

**CRITICAL THINKING IN WRITING: A STUDY ON THE NATURAL AND SOCIAL
SCIENCE STUDENTS' ARGUMENT COHERENCE AND COHESION**

Berlin Sibarani

Pr4_unimed@yahoo.co.id

Universitas Negeri Medan Indonesia

Betharia Sembiring Pandia

bethariasp@mhs.unimed.ac.id

Universitas Negeri Medan

Abstract

The objectives of this study were to investigate Natural and Social Science students' critical thinking reflected in the cohesion and coherence of argumentative writing. The data needed to achieve the objectives was the students' argumentative writing from predetermined topic: *National Examination* and *Wearing Uniform*. The cohesion was analyzed following Halliday and Hasan (1976) the coherence was analyzed through the use of three principles of coherence by Carlos and Ceballos in Garing (2014) and text structure by Knapp and Watkins (2005) in which these two items reflected the critical thinking skill as defined by Chafee (2011). This researched showed that both Natural and Social Science students could write cohesive and coherent argumentative writing. Natural Science students produced cohesive and coherent writing in *National Examination* topic; while Social Science students wrote cohesive and coherent writing in *Wearing Uniform* topic. This finding revealed that both of the groups were still lack of critical thinking skill since they were not able to write equally cohesive and coherent in both of the predetermined topics.

Keywords: *critical thinking, cohesion, coherence, argumentative writing*

1. INTRODUCTION

Writing argumentative text is one of several common ways that an educator asks the students to train them to express their thoughts and feelings of certain issue in a written form. By writing the argumentative text, someone is urged to achieve its goal that is to persuade the readers. However, to get the message be accepted or even to get the readers be persuaded, the content of the writing should also be well understood to them. Thus, an argumentative writer is required to have good linguistic competence to express the message and also adequate subject knowledge to criticize certain issue or situation. This is to say that a written text should be accessible. Harmer (2004:22) states that for a text to be accessible, it needs to be cohesive and coherent.

Cohesion is important to achieve a well-knit piece of writing through the use of explicit linguistic devices meanwhile coherence is the overall impression of the text. Harmer (2004:25) states that when a text is coherent, a reader can understand the writer's purpose and line of thought. Thus, cohesion and coherence are two inseparable elements to call a text as being communicative.

However, to be connected across sentences (cohesion) and logically understood (coherence) by the readers are not enough to assert that the argumentative text to be qualified. It should be understood that an argumentative writers must possess adequate knowledge of the topic that basically involves the action of stating a claim and supporting the claim with fair-minded reasoning along with examples and evidence (Sims, 2012). For this reason, students are required to have a skill that covers the cohesion, coherence, and knowledge of the topic that is critical thinking skill.

Critical thinking is a skill that needs to be embedded with writing skill. Chaffee (2011:57) states that critical thinking in writing means that the writer is required to carefully explore situations or viewing them from different perspectives, support various perspectives with reasons and evidence, and discuss the ideas in an organized way. The aim of utilizing critical thinking in argumentative writing is to make the writing become accessible to the readers or even to get them be persuaded.

In Indonesia educational context, Senior High School students are divided into two majors, they are Natural and Social Science. According to Safitri (2013), Natural and Social Science students get through different cognitive process in writing argumentative writing. She found that Natural Science students tended to follow the structure of argumentative text. They

took more time on planning and each main idea is separated into several paragraphs. Besides, she also stated that Natural Science students reviewed their writing to ensure their ideas would not be vague. In contrast, Social Science students avoid planning and reviewing as the important process in writing. They let their ideas flow but it was unstructured according to argumentative text structure. Her research was focused on the cognitive process and found that both groups of the students underwent the process differently because of their different major.

Based on the phenomena, it is believed that the Natural and Social Science students also have different critical thinking skill in writing argumentative text.

2. REVIEW OF RELATED LITERATURE

2.1. Critical Thinking Skill and Argumentative Writing

Argumentative writing is aimed at persuading others to agree with the writer or even cause the readers to take action on certain issue. To do this, argumentative writing cannot merely be constituted of sentences representing writer's stances, but it requires the writer to put justifications for each claim. To achieve the goal of argumentative writing, a writer needs to possess critical thinking skill.

Critical thinking skill is the ability to explore a situation from several perspectives, provide them with reasons and evidence, and express them in an organized structure (Chaffee, 2011). In writing argumentative text accompanied with critical thinking skill, the writers explore the situations by looking for the other perspectives. While the writers try to do this, they have to compare their viewpoints with the others. This is to say that the writer also needs to distinguish to what extend that their views are similar or completely different from the other sources. As argument is meant to be persuasive, critical thinking has a role to urge the writers to provide reasons or evidence and match them with conclusions. Besides, by possessing critical thinking skill, the writers will be able to present their overall ideas in an organized way. To this point, Mayberry (2009:31) states that argument's success largely depends on the clarity and the image of the claim. The clarity refers to a situation where readers are not confused by the writers' position towards the issue. It can be done through following the text structure of argumentative text where the writer can put their thesis, main ideas, and conclusions in place. Meanwhile, the image of the claim pertains to the total

impression that the readers get after reading the argumentative text. The impression is represented in word choices and sentence length.

Thus, critical thinking skill supports the students' ability in writing argumentative text as it directs the writers' wordings up to the overall idea of the text.

2.2. Cohesion

Cohesion is the textual relatedness which is signalled by semantic relations between lexical and grammatical structures (Navratilova, 2017). Similar to this, Halliday and Hasan (1967:7) formerly used the term 'cohesion tie' to refer to the elements of cohesion. Lexical cohesion comprises of reiteration and collocation; meanwhile grammatical cohesion entails four major classes: reference, substitution, ellipsis, and conjunction.

2.2.1 Lexical cohesion

Lexical cohesion encompasses the word choices to show interrelationship in a text. It contributes meaning to the text and help readers to get the keywords of the text. Lexical cohesion is divided into two categories: (1) reiteration; (2) collocation. Reiteration is the repetition of words which occurs through the same words, synonym, and superordinate. Meanwhile, collocation is defined as the words occur in the same lexical environment. Halliday and Hasan(1976:285) states that collocation occurs when pairs of words from the same ordered series or pairs of words which occur in recognizable semantic relation.

2.2.2 Grammatical cohesion

Grammatical cohesion is the way to relate one sentence to the other in a grammatical form. It is divided into several types, such as: (1) reference (one item point to the other part that refers to it); (2) substitution (replacement of one item in a sentence by another in order to avoid repetition); (3) ellipsis (the disuse of a part of words, a sentence in order to avoid redundancy) and (4) conjunction (the use of certain words to connect one clause or sentence to the other one which also gives certain effect between them, such as: additive, adversative, causal, temporal, and continuative conjunction)

2.3 Coherence

In addition to being cohesive, a text also needs to be coherent. Cohesion and coherence are interdependence in relation to written text. As cohesion refers to the textual relation, coherence pertains to the whole meaning of the text or how the text makes sense to the readers. This is to say that coherence refers to the relatedness of a text as whole as the result

of semantic unity and clear purposefulness (Navratilova, 2017). The semantic unity is realized through the uses of cohesive devices; while according to Carlos and Ceballos in Garing (2014) the clear purposefulness is solely constituted through three important things: (1) it uses a topic sentence for each paragraph; (2) it consists of only one idea for each paragraph; (3) it does not cause digression among paragraphs. In addition to this, the coherence of argumentative text should consider the text structure. Knapp (2005:91) describes that the text structure of argumentative text is: thesis, arguments (point and elaboration), and conclusion.

3. RESEARCH METHOD

The study was conducted by applying descriptive qualitative method. The arguments written by students majoring in Natural and Social Sciences were studied and the object of the study is their using of cohesive devices and coherence principles in their argumentative writing. This study assumes that the difference in the using of *cohesive devices* and *coherence principles* is resulted from different ways of thinking. Students majoring in Natural Science work with numbers and apply more critical thinking skills. While the students whose majors are Social Science work with words (language) and apply less critical thinking. Other factor which may affect the use of *cohesive devices* and *coherence principles* in their writing is their background knowledge about the *topics* of the writing. Based on such consideration, two topics, namely (1) *Should National Examination be retained?*; (2) *Should students wear school uniform?* are assigned for the subjects to write. The first topic is considered as the topic which requires more critical thinking while the latter is seen as problem which tends to be more simple and social matter. The subjects of this study are the students of Natural and Social Science of SMA Methodist Binjai, North Sumatera Indonesia..The data this research was analyzed with qualitative data analysis model proposed by Miles &Huberman (2014:10). With this model, the data was analyzed with a four - staged cycling process: data condensation, data display, drawing and verifying conclusion.

4. FINDINGS

Theoretically, cohesion is the textual relatedness which is signalled by semantic relations between lexical and grammatical structures Navratilova *et.al* (2016).

Empirically, the variety of cohesive devices was used differently by Natural and Social Science students as it can be seen in these following tables.

Table 4.1. Cohesive Devices on *National Examination* Topic

No.	Cohesive Devices	Natural Science	f	%	Social Science	f	%	Note
1.	Per.R	I think UN don't need to be held because it's just makes students become stressed. (VO/1)	7	31	It continues to run every year until now. (FS/8)	5	31	NS students used more personal reference than SS students and they were used anaphorically.
2.	Dem.R	I think this is depend on the people who want to study. (JL/6)	3	13	-	-	-	NS students used demonstrative reference to point the issue. Meanwhile, SS students did not use it at all.
3.	Add.C	Moreover , they can bought key answer so they succeeded but got nothing. (KU/5)	4	17	National examination is one of the rules in Indonesia and its okay a command from the government for us. (JS/1)	5	31	SS students used more additive conjunction to extend their ideas.
4.	Adv.C	But , there are students who still like to cheating (JL/5)	5	22	On the other hand , the NE actually makes students become overburdened with a value that must be achieved (JE/10)	4	25	NS students used more adversative conjunction to show contrary to the previous ideas.
5.	Cau.C	National Examination can make student not	4	17	So many students worry about National	2	13	NS students used more causative conjunction to

		creative because in National Examination student will be cheated. (AK/14)			exam because they think that National Exam was taught.(JU/14)			show causal relationship.
6.	Rep.	National Examination	19	42	National Examination	19	46	NS and SS students used the same varieties of repetition. However, NS students used more repetition to emphasize the experienter that was the student.
		Students	21	47	Students	19	46	
7.	Col.	a-7-word chain National exam ¹ ...student ² ...test ³ ... graduate ⁴ ... study ⁵ ...computer ⁶ ...system ⁷ (JE/NS/NE)	5	11	a-7-word-chain: National exam ¹ ...government ² ...assessment ³ ...student ⁴ ...graduation ⁵ ...education ⁶ ... school ⁷ (JE/NS/NE)	3	7	The longest word chain is the 7-word chain both from NS and SS students. However, they were different in number. NS students link their ideas to the rule running for National Exam as they used the word <i>system</i> ; while SS students emphasized on the <i>graduation</i> .

Note:

- SS = Social Science
- NS = Natural Science
- Per.R = Personal Reference

- Dem.R = Demonstrative Reference
 Add.C = Additional Conjunction
 Adv.C = Adversative Conjunction
 Cau.C = Causal Conjunction
 Rep. = Repetition
 Col. = Collocation

Table 4.1.explicated that Natural Science students used more various cohesive devices to connect sentences in *National Examination* topic. They tried to emphasize the issue and the subjects related to it by dominantly using personal reference. They also tried to use various conjunctions from adversative conjunction to show contrary between the good expectations of running National Examination and the reality that happened in educational context. By using this, they raised the concrete issue like it did not prevent the students from cheating or it did not equally assess students’ academic achievement from different regions. Then, it was followed by additional to add more ideas about the issue and causal conjunction to show cause effect relationship through their argument. Similarly, Social Science students also used various cohesive devices but demonstrative reference.

The different use of cohesive devices between these groups is the number of varieties of cohesive devices. It implied that Natural Science students had more ideas than Social Science students in writing argumentative text about *National Examination* topic. It meant that they were more critical than the Social Science students.

Table 4.2. Cohesive Devices on Wearing Uniform Topic

No.	Cohesive Devices	Natural Science	f	%	Social Science	f	%	Notes
1.	Per.R	They can get bullying and make a different social class in school (AK/5)	2	14	It can be our identity. (JE/1)	15	56	SS students used more personal reference than the NS students.
2.	Dem.R	-	-	-	-	-	-	-
3.	Add.C	Second, make students look tidy and eliminate racism.(KE/4)	5	36	We must wear school uniform cause we at school and it easy for people to know us	6	22	SS students used more additive conjunction to add more information about their argument.

					that we are a student. (FS/17)			
4.	Adv.C	Uniform usually can be found in school although not only school using uniform. (KE/1)	5	36	If we don't wear school uniform we don't go to school but college. (SM/15)	3	11	NS students used more adversative conjunction to show contrast between ideas.
5.	Cau.C	Student wear uniform go to school because it's a system to school. (AK/4)	2	14	School is one community, so the students must wear school uniform to show that community. (FS/14)	3	11	SS students used more causal conjunction to emphasize that school uniform is the representation of a community.
6.	Rep.	student	20	34	student	20	23	More repetitions were used by NS students even though both groups of Notes
		school	23	40	school	35	40	
		Uniform	12	21	Uniform	27	31	
No.	Cohesive Devices	Natural Science	f	%	Social Science	f	%	
								students equally repeated the same word <i>school</i> .
7.	Col.	a-3-word-chain: uniform ¹ ...student ² ...school ³	3	5	a-3-word-chain: school ¹ ...student ² ...uniform ³	5	6	Students from NS and SS major did not quite long paragraphs in <i>Wearing Uniform</i> topic. Thus, the longest chain was a-3-word-chain and dominantly

								applied by SS students.
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Note:

- SS = Social Science
- NS = Natural Science
- Per.R = Personal Reference
- Dem.R = Demonstrative Reference
- Add.C = Additional Conjunction
- Adv.C = Adversative Conjunction
- Cau.C = Causal Conjunction
- Rep. = Repetition
- Col. = Collocation

Table 4.2. depicted that Social Science and Natural Science students use various cohesive devices. But, Social Science students used more cohesive devices to relate their sentences. Most of the cohesive devices used by Social Science students were personal reference. They described more about the importance of wearing uniform for students. Then, it followed by the use of additional conjunction which aimed at adding more ideas about the benefit of wearing uniform.

The great different in number of using cohesive devices corresponded to the varieties of ideas. The table above showed that Social Science students are more critical in thinking, particularly in generating ideas to be linked by using cohesive devices.

Theoretically, coherence refers to the relatedness of a text as whole as the result of semantic unity and clear purposefulness (Navratilova *et.al*, 2017). Coherent writing can be achieved by applying the principle of coherence according to Carlos and Debalos in Garing (2014) and also the text structure of argumentative text by Knapp (2005:91)

Empirically, the coherence of argumentative text written by Natural and Social Science students were different particularly for the predetermined topics as it was summarized in this following table:

Table 4.3. Coherence in National Examination Topic

No	Natural Science			Social Science		
	Principle of Coherence	Text Structure	Note	Principle of Coherence	Text Structure	Note
1.	It uses topic sentence	Thesis	✓	It uses topic sentence	Thesis 1	-
		Argument 1	✓		Thesis 2	-
		Argument 2	✓		Argument	-
		Conclusion	✓		Conclusion	-
2.	It uses one	Thesis	✓	It uses one	Thesis 1	-

	idea in one paragraph	Argument 1	✓	idea in one paragraph	Thesis 2	-
		Argument 2	✓		Argument	-
		Conclusion	✓		Conclusion	-
3.	It avoids digression among paragraphs	Thesis	✓	It avoids digression among paragraphs	Thesis 1	-
		Argument 1	✓		Thesis 2	-
		Argument 2	✓		Argument	-
		Conclusion	✓		Conclusion	-

Table 4.3 presented that Natural Science students followed the principle of coherence as well as the structure of argumentative text. The students provided thesis statement and more elaboration in argument paragraphs and ended with the conclusion. Meanwhile, Social Science student did not write their argumentative text based on the structure. They wrote two paragraphs thesis statements in which probably caused confusion to the reader about their standpoint or major claim. Besides, they did not apply the principle of coherence for each paragraph.

This explanation implied that Natural Science students are more critical thinker students than the Social Science students. It could be seen that Natural Science students tried to elaborate their ideas in several paragraphs as the idea development from thesis statement. Besides, their way of keeping the ideas on track was obviously seen in the use of principle of coherence.

Table 4.4. Coherence in *Wearing Uniform* Topic

No	Natural Science			Social Science		
	Principle of Coherence	Text Structure	Note	Principle of Coherence	Text Structure	Note
1.	It uses topic sentence	Thesis 1	✓	It uses topic sentence	Thesis	✓
		Thesis 2	-		Argument	✓
		Argument	✓		Conclusion	✓
2.	It uses one idea in one paragraph	Thesis 1	✓	It uses one idea in one paragraph	Thesis	✓
		Thesis 2	-		Argument	✓
		Argument	✓		Conclusion	✓
3.	It avoids digression among paragraphs	Thesis 1	-	It avoids digression among paragraphs	Thesis	✓
		Thesis 2	-		Argument	✓
		Argument	-		Conclusion	✓

Based on the table 4.4 above, it could be seen that Social Science students composed coherent writing in *Wearing Uniform* topic. Social Science students followed the text structure or argumentative writing that is thesis, argument, and conclusion. Besides, they also used the principles of coherence. They attempted to use topic sentence to get the readers focus

what they wanted to tell them about. After writing the topic sentence, the students also consistently used one idea for each paragraph which meant that they kept track of one idea in one paragraph. Further, the idea in each paragraph is also connected to the thesis so jumping ideas or digression was not found in their writing.

In contrast, the *Natural Science* students did not follow the structure of argumentative text. They tended to state their claims in the form of separated thesis statement thus there was thesis 1 and thesis 2. Then, it was followed by the paragraph of argument which was not related to any thesis paragraph. Thus, it completely produced digression of ideas.

In relation to critical thinking, the data from the table above represented that Social Science students inclined to be, at least, more critical in writing *Wearing Uniform* topic because they could make the ideas follow the structure of argumentative text and fulfill the principles of coherence. However, the students from each major was still lack of possessing critical thinking skill to the extent in which the students were required to view situation in different perspectives.

5. CONCLUSION

1. Both Natural and Social Science students used cohesive devices in *National Examination* and *Wearing Uniform* topic. However, the difference was that Natural Science students wrote more cohesive writing in *National Examination* topic. Meanwhile, Social Science students wrote more cohesively in *Wearing Uniform* topic.
2. Both Natural and Social Science students wrote coherently but they did it differently according to the topic. Natural Science students wrote coherent writing in *National Examination* topic while Social Science students wrote coherent writing in *Wearing Uniform* topic.
3. Based on the cohesion through the use of cohesive devices and coherence through the application of coherence principle, it was concluded that the critical thinking in writing from Natural and Social Science students were different. It was because of the topic that they were asked to write. They might not have adequate knowledge or information so that they did not view the issue from different perspective even though they followed the structure of argumentative writing.

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