

The Effectiveness of 21st Century Competency Assessment Model and HOTS in Improving Writing Skills: An Experimental Research

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Abstract—The Research examines the effectiveness of a 21st Century Competency and Higher-Order Thinking Skills (HOTS)-based writing assessment model in improving students' writing skills. The research employs an experimental design with two groups: an experimental group that participated in HOTS and 21st Century Competency-based learning, and a control group that followed conventional learning methods. Data were collected through pre-test and post-test evaluations to measure students' writing abilities across various text types, such as observation report texts, biographies, procedures, explanations, editorials, and articles. Data analysis was conducted using SPSS 24 and Microsoft Excel. The findings reveal a significant difference in writing skills between the group using the HOTS and 21st Century Competency-based assessment model and the control group. The Mann-Whitney test indicated that the significance value for the post-test across all text types was 0.000, which is less than 0.05, meaning H₀ was rejected and a significant difference was observed. The HOTS-based learning approach proved to be more effective in enhancing students' writing skills, as it encourages critical and creative thinking, enabling students to produce more structured and meaningful writing. These findings support the theory that a 21st Century Competency-based approach, which integrates higher-order thinking skills, can lead to significant improvements in students' writing abilities.

Index Terms—21st century competency assessment model, HOTS-based education, experimental design, writing skills

I. INTRODUCTION

In the era of globalization and the Fourth Industrial Revolution, 21st-century skills have become essential for students to compete and succeed in an increasingly complex and dynamic world. Critical thinking, creativity, collaboration, and communication (4C) are key demands in modern education, with particular emphasis on the development of Higher Order Thinking Skills (HOTS). In the context of language learning, writing skills are a crucial aspect that requires higher-order cognitive abilities such as analysis, evaluation, and creation, in line with the revised Bloom's Taxonomy. According to previous experts, such as Trilling and Fadel (2002), Voogt and Roblin (2012), Jia et al. (2016), Motallebzadeh et al. (2018), Prayogi and Estetika (2019), Kasihani and Sentana (2020), Suyitno et al. (2021), and Barnes et al. (2022) as concluded that students must master skills such as critical thinking, creativity, collaboration, and communication, which are vital for navigating the rapidly changing global landscape. Meanwhile, the revised Bloom's Taxonomy emphasizes cognitive processes like analyzing, evaluating, and creating, which are fundamental for developing advanced writing skills in language learning.

However, various studies indicate that students' writing skills are often at a low to moderate level, particularly in their ability to produce analytical, critical, and creative writing. One of the primary causes of this issue is the assessment approach, which remains focused on basic aspects such as grammar and vocabulary, without adequately incorporating HOTS based assessments that encourage deeper and more comprehensive thinking. According to previous experts such as Dappen et al. (2008), Brookhart (2010), Sumarni et al. (2018), White (2019), Ghanizadeh et al. (2020), Sumiati et al. (2020), Setiawan et al. (2021), and Herunata et al. (2021) stated that higher-order thinking involves mastering complex

assessment skills such as critical thinking and problem-solving. Higher-order thinking goes beyond mere recall of facts and emphasizes the application, analysis, synthesis, and evaluation of information.

The 21st-century competency assessment model based on Higher Order Thinking Skills (HOTS) offers an alternative that can be implemented in writing instruction to encourage students to think more critically, creatively, and reflectively. This model emphasizes active student engagement in the writing process, urging them not only to master the technical aspects of writing but also to construct arguments, analyze information, and produce original and meaningful written works. According to Aryana et al. (2024), this model aims to involve students in active learning and authentic assessment processes. Writing through HOTS-based assessment pushes learners beyond basic skills and focuses on higher-level processes such as analysis, synthesis, and creative expression (Yulianto et al., 2019; Ghanizadeh et al., 2020; Edi Puryanto et al., 2020; Herunata et al., 2021; Setiawan et al., 2021; Aryana et al., 2024).

Although this assessment model shows promise, empirical research is still required to validate its effectiveness, particularly in the context of writing instruction (Aryana et al., 2024). This research aims to examine the extent to which the 21st-century competency and HOTS-based assessment model can enhance students' writing skills, both in terms of content and the quality of their critical thinking. Through this experimental research, the research outcomes are expected to make a significant contribution to the development of evaluation methods better aligned with the demands of 21st-century competencies while simultaneously improving the quality of writing instruction in senior high schools.

II. METHODOLOGY

This research uses a True-Experimental Design with a pretest-posttest control group design across three schools. The effectiveness is tested based on Pre-Test and Post-Test scores from experimental and control groups for various text tasks, including observation report and biographical texts for Grade X, procedural and explanatory texts for Grade XI, and editorial texts and articles for Grade XII.

The population of this research comprises all high school students in the Bandung Raya area, West Java, Indonesia, specifically students from Cimahi Senior High School, Padalarang Senior High School as the experimental groups, and Ngamprah Senior High School as the control group, totaling 1,260 students. These students are currently researching the Indonesian language subject with a focus on writing skills.

The sample was selected using cluster random sampling, with two classes randomly chosen from the population. One class was assigned as the experimental group, and the other as the control group. The Research involved 420 students, with 35 students in each group from Grades X, XI, and XII at Cimahi Senior High School, Padalarang Senior High School, and Ngamprah Senior High School, depending on subject availability at the research sites.

Data collection in this research involved written tests (pre-test and post-test), observation, and questionnaires. Data analysis used inferential statistics, primarily the t-test, to identify significant differences between pre-test and post-test results for both groups (experimental and control). Normality and homogeneity of variance tests were conducted before the t-test to meet statistical assumptions. Additionally, the Likert scale results from the questionnaires were analyzed descriptively to assess students' perceptions of the HOTS-based assessment model's effectiveness.

III. RESULT AND DISCUSSION

The primary field trial for the experimental class was conducted offline over six weeks, using the 21st-century competency and HOTS-based writing skills assessment model, with two-hour weekly sessions. Prior to the trial, the researchers held discussions and provided teachers with guidelines on using the model for assignment tasks in each class.

The assessment model product was accessed by Indonesian language teachers at Cimahi Senior High School and Padalarang Senior High School through a provided link <https://bit.ly/ebook4b4d21> and link *Flipbook* <https://bit.ly/flipbook4b4d21> with keywords "4b4d21". The following presents the documentation of the briefing provided to Indonesian language teachers at Cimahi Senior High School West Java Indonesia and Padalarang Senior High School West Java Indonesia before conducting the primary field trial for the experimental and control classes with Indonesian language teachers at Ngamprah Senior High School.

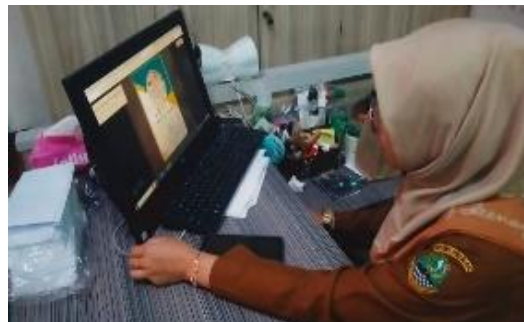




Figure 1. Directions to Indonesian Language Teachers

The primary field trials were conducted at Cimahi Senior High School, Padalarang Senior High School and Ngamprah Senior High School from February 1st to February 16th, 2024. The field trial activities were adjusted to the schedules of the Indonesian language teachers at each school. The following presents documentation of the implementation of the writing skills assessment model during the primary field trials in the experimental classes Cimahi Senior High School and Padalarang Senior High School and the control class Ngamprah Senior High School.

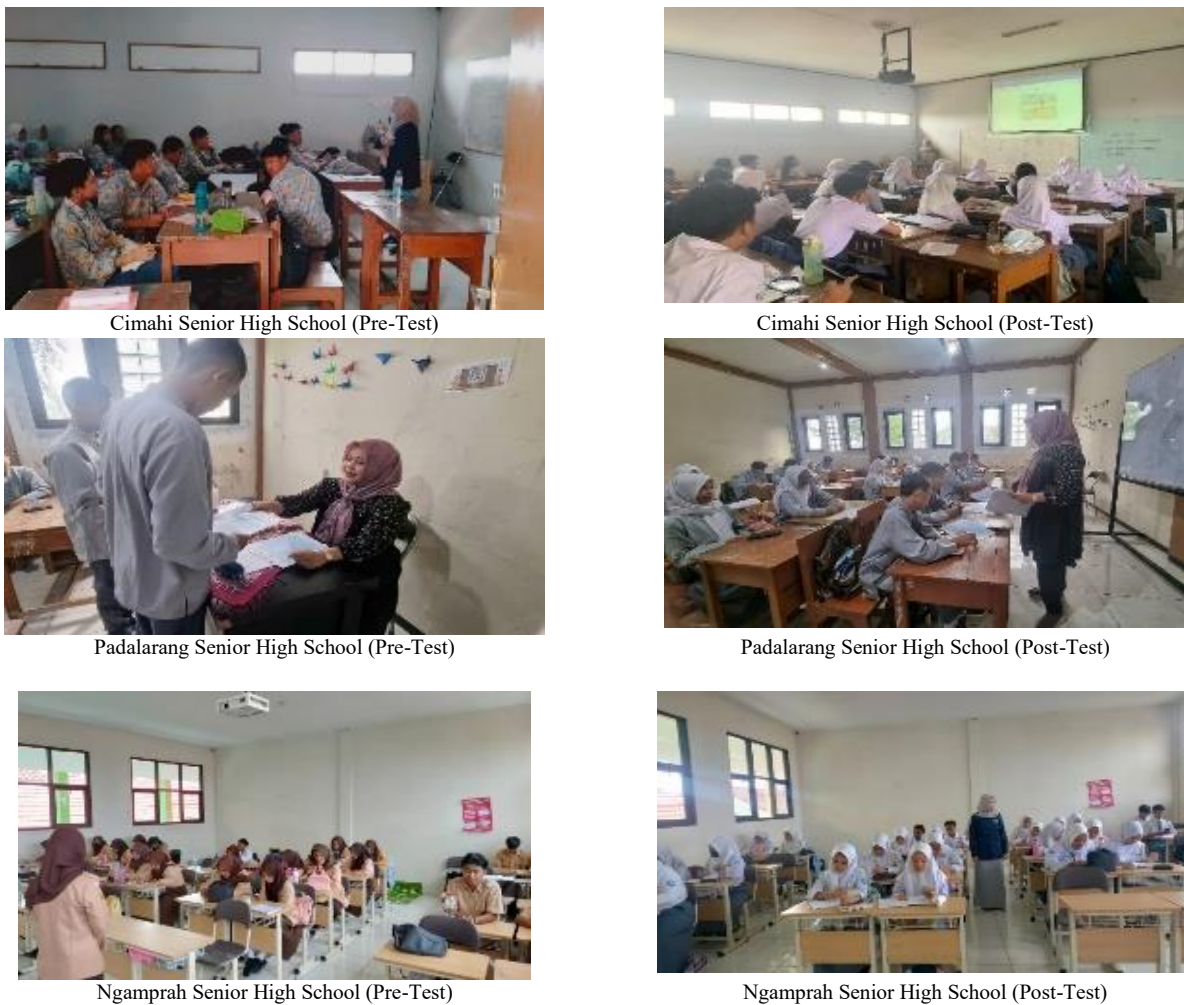


Figure 2. Implementation of Pre-Test and Post-Test

A. Text of Observation Report Results

- 1) Pre-Test
 - a) Normality test

The normality test employed in this research was the Kolmogorov-Smirnov test, conducted at a significance level of 0.05. The decision criteria were as follows: if the significance (sig.) value exceeds 0.05, the data follows a normal

distribution; however, if the sig. value is less than or equal to 0.05, the sample originates from a non-normally distributed population. The results of the normality test, performed using SPSS 24 software, are presented in the table below.

TABLE 1
NORMALITY TEST OF PRE-TEST DATA FOR OBSERVATION REPORT TEXT

Class	Statistic	Df	Sig.
Control	0,169	35	0.013
Experiment	0.103	70	0.064

The significance value is $0.452 > 0.05$, so H_0 is accepted, indicating no significant difference in the initial writing skills of observation report texts (LHO) between students using the 21st-century competency and HOTS-based model and those using the conventional model. According to Ghasemi and Zahediasl (2012), and Field (2018), the Mann-Whitney test is appropriate for comparing independent groups with non-normally distributed data, with significant results indicating a meaningful difference.

b) Test of differences between two means

The results of the normality test indicated that one of the classes originated from a non-normally distributed sample. Consequently, the Mann-Whitney test was employed to analyze the difference between the two means for the Pre-Test data on the ability to write observation report texts. The decision criteria were as follows: if the significance (sig.) value exceeds 0.05, the null hypothesis (H_0) is accepted; however, if the sig. value is less than or equal to 0.05, H_0 is rejected. The table below presents the results of the two-mean comparison test conducted using SPSS 24 software.

TABLE 2
MANN-WHITNEY TEST OF PRE-TEST DATA FOR OBSERVATION REPORT TEXT

Class	Sig.	Interpretation
Control	0,452	H_0 accepted
Experiment		

The significance value is $0.452 > 0.05$, so H_0 is accepted, indicating no significant difference in the initial writing skills of observation report texts (LHO) between students using the 21st-century competency and HOTS-based model and those using the conventional model. Field (2018) states that the Mann-Whitney test is suitable for comparing two independent groups when the data is not normally distributed, with a significant result showing a meaningful difference.

2) Post-Test

a) Normality test

This research utilized the Kolmogorov-Smirnov test to assess data normality. The test was conducted at a significance level of 0.05, with the following decision criteria: if the significance (sig.) value is greater than 0.05, the data is considered normally distributed; whereas if the sig. value is less than or equal to 0.05, the sample is deemed to originate from a non-normally distributed population. The table below presents the normality test results obtained using SPSS 24 software.

TABLE 3
POST-TEST DATA NORMALITY TEST OF OBSERVATION RESULT SHEET TEXT

Class	Statistic	Df	Sig.
Control	0,104	35	0.200
Experiment	0.110	70	0.035

The control class yielded a significance value of 0.200, which is greater than 0.05, while the experimental class had a significance value of 0.035, which is less than 0.05. Based on the testing criteria, the control class data follows a normal distribution, whereas the experimental class data does not. Given that one dataset is not normally distributed, the Mann-Whitney non-parametric test was applied to assess the significance of the difference. The decision rule states that if the significance value exceeds 0.05, the null hypothesis (H_0) is accepted, whereas if it is less than or equal to 0.05, H_0 is rejected. According to Ghasemi and Zahediasl (2012), the normality test is used to determine whether a dataset originates from a normally distributed population.

b) Test the difference between two means

The normality test results indicated that one of the classes originated from a non-normally distributed sample. As a result, the Mann-Whitney test was employed to analyze the difference between the two means for the Post-Test data on the ability to write observation report texts (LHO). The table below presents the results of the two-mean difference test conducted using SPSS 24 software.

TABLE 4
MANN-WHITNEY TEST POST-TEST DATA TEXT OBSERVATION RESULT SHEET

Class	Sig.	Interpretation
Control	0.000	H_0 rejected
Experiment		

The significance value of $0.000 < 0.05$ indicates a significant difference in biographical writing skills between students using the 21st-century competency and HOTS-based model and those using the conventional model. Voogt and Roblin (2012) highlight that this model fosters critical, creative, and collaborative thinking, enhancing skills like writing. Brookhart (2010) asserts that HOTS develops analysis, evaluation, and synthesis, essential for writing biographical texts. Brown et al. (2014) emphasize that HOTS-based methods are more effective than conventional approaches in developing high-level skills like writing.

B. Biography Text

- 1) Pre-Test
 - a) Normality test

In this research, the Kolmogorov-Smirnov test was employed to assess data normality. The test was conducted at a significance level of 0.05, with the decision criteria as follows: if the significance (sig.) value is greater than 0.05, the data is considered normally distributed; however, if the sig. value is less than or equal to 0.05, the sample is derived from a non-normally distributed population. The table below displays the normality test results obtained through SPSS 24 software.

TABLE 5
PRE-TEST DATA FOR BIOGRAPHY TEXTS

Class	Statistic	Df	Sig.
Control	0,191	35	0.002
Experiment	0.094	70	0.200

Referring to the table above, the control class has a significance value of 0.002, which is less than 0.05, while the experimental class has a significance value of 0.200, which is greater than 0.05. According to the testing criteria, this indicates that the control class data is not normally distributed, whereas the experimental class data follows a normal distribution. Since one of the datasets does not meet the assumption of normality, the Mann-Whitney non-parametric test was employed to assess the significance of the difference between the two means.

- b) Test the difference between two means

The normality test results revealed that one of the classes originated from a non-normally distributed sample. Consequently, the Mann-Whitney test was applied to evaluate the difference between the two means for the Pre-Test data on the ability to write Biography texts. The decision criteria are as follows: if the significance (sig.) value is greater than 0.05, the null hypothesis (H0) is accepted; whereas if the sig. value is less than or equal to 0.05, H0 is rejected. The table below presents the results of the two-mean comparison test conducted using SPSS 24 software.

TABLE 6
MANN-WHITNEY TEST OF BIOGRAPHY TEXT PRE-TEST DATA

Class	Sig.	Interpretation
Control	0,276	H ₀ accepted
Experiment		

Based on the table above, the significance value is $0.276 > 0.05$. According to the testing criteria, H0 is accepted, meaning there is no significant difference in the initial writing skills in biographical texts between students who participated in learning using the 21st-century competency and HOTS-based writing skills assessment model and students who participated in learning with the conventional writing skills assessment model. Ghasemi and Zahediasl (2012) state that normality tests such as Kolmogorov-Smirnov are crucial for determining the data distribution. If the data does not meet the assumption of normal distribution, non-parametric methods such as the Mann-Whitney test are more suitable for analysis because they do not rely on a specific distribution.

- 2) Post-Test
 - a) Normality test

This research employed the Kolmogorov-Smirnov test to assess the normality of the data. The test was conducted at a significance level of 0.05, with the following decision criteria: if the significance (sig.) value is greater than 0.05, the data is considered to be normally distributed; however, if the sig. value is less than or equal to 0.05, the sample is assumed to come from a non-normally distributed population. The table below presents the normality test results obtained using SPSS 24 software.

TABLE 7
POST-TEST DATA OF BIOGRAPHY TEXT

Class	Statistic	Df	Sig.
Control	0.181	35	0.005
Experiment	0.117	70	0.018

As shown in the table above, the significance values for both the control class (0.005) and the experimental class (0.018) are less than 0.05. Based on the testing criteria, this indicates that neither dataset follows a normal distribution. Consequently, the Mann-Whitney non-parametric test was employed to assess the significance of the difference

between the two means. According to Ghasemi and Zahediasl (2012), normality tests, such as the Kolmogorov-Smirnov test, play a crucial role in evaluating data distribution. When the normality assumption is not met, non-parametric methods like the Mann-Whitney test are more suitable for analysis, as they do not depend on specific distribution assumptions.

b) Test the difference between two means

The normality test results indicated that both classes were derived from non-normally distributed samples. As a result, the Mann-Whitney test was used to examine the difference between the two means for the Post-Test data on Biography text writing skills. The decision criteria are as follows: if the significance (sig.) value is greater than 0.05, the null hypothesis (H_0) is accepted; whereas if the sig. value is less than or equal to 0.05, H_0 is rejected. The table below presents the test results obtained using SPSS 24 software.

TABLE 8
MANN-WHITNEY TEST POST-TEST DATA OF BIOGRAPHY TEXT

Class	Sig.	Interpretation
Control	0.000	H_0 rejected
Experiment		

The significance value of $0.000 < 0.05$ indicates a significant difference in biographical writing skills between students using the 21st-century competency and HOTS-based assessment model and those using the conventional model. Voogt and Roblin (2012) note that this model enhances critical, creative, and collaborative thinking, improving skills like writing that require analysis and structured ideas. Brookhart (2010) states that HOTS develops abilities in analysis, evaluation, and synthesis, crucial for writing biographical texts with narrative structure and critical reflection. Brown et al. (2014) emphasize that HOTS-based methods are more effective than conventional approaches in improving high-level skills like writing.

C. Procedure Text

1) Pre-Test

a) Normality test

The Kolmogorov-Smirnov test was employed in this study to assess data normality. The test was conducted at a significance level of 0.05, with the following decision criteria: if the significance (sig.) value is greater than 0.05, the data is considered normally distributed; however, if the sig. value is less than or equal to 0.05, the sample is classified as originating from a non-normally distributed population. The table below presents the normality test results obtained using SPSS 24 software.

TABLE 9
PRE-TEST DATA FOR PROCEDURE TEXT

Class	Statistic	Df	Sig.
Control	0.141	35	0.074
Experiment	0.133	70	0.004

As shown in the table above, the control class has a significance value of 0.074, which is greater than 0.05, indicating a normally distributed sample. In contrast, the experimental class has a significance value of 0.004, which is less than 0.05, suggesting that its sample is not normally distributed. Given that one of the datasets does not meet the normality assumption, the Mann-Whitney non-parametric test was applied to assess the significance of the difference between the two means. Ghasemi and Zahediasl (2012) emphasize that normality tests play a key role in selecting the appropriate statistical analysis method.

b) Test the difference between two means

The normality test results indicated that one of the classes was derived from a non-normally distributed sample. Therefore, the Mann-Whitney test was employed to analyze the difference between the two means for the Pre-Test data on procedural writing skills. The decision criteria are as follows: if the significance (sig.) value is greater than 0.05, the null hypothesis (H_0) is accepted; however, if the sig. value is less than or equal to 0.05, H_0 is rejected. The table below presents the test results obtained using SPSS 24 software.

TABLE 10
UJI MANN-WHITNEY DATA PRE-TEST TEKS PROCEDURE

Class	Sig.	Interpretation
Control	0,484	H_0 accepted
Experiment		

Referring to the table above, the significance value is 0.484, which is greater than 0.05. According to the testing criteria, this result leads to the acceptance of the null hypothesis (H_0), indicating that there is no significant difference in the initial procedural writing skills between students who participate in learning using the 21st-century competency-based writing skills assessment model incorporating HOTS and those who engage in learning through the conventional writing skills assessment model.

- 2) Post-Test
 - a) Normality test

This research employed the Kolmogorov-Smirnov test to assess the normality of the data. The test was conducted at a significance level of 0.05, with the following decision criteria: if the significance (sig.) value exceeds 0.05, the data is considered normally distributed; however, if the sig. value is less than or equal to 0.05, the sample is classified as originating from a non-normally distributed population. The table below presents the normality test results obtained using SPSS software.

TABLE 11
POST-TEST DATA NORMALITY TEST FOR PROCEDURAL TEXTS

Class	Statistic	Df	Sig.
Control	0.146	35	0.055
Experiment	0.088	70	0.200

As presented in the table above, the significance value for the control class is 0.055, which is greater than 0.05, and the significance value for the experimental class is 0.200, also exceeding 0.05. Based on the testing criteria, both datasets are considered normally distributed. Consequently, the next step is to conduct a homogeneity of variances test. Ghasemi and Zahediasl (2012) emphasize the importance of normality tests in selecting the appropriate statistical analysis method. When the assumptions of normality and homogeneity are not met, alternative statistical approaches, such as the Mann-Whitney test or t-test, should be applied.

- b) Homogeneity test

The homogeneity of variance test is conducted to determine whether the data from two normally distributed groups exhibit equal variance. This test is performed at a significance level of 0.05, with the following decision criteria: if the significance (sig.) value is greater than or equal to 0.05, the data sample is considered homogeneous; however, if the sig. value is less than 0.05, the data sample is classified as non-homogeneous. The table below presents the results of the homogeneity of variance test, obtained using SPSS 24 software.

TABLE 12
HOMOGENEITY TEST OF PROCEDURE TEXT VARIANTS

Class	Sig.	Interpretation
Control	0.002	not homogeneous
Experiment		

Based on the table above, the significance value is 0.002, according to the testing criteria that the variance of the two sample groups is not homogeneous. Therefore, the next step is to test the data for the difference in the two averages of the t^1 -Test.

- c) Test of differences between two means

Based on the results of the normality test and the homogeneity of variance test, it was found that both classes came from samples that were normally distributed and not homogeneous, so that the test for the difference in two means for the Post-Test data on the ability to write procedural texts using the t^1 test. The testing criteria are if the sig. value > 0.05 then H_0 is accepted while if the sig. value ≤ 0.05 then H_0 is rejected. The following is a table of test results using SPSS 24 software.

TABLE 13
 T^1 TEST POST-TEST DATA OF PROCEDURE TEXT

Class	Sig.	Interpretation
Control	0.002	H_0 rejected
Experiment		

The significance value of $0.002 < 0.05$ indicates a significant difference in procedural writing skills between students using the 21st-century competency and HOTS-based assessment model and those using the conventional model. Brookhart (2010) explains that HOTS, including analysis and synthesis, is essential for writing clear procedural texts. Voogt and Roblin (2012) note that 21st-century learning integrated with HOTS enhances skills in problem-solving, critical thinking, and producing structured works like procedural texts. Brown et al. (2014), and Hoang (2024) show that conventional methods are less effective in engaging critical thinking compared to HOTS-based approaches.

D. Explanation Text

- 1) Pre-Test
 - a) Normality test

This study utilized the Kolmogorov-Smirnov test to assess the normality of the data. The test was conducted at a significance level of 0.05, with the following criteria: if the significance (sig.) value is greater than 0.05, the data is considered to follow a normal distribution; however, if the sig. value is less than or equal to 0.05, the sample is deemed to originate from a non-normally distributed population. The table below presents the normality test results obtained using SPSS 24 software.

TABLE 14
PRE-TEST DATA FOR EXPLANATORY TEXT

Class	Statistic	Df	Sig.
Control	0.152	35	0.039
Experiment	0.092	70	0.200

As shown in the table above, the significance value for the control class is 0.039, which is less than 0.05, indicating that the sample is not normally distributed. In contrast, the significance value for the experimental class is 0.200, exceeding 0.05, meaning the sample follows a normal distribution. Given that one dataset does not meet the normality assumption, the Mann-Whitney non-parametric test was employed to analyze the significance of the difference between the two means.

b) Test the difference between two means

The normality test results indicated that both classes were derived from non-normally distributed samples. Consequently, the Mann-Whitney test was applied to examine the difference between the two means for the Pre-Test data on explanatory writing skills. The decision criteria for the test are as follows: if the significance (sig.) value is greater than 0.05, the null hypothesis (H₀) is accepted; however, if the sig. value is less than or equal to 0.05, H₀ is rejected. The table below presents the test results obtained using SPSS 24 software.

TABLE 15
MANN-WHITNEY TEST OF PRE-TEST DATA FOR EXPLANATORY TEXT

Class	Sig.	Interpretation
Control	0.384	H ₀ rejected
Experiment		

Referring to the table above, the significance value for the difference test of the two mean Pre-Test scores in students' explanatory text writing skills is 0.384, which is greater than 0.05. Based on the testing criteria, the null hypothesis (H₀) is accepted, indicating that there is no statistically significant difference in the initial explanatory text writing skills between students who participated in learning using the 21st-century competency-based writing skills assessment model with HOTS and those who were taught using the conventional writing skills assessment model.

2) Post-Test

a) Normality test

This study employed the Kolmogorov-Smirnov test to assess data normality. The test was conducted at a significance level of 0.05, with the following decision criteria: if the significance (sig.) value exceeds 0.05, the data is considered normally distributed; however, if the sig. value is less than or equal to 0.05, the sample is classified as originating from a non-normally distributed population. The table below presents the results of the normality test performed using SPSS 24 software.

TABLE 16
POST-TEST DATA FOR EXPLANATORY TEXT

Class	Statistic	Df	Sig.
Control	0.140	35	0.080
Experiment	0.081	70	0.200

As shown in the table above, the significance value for the control class is 0.080, which is greater than 0.05, while the significance value for the experimental class is 0.200, also exceeding 0.05. Based on the testing criteria, both the control and experimental class samples meet the assumption of normality. Consequently, the next step is to conduct a homogeneity of variance test.

b) Homogeneous test

The variance homogeneity test is conducted to determine whether the data from two normally distributed groups exhibit homogeneity. This test is performed at a significance level of 0.05, with the following decision criteria: if the significance (sig.) value is greater than or equal to 0.05, the data sample is considered homogeneous; however, if the sig. value is less than 0.05, the data sample is deemed non-homogeneous. The table below presents the results of the variance homogeneity test using SPSS 24 software.

TABLE 17
HOMOGENEITY TEST OF PROCEDURE TEXT VARIANTS

Class	Sig.	Interpretation
Control	0.000	not homogeneous
Experiment		

Based on the table above, the significance value is 0.000 according to the test criteria that the variance of the two sample groups is not homogeneous. Therefore, the next step is to test the data for the difference between the two averages, the t¹ test.

c) Test of differences between two means

The results of the normality and variance homogeneity tests indicate that both classes originate from normally distributed samples but do not meet the homogeneity assumption. Therefore, the t-test was employed to analyze the difference in means for the post-test data on explanatory text writing skills. The decision criteria for this test are as follows: if the significance (sig.) value is greater than 0.05, H₀ is accepted; however, if the sig. value is less than or equal to 0.05, H₀ is rejected. The table below presents the test results obtained using SPSS 24 software.

TABLE 18
TEST -T¹ POST-TEST DATA EXPLANATORY TEXT

Class	Sig.	Interpretation
Control	0.000	H ₀ rejected
Experiment		

The test of the difference between the two means for Pre-Test data on explanation text writing skills shows a significance value of 0.000 < 0.05, indicating a significant difference between students using the 21st-century competency and HOTS-based writing assessment model and those using the conventional model. Voogt and Roblin (2012) highlight that 21st-century education integrates critical thinking, collaboration, and communication, essential for writing explanation texts. Brookhart (2010) states that HOTS, which includes analysis, evaluation, and creation, is crucial for explanation writing. Derewianka (2015) and Carey et al. (2024) emphasize that writing explanation texts requires both conceptual understanding and the ability to communicate ideas logically, skills fostered through HOTS-based learning.

E. *Teks Editorial*

- 1) Pre-Test
- a) Normality test

This study employs the Kolmogorov-Smirnov test to assess the normality of the data. The test is conducted at a significance level of 0.05, with the following criteria: if the significance (sig.) value exceeds 0.05, the data is considered normally distributed; however, if the sig. value is less than or equal to 0.05, the sample is classified as originating from a non-normally distributed population. The table below presents the results of the normality test obtained using SPSS 24 software.

TABLE 19
EDITORIAL TEXT PRE-TEST DATA

Class	Statistic	Df	Sig.
Control	0.152	35	0.040
Experiment	0.165	70	0.000

Referring to the table above, the significance value for the control class is 0.040 (< 0.05), while the significance value for the experimental class is 0.000 (< 0.05). Based on the testing criteria, both the control and experimental class samples originate from a population that is not normally distributed. Consequently, to analyze the significance of the difference between the two means, a non-parametric approach, specifically the Mann-Whitney test, was employed.

- b) Test the difference between two means

Based on the results of the normality test, it was obtained that both classes came from samples that were not Since the data is not normally distributed, the Mann-Whitney test was utilized to assess the difference between the two means for the pre-test data on editorial text writing skills. The decision criteria state that if the significance value exceeds 0.05, H₀ is accepted, whereas if it is ≤ 0.05, H₀ is rejected. The table below presents the test results obtained using SPSS 24 software.

TABLE 20
MANN-WHITNEY TEST OF EDITORIAL TEXT PRE-TEST DATA

Class	Sig.	Interpretation
Control	0.317	H ₀ rejected
Experiment		

Based on the table above, it can be seen that the significance value is 0.317 > 0.05. In accordance with the testing criteria, H₀ is accepted, meaning that there is no significant difference in the initial ability of editorial text writing skills between students who take part in learning using the 21st century competency-based writing skills assessment model and HOTS and students who take part in learning with the conventional writing skills assessment model.

- 2) Post-Test
- a) Normality test

This research employs the Kolmogorov-Smirnov test to assess data normality. With a significance level of 0.05, the test criteria state that if the significance value is greater than 0.05, the data follows a normal distribution. Conversely, if the significance value is ≤ 0.05, the sample is considered to originate from a non-normally distributed population. The table below presents the normality test results obtained using SPSS 24 software.

TABLE 21
POST-TEST DATA ON OBSERVATION RESULT SHEET TEXT

Class	Statistic	Df	Sig.
Control	0.130	35	0.146
Experiment	0.106	70	0.048

Referring to the table above, the significance value for the control class is 0.146, which exceeds 0.05, indicating a normally distributed sample. In contrast, the experimental class has a significance value of 0.048, which is below 0.05, signifying a non-normally distributed sample. As one of the data sets does not meet the assumption of normality, the Mann-Whitney non-parametric test is employed to assess the significance of the difference between the two means. According to Gibbons and Chakraborti (2010), the Mann-Whitney test is a suitable statistical method for comparing two independent groups when the normality assumption is not satisfied.

b) Test the difference between two means

The normality test results indicate that one of the classes originates from a sample that is not normally distributed. Consequently, the Mann-Whitney non-parametric test is applied to evaluate the difference between the two means for the post-test data on editorial text writing skills. The decision rule for hypothesis testing states that if the significance value exceeds 0.05, H_0 is accepted, whereas if the significance value is 0.05 or lower, H_0 is rejected. The table below presents the test results generated using SPSS 24 software.

TABLE 22
MANN-WHITNEY TEST OF EDITORIAL TEXT POST-TEST DATA

Class	Sig.	Interpretation
Control	0.000	H_0 rejected
Experiment		

The comparison of Post-Test data on editorial writing skills shows a significance value of $0.000 < 0.05$, indicating a significant difference between students using the 21st-century competency-based and HOTS assessment model and those using the conventional model. Hyland (2002) emphasizes the importance of genre mastery and high-level thinking strategies in writing. The competency-based approach helps students grasp editorial text structure, content, and style. Brown et al. (2014) note that conventional methods often fail to engage critical and creative thinking, while 21st-century approaches offer a more meaningful learning experience. Voogt and Roblin (2012), Yulianto et al. (2019), Sumiati et al. (2020), Suyitno et al. (2021), Khoiri et al. (2021), and Aryana S. (2024) highlight that 21st-century education integrates critical thinking, collaboration, creativity, and communication skills, essential for writing editorial texts with logical and in-depth opinions.

F. Article Text

1) Pre-Test

a) Normality test

This study employs the Kolmogorov-Smirnov test to assess the normality of the data. With a significance level set at 0.05, the decision criteria are as follows: if the significance value is greater than 0.05, the data follows a normal distribution; however, if the significance value is 0.05 or lower, the data is considered to originate from a non-normally distributed population. The table below presents the normality test results obtained using SPSS 24 software.

TABLE 23
PRE-TEST DATA OF ARTICLE TEXT

Class	Statistic	Df	Sig.
Control	0.177	35	0.007
Experiment	0.115	70	0.023

Referring to the table above, the significance value for the control class is 0.007, which is less than 0.05, and for the experimental class, the significance value is 0.023, also below 0.05. Based on these results, both the control and experimental class samples are derived from a population that does not follow a normal distribution. Consequently, the appropriate method for analyzing the difference between the two means is a non-parametric approach, specifically the Mann-Whitney test. This test is suitable for comparing two independent groups when the normality assumption is not met, ensuring a more reliable statistical analysis of the data.

b) Test the difference between two means

The results of the normality test indicate that both the control and experimental class samples do not follow a normal distribution. As a result, the Mann-Whitney test was employed to analyze the difference between the two means for the Pre-Test data on students' article writing skills. In this study, the Mann-Whitney test was conducted based on the following hypothesis: if the significance (sig.) value is greater than 0.05, then the null hypothesis (H_0) is accepted, suggesting no significant difference between the groups. However, if the significance value is less than or equal to 0.05, H_0 is rejected, indicating a statistically significant difference in article writing skills between the two groups.

TABLE 24
MANN-WHITNEY TEST PRE-TEST DATA ARTICLE TEXT

Class	Sig.	Interpretation
Control	0.678	H ₀ accepted
Experiment		

Based on the results of the comparison of two means for the Pre-Test data on students' writing skills in article texts presented in the table above, the significance value is $0.678 > 0.05$. According to the testing criteria, H₀ is accepted, meaning that there is no significant difference in the initial writing skills in article texts between students who participated in learning using the 21st-century competency-based and HOTS assessment model and those who participated in learning with the conventional writing skills assessment model. According to {Formatting Citation}, if the results of statistical tests indicate no significant difference between the two groups, other factors such as teaching methods, learning motivation, or the learning environment may influence learning outcomes.

- 2) Post-Test
 - a) Normality test

In this study, the Kolmogorov-Smirnov test was utilized to assess the normality of the data distribution. The test was conducted at a significance level of 0.05, with the following decision criteria: if the significance (sig.) value exceeds 0.05, the data is considered to be normally distributed; conversely, if the sig. value is less than or equal to 0.05, it indicates that the sample originates from a non-normally distributed population. The results of the normality test, as analyzed using SPSS 24 software, are presented in the table below. Ensuring the normality of data is essential in selecting the appropriate statistical analysis method for further hypothesis testing.

TABLE 25
POST-TEST DATA NORMALITY TEST OF ARTICLE TEXT

Class	Statistic	Df	Sig.
Control	0.090	35	0.200
Experiment	0.150	70	0.000

Referring to the table above, the significance value for the control class is 0.200, which is greater than 0.05, indicating that the data follows a normal distribution. Conversely, the significance value for the experimental class is 0.000, which is less than 0.05, suggesting that the data is not normally distributed. Based on these findings and the established testing criteria, it can be concluded that while the control class sample meets the assumption of normality, the experimental class sample does not. Given that one of the data sets originates from a non-normally distributed population, the appropriate method for comparing the two group means is a non-parametric statistical test. Therefore, the Mann-Whitney test is employed to assess the significance of the difference between the two averages, as it is specifically designed for analyzing data that does not meet the assumption of normality.

- b) Test the difference between two means

The normality test results indicated that both the control and experimental class samples were not normally distributed. Consequently, the Mann-Whitney test was employed to analyze the difference between the two means for the post-test data on article writing skills. In this study, the Mann-Whitney test was conducted based on the following hypothesis: if the significance value (sig.) is greater than 0.05, the null hypothesis (H₀) is accepted, implying no significant difference between the groups. However, if the significance value is less than or equal to 0.05, H₀ is rejected, indicating a significant difference. The subsequent table presents the detailed test results obtained using SPSS 24 software.

TABLE 26
MANN-WHITNEY TEST POST-TEST DATA ARTICLE TEXT

Class	Sig.	Interpretation
Control	0.000	H ₀ rejected
Experiment		

The comparison of Post-Test data on students' article writing skills shows a significance value of $0.000 < 0.05$, indicating a significant difference between students using the 21st-century competency-based and HOTS assessment model and those using the conventional model. The effectiveness of the competency-based and HOTS model in Indonesian language learning was evident, as students in this group outperformed those using the conventional model. Marzano (2007) states that a competency-based approach helps students systematically master specific skills, while Anderson and Krathwohl (2001), Setiawan et al. (2021), Herunata et al. (2021), and Aryana S. et al. (2022) note that HOTS fosters skills in evaluation, analysis, and creation, essential for writing article texts.

IV. CONCLUSION

This research concluded that the 21st-century competency-based and Higher Order Thinking Skills (HOTS) writing assessment model is significantly more effective in improving students' writing skills compared to the conventional method. This effectiveness applies to various types of texts, such as observation reports, biographies, procedures,

explanations, editorials, and articles. HOTS-based learning encourages students to think critically, analyze, evaluate, and create, enabling them to produce more structured and high-quality writing. The HOTS-based approach also allows students to master high-level skills relevant to the needs of the modern world. This model integrates critical thinking, collaboration, creativity, and communication skills.

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