# The Role of Writing Process Components and Cognitive Components in Improving the Quality of Narrative

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**Abstract.** This study aims to study the relationship between the writing process through an online learning system and students' writing products. This study also studied cognitive factors in the process component and the final product of writing. The study used a factorial analysis design because it aims to determine what factors contribute significantly to narrative writing skills. The students who became the sample were 125 students comprising 60 males and 65 females. The research findings show that the writing process component has a significant contribution to the quality of students' narrative writing. The process components that affect the quality of narrative writing are spelling ability and the number of revisions made by students. Cognitive components that affect students' writing skills are oral language skills, reading skills, selective attention, capitalization, and spelling. Thus, this component of the process of writing narrative text is only correlated with the cognitive abilities of spelling and reading, in contrast to the quality of the final product which is correlated with spoken language skills, attention, and working memory. The implication of this research is to strengthen the cognitive role in narrative writing; teachers must

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encourage students to be active in spoken language and optimize reading teaching in the learning process.

## 1. Introduction

Writing skill is one of the language skills that can be learned. Learning to write is seen from the aspect of the process and the end result. The process aspect relates to the process of producing the text and the factors that can support the smooth process of making the text, such as the speed and fluency of writing and revision (Grenner et al., 2020; Grenner, van de Weijer et al., 2021). The product aspect is related to the final product of writing, learning from the product aspect, for example, learning how to contain quality, length, spelling, and story text. Several previous studies have observed that there are cognitive factors that affect the quality of writing (Hadianto et al., 2021; Holloway, 2019; Repaskey et al., 2017). However, it is still not widely known what students' actions during the writing process have an important role in producing quality writing. In addition, whether there are differences in cognitive factors that play a role when the writing process takes place with cognitive factors related to the final product of writing. Based on this idea, this research seeks to study the process factors that contribute to product quality and the cognitive skills of students used in the writing process.

The writing skills of middle-level students are seen from the use of words and sentences. However, in the aspect of creative writing, there are aspects of individual competence concerning the style of using language creatively. This research focuses on the type of narrative writing. Narrative is a type of writing that contains stories or sequences of real or fictional events according to the context of the story (Grenner, van de Weijer et al., 2021; Kirby et al., 2021). In narrative texts, there are creative elements of students, such as storylines and other elements that build the narrative. This study investigates the relationship between writing skills and students' cognitive abilities. Previous research found that writing narrative and ordinary sentences requires different cognitive abilities. Visual skills can predict the performance of writing ordinary sentences and writing narratives (Lonigro et al., 2020; Varotsis, 2020). The task of writing ordinary sentences can show the literacy level of students, while the task of writing narrative requires complex cognitive and imaginative abilities, so that the ability to write narrative is included in the ability to write creatively. The level of student creativity can be checked from the quality of the story and other aspects (Kirby et al., 2021; Lonigro et al., 2020).

The difference between this study and previous research is that the researcher focuses on the components of the writing process and the cognitive components that contribute to the quality of students' writing. Previous research has only analyzed cognitive, rarely involving components of the writing process. Through this research, the researcher describes in detail all the cognitive and process components, so that teachers can get an overview of what cognitive and process skills need to be strengthened. This study seeks to uncover components of the writing process and cognitive components that contribute significantly to

students' narrative writing abilities or the quality of students' narrative writing. This study took samples from junior high school level students in the Bandung area, Indonesia. A total of 125 were involved in this study with a composition of 60 boys and 65 girls. Students who participated were first examined for their reading comprehension skills with the result that the differences between the students involved were not much different from other students. All students involved had experience of writing using a computer device for fluency during the research process because the context of writing stories in this study was the context of writing using a computer device. The main objective of this research is to investigate the component factors in the writing process and the cognitive components that make a significant contribution to the quality of students' narrative writing.

## 2. Literature Review
### 2.1 Aspects of the Process in Writing Skills
Writing skills involve three stages, namely planning, writing, and revising. In the planning stage, there are several components, namely the selection of ideas, organizational planning and setting writing goals (Yang et al., 2022; Zupan & Babbage, 2017). The writing stage involves several skills, namely converting ideas into language (drafting) and the written word. The revision stage includes the stage of correcting spelling errors, sentences, or it can also modify other aspects. In this study, it focuses on the components of the process and revision. Previous research found that fluency when writing drafts was measured by the use of time and frequency of word and sentence replacement (Bueno, 2018; Gilbert, 2021). These components are proven to be related to the quality of students' narrative writing. This research tries to reveal the students' writing process by using hardware that is recorded entirely by paying attention to the time and pauses in writing. The findings in previous studies were that students with dyslexia did not have a relationship between process components (time, pauses, writing fluency, word or sentence replacement) with the quality of the final written product. In contrast to research on normal students aged (14-19) the writing process greatly affects the quality of students' writing. Similar findings in younger students (7-12 years), the process component can predict and determine the quality of students' writing (Harper, 2008; King, 2018).

The length of the writing also affects the quality of the writing at all levels. The previous research shows that the factors of the writing process (writing speed, fluency, and length of writing) can have a significant influence on the reader's understanding (Peterle, 2019; Peterson & Graham, 2015). So, it can be concluded that this aspect of the process greatly affects the quality of students' writing. In the writing process, there is a revision stage. This revision stage was found to vary among students from elementary to middle school levels. Aspects of student revision at the elementary school level are found during the writing process, which can occur in word or sentence classes. However, revisions to students in secondary schools were found at the post-transcript stage or after the writing was completed. This proves that the aspects of the writing process at each level and age of students are different.

Other research on the revision aspect proves that the revision stage at the level of young and adult students makes different contributions to the quality of their writing (Cake, 2018; Chang et al., 2021). The effect of revisions differs in students with different early and adult ages. Revisions made by students at an early age did not significantly contribute to the quality of the text because the revisions made at an early age were carried out spontaneously and were at the level of low linguistic devices. In contrast to the revisions made by adult students contribute significantly to the quality of writing because revisions at the adult level are carried out on deeper aspects, such as meaning and relationships between paragraphs or plots (more complex linguistic classes) (Hadianto et al., 2022; Yoo, 2019). The different stages of revision carried out by students at different levels are due to the inability of early or low grade students to revise texts in deeper aspects (meaning, relationships between paragraphs, and other complex linguistic classes). However, this difference in revision ability is also caused by the inability of early age students to control their writing and limited knowledge in applying tools, which can affect the quality of writing.

## 2.2 Writing Using a Computer

At this time, computers or laptops are commonly used in schools by students to write or take notes. Researches on students' writing abilities using computer devices have begun to be widely carried out. The results of the study found that stationery had an effect on the quality of students' writing (Chang et al., 2021; Gilbert, 2021). The computer equipment used in writing greatly affects the quantity and quality of substantive writing. Children who use computers tend to revise their writing more often than writing by hand (King, 2018; Martin et al., 2021). The revision process on the computer is mostly done through deleting, cutting, replacing, and pasting writing, which can affect the quality of writing. Writing using a computer, laptop, or tablet aims to record the writing process. This is done to make it easier for researchers to analyze the factors involved in the process (drafting, pauses, and revisions) and their effects on the quality of writing (Gupta, 2019; Harper, 2007). This computer-based writing method is used by researchers to make it easier to analyze process aspects and children's literacy skills during the writing process. By knowing in more detail the student's writing process, it will be easier for the teacher to determine which aspects of the process need to be improved. There are several previous studies that reveal the development of writing skills through computer recording devices (Attard, 2012; Grenner, van de Weijer, et al., 2021).

This study investigates the process and outcome aspects to examine the correlation between the final product of the writing and the process of how to make the writing. Researchers studied the writing process of students at the high school level, which included writing speed, thinking pauses, writing fluency and the time needed in the revision stage before the written product was declared complete. In addition, this study also assessed aspects of the final product of students' writing, including the number of words, complex clauses, and narrative structure (Beck, 2004; Blythe & Sweet, 2005; Brayfield, 2009). From this research, it was found that there is a significant correlation between the components of the writing speed process and the percentage of complex clauses with the quality of the final product of students' writing. In addition, it was found that the pause in

the aspect of the writing process was not related to the quality of narrative text. Another study also found that the gender aspect of older students affected the speed and fluency of writing and affected the quality. Female students excel in aspects of the writing process using a computer, so the quality of their writing is better than male students. Another study analyzed aspects of the writing process, namely the comparison between groups of children with dyslexia and normal children. Both groups were instructed to write through the teacher's dictation method. The results found that the aspects of the process that the dyslexic group went through were not much different from the normal group, but the quality of the final product in the normal group of students was better than that of the dyslexic group (Bueno, 2018; Fang, 2021).

**2.3 Cognitive Factors in Writing**
Cognitive factors have an important role in the writing process. The model that contains the concept of cognitive factors that affect writing ability is the writing process model (Grenner et al., 2020; Grenner, Johansson, et al., 2021). There are four cognitive factors that influence the quality of the final writing product, including text interpretation (text comprehension through language and memory, transcription (conversion of ideas into written text), executive function (attention, control, purpose, planning, checking, revision), and ability memory which includes verbal information processing, phonological abilities, and executive support that makes the connection between verbal abilities and general executive abilities (Varotsis, 2020; Yang et al., 2022). The following describes the cognitive factors involved in the writing process.

From the findings of several studies that have been described by researchers, it can be concluded that students' cognitive factors greatly affect the writing process and the quality of the final product. Students in the early grades have cognitive factors that influence spelling, punctuation, and word use. In contrast to adult students, cognitive factors that affect the quality of writing are text structure, complex linguistic level (complex clauses, sentences, relationships between paragraphs) (Foxworth et al., 2017; Martin et al., 2021).

*2.3.1 Spoken Language and Reading Ability*
The writing process involves other aspects of the process, namely oral language skills and active reading skills. Based on the previous research, it has been proven that students' verbal reasoning ability and reading ability have a significant influence on the quality of the final product of narrative writing (Grenner, van de Weijer, et al., 2021; Kirby et al., 2021). However, between these two factors, reading ability has more influence on the quality of writing. The quality of narrative writing is significantly influenced by students' oral language skills. Oral language skills that greatly affect the quality of writing are grammar and vocabulary mastery (Ferrari, 2015; Grenner et al., 2020). Although there are several studies that prove that the ability of spoken language is strongly related to the quality of writing, there are, however, studies that prove that students with language disorders have no relationship between their oral language skills and the quality of writing (Grenner, Johansson et al., 2021; Kirby et al., 2021; Lonigro et al., 2020). In addition, other studies also prove that there is no effect of spoken language ability on written content in older students. Another study at an early

age found that there was a significant contribution of oral language skills to the ability to express ideas in writing. So it can be concluded from these studies that oral language and reading skills in early age children greatly affect writing ability, but it does not happen to more mature students because many more complex factors affect it.

Teachers of early age students suggest optimizing activities that encourage the frequency of use of spoken language in the learning process because spoken language has an important role in students' writing skills. In addition, the learning process must also optimize reading activities. Students' reading ability can affect the quality of writing because knowledge or schemata can help the process of pouring ideas into written text smoothly. So, the two skills influence each other. From previous research, it was found that reading comprehension skills had a significant and direct effect on composition and fluency in writing narrative and expository texts for all students at every level (Cheung, 2018; Gifford, 2002). So, the ability to read and understand affects students' ability to represent language, making it easier for students to write. This reading comprehension ability will make students better able to write using complex sentences. Other studies also prove that reading comprehension ability is a predictor to see or determine the quality of narrative writing. Factors of reading ability that affect the quality of writing at each level of students are the ability to read words, reading accuracy, reading fluency or speed, and the ability to understand inferential meanings. Students who are fluent in reading affect the amount of vocabulary produced in writing texts. Reading fluency facilitates students to understand the meaning and understand orthographic information which, in turn, facilitates students in pouring it into writing. In the process of writing, students retrieve schemata from long-term memory and use them to generate new ideas (Mohseni et al., 2020; Noor, 2021; Sun et al., 2016).

*2.3.2 Drafting Factor*
Drafting or transcription is the process of transforming the resulting ideas into written language. Writing manually or on a computer is an important factor in the process. The ability to transcribe or make written drafts with constructive skills is an ability that must be coordinated during the writing process. From several previous studies it was found that the ability of drafting or transcription can predict the quality of writing because fluency in writing can reduce pressure on memory, so that this memory component can be used in processes that involve high cognitive levels (Harper, 2008; Hirson, 2015; Jess-Cooke, 2015).

*2.3.3 Cognitive Factors of Executive Function*
This executive function offers a writing model, namely the "simple writing model" which focuses on writing methods at a high level. This model also pays attention to low-level writing skills. This simple writing model combines a control component by selecting relevant ideas, filtering out ideas that do not fit in the mental process of writing. The difference between low-level and high-level executive functions can be seen from their functions, namely inhibition, change, and renewal. Inhibition is the ability to block dominant responses, including the idea of screening attention. Change is the ability to use different mental operations on different writing tasks. Updating is the ability of a person to use his working

memory in the process of writing. Updating is the ability to view and filter out irrelevant information or replace irrelevant ideas with new and appropriate ones (Jordan-Baker, 2015; King, 2018). The components of the executive function are included in the lower executive functions which form the basis of the higher executive functions which have been examined by several previous studies. This process of inhibiting, modifying, and updating has a very important role in developing the quality of student writing. The inhibition process plays a role in inhibiting inappropriate words and choosing words that have appropriate lexical, grammatical and syntactical meanings during the writing process (Martin et al., 2021; Monk, 2016).

Another study investigating the role of the executive found that obstruction and renewal have a significant effect on the length of narrative texts. In addition, obstructions and updates also affect the fluency of writing and the use of spelling, which ultimately affects the use of complex syntax and text content (Morrison, 2013; Newton & Newton, 2010; Onkas, 2015). The executive function of this cognitive factor in general is so that students' writing processes are of good quality in terms of language, meaning, and content quality. This executive function is very concerned about the development of student writing. There are several ways to assess students' attention in the writing process. Currently, several previous studies have suggested that dicotic listening is one that can be used to measure verbal and brain processing abilities. This method can be used to control students' cognitive process so that the use of language and literacy is appropriate. Furthermore, related to the executive function in the writing process is working memory.

*2.3.5 Working Memory*
Working memory is one aspect of the renewal role in the executive function. The role of working memory can be explained in a simple writing model. There are several previous studies that prove there is a relationship between verbal working memory and the quality of narrative writing in students. Working memory has a significant effect on the quality and length of the text created (Attard, 2012; Ferrari, 2015). The contribution of working memory is very influential on the writing process of students and its contribution is stable until adulthood. A working memory contributes to fluency in writing by the dictation method. However, this working memory does not contribute to the number of revisions while writing.

**2.4 Current Research**
Based on previous research which mostly examined handwriting and tended to address the quality of the final product of writing, the current research focuses on the ability to write using a computer device and focuses on the process. To answer the formulation of the problem, researchers took samples of students who already have the ability to use computers or laptops in their daily lives. The researcher formulates the research question as follows.
 1) What components of the writing process contribute significantly to the quality of students' narrative text writing?
 2) What components of cognitive factors contribute significantly to the writing process and the quality of the final product of students' narrative writing?

## 3. Methodology

### 3.1 Participants

This study uses a factorial analysis design because it aims to determine what factors contribute significantly to narrative writing skills. The factorial analysis design is a research design that pays attention to the possibility of moderator variables affecting the dependent variable or treatment variable on the dependent variable or outcome. The selection of samples in this study was carried out randomly. Factorial analysis was used because it fits the purpose of this study, namely to find out which aspects of the writing process components and which aspects of the cognitive components contribute most to narrative writing skills. This research involved junior high school students. The students who became the sample were 125 students comprising 60 males and 65 females. The participating students were first checked for their reading comprehension skills with the result that the differences between the students involved were not much different from other students who did not participate. The research sample represents all levels of literacy with the aim of looking at aspects of the writing process and cognitive factors at each level. Parents of students participating in the study were examined with an undergraduate education level of 46% mothers and 49% fathers. All students who became research participants had experience writing using a computer device for fluency during the research process. From the results of a survey on computer use at home, it was found that 65% of students use computers less than 3 hours per week, 35% use 4-7 hours, and 5% use computers more than 7 hours per week.

### 3.2 Materials and Procedures

All students who participated in this study have been approved by the schools and the children and parents of students who are research participants. The process of writing narrative texts lasted about 2-3 hours for each child. Researchers worked closely with lecturers and linguists with PhD qualifications to be involved in every stage, both the instrument testing stage and student writing test testing. The following describes the materials and procedures in more detail on each aspect studied The instruments used in this study include:

### 3.3 Instrument for Evaluating Narrative Writing Skills

To assess students' narrative writing skills, the researcher used the criteria for assessing the quality of narrative writing, a narrative text element rating scale starting from the theme, characters, plot, setting, and other elements. In the narrative text writing test, the researcher only determines the theme elements, the students are given freedom in determining the other elements, such as character, plot, setting, etc., when writing. Each student writes on a computer that is specially placed in a computer laboratory. During the writing process, students are recorded using a recorder application to facilitate researchers in studying the writing process and cognitive aspects, then confirmed by the quality of the final written result. The writing process is recorded from the time the writing process starts to the end. So, all stages of the process carried out by students are recorded starting from the drafting stage, spontaneous revision, and revision after the drafting stage is complete. The process components analyzed while students were writing are listed in Table 1 and their explanations. Measurement of writing

fluency is carried out on every word produced every minute and the number of words in the final product of student writing.

The aspect of the students' writing process that was not examined by the researcher was the pause aspect. The revision aspect was examined based on three types of revisions, namely spontaneous revision, post hoc revision, and insertion revision. Spontaneous revision is the replacement of words or sentences after they are written at the same time. Post hoc revisions are revisions to the last written word in each sentence. Insertion revision is the addition of new words or sentences to the written text. So it can be concluded that spontaneous revisions are referred to as online local revisions, post hoc revisions are local post-drafting revisions, and insertion revisions are post-drafting global revisions. The quality of the final product of students' narrative writing is assessed for its overall narrative structure using narrative assessment criteria. The narrative assessment criteria include seven aspects. Each aspect has a point. Three aspects are related to grammar, content, and story, which include introduction, resolution, and conclusion. Two other aspects are related to the use of students' literacy language, which includes terms that describe mental conditions and character. Two other aspects are coherence between paragraphs, which include coherence and cohesion. Each aspect is scored on a scale of 1-5. So, the lowest score is 7 and the highest is 35. The researcher conducted an assessment using narrative assessment criteria and produced an inter-rater coefficient of 90%.

### 3.4 Instrument for Evaluating of Oral Language Skills

Students' oral language skills were assessed using a vocabulary scale. This scale assesses receptive vocabulary and produces a 90% internal consistency reliability. In addition, the researcher also assessed the receptive grammar which was adapted from Bishop's receptive grammar and yielded 95% consistency reliability. Expressive language assessment at the morphological, syntactic, and semantic levels uses a sentence model. To measure expressive language using this sentence model, the researcher presents the context with two pictures and then students are asked to make sentences that match the two pictures. The results of this sentence model test resulted in 25 sentences of varying complexity. The majority of errors are at the morphological and semantic levels. Measurements on the sample using the sentence model resulted in 92% reliability.

**Table 1. Components of the process and product of narrative text**

| Component | Explanation |
|---|---|
| Product size | |
| Narrative structure quality | The total score of the seven aspects of narrative story |
| Long story | Total number of words |
| % misspelling | Percentage of misspellings in stories |
| % punctuation error | Percentage of errors using capital letters and punctuation |
| Process steps | |
| Smooth drafting | Number of words per second |
| Spontaneous revision | Number of changes word in the text |
| Post hoc revision | The number of word changes remaining from the last word |
| Text revision | The number of words or sentences inserted in the text |

**3.5 Instrument for Evaluating Reading and Writing Skills**

Students' reading ability was assessed using the cloze technique. The reader is given a blank text with three answer choices. Students are asked to fill in the gap text from the three answer choices provided. The text provided to assess reading ability is 500 words. In addition, the writing test was conducted using dictation consisting of 10 sentences with attention to spelling and capitalization. This reading and writing ability test is used as material for comparison with the final product of students' narrative writing.

**3.6 Instrument for Evaluating Nonverbal Skills and Working Memory**

Students' nonverbal ability was measured using a matrix analogy test. This test measures general nonverbal ability by providing 35 missing matrices and students are asked to complete the section by choosing several options. This test resulted in the reliability of students' consistency with a score of 91%. This score indicates that the students' nonverbal abilities meet the criteria to take the narrative text writing ability test. Students' working memory abilities were assessed using an intelligence scale. Short-term memory was measured in the forward recall condition, while students' working memory was measured in the backward condition. Both conditions are related to writing ability. The reliability of internal consistency on the measurement of students' working memory is 78%.

# 4. Result

Scores for students' cognitive abilities are described in Table 2. Students' reading abilities were converted to z-scores. The results show a normal distribution with the average reading ability z= 0.00 (SD: 0.98), and the average spelling is z: -0.03 (SD: 1.03). From the results of processing these scores, there is no significant difference between the two reading and spelling competencies. However, there was a significant relationship between the two scores (r=0.70, p=0.001). In addition, the expressive language ability score was also converted into a z-score with an abnormal distribution result (M z-score: 0.01, SD: 1.02). The summary of students' cognitive abilities in each aspect that plays a role in students' narrative writing skills is listed in Table 2.

**Table 2. Scores of students' cognitive ability**

| Component | Mean | SD | Mean standard |
|---|---|---|---|
| IQ nonverbal | 17.35 | 6.62 | 112 |
| Working memory | 12.12 | 3.75 | 98 |
| Receptive words | 93.13 | 14.81 | 100 |
| Receptive grammar | 16.50 | 3.12 | 113 |
| Expressive language | 21.12 | 10.92 | |
| Spelling error | 4.92 | 3.76 | |
| Reading text (words per minute) | 72.24 | 32.13 | |

Furthermore, based on the results of the bivariate correlation analysis, there is a moderate correlation between the components of students' cognitive abilities. Bivariate correlations between cognitive components are presented in Table 3. The results of value processing on the quality of the final product of students' narrative writing are presented in Table 4. Significant variations were found in narrative structure and length of narrative text among students. From the results of the

analysis, it was found that the variability was quite high in the aspect of using narrative writing conventions. In addition, a quarter of spelling errors were found in the words used. However, there were also students' writings that did not contain spelling errors. Furthermore, aspects of students' writing fluency varied from the fastest which only took 2-3 seconds per word to the last one. Almost all students made online revisions to the texts they wrote, but only five students were found to revise their revised writings. There were five children who did as many as 30 online revisions; 50% of the participants did post hoc revision, and only one third did the text revision. From the results of the analysis, only five students produced abnormal scores and these students were not involved for further analysis.

**Table 3. Correlation between cognitive components**

| Measure | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 1. IQ nonverbal | – | -0.08 | 0.52** | 0.51** | 0.63** | 0.71** | -0.30 | 0.50** |
| 2. Working memory | 0.50** | 0.04 | – | 0.35* | 0.40* | 0.50** | -0.45** | 0.60 |
| 3. Receptive words | 0.51** | -0.09 | 0.38* | – | 0.37* | 0.54** | -0.43* | 0.43* |
| 4. Receptive grammar | 0.60** | -0.05 | 0.40* | 0.35* | – | 0.54** | -0.45** | 0.50* |
| 5. Expressive language | 0.70** | 0.04 | 0.50** | 0.47** | 0.55** | – | -0.38* | 0.50** |
| 6. Spelling error | -0.30 | -0.30 | -0.52** | -0.45* | -0.51** | -0.40* | – | -0.70** |
| 7. Reading text | 0.47** | 0.25 | 0.60** | 0.43* | 0.50** | 0.50** | -0.65** | – |

* p=0.05; ** p=0.01

**Table 4. Results of assessment of narrative writing process and products**

| | Minimum | Maximum | Mean (SD) |
|---|---|---|---|
| Narrative macrostructural qualities | 15 | 30 | 20.60 (4.20) |
| Text length | 13 | 90 | 40.52 (16.87) |
| Misspelling (%) | 4 | 70 | 30.54 (17.40) |
| Capitalization and punctuation errors (%) | 2 | 100 | 72.60 (40.02) |
| Smooth drafting | 6.42 | 62.71 | 17.70 (10.40) |
| Revision of online | 0 | 150 | 5.76 (4.38) |
| Revision of post hoc | 0 | 75 | 2.93 (4.44) |
| Revision of text | 0 | 15 | 0.60 (1.25) |

To answer the problem formulation of how is the relationship between the process and the quality of the students' final writing, the researcher conducted an analysis of the two components. It was found that the factors of writing fluency and online revision had a significant effect on the variance in the quality of narrative structure, length, and spelling. The researcher conducted a multiple regression test to see the quality of the structure, length of the text, and spelling in the narrative text. The multiple regression test of process components that can predict the quality of the final writing of narrative text can be seen in Table 5. The results of the analysis show that the fluency of writing or drafting and the number of online revisions can predict the quality of narrative text and the length of narrative text. Students who have the ability to write fast and make online revisions more often can produce narrative texts with quality structures and produce longer narrative texts. Revisions made by students with few spelling errors cannot predict the number of spelling errors in the final product of writing. A process

factor below the value of 1.2 indicates that there is no negative effect of multicollinearity.

To answer the second problem formulation, the researcher examined the correlation between the writing process and the final product with students' cognitive abilities. From the results of the analysis, it was found that all aspects of the final written product have a strong correlation with a number of cognitive abilities. However, the narrative writing process factor only has a strong correlation with reading and spelling abilities. The data are presented in Table 6. Students who have better reading and spelling skills do online revisions more often than other students. Students who have the ability to spell have the ability to write faster than others. So, cognitive abilities play a role in choosing and using upper or lower case letters and punctuation correctly.

**Table 5. Results of multiple regression analysis correlation of process factors and narrative text products**

| Product and process assessment | B | SE B | b | t-value | p value | R2 adjusted |
|---|---|---|---|---|---|---|
| Product: narrative text structure quality | | | | | | |
| Final model | | | | | | 0.371 |
| Writing fluency | -0.31 | 0.06 | -0.60 | -5.54 | >0.002 | |
| Online revision | 0.30 | 0.13 | 0.42 | 3.56 | 0.020 | |
| Product: long story | | | | | | |
| Final model | | | | | | 0.562 |
| Fluency of Writing | -1.40 | 0.30 | -0.70 | -6.60 | >0.002 | |
| Online revision | 1.40 | 0.61 | 0.41 | 3.62 | 0.018 | |
| Product: spelling in narrative | | | | | | |
| Final model | | | | | | 0.184 |
| Writing fluency | 0.94 | 0.40 | 0.50 | 4.20 | 0.004 | |
| Online revision | -0.80 | 0.70 | -0.20 | -1.15 | 0.382 | |
| Final model | | | | | | 0.183 |
| Writing fluency | 0.95 | 0.33 | 0.52 | 4.11 | 0.006 | |

**Table 6. Bivariate correlation of narrative text writing ability and cognitive ability**

| Component | Working memory | Vocabulary of Receptive | Grammar of Receptive | Errors of language | Misspelling | Text Reading |
|---|---|---|---|---|---|---|
| Product Rating | | | | | | |
| Narrative structure quality | 0.40* | 0.41* | 0.43* | -0.40* | -0.45** | 0.50** |
| Text length | 0.43** | 0.25 | 0.40* | -0.20 | -0.54** | 0.50** |
| Spelling error | -0.34* | -0.30 | -0.40* | 0.50** | 0.84** | -0.60** |
| Misuse of capital letters and punctuation | -0.30 | 0.20 | 0.30 | -0.30 | 0.40* | -0.55** |
| Process aspect | | | | | | |
| Writing fluency | -0.18 | 0.03 | -0.20 | 0.02 | 0.40* | -0.20 |
| Online revision | 0.18 | 0.30_ | 0.25 | -0.15 | -0.35* | 0.40* |

_pB 0.09; * p\0.05; ** p\0.01

The researcher conducted multiple linear regression test on the oral language cognitive process to analyze the predictor components that had a significant effect on the variance of narrative writing and the writing process. The results of the

cognitive multiple regression test of students' spoken language can be seen in Table 7. Cognitive spoken language analyzed includes vocabulary, grammar, and expressive language along with reading skills, working memory, notice and spelling. From the results of the analysis, it was found that only oral and spelling language skills proved to be significant predictors, while the quality of narrative text structure did not become a significant predictor even though it still had a correlation with students' cognitive abilities. Students who had better memory of working and spelling skills correlated with longer texts. The component of the process that predicts fluency in writing and revision is the students' spelling ability. From the results of the analysis of the variance inflation factor below 2.3, it means that there is no negative effect of multicollinearity.

**Table 7. Results of cognitive ability multiple regression analysis**

| Final products and processes | B | SE B | b | t-value | p value | R2 adjusted |
|---|---|---|---|---|---|---|
| Product: narrative structure quality | | | | | | |
| Complete models | | | | | | 0.278 |
| Spoken language | 0.40 | 0.28 | 0.30 | 1.62 | 0.142 | |
| Reading text | 0.03 | 0.03 | 0.20 | 0.80 | 0.453 | |
| Working memory | 0.11 | 0.22 | 0.010 | 0.50 | 0.730 | |
| Notice | 0.02 | 0.03 | 0.09 | 0.60 | 0.720 | |
| Spelling | -0.28 | 0.30 | -0.25 | -1.04 | 0.324 | |
| Complete model | | | | | | 0.334 |
| Spoken language | 0.48 | 0.23 | 0.40 | 2.20 | 0.040 | |
| Spelling | -0.50 | 0.20 | -0.40 | -2.45 | 0.030 | |
| Product: long story | | | | | | |
| Complete models | | | | | | 0.360 |
| Spoken language | -0.56 | 1.32 | -0.07 | -0.40 | 0.823 | |
| Reading text | 0.010 | 0.15 | 0.20 | 0.90 | 0.510 | |
| Working memory | 1.70 | 1.04 | 0.30 | 1.70 | 0.120 | |
| Notice | -0.95 | 0.096 | -0.20 | -0.89 | 0.450 | |
| Spelling | -2.89 | 1.30 | -0.50 | -2.45 | 0.030 | |
| Complete model | | | | | | |
| Working memory k | 3.02 | 0.89 | 0.42 | 2.32 | 0.045 | |
| Spelling | -2.89 | 0.95 | -0.50 | -4.16 | 0.005 | |
| Process: write | | | | | | |
| Complete models | | | | | | 0.092 |
| Spoken language | 0.62 | 0.70 | 0.20 | 0.80 | 0.540 | |
| Reading text | -0.04 | 0.08 | -0.15 | -0.60 | 0.645 | |
| Working memory | -0.30 | 0.60 | -0.10 | -0.52 | 0.324 | |
| Notice | 0.08 | 0.10 | 0.30 | 1.20 | 0.250 | |
| Spelling | 1.20 | 0.92 | 0.40 | 1.50 | 0.243 | |
| Complete model | | | | | | 0.120 |
| Spelling | -1.30 | 0.60 | -0.40 | -2.45 | 0.030 | |
| Process: online revision | | | | | | |
| Spoken language | 0.46 | 0.40 | 0.25 | 1.15 | 0.380 | |
| Reading text | 0.43 | 0.05 | 0.20 | 0.90 | 0.520 | |
| Working memory | -0.05 | 0.40 | -0.03 | -0.15 | 0.988 | |
| Notice | -0.04 | 0.04 | -0.03 | -0.15 | 0.920 | |
| Spelling | -0.53 | 0.52 | -0.30 | -1.32 | 0.340 | |

| Complete model | | | | | 0.189 |
|---|---|---|---|---|---|
| Spelling | -0.092 | 0.30 | -0.50 | -4.06 | 0.006 |

## 5. Discussion

This study investigates the factors of the writing process by recording writing activities with a computer with the aim of seeing the relationship and influence with the quality of students' narrative writing. The results of the research in the revision aspect showed that, in general, students did online revisions, but did not do post-transcription revisions. Students who have good reading and spelling skills show the most revision intensity. The number of online revisions made by students can predict the quality of the narrative structure and the length of the text. Students who carry out online revision with high intensity can produce higher quality and longer narrative texts. Students' writing speed also determines the quality of spelling in their narrative text writing (Foxworth et al., 2017; Grenner, van de Weijer et al., 2021). Researchers also analyzed cognitive components that have a strong correlation with writing process factors. From the research results, the process factors that can predict the quality of narrative writing are spelling, spoken language, and working memory.

**5.1 Relationship between Process Components in Narrative Writing Products**
Based on the research results, students who have the ability to write quickly contribute to the quality of narrative text structure and text content. The study on the process and student writing was carried out using computers and tablets which recorded all their activities from writing to completion. Students' writing fluency contributes to students' spelling ability, but the relationship shown by the two process factors is not very significant. This finding is in line with other models which show that limited spelling skills can hinder students' writing skills in converting ideas into written text. The next finding is that the number of online revisions is a predictor of the quality of the structure and length of the story. Students who frequently revise online tend to produce better narrative writing (Lonigro et al., 2020; Montanero et al., 2014). This finding is consistent with the results of correlation analysis which shows that students with good reading and spelling skills make online revisions more frequently.

The findings in this study are in line with the findings of previous studies which prove that the number of revisions made by students can affect the quality of narrative writing in lower grades or elementary schools. In addition, the revisions made by middle class students also greatly contributed to the quality of writing. Revisions made by students are more frequent on substantive components than on mechanical components. To measure students' revision ability, revision instructions were given to texts containing errors. Comparison of the revision process and the quality of the final writing was carried out by researchers to see the contribution of the revision process (Beck, 2004; Bueno, 2018). To distinguish students who have good writing skills and those who don't have, students are asked to revise the wrong text and integrate it into the writing process. This study is in line with the findings of previous studies that students have revision skills but their use is not optimal because of the executive burden on other components of the writing process. This is also supported by other studies, namely students

mostly delay revisions until the draft is finished. This makes the frequency of revisions made by students more intensive and in-depth (Jordan-Baker, 2015; King, 2018). This revision process often occurs in early and intermediate level students. Students who do online revisions with a higher frequency have better spelling skills.

This good spelling ability can minimize executive functions so that students can focus on misspellings in the text (Foxworth et al., 2017; Grenner, van de Weijer et al., 2021). The findings in this study are consistent with previous studies which proved that online revisions contributed to text quality. Early and middle grade students tend to write narrative stories by using storytelling strategies that optimize their oral language skills so as to produce writing that does not go through prior revision. Through classroom teaching, students are given various learning methods to change ideas by filtering them, so that students can evaluate and modify texts to produce quality writing. In general, students' awareness and skills in revising texts will appear for approximately two years when they enter school age. However, there are some students who have good reading and spelling skills who can take advantage of revision skills to improve the quality of their writing (Martin et al., 2021; McDermott, 2015). The revision abilities that appear in early grade students are revisions to simple components such as changing words, while the revisions made by middle grade students are changes or blending of texts such as changing sentences, inserting sentences, or changing narrative storylines. This finding is in line with previous research that post-transcriptional revision is a skill possessed by middle grade students (Monk, 2016; Moolman, 2015). The limitation of this research is the limited writing time, which is 15 minutes to write narrative text, resulting in short texts and some are found to be incomplete. If students are given more time, the assessment of the quality of the structure will be more accurate in describing students' narrative writing competence. In addition, time constraints also prevent students from doing post-transcriptions because there is no more time to reread after the text has been written. However, this limited time also contributes to fluency in writing.

**5.2 Correlation of Cognitive Ability with Students' Writing Ability**
The product component of writing narrative text is related to the simple writing concept that was explained earlier. The findings of this study indicate that the cognitive factors used by students to write using a computer or tablet are relatively the same as the cognitive components used by students when writing by hand or manually. There is a difference with previous studies which found the fact that oral language skills did not significantly affect the quality of the final product of narrative writing because previous research writing instructions were equipped with series of pictures so that students were helped with pictures (Onkas, 2015; Peterle, 2019). With instructions equipped with serial images, the executive function of students is not optimal. In contrast to previous studies, this study found that oral language skills and reading skills have a significant effect on the quality of narrative text structure. In addition, there is a strong correlation between the ability of selective attention, capitalization, and punctuation in writing narrative texts. This filtering component or selective attention is used as cognitive control. This component of selective attention is correlated with text

length and writing fluency. This is consistent with previous studies examining the components of selective attention.

This component of the process of writing narrative text only correlates with cognitive abilities of spelling and reading, in contrast to the quality of the final product which correlates with oral language skills, attention, and working memory. In addition, based on the results of regression analysis processing, spelling is a cognitive factor that affects the fluency of transcription and revision. From this explanation, it can be concluded that this component of the writing process has a relationship with students' cognitive abilities (Holloway, 2019; Taylor & Jordan-Baker, 2019). Reading and spelling skills are the most important factors to facilitate students in doing transcription. This is reinforced by previous research which found that this spelling ability made a positive contribution to the length of narrative texts (Denner et al., 2003; Grenner et al., 2020). In addition, the findings in this study were also strengthened by another study which found that there was a strong correlation between spelling ability and the pause process factor and writing fluency in dyslexic students. There is some evidence related to reading skills, including students who have good reading skills affect the ability to understand lexical, semantic, and orthographic meaning so that students can write faster.

## 6. Conclusion, Limitation, and Recommendation

Based on the research findings, it can be concluded that several components of the writing process and cognitive components have a significant contribution to the quality of students' narrative writing. The process components that affect the quality of narrative writing are spelling ability and the number of revisions made by students. Cognitive components that affect students' writing skills are oral language skills, reading skills, selective attention, capitalization, and spelling. So, this component of the process of writing narrative text is only correlated with cognitive ability to spell and read, in contrast to the quality of the final product which is correlated with spoken language ability, attention, and working memory. The implication of this research is that the teacher must provide spelling instructions and how to revise a piece of writing to optimize the quality of students' writing. In addition, to strengthen the cognitive role in writing narratives, teachers must encourage students to be active in spoken language and bring up reading teaching in every learning process.

This study has several limitations including the limited writing time, which is 15 minutes to write narrative texts, so the texts are short and some are found incomplete. If students are given more time, the structure quality assessment will be more accurate in describing students' narrative writing competence. In addition, time constraints also prevent students from doing post-transcription because there is no more time to re-read after the text has been written. However, this limited time also contributes to fluency in writing. Based on these deficiencies, the researcher recommends further research to focus on revision categories (revision of spelling, semantics, and narrative style), involving a wider sample, considering gender in research, in addition, further research should pay attention to different age groups. Through this research, teachers must optimize the role of

the writing process and students' cognitive components so that they are able to improve the quality of their writing.

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