
COGNITIVE PROCESS OF THE STUDENTS IN WRITING ARGUMENTATIVE TEXT

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Abstract

This study examined whether cognitive process (students majoring in social and natural science) influences their writing in argumentative text. In qualitative research designs, the researcher administered writing test with five various topics in argumentative text form and then conducted a retrospective interview. The subjects were the students of SMA Negeri 1 Padangsidempuan from two different majors, Natural Science Major and Social Science Major. The analysis showed that the cognitive processes of the students from the two majors were different in planning, translating and reviewing. The cognitive processes of the students were different because they have different ability in the proficiency of writing, vocabulary and discourse comprehension.

Keywords: Cognitive Process, Students, Writing, Argumentative

Introduction

The national goal of teaching English in Indonesia is to develop the students' ability in communication both in oral or written form (Depdiknas:2004). Writing as one of the language skills must be taught in English classes especially Senior High School students. Through the teaching and learning of writing the students are expected to be able to produce a text well. This is in line with the objective of writing instruction in Senior High School, to order to the students in order they can write into English effectively and accurately. Moreover, there is a national expectation that students become able to comprehend and think critically within a domain.

According to Stenbergh in Zabu & Davia (2004) the students who study in Natural science tend to think logically and based on the fact. He also categorized students who study in Natural Science (IPA) major into conservative. In this category, they like adhering to existing rules and procedures, minimize changes, avoid ambiguous situations as far as possible, and prefer familiarity in life and work.

Actually, the students of Natural Science (IPA) major have such a way of thinking because their activities during learning in the classroom are engaging in investigations and activities that would allow them to develop deep conceptual understandings of scientific ideas and of the process of inquiry. They also read the work of others as their progress through an investigation to help them make sense of their own findings.

In addition, because investigations are generally complex, the students of Natural Science often act like scientists; must record data points, observations, and initial analyses in writing. It is reflected through their activity in the laboratory, doing experiments and other subjects that required them to think critically.

Meanwhile, according to Scharfersmen in Synder and Mark (2008), students who study in Social Science major are accustomed to explain something based on social phenomena. It is in line with Stenberg in Zabu (2004) that proposed the students who study in Social Science major tend to memorize and recall information. Related to the learning of thinking styles, Stenberg in Zabu (2004) also categorized students who study in social major into liberal. In this category, they like surpassing existing rules and procedures and attempt to maximize changes. In addition, they also seek or are at least comfortable with ambiguous situations, and accept to certain degree unfamiliarity in life and work.

On the other hand, argumentative text is kind of text in which the process of making what writers or speakers think clear to themselves and to others are organized systematically. As proposed by Nippold, Ward-Lonergan, & Fanning in Chase (2011), argumentative text requires the writer to embrace a particular point of view and try to convince the readers in order to have the same perspective. The writers also have to arise the problems and attempt to map language onto his or her own thoughts and feelings as well as the expectations of the reader.

At the level of Senior High school, generally it has two majors, Natural Science major (IPA) and Social Science major (IPS). The students of the two majors have different cognitive process in doing something. Cognitive process is something happening in the students' mind. However, there is an evidence or

tendency that the IPA students are smarter than the IPS students. Most of people or even the teachers themselves belief that the students of Natural Science (IPA) are better especially in writing than the students of Social Science (IPS) do. They propose that the IPA students will have best quality in writing argumentative text than the IPS students do. We could see that the problem did not lie in the cognitive abilities of the Natural Science (IPA) students are better than Social Science (IPS) students have. However, it is caused of the different way of their cognitive process of processing something. The ways they express their ideas is not similar and depend on their characteristics.

Review of Cognitive Process of Writing

Factors Affecting the Process of Writing

According to Lu (2010), there are several factors affecting the process of L2 writing, they are: (a) L1 writing ability, (b) L2 language proficiency, (c) Use of writing strategy, and (d) Working memory Capacity

(a) L1 writing ability

The process of writing is influenced by L1 writing ability (Zhang Jun, 2008). In other words, L2 writing ability has a positive relationship because literacy skills could be transferable across languages. Carson in Zhang Jun (2008) stated that L2 writing ability correlated significantly with L1 writing ability. He conducted a research to Japanese and Chinese ESL students in academic settings and they were asked to write an essay in both their first and second languages. The results indicated that writing skills could transfer across languages examined the first language and second language writing abilities of adult ESL learners to determine the relationships across languages (L1 and L2) in the acquisition of L2 writing skills.

(b) L2 language proficiency

The process of writing is influenced by L2 Language proficiency. L2 literacy development is a complex phenomenon for already literate adult second language learners and involved variables such as L2 proficiency and L1 and L2 educational experience. L2 proficiency levels could be significantly predicted by L1 writing ability of a writer. L2 writing was indirectly affected by L1 writing ability, which in turn directly affected L2 oral expression ability, L2 vocabulary

comprehension, and L2 discourse comprehension ability. Furthermore, there appeared to be a writing aptitude factor that constrained writing development both in L1 and in L2.

(c) Writing strategies

The process of writing is influenced by the strategies used. Various specific writing strategies have been identified in the L2 writing process.

(d) Working Memory Capacity

The process of writing is influence by the working memory. . Lu (2010) said that person who has a limited working memory capacity will constrained by the limitations and tend to depend on knowledge- telling strategies and engage in non- interactive processes. He concluded that novice writers who have limited working memory unable to deal with the complex demands imposed by the writing process. Meanwhile, skilled writers possess fluent encoding processes for the text- generation and transcription, as well as extensive knowledge about topic, genre, and routines for coordinating writing processes.

Argumentative Writing

Argumentative text is kind of text in which the process of making what writers or speakers think clear to themselves and to others are organized systematically (Saito 2010). In writing an argument text there are two part structures: the statement of an opinion and the statement of one or more reasons for holding that opinion. Furthermore, Nippold, Ward-Lonergan, & Fanning, in Chase (2011) propose that argumentative text is a form of essay writing that requires the writer to embrace a particular point of view and try to convince the readers in order to get the same perspective. In writing argumentative, the writer have to consider about the component of the argumentative writing itself such as a stance, anticipate the audience's position, justify his or her own position, consider the alternative positions, and if appropriate, rebut the opposing positions.

In addition, Hale in Yanbin Lu (2010) mentioned that argumentative essay is one of the genres which have a function to generate and organize ideas through

examples or evidence for the type of writing. Argumentative essay writing is a text which is taught to the students and encouraged them to think critically.

Cognitive Process of Writing Argumentative Writing

Cognitive processes of argumentative text are those which transform, reduce, elaborate, store, recover and use the sensory input when writing an argumentative text. During writing argumentative text, the cognitive process which is happening should follow the structure of the argumentative text as the criteria proposed by Saito (2010) namely; (1) situation, it introduces the background material (2) problem, it include the statements of undesirable condition of things (3) solution and evaluation, it include a statement of a desirable and it is often followed by an evaluation.

According to Kellog (2001), one's memory language and thinking ability are tested in writing because cognitive challenge is reflected through one's writing quality. Meanwhile, Chase (2011) proposed that through writing, the writer can link new concepts with familiar ones, synthesize knowledge, explore relations and implications, outline information, and strengthen conceptual frameworks. It is due to the act of writing give the chance to the writer to create an environment to develop the cognitive and organization strategies.

Furthermore, Toulmin in Saito (2010) states that the production of argumentative text is a reflection of cognitive process of problem solving. In writing argumentative text, the writer arise the problems and attempt to map language onto his or her own thoughts and feelings as well as the expectations of the reader. The complexity of this writing reflected on the strategic considerations (such as the organization of ideas) to the implementation of motor plans (such as finding the right keys on the keyboard). In addition, Hayes and Flower in EST Research Report (2008) proposed that there are various activities occur during writing in the long term memory of the writer. In order to achieve the problem solving which conceptualized before in term of information processing, long term memory has various types of knowledge, knowledge of the topic, knowledge of the audience and stored writing plans.

The Characteristics of Students of Natural and Social Science Majors

There are several characteristics of students who major in Natural Science that are generally reflected in their attitudes to learning. Typically students majoring in Natural Science (IPA) are accustomed to thinking logically and factually. As O'Brien in Lu (2010) stated that students majoring in Natural Science are mathematically logical and have high level of inductive and deductive reasoning. Moreover, they are able to manipulate numbers, quantities and operations.

According to Stenberg in Zabu (2004), there are two level of thinking styles; global thinking and local thinking. Dealing with thinking styles, students who majoring in Natural Science major are categorized into local thinking which prefer dealing with details and often surround concrete issues. Related to the learning of thinking styles, Stenberg in Zabu (2004) also categorized students majors in Natural Science are conservative. In this category, people whose thinking styles are conservative like adhering to existing rules and procedures, minimizing changes, avoiding ambiguous situations as far as possible, and prefer familiarity in life and work.

There are several characteristics of students who study in Social Science major that generally reflected on their attitudes in learning. Students who study in social major are accustomed to memorize and recall information. As Scharfersmen in Synder and Mark (2008) proposed that students who major in Social Science major are accustomed to explain something based on social phenomena. It is also related to the Ministry Education of Ontario curriculum (2004) that mentioned social students must develop a thorough knowledge of basic concepts that they can apply in a wide range of situations. Students who majoring in social science major have to learn critically to solve problems and to make decision on variety of issues.

According to Stenberg in Zabu (2004), the level of thinking styles can be categorized into; global thinking and local thinking. He proposed that students who majoring in social science major are categorized into global thinking in which the people prefer dealing with broad concepts as well as with relatively large and often abstract issues. Related to the learning of thinking styles, Stenberg in Zabu (2004) also categorized students who majoring in social science major into liberal.

In this category, people whose thinking style is liberal thinking like surpassing existing rules and procedures and attempt to maximize changes. In addition, they also seek or are at least comfortable with ambiguous situations, and accept to certain degree unfamiliarity in life and work.

Method

The study applied a descriptive method, that is described the cognitive process of the SMA students in writing argumentative text viewed from the two different majors, IPA (Natural Science) and IPS (Social Science) majors. Thus, the result of the research was a description of the cognitive process of the SMA students in writing argumentative text related with the different majors.

Moreover, this research also explained the reasons why does the process happen the way it is in the process of writing argumentative text in the students' mind of IPA (Natural Science) and IPS (Social Science) majors. Thus, the result of the research was the elaboration of the reasons of the cognitive process of the SMA students in writing argumentative text related with the different majors.

Results and Discussion

There were two kinds of data. The first was the students' argumentative writing. This data were collected by asking the subjects to write an essay for which they were given a chance to select one of the topics before by the researcher.

The second data was the transcription of the interview or from the retrospective interview. Retrospective interview is the technique of eliciting data which will be conducted by interviewing the subjects by keeping on the subjects' thinking or the process of writing. The subjects were given the topics to be written in the form of argumentative text and then the interview was conducted.

Subjects Major	Type of Text	Cognitive Process in Writing		
		Planning	Translating	Reviewing

Natural Science	Argumentative	- Students did planning before writing. Gathering ideas, organizing & jot down their ideas	- Less in translating in order to get the meaning	- The students read & edit their text which has been written down in order to evaluate them.
Social Science		- Students did not do planning before writing. In gathering their ideas or organize the ideas, they seemed do not have an effort.	- More often in translating in order to get the meaning	- Students did not review in order to evaluate their written text.

Tabel. 1 Cognitive Process of the Students Majoring in Natural Science and Social Science

The analysis of the Students’ Cognitive Process in Writing Argumentative Text

Cognitive process in writing is the act or process of knowing in the broadest sense; specifically an intellectual process by which knowledge is gained from perception or ideas. During the writing, there are some mental process taking place in the students’ mind, they are (1) Planning (2) Translating and (3) Reviewing, (Flower & Hayes in Saito, 2010). Dealing with the theory, it was also found that while writing an argumentative text, cognitive process of the students occurs in the three stages, namely planning, translating and reviewing. The cognitive processes of the students of the two majors were different in planning, translating and reviewing.

1) In the stage of planning, it was found out that in writing argumentative text all students of Natural Science major activate their cognitive process and did planning before writing. Meanwhile, it was also found that in writing argumentative text all students of Social Science major did not activate their cognitive process and did not do planning before writing a text. After reading

the topics, they begin to generate ideas, but it seemed that they did not make effort to organize or structure these ideas.

- 2) In the stage of translating, it was also found that the students majoring in Natural Science in writing Argumentative text integrate their cognitive process and did translating during writing in order to get the fix meaning as their expectation. Meanwhile, the students majoring in Social Science did not organize their cognitive process and tend to translate the words to find the meaning during writing a text. During this stage, there was much less back and forth movement in the text. Their developing texts did not appear to create opportunities.
- 3) In the stage of reviewing, it was also found that the students majoring in Natural Science in writing Argumentative text activate their cognitive process and did reviewing after finishing writing a text. Meanwhile, the students majoring in Social Science did not organize their cognitive process and did not do reviewing after finishing writing a text. It seemed that they were unaware of the possibilities for revision in their texts. May be it was occurring because they view writing assignment as perfunctory duties, things to be completed but not lingered on or savored.

As stated that writing is a difficult skill for students due to the process of writing itself which is influenced by cognitive activities, Van den berg and Rijlaarsdam (2006) propose that there are several factors which affect the process of writing, they are: 1) Cognitive Activities of the Writers and 2) Topic Knowledge of the Writer.

Dealing with the theory of cognitive activities of the writers that mention the process of writing is influenced by cognitive activities, the differences between writers are related to differences in text quality. It was also found that students majoring in Natural Science are different from students majoring in Social Science in writing argumentative text. The differences are in temporal organization of other activities during writing. In other words, the relation between 'reading the assignment' and 'generating' also different between the students of the majors. For some students majoring in Natural Science there is a positive relation between 'reading the assignment' and 'generating' while for students majoring in Social

Science the relation between these two activities is negative or they did not follow the temporal organization.

Furthermore, the theory that explained the process of writing is influenced by topic knowledge of a writer and varying one another, it was also found from the students of the two majors. The students majoring in Natural Science use the information in the assignment to generate new information and they know about the topic to be developed. Whereas, students majoring in Social Science do not really know about the topic so that way they could not generate content information and develop the text.

Conclusion

After analyzing the data, the conclusions can be stated as the following:

The Cognitive process taking place in students of Natural Science and Social Science is different. The difference occurs in the three stages; in planning, translating, and reviewing.

- a. In terms of planning, students of Natural Science Major demonstrated a more concern for the aspects of global planning such as organization and style, devised clear goal formation strategies to solve their problems, whereas students of Social Science Major did not have this strategic knowledge for establishing clear writing plans and were unclear in their mind through writing.
- b. In terms of translation, students of Social Science Major did more translation compare with students of Natural Science Major that exerted more efforts on text generating than doing translation during writing a text. This behavior indicated that they were likely to be more motivated in order to be more productive. To make sure what they had written in relation to their overall plan for the essay, to reassure their plans originally thought and to develop their writing later on.
- c. In term of reviewing, students of Natural Science Major were engaged more in high level reflective activity in reviewing. In other hand, students of Social Science Major did not have the awareness of constantly rethinking and

reflecting the text of what they had written and they tended to stop earlier when they thought they had finished their writing.

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