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Rationale as an Innovative Learning Application to Improve Students' Critical Thinking in Argumentative Writing

Nova Alfi Laili Rahmah¹, Ahmad Munir², Syafi'ul Anam³

¹English Education Department, Language Literature Education Study, Postgraduate of State University of Surabaya, 60213, Indonesia

^anova.17070835051@mhs.unesa.ac.id, ^bahmad.munir@unesa.ac.id, ^csyafiul.anam@unesa.ac.id

^{*}Corresponding Author

Whatsapp number [+6285733339322]

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ABSTRACT

This study is about the effect of rationale application usage as innovative learning application to help students being critical thinker in writing argumentative text. It was attempted to investigate (1) whether there is any significant difference between students reading ability, (2) whether there is any significant difference between students structuring ability, and (3) whether there is any significant difference between students analyzing ability who are taught by using rationale application as found in their argumentative writing and those who are not taught without using rationale. To do so, a quasi-experimental designed was administered to a sample of University students (N=50). In order to answer the research questions, the data are analyzed by using independent sample t-test. SPSS 21 is used to do those statistical analysis. In conclusion, the findings showed that rationale application can be chosen as an alternative media of improving critical thinking in argumentative writing. It was proved by the findings of the study that bring us to the point that there was a significant difference on the students' critical thinking in some aspects (reasoning, structuring and analyzing ability) as found in their argumentative writing between learners in experimental and control group. Learners who are given rationale application treatment achieve higher than those who are given conventional method.

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1. INTRODUCTION

In university context, students are expected to be able to report research academically. The report can be in the form of essay, paper or theses. Through that way, university students are expected not only able to conduct a valuable research academic way but also into a systematic writing product to contribute in academic literature. Because of this reason, critical thinking is needed in order to achieve it. Cotrell (2005) defines critical thinking is a complex process of developing a wide range of personal qualities, skills and attitudes. She explains critical thinking skill will improve with practice and with a proper sense of what is required. Sometimes, it may change behaviors such as paying attention to detail or taking a more uncertain to what they see, hear and read. Critical thinking is important, it can help to shape the students' attitude and skill. Thinking critically will also influence on the way they think in understanding what is relevant and what is not to be more accurate and specific.

Critical thinking is strictly tied in academic writing, it is an expression of the authors' ability to understand and analyze the ideas, evaluate and synthesize the arguments-

in a variety of sources before making any conclusions, and then presenting them clearly to the reader. Practicing argumentative writing is tightened to the development of critical thinking skills (Twardy, 2004; Dariman, 2019).

However, there are some problems which is faced from the teacher and students in teaching learning process. (Sadli, 2002) stated there is little guidance to encourage critical thinking skills and students get difficulty in providing a supporting reason. As a result, they get stuck in the process of writing without being critical thinker. Moreover, (Samanhudi, 2011) in his study showed that the students need more guidance to grasp some critical thinking standards in such mentioning credible source and constructing argument systematically, following a line of reasoning consistently to a conclusion. Therefore, there is a need of designing a powerful writing environment for EFL students to allow them practicing their argumentation to develop their critical thinking skills effectively. Here, the researcher proposed Rationale application would be an effective way to enhance general critical thinking skills (Twardy, 2003; Dariman, 2019; Sukariasih *et al.*, 2019).

Gelder (2007) stated that Rationale is considered as one of critical thinking program to represent better arguments for the following reasons: 1) It is designed for argument mapping to present reasoning which provides the way of improving critical thinking skills 2) This application can be used to improve the students' ability in processing information and 3) this application provides a usable for semi-formal reasoning. That is why, Rationale as one of the argument mappings application which can be used facilitating students to visualize their arguments in order to produce an organized argumentative essay.

Based on Gelder (2007) Critical thinking with rationale comprises six clusters, (1) Grouping, it is about how the students' ability to organize their idea. (2) Reasoning deals with how the students support a claim and structure. (3) Structuring is about the students' ability to analyze claims and uncover assumptions. (4) Analyzing is the students' ability to identify and assess sources of information. (5) Evaluating means the students' ability to evaluate arguments (6) Deliberating deals with students' ability to decide whether the claims based on relevant consideration or not.

In this study, the researcher only focuses on three competencies because based on problem identified by Elsegood (2007) is most of students were unable to see how a writer unable to follow the flow of logical reasoning, they lack of understand the link between supporting and opposing (counter) arguments which belong to three aspect of critical thinking: reasoning, structuring and evaluating.

In response to this, the researcher formulate a question "Is there any significant difference in developing critical thinking aspect (reasoning, structuring, and analyzing ability) between learners who are taught using rationale application as found in their argumentative writing and those who are not taught using rationale?".

2. METHODS

The researcher used quasi experimental design in order to investigate the significant difference between aspect of students' critical thinking that are taught using Rationale and that of students without using Rationale. To determine the group, the researcher took classes that have been selected as sample of research. The test is conducted in Unusa and the researcher needs another lecturer to help her in distributing and collecting the test sheets. In finding the sample, the researcher took one class, the number of one class is 25 students which means the researcher will find 50 students as the sample.

In this study, the research instrument designed to collect the data. Those are pre-test, post-test and scoring rubric. The pre-test is administered to obtain the subject score before giving treatment and the post-test to obtain after giving a treatment (the implementation of rationale). The pre-test and post-test consist of same topic to compose a short essay.

The following are the procedures of the research which is done by the researcher. First, the researcher conducted a pre-test by giving topic of argumentative writing on April 16th, 2019. It administered one week before receiving the treatment. The topic which was given was about "youtuber". The students are expected to write at least 250 words. Then, the researcher assessed the students' writing by analyzing aspects of critical thinking in argumentative writing. The aspects can be analyzed through scoring rubric to know how the students' critical thinking of each aspect in argumentative writing before the treatment.

After giving the pre-test, the experimental group were taught using Rational, while the control group was taught without using Rational. The schedule of research will be shown below:

Table 1. Research schedule

No.	Activity
1.	Deciding experimental and control group
2.	Conducting pre test
3.	Analyzing aspects of critical thinking in argumentative by assessing students' writing
4.	Giving treatment
	Control Group
	Experimental Group
	Planning and drafting stages manually
	- Organize information or grouping in Rationale application
	- Rationale's reasoning step by giving support a daim and structure their reasoning
	Revising and editing
	- Considering their evidence
	- Identifying arguments by ensure it is valid or well-formed
	- Evaluating arguments by evaluating their arguments for and against an issue have been logically structured or not.
	Publishing
	Publishing
5.	Conducting post test
6	Analyze the result to answer the research question by using SPSS

In order to answer all the research questions the difference of critical thinking in each aspect-independent sample t-test will be used. It compares the mean of total post test score between experimental and control group. To answer research question, the researcher will collect the students writing result in pre-test and post-test for both experimental and control group to analyze their critical thinking ability in each aspect by using scoring rubric. The

next step, the researcher measure the means of each group by dividing the sum of all scores by the number of students in each group. In this measurement, mean of pre and post-t are compared to find out the progress of their score before and after the treatment by using independent sample t-test to know whether the students in experimental group have equal or different level before the treatment given.

Before independent sample t-test are done, the data of normality and homogeneity are important to be tested. Test of data normality using SPSS is applied. After analyzing normality, the analysis of homogeneity is needed to know whether the learners in both groups have equal competence or not.

To draw a conclusion using the output of independent t-test, if p-value is greater than 0,05, null hypothesis is rejected so alternative hypothesis is accepted (Garson Hall, 2010). If alternative hypothesis is accepted, it means that the difference of means score between experimental and control group is greater enough or significant. In other words, the improvement of students score in each aspect of critical thinking in argumentative writing is the significance effect of the use rational application. Otherwise, if p-value is less than 0,05, null hypothesis is accepted which means there is no significance differences of students taught using rational application and using lecturing method.

Table 2. Comparison of the Post-test Reasoning ability Scores from the Experimental and Control Groups

Score	Group	Mean	N	SD	T	p-value	Analysis
Post-test reasoning ability	Experimental (by using Rationale app.)	31.32	25	1.314	23.12	0.000	Significant
	Control (manually)	22.48	25	1.388	23.12		

From the table, it shows that there was a significant difference in the post test score for experimental (M=31.32, SD=1.314) and control group (M=22.48, SD=1.388) conditions $t(48)=23.12, p=0.000$. The p-value is smaller than the 0.05 level of significance. In other words, there was an effect on the implementation of rationale application. The students which is taught using it reached better score than those taught manually.

Through this application, the students are facilitated to support their responses and to consider different opinions which is done in the planning stage of writing. So that students understand the relationship between the statements. This result was in line with the way proposed by Gelder (2009) stated that Rationale is considered as one of critical thinking program to represent better arguments.

With regard to the first research question, the result of this study indicated that rationale application was also beneficial to develop critical thinking in a reasoning aspect. It was figured out by the result of the post-test showing that the students established an increase their reasoning throughout the treatment. The data from the first research

Table 3. Comparison of the Post-test Structuring ability Scores from the Experimental and Control Groups

Score	Group	Mean	N	SD	T	p-value	Analysis
Post-test reasoning ability	Experimental (by using Rationale app.)	22.88	25	1.452	14.33	0.000	Significant
	Control (manually)	17.04	25	1.428	14.33		

The result of t-test on the students' post-test scores showed that the result is same in the score of post-test treatment group (M=22.88, SD=17.04) and manual group (M=17.04, SD=1.42) condition $t(48)=14.33, p=0.000$. As the p-value was smaller than 0.05, it can be concluded that student's structuring ability is better when they were taught using rationale application.

3. RESULTS AND DISCUSSION

3.1 The Students' Reasoning Ability as Found in Their Argumentative Writing by using Rationale Application

The term reasoning ability deals with the students' ability to support a claim and structure their reasoning. Sometimes, many students provide opinions but rarely give supporting reasons for their view. Research question 1 deals with the significant difference on the reasoning ability of learners taught using Rationale application and those taught using conventional method. The independent-sample t-test was used to answer the first research question on finding out whether there was a significant difference on the scores between the two compared groups (experimental and control group). The comparison of the results of the test of the experimental and control groups is portrayed in the following table 2.

question 1 implies that the mean score of the students from the experimental group was higher than the scores of the students from the control group.

Another evidence to support the statistical data was that the result of t-test (independent sample) reports from Dwyer (2012) that there was a significant difference on post-testing compared with pre-testing on overall CT ability and CT sub-scales which can be said that students who is taught using argument mapping achieved better score than those taught using conventional method.

3.2 The Students' Structuring Ability as Found in Their Argumentative Writing by using Rationale Application

Structuring ability involves the students' ability to analyze claims and uncover assumptions. Research question 2 was answered by using independent-sample t-test to find the effect of the treatment in their structuring ability. The post-test score of structuring ability between the experimental and control group was analyzed by means of SPSS 21.

As technology becomes part of students' everyday life, rationale application can be chosen as the alternative way to help the students able to present arguments (opening, closing and all major of support) orderly in paragraph and to demonstrate coherence and cohesion by using of transitional devices. These facts were related with the statement of Gelder (2009) stated that Rationale

application can be used by the teacher as a tool to help students build map arguments properly because there is a table for the argument topic at the top level then followed by a conjunction 'because' as supporting claim and 'but' as the objection. Thus, by practicing argument mapping through this media the students are forced to be more structured in expressing their idea critically. This result was also in line with Wegerif and Dawes (2004) theory that computers can most effectively support meaningful learning and knowledge construction in higher education cognitive amplification tools for reflecting on what students have learned and what they know." To sum up, the implementation of rationale application can enhance students' critical ability especially in the students' structuring ability. The current study has shown that students taught using rationale application had better in

Table 4. Comparison of the Post-test Analyzing ability Scores from the Experimental and Control Groups

Score	Group	Mean	N	SD	T	p-value	Analysis
Post-test reasoning ability	Experimental (by using Rationale app.)	10.28	25	0.613	8.13	0.000	Significant
	Control (manually)	8.72	25	0.872	8.13		

The result of t-test on the students' post-test scores of analyzing ability showed the score for treatment by using rationale application (M=10.28, SD=0.613) and manually (M=8.72, SD=0.872), condition $t(48)=8.13$, $P=0.000$. It can be seen that rationale application affected the students' analyzing ability.

The result gives evidence that rationale application may be applied to improve the performance of analyzing ability because they are able to achieve some sub skills in the analyzing ability such as providing well-structured argument, other research and counter argument. Baron (1988) stated argument-counterargument integration is important because it is central aspect of critical thinking. He viewed thinking as active open minded thinking which considers counterarguments.

This result was in line with the study by Okumus (2012) the students can enhance their argumentation skills through argumentation mapping model. They were able to use rebuttals effectively and related claims and reason. They could also use support opinion and data in their arguments. Regardless the difference of the tools used in the treatment, both of these studies has shared the same positive results.

In addition, the successful result of this study can be used to solve the problem from Elsegood (2007) research. His research showed that most of students were unable to see how built up their case because they were unable to follow the flow of logical reasoning. They are difficult to present a clear position in their writing like difficulties in providing a supporting reason and lack of understand the link between supporting and counter arguments. Whereas, Nusbaum (2007) stated the persuasiveness of the argument can increase if the writer able to consider counterarguments to their own arguments and integrate their arguments and the counterarguments into an overall final position.

presenting their argument orderly and demonstrate the transactional devices (i.e on the other hand, however, moreover, etc.) properly. The treatment given in the experimental group proved that rationale application influence the students' achievement in structuring ability of writing argumentative essay.

3.3 The Students' Analyzing Ability as Found in Their Argumentative Writing by using Rationale Application

Analyzing ability deals with the students' ability to identify and assess sources of information. In addressing the third research question, the comparison of structuring ability scores from the experimental and control groups was presented in table 4.

In short, the students' difficulties in forming argument can be decreased by using rationale application. Since this application provides table for the argument topic at the top level then followed by reason, objection and rebuttal table that should be filled by the students. Gelder (2009).

4. CONCLUSION

The current study was aimed at investigating the effect of Rationale application usage on students' critical thinking in argumentative writing. A quasi-experimental design was selected to seek the effect of the treatments and the conclusions described as follow:

The first finding was in line with (Dwyer, 2012) research that there was a significant difference on post-testing compared with pre-testing. So, students who is taught using argument mapping achieved better score than those taught using conventional method. The second finding showed that there was a significant difference in the structuring aspect, the mean of the post-test have significantly different score and the third finding showed that rationale application can enhance their argumentation skills through argumentation mapping model. They were able to use rebuttals effectively and related claims and reason.

In general, the use of rationale application was proved to be a good choice in promoting the students' critical thinking performance especially in writing argumentative text. This concept was in line with (Alvarez-Ortiz, 2007), (Gelder, 2009) that the use of Argument Mapping as a strategy may enhance overall levels of critical thinking.

It is also in line with (Wegerif & Dawes, 2004) theory that "computers can most effectively support meaningful learning and knowledge construction in higher education as cognitive amplification tools for reflecting on what students have learned and what they know."

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