

THE EFFECT OF QUESTION PROMPTING AND LANGUAGE ABILITY ON THE QUALITY OF STUDENTS' ARGUMENTS

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Abstract

This research examines the effect of question prompts on the quality of arguments written by students with high, moderate, and low language abilities. The research is conducted with a pretest-posttest non-equivalent control group design, focusing on finding the answers to two research questions: a) What are the significant differences between the quality of arguments written by students who use question prompt scaffolding and those who teach with an expository method? b) What are the significant differences between the quality of arguments written by students with high, moderate, and low language abilities? Data is gathered by conducting pre- and post-argumentative tests, which is scored with an adapted version of the Rubric of Argument Quality from Cho and Jonassen (2002). The scores of the quality of students' arguments are then analyzed with a mean differential analysis. The results of the study indicate that: a) there are significant differences between the quality of arguments written by students who use question prompt scaffolding and those who teach with an expository method; b) there are no significant differences between the quality of arguments written by students with high, moderate, and low language abilities.

Keywords: *Question Prompt Scaffolding, The Quality of An Argument.*

Introduction

The ability to evaluate and make well-founded arguments – as a basis in obtaining critical thinking competence – is an important learning outcome in the educational process in various countries. This skill is closely related with various high-level learning outcomes like the ability to think at a high level and solve ill-structured problems (Goodlad, in Marzano, 1988; Tan et al., 2001; Nussbaum, 2002; Shin & McGee, 2004; Kuhn, 2003; Shin & McGee, 2004; Marttunen et al., 2005; Simon et al., 2006; Chang, 2007; Pinkwart, 2008; Abbas & Sawamura, 2009; Easterday, 2010; and Chase, 2011).

In Indonesia, having a critical thinking ability is also applied as one of the competences that must be mastered by students, starting from the elementary and middle school levels until the tertiary educational level (National Education Department a, 2006; National Education Department b, 2006). Now, the 2013 Curriculum also emphasizes a high order thinking domain as a learning goal, which also covers the development of a critical thinking ability in students (National Education Department, 2013).

According to Paul (in Marzano, 1988) critical thinking can be differentiated into two characteristics: a “weak sense” and a “strong sense”. Critical thinking behavior that is lacking in sensitivity occurs when a person uses one’s primary analytical and argumentative abilities to attack and criticize another person who has a different way of thinking. In contrast, a person who thinks critically with sensitivity awareness is not blinded by his/her own viewpoints and is able to realize the significance of considering rebuttals to one’s own insights. Education should be directed to develop a strong sense of critical thinking. In the Pancasila course, students are also expected to develop their analytical abilities and expand their arguments about democratic civics issues in a respectful manner or arguments that heed others’ feelings.

An argument can be defined as a position that is adjusted through cognitive reasoning based on evidence or foundations (Toulmin, 2005). In other words, there are three primary elements in an argument, which are position/claim, evidence / position framework, and reasoning that justify a logical argument between its basics and position. Besides the three primary elements above, Toulmin (2005) stated that there are three other components from a supporting reasoning argument, modal qualifier, and rebuttal. An argument is considered good, sound, or high quality if (a) the position is clear and complete; (b) the foundation of its establishment is relevant and sufficient as a basis; (c) the reasoning is relevant and sufficient to gain backing; (d) the supporting evidence behind the reasoning is clear, relevant, and specific; as well as (e) it considers rebuttals that may be contra to the argument, so that (f) it uses proper modal qualifiers (Cerbin, 1988).

Although competence in building an argument is an important learning outcome, a number of studies reveal that in general students are unable to build cogent arguments (Cerbin, 1988; Jonnassen, 1999; Tan et al., 2001; Marttunen et al., 2005; Erduran et al., 2006; Simon et al., 2006; Chase, 2011). Erduran et al. (2006) found that even science program graduates are usually unable to provide proof and justification for their claims. Simon et al. (2006) and Chase (2011) stated that based on the national evaluation results in the USA in 1996, 1998, and 2008, about 40% of 12th grade students did not have the skills to make written arguments.

Therefore, now many learning methods have been developed to improve argument building proficiency (Cerbin, 1988; Cho & Jonassen, 2002). Cho & Jonassen (2002) revealed that nowadays an argument mastery scaffolding has been developed in the form of cognitive tools, like the Sherlock program made by Lajole and Lesgod as well as CSCA (computer-

supported collaborative argumentation). In addition, there is also an argument map from Nussbaum (2002) called 'Quest-Map'; a 'constrain-based argumentation tool' from Tan et al. (2001); 'peer challenge' guidance, 'self-monitoring' guidance, and 'self-monitoring' without guidance as historical learning scaffolding from Choi (2004); and 'online argumentation scaffolds' from Cho & Jonassen (2002). Pinkwart et al. (2008) developed the LARGO program, which is a legal argumentation program that assists students in making an oral argument diagram that is contained in the United States Supreme Court transcript. Meanwhile, Abbas and Sawamura (2009) developed the ALES program to aid students in developing their arguments.

Based on the need to develop students' critical thinking ability through refining their argument building above, research about the influence of using scaffolding (learning assistance) on the quality of students' arguments in the Pancasila course is conducted.

This research focuses on answering two research questions: a) Are there significant differences between the quality of students' arguments when they learn with guided questions as learning assistance compared with students who learn with a conventional method in the Pancasila course? b) Are there significant differences between the quality of students' arguments when they have good mastery of Indonesian language compared with those students who have low mastery of Indonesian language in the Pancasila course?

The two hypotheses tested in this research are: a) There are no significant differences between the quality of students' arguments when they learn with guided questions as learning assistance compared with the quality of students' arguments when they learn with a conventional method in the Pancasila course; and b) There are no significant differences between the quality of students' arguments when they have high, moderate, and low mastery of Indonesian language in the Pancasila course.

Research Method

This quasi-experiment research is conducted with a pretest-posttest non-equivalent control group design. The population for this study is Satya Wacana Christian University (SWCU) Information Technology Faculty (FTI) students in the *Pancasila* course. There are approximately 600 students divided into 10 parallel classes. From this population, 2 classes are chosen randomly as the research sample / experiment class with a total of 121 individuals.

To measure the ability of students to build their arguments, an argument making test is developed that functions as a pretest and posttest instrument. Meanwhile, to measure

students' language mastery, the same test used by Satya Wacana Christian University to select new potential students is applied. In other words, the data source of this research is 2 student classes of the Pancasila course.

The data gathering is conducted through a pretest to discover the quality of students' arguments before they are given treatment and a posttest to find out the quality of students' arguments after undergoing the experiment treatment. The same pretest and posttest instruments are used. Data is collected through a pretest and posttest by using an argumentative test. The test results are then given a score with the Argument Quality Evaluation Rubric that is adopted from the Rubric of Argument Quality that was developed by Cho and Jonassen (2002).

To test the two hypotheses above, a Mean Differential Test statistical analysis is used (Hair Jr. et al., 1995) by applying the SPSS 15.0 for Windows analytical program. A significant range of 0.05 is established. Before conducting the variant analytical test, a conditional fulfillment test or assumption test, also known as a normality test and homogeneity test, is carried out. The data distribution normality test is conducted by using Kolmogorov-Smirnov and Shapiro-Wilk statistics, while the data homogeneity test between data variants is carried out with the Levene's Test.

One-Sample Kolmogorov-Smirnov Test			
		Delta control	Delta-x
N		54	49
Normal Parameters ^{a,b}	Mean	30.6667	40.1429
	Std. Deviation	15.61567	6.91014
Most Extreme Differences	Absolute	.180	.115
	Positive	.096	.115
	Negative	-.180	-.059
Kolmogorov-Smirnov Z		1.321	.806
Asymp. Sig. (2-tailed)		.061	.534
a. Test distribution is normal. b. Calculated from data.			

From the variable normalcy test results above, there is a control group Kolmogorov index of 1.321 and experiment group Kolmogorov index of 0.806, where the significance level is 0.061 and 0.531; keeping in mind that the significance level is larger than 0.05, both variables above are included in the normal category.

Meanwhile, for the data homogeneity test between data variants, the Levene's Test is used. The following results were obtained.

Test of Homogeneity of Variances

Delta-x

Levene Statistic	df1	df2	Sig.
.917	9	34	.522

Bearing in mind that from the Levene Statistic test results, an index of 0.917 with a significance level of 0.522 greater than 0.05 was obtained, and the experiment group variable is considered homogenous.

Test of Homogeneity of Variances

Delta control

Levene Statistic	df1	df2	Sig.
3.438	11	37	.002

Meanwhile, from the results of the Levene Statistic test for the control variable, an index of 3.488 was obtained with a significance level of 0.002 smaller than 0.05, so this control group variable is considered as not being homogenous.

Research Results and Discussion

The Kolmogorov-Smirnov statistical test reveals that the Sig (p-level) experiment class data group and control class data group > 0.05, which implies that the data distribution of both data groups above is normal. Meanwhile, the Levene test for the experiment class data conveys that the data is homogenous, but the data for the control class is not homogenous. As a result, the next step undertaken is a non-parametric statistical test.

After a statistical pair sample test was conducted, the following results were obtained.

Paired Sample Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Delta-x	40.1429	49	6.91014	.98716
	Delta control	32.0816	49	13.63335	1.94762

From the table above, there was an increase from the pretest to the posttest scores of the experiment class with an average of 40.1429. Then in the control group there was an increase from the pretest to the posttest with an average of 32.0816. Numerically, the experiment group was higher than the control group. To determine the significant statistical difference, a mean differential test with a T-test technique was conducted with the following results obtained.

Paired Sample Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Delta-x Delta control	8.06122	15.84878	2.26411	3.50892	12.61352	3.560	48	.001

From the T-test results, $t = 3.560$ with a significance level of 0.001. This implies that there are significant achievement differences (pretest – posttest). The experiment group achievement (an average of 40.1429) is higher than the control group achievement (an average of 32.0816). As a result, the significance or probability level is $0.001 < 0.05$. Therefore, the H_0 statement “There are no significant differences between the quality of students’ arguments when they learn with guided questions as learning assistance compared with the quality of students’ arguments when they learn with a conventional method in the *Pancasila* course” is rejected. In other words, there are significant differences in providing guided learning questions as assistance towards the quality of their arguments.

Next, a Chi-Square Test is used to measure whether there are differences in students’ argumentation abilities according to their Indonesian language abilities. The results are listed below.

Chi-Square Test			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	58.800 ^a	63	.627
Likelihood Ratio	59.301	63	.609
Linear-by-Linear Association	4.392	1	.036
N of Valid Cases	49		
a. 88 cells (100.0%) have an expected count of less than 5. The minimum expected count is 0.02.			

From the Chi-Square Test results in the table above, there is a Chi-Square value of 58.800 with a significance level of 0.627. Since this value is greater than 0.05, it can be concluded that there are no significant differences in students' argumentation abilities based on their Indonesian language abilities. Thus, the low/high level of students' argumentation ability is not determined by their Indonesian language abilities.

The research results reveal that there are significant influential differences between learning with guided question assistance and learning with a conventional learning method towards the quality of students' arguments. This is in line with the study results of several experts that a) convey that guided questions and statements can function as an effective learning aid, including in designing sound arguments (Chi et al., 2004; Lin & Lehman, 2004; King & Rosenshine, 2004; Blanton, 2003; Myhill & Warren, 2005). These research results can be considered as being related with learning aid factors. As a series of questions to delve into argumentation elements and substances that are used by lecturers to assist students in building arguments, the assistance questions are thought to help students in developing their prerequisite abilities to construct good arguments. Cerbin (in Choi et al., 2004) identified a number of skills needed to build effective arguments: (a) an analytical ability, which is the capacity to delve into argument elements, and (b) an evaluative ability, which is the mastery of criteria to determine whether: the position is clear, the data is relevant and sufficient to support the position, the reasoning is relevant and enough to be supported, as well as does the conclusion already consider contra-arguments or possible exceptions. The reasoning questions used in this research are thought to assist students in developing both argument making primary abilities above.

The research results above are considered to be connected with the role of learning aids as a means to fulfill cognitive and meta-cognitive requirements in solving ill-structured problems. Ge & Land (2004) found that ill-structured problems need cognitive and meta-cognitive skills to solve them. Cognitive requirements to solve an ill-structured problem cover special domain knowledge as well as the knowledge structure itself. Knowledge about a special domain is knowledge about a particular related scholarly discipline like propositional information, concepts, regulations, and principles. In contrast, meta-cognitive requirements involve knowledge about how to solve problems and working arrangements in solving problems. In this research, specific domain knowledge and a Pancasila knowledge structure are provided in the form of teaching material and lecturer explanations about the teaching material. Then knowledge about how to solve problems and working arrangements in solving problems are revealed through explanations about how to take advantage of assistance questions in the learning process.

However, the results above are different with the study results of Choi et al. (2004) regarding using scaffolding in learning about history. In the study by Choi et al., there were no significant differences between the scaffolding / kinds of learning assistance on the students' argumentation scores. Nevertheless, Choi's study also reveals that students' argument scores in their final essays show an improvement compared with their first essays.

Related with the Indonesian language mastery level variable, the research results show that this variable does not have a significant influence on the quality of students' arguments. In other words, there are no real differences between the quality of students' arguments when they have high, moderate, and low Indonesian language abilities. This finding is dissimilar with research results by Nussbaum (2002), who concluded that students with high verbal scores from the California Test of Basic Skills were more capable of producing numerous arguments, and these differences were statistically significant.

These research results are assumed to be related with the nature of the argument itself as a position that is justified logically based on evidence or good argument fundamentals, sound arguments, or high quality arguments if (a) the position is clear and complete; (b) the foundation of its establishment is relevant and sufficient as a basis; (c) the reasoning is relevant and sufficient to gain backing; (d) the supporting evidence behind the reasoning is clear, relevant, and specific; as well as (e) it considers rebuttals that may be contra to the argument, so that (f) it uses proper modal qualifiers. Thus, the argument maker does not just

need language ability, but rather the ability to think logically in using language is more important.

Conclusion and Suggestions

Conclusion

It can be concluded that (a) there are significant differences in the quality of students' arguments when they are provided with guided question learning aids compared with students' arguments when they just receive conventional learning; (b) there are no significant differences in the quality of students' arguments based on their Indonesian language abilities.

Suggestions

The development of student building excellence needs to be supported by various learning aids, in order that students are capable of building cogent arguments.

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