significant effect of QuillBot on students' writing skills. QuillBot features, such as paraphrasing, grammar checking, and vocabulary suggestions, help students enhance their writing quality by improving clarity, coherence, and accuracy. This improvement is evident in their ability to produce more structured and refined written work.

This study also found a significant effect of QuillBot on students' academic integrity. By providing features for plagiarism detection and encouraging proper paraphrasing, QuillBot helps students understand and adhere to ethical writing standards. In conclusion, QuillBot serves as an effective educational tool that enhances students' writing skills and fosters academic integrity when used appropriately. The result suggests that with proper guidelines and instructional support, QuillBot can be integrated into educational settings to improve both writing skills and ethical awareness in academic practices.

ISSN 2338-4778 (Print)
ISSN 2548-4192 (Online)

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