

Students' Creative Thinking Patterns in Writing Scientific Papers

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Abstract. This study aims to determine the creative thinking patterns of students contained in scientific papers. The method used is a qualitative research method. Sources of data in research are students and documents in the form of papers. There are three data collection techniques, namely (1) reading papers, (2) interviews, and (3) observation. The results of this study show a pattern of lateral thinking that appears in several developments of ideas. Then, there are still traditional thinking patterns. Factors that cause traditional thinking are (1) experience, (2) sources of information, (3) lack of confidence, and (4) willingness to learn.

Keywords: Creative Thinking, Scientific Papers, Lateral Thinking

1 Introduction

Writing within the scope of human life becomes a container that stores information. Information is poured in the form of a series of language sounds that pay attention to the rules. When assembling sound symbols, the writer needs an understanding of the topic or has an idea that will be used as information. Writing is the last activity in language skills based on acquisition. This is in accordance with the opinion of Ur, Penny (1996: 103-170) which explains that "The process of learning language skills is in accordance with the process of acquiring language in humans when humans are born until they can learn language, namely (1) listening, (2) speaking, (3) writing, and (4) reading. Then, Harmer (2007: 265-280) says that "The language learning process is in two large groups, namely (1) is receptive which includes reading and listening and (2) is productive which includes writing and speaking." Productive activities are not easy to do, because you need to go through several stages in the thinking process.

Thinking is the activity of recalling information that has been inputted into short-term memory and long-term memory. Then, the information is processed so that it can be poured orally and in writing and can become a behavior. Based on Bloom's taxonomy, the dimensions of cognitive processes have levels based on information processing. There are six stages of the cognitive process, namely (1) remembering, (2) understanding, (3) applying, (4) analyzing, (5) evaluating, and (6) creating. Therefore, creating is a skill that is integrated with creative thinking. Creative thinking is the highest level of thinking in cognitive processes.

There are two patterns of creative thinking, namely divergent and lateral. First, divergent thinking is a pattern of thinking that provides various problem solutions from existing

hypotheses. This is consistent with the opinion of Faridah, N. S (2019: 440) who says that "Divergent thinking is thinking to provide various possible answers based on the information provided with an emphasis on the quantity, diversity and originality of answers." Divergent thinking is usually carried out by way of stimulation (asking questions) so that ideas or ideas flow freely and spontaneously so that many ideas are generated. When someone thinks divergently, they automatically think critically. According to Guilford (in Nurdiansyah, E, 2016) divergent thinking is a trait based on four factors, namely fluency, flexibility, originality, and elaboration.

Second, lateral thinking is a way to build and rearrange old patterns to produce new patterns. According to Sarjono (2006: 209) lateral thinking patterns can generally be interpreted as an attitude or a way of using an effective mind, but producing optimal ideas. Through the method of thinking, the memory of the human mindset is invited to always look for alternatives to open up solutions, because lateral thinking is related to experience, creativity, and humor. Thinking laterally is different from traditional thinking. According to Bono (1991: 14) traditional thinking patterns and lateral thinking patterns have differences. Traditional thinking is concerned with proving or developing patterns of conception, whereas lateral thinking is concerned with rebuilding such patterns (understanding) and generating something new (creative). Lateral thinking and traditional thinking complement each other, and both skills are required.

The paper is one type of scientific work that contains a variety of scientific information. The process of creative thinking in writing a paper is very important so that it is able to contain various information that enriches knowledge. Writing papers pays attention to the rules of writing, namely (1) standard language, (2) General Guidelines for Indonesian Spelling, (3) characteristics of effective sentences, and (4) structure of paper writing. Scientific papers have a structure namely (1) cover page, (2) preface, (3) table of contents, (4) introduction, (5) discussion, (6) closing, and (7) list of references.

2 Research Methods

This study uses a qualitative research method with a type of phenomenology. Sources of data in this study were documents in the form of papers and class A students in semester 1 (one), Mining Engineering Study Program, Faculty of Engineering at Muhammadiyah University of Mataram. The number of students in the study were 29 students. There are 8 (eight) female students. Meanwhile, there were 21 (twenty one) male students.

Data collection techniques are (1) reading papers to identify and classify according to creative thinking patterns, (2) conducting interviews to find out the causes of traditional thinking patterns in papers, and (3) observations are made to find out how students learn in learning. Document analysis in the form of papers was carried out by theoretical triangulation through matching the results of data analysis according to the theoretical studies used in the research. Then, the analysis of the results of the interviews was carried out using transcripts and coding.

3 Result and Discussion

3.1 Literary Creative Thinking

There are two patterns of creative thinking, namely divergent and lateral. First, divergent thinking is a pattern of thinking that provides various problem solutions from existing hypotheses. This is consistent with the opinion of Faridah, N. S (2019: 440) who says that "Divergent thinking is thinking to provide various possible answers based on the information provided with an emphasis on the quantity, diversity and originality of answers." Divergent thinking is usually carried out by way of stimulation (asking questions) so that ideas or ideas flow freely and spontaneously so that many ideas are generated. When someone thinks divergently, they automatically think critically. According to Guilford (in Nurdiansyah, E, 2016) divergent thinking is a trait based on four factors, namely fluency, flexibility, originality, and elaboration.

Second, lateral thinking is a way to build and rearrange old patterns to produce new patterns. According to Sarjono [3] lateral thinking patterns can generally be interpreted as an attitude or a way of using an effective mind, but producing optimal ideas. Through the method of thinking, the memory of the human mindset is invited to always look for alternatives to open up solutions, because lateral thinking is related to experience, creativity, and humor. Thinking laterally is different from traditional thinking. According to Bono [1] traditional thinking patterns and lateral thinking patterns have differences. Traditional thinking is concerned with proving or developing patterns of conception, whereas lateral thinking is concerned with rebuilding such patterns (understanding) and generating something new (creative). Lateral thinking and traditional thinking complement each other, and both skills are required.

3.2 Analysis of Creative Thinking Patterns

There are two patterns of creative thinking, namely divergent and lateral. First, divergent thinking is a pattern of thinking that provides various problem solutions from existing hypotheses. Second, lateral thinking is a way to build and rearrange old patterns to produce new patterns. There are two paper titles that will be analyzed, namely (1) History of Indonesian Spelling and (2) Types and Requirements for Forming Paragraphs.

Table 1: Findings of Lateral Thinking Patterns

History of Indonesian Spelling		
Language has an important role in life because besides being used as a direct communication tool, language can also be used as a written communication tool. In the current era of globalization and development reform, people are required to actively	Sentence 1 Core: the role and use of language.	Sentences in the first paragraph are developed with deductive development.
	Sentence 2 Core: due to the times, must be able to understand information from all aspects.	
	Sentence 3	

<p>monitor and understand information in all aspects of social life properly and correctly.</p> <p>As a supporting material for this completeness, language functions as a medium for conveying information properly and accurately. By conveying news or material in writing, it is hoped that the public can use the media properly and correctly.</p>	<p>Core: the function of language as a medium so that the writer hopes to be able to use media (language) properly and correctly.</p>	
<p>In integrating an agreement in language ethics, this is where the standard role is used in this case, we as good citizens should always pay attention to the signs of good and correct Indonesian words.</p> <p>Enhanced Spelling (EYD) is a sub-material in the obedience of the Indonesian language, which has a significant role in regulating written exchange ethics so that it is hoped that this information can be conveyed and understood in a comprehensive and directed manner.</p> <p>In practice, it is hoped that these rules can be used in people's daily activities, so that the process of using Indonesian words can be used properly and correctly.</p>	<p>Sentence 1 Core: in language there are rules that must be obeyed.</p> <p>Sentence 2 Core: EYD has a big role in regulating language ethics.</p> <p>Sentence 3 Core: the hope to be able to apply the rules of language in life.</p>	<p>Sentences in the first paragraph are developed with deductive development.</p>
<p>Types and Requirements for Forming Paragraphs</p>		
<p>Generally, the first difficulty in making scientific papers is expressing thoughts into sentences in scientific language. Often forgotten the difference between paragraphs and sentences. A sentence in writing does not</p>	<p>Sentence 1 Core: language phenomenon.</p> <p>Sentence 2 Core: language has strings.</p> <p>Sentence 3</p>	<p>Sentences in the first paragraph are developed with deductive development.</p>

stand alone, but links in other sentences that form paragraphs, paragraphs are a small art of an essay that builds a unit of thought as a message conveyed by the author in the essay.	Core: sentences form paragraph.	
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The introductory section contains a background that explains briefly so as to provide an initial understanding to readers and listeners. The introduction reflects a pattern of lateral thinking because it contains opinions that are supported by facts and conveyed in a different way. Not following an example. but arranged in their own language based on their understanding. However, the second paragraph is specific and does not reflect the discussion. Lacks cohesion with the first paragraph.

Table 2: Results of Traditional Thinking

History of Indonesian Spelling		
Spelling is a set of rules on how to write language using letters, words and punctuation as ingredients. This limitation shows that the meaning of the word spelling is different from the word spelling. Spelling is the activity of pronouncing letters, syllables or words, while spelling is a system of rules that is much broader than just a matter of pronunciation. Spelling governs the entire way of writing a language. Spelling is a rule that must be obeyed by language users for the sake of regularity and uniformity of form, especially in written language, so that the impact of regularity of form will have implications for the accuracy and clarity of meaning.	<p>Sentence 1 Core: definitions and rules in spelling.</p> <p>Sentence 2 Core: emphasis on spelling definitions.</p> <p>Sentence 3 The gist: spelling and spelling differences.</p> <p>Sentence 4 The gist: the benefits of spelling.</p> <p>Sentence 5 Core: emphasizing definitions and spelling benefits.</p>	Sentences in the first paragraph are developed with deductive development.

<p>Like driving a vehicle, spelling is a traffic sign that must be obeyed by every driver. If the drivers obey the existing signs, an orderly and orderly traffic will be created. Such is the form of the relationship between language users with good and correct spelling. Spelling, currently in effect is called Enhanced Spelling (EYD). EYD came into force on August 16, 1972. The third spelling in the history of the Indonesian language is an attempt to improve the previous spelling that has been used for twenty-five years, known as the Republic Spell or Soewandi Spell.</p>	<p>Sentence 1 The gist: spelling analogies.</p> <p>Sentence 2 Core: causation understands rules (analogy).</p> <p>Sentence 3 Core: affirmation of analogy as an example.</p> <p>Sentence 4 Core: the spelling that applies in 2022. However, the EYD has been perfected since 2015.</p> <p>Sentence 5 Core: introducing the third spelling.</p>	<p>Sentences in the first paragraph are developed with deductive development.</p>
<p>There are 3 experts who define the definition of spelling. First, according to the Big Indonesian Dictionary, are rules or ways that describe word sounds and sentence sounds in written form and regulate the use of punctuation marks. Second, according to Keraf, are all the rules regarding sound, speech, and the relationship between symbols (separation or combination) in a language. Third, according to Arifin, are the rules regarding how to symbolize the sound of the description and how the relationship between the symbols is meant.</p>	<p>Sentence 1 Core: an introduction to the opinions of three experts.</p> <p>Sentence 2 Core: definition according to the dictionary.</p> <p>Sentence 3 Core: definition according to Keraf.</p> <p>Sentence 4 Core: definition according to Arifin.</p>	<p>Sentences in the first paragraph are developed with deductive development.</p>
<p>Spelling is a set of rules regarding procedures for writing language using letters, words and</p>	<p>Sentence 1 Core: definitions and rules in spelling.</p>	<p>Sentences in the first paragraph are developed with deductive development.</p>

<p>punctuation as ingredients. This limitation shows that the meaning of the word spelling is different from the word spelling. Spelling is the activity of pronouncing letters, syllables or words; while spelling is a system of rules that is much broader than just a matter of pronunciation. Spelling governs the entire way of writing language. Spelling is a rule that must be obeyed by language users for the sake of regularity and uniformity of form, especially in written language. The regularity of form will have implications for the accuracy and clarity of meaning.</p>	<p>Sentence 2 The gist: the difference between spelling and spelling.</p> <p>Sentence 3 Core: spell function.</p> <p>Sentence 4 Core: affirmation to comply with spelling rules.</p> <p>Sentence 5 The gist: the benefits of obeying spelling rules.</p>	
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Traditional thinking and lateral thinking have differences; Vertical lateral thinking patterns are selective, while lateral thinking patterns are generative. The discussion section of the paper reflects traditional thinking patterns because it contains opinions supported by expert opinions. Writing has no development. The writing follows the examples contained in the papers that have been presented. In addition, it is less logical because the written sources are not clear.

4 Conclusion

The paper written by students only contains lateral thinking patterns. Lately, there are still many writings using traditional thinking patterns. Papers that should be written critically and creatively are not reflected in the paper. Therefore, it can be seen that the creative thinking skills possessed by class A students in semester 1 (one) are still lacking. The results of the interviews show that there are four factors that cause traditional thinking, namely (1) experience, (2) sources of information, (3) lack of confidence, and (4) willingness to learn.

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