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Critical Thinking Ability and Students' Learning Achievement of Sociology Education in the Industrial Sociology Courses

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***Abstract*—This study aims to showed that the students' learning achievements of Sociology Education were influenced by the critical thinking ability of students themselves; both were taught using Group Investigation (GI) and Direct Instruction Learning strategies. The participants of this study were Sociology Education students at one of the private universities in Indonesia. This research design used a treatment by level 2 x 2 design. In this design, the independent variable consisted of Group Investigation Learning strategy and Direct Instruction Learning strategy (A). The independent variable attribute was classified into 2, namely high critical thinking and low critical thinking (B). The research hypothesis was tested using analysis of variance (ANAVA) of two-way 2 x 2 and continued with the Dunnet t test. The results showed that the students' learning achievement who had high critical thinking ability was better taught using Group Investigation (GI) learning strategy compared with Direct Instruction (DI) learning strategy. Therefore, the students' learning achievement who had low critical thinking ability was better taught using Direct Instruction (DI) Learning strategy than taught using Group Investigation (GI) learning strategy.**

Keywords—critical thinking; learning achievement; sociology education

I. INTRODUCTION

Increasing critical thinking ability of sociology education students was also important. In the fact that the learning of industrial sociology courses was found that the ability to understand industrial sociology material was low, where the level of students' learning achievement was 69.74% of students scored lower than 70 [1]. This phenomenon was caused by the process of lecture activities were very passive so the students' critical thinking ability were having not been maximized.

Learning strategy can improve students' critical thinking ability according to the results of research [2]. Students' critical thinking skills can be influenced by problem based learning strategies [3]. The ability of critical think influences success in work. The results of some study conducted showed that the class using strategies projection based learning can be influences critical think students and had better average scores than other classes [4,5]. Related to the previous, one of the solutions to learning strategies used in industrial sociology lectures is to use a group investigation (GI) learning strategy. GI is one of the cooperative learning strategies that emphasize the participation and activities of students to find their own material (information) lessons to be learned so as to make students actively in gaining knowledge. By using Group Instruction learning strategy, students were required to have the ability to think critically so that students will be accustomed to find a problem and to analyze various solutions to solve the problem based on rational theories.

The aims of this research was to show the differences in learning achievement of industrial sociology between groups of students who had high critical thinking ability taught using Group Investigation (GI) learning strategy than using direct instruction (DI) learning strategies. In addition, the aim is to show differences in learning outcomes of industrial sociology between groups of students who have low critical thinking skills, who are taught using group investigation (GI) learning strategies compared to using direct instruction (DI) learning strategies.

II. METHOD

A. Research Design

This research design was a treatment by level 2 x 2 designs. In this design the independent variable consisted of Group Investigation Learning strategy and Direct Instruction Learning Strategy (A). The independent variable attribute was classified into 2, namely high critical thinking and low critical thinking (B). The following was the experimental design used in this study:

TABLE I. EXPERIMENTAL DESIGN BY LEVEL 2 X 2

Critical Thinking (B)	**Learning Strategy (A)**	
	Group Investigation (A_1)	***Direct Instruction (A_2)***
High (B1)	A1B1 {Y}11 k k = 1,2....,n11	A2B1 {Y}21 k k = 1,2....,n21
Low (B2)	A1B2 {Y}12 k k = 1,2....,n12	A2B2 {Y}22 k k = 1,2....,n22

B. Participants

The sample of this study was the fourth semester students of the Sociology Education Study Program at Hamzanwadi University. Sampling was done by the following steps; (1) Sampling was done randomly; this was done because the number of the fourth semester sociology education study program consisted of three classes. For class IV A was consisted of 24 students, class IV B were 23 students and IV C class were 23 students. (2) To take the sample from three classes, for the two classes was taken as research samples. Based on random results, classes of IV A and IV C were used as research samples. (3) Select the classes that were used as the experimental class and control class by taking two classes. Based on the lottery results, the IV C class as the experimental class and IV A class as the control class. (4) Distributing critical thinking test instruments. (5) Calculate and sort the results of critical thinking tests from the highest score to the lowest. (6) The scores obtained from the measurements were ranked 33% of the top group (highest score) stated as a group of students with high critical thinking ability, while 33% of the lower group (lowest score) was stated as a group of students who had low critical thinking ability. Referring to this theory, each of the 8 people was indicated to have high and low critical thinking ability.

C. Data Analysis

In order to test the hypothesis research, inferential statistics was used, namely analysis of variance (ANAVA) of two-way 2 x 2, to know the differences in learning achievement of industrial sociology produced through the Group Investigation Learning strategy and Direct Instruction Learning strategies and to determine the effect of the interaction between learning strategies viewed from critical thinking of the students' learning achievement in industrial sociology. Test criteria: (1) If F_{test} (A) ≥ F_{table} at α significance level .05, then there was a significant difference between the students' learning achievement of industrial sociology who were taught using Group Investigation Learning strategy and Direct Instruction learning strategy and. (2) If F_{test} (I) ≥ F_{table} at α significance level .05, then there was an effect of interaction between learning strategies and the critical thinking ability viewed from students' learning achievement of industrial sociology.

Furthermore, *Dunnet's* t test was conducted to know the comparison between groups with the following criteria: (1) $t_{test} > t_{table}$ at α .05 significance level, then H_o was rejected and H_a was accepted or students' learning achievement of industrial sociology those who had high critical thinking ability and Group Investigation learning strategy was better than the students' learning achievement of industrial sociology who had high critical thinking ability and Direct Instruction learning strategy. (2) $t_{test} < t_{table}$ on the significance level α .05, then H_o was rejected and H_a was accepted or the students' learning achievement of industrial sociology who had low critical thinking ability and Group Investigation strategy was lower compared with students' learning achievement of industrial sociology who had low critical thinking ability than using Direct Instruction Learning strategy.

III. Results and Discussion

A. Results

1) The Differences in students' learning achievement of industrial sociology taught using group investigation (A1) learning strategy and direct instruction learning strategy (A2): The results of data analysis using two-way ANAVA at the significance level α 0.05 obtained F_{test} (Ft = 8.03) higher than F_{table} (Ft α .05 = 4.20). This means that H_o was rejected, therefore H_1 was accepted. It can be concluded that there was a difference between the learning achievements of industrial sociology between students who were taught using Group Investigation Learning strategy than the students' learning achievement of industrial sociology who were taught using Direct Instruction strategy. The mean score of industrial sociology course between the two groups showed that group A1> group A2.

2) The Interaction between the learning methods (A) and learning motivation (B): The results of data analysis using two-way ANAVA at the 0.05 significance level above, F_{test} (Ft = 14.94) greater than F_{table} (Ft α 0.05 = 4.20). This means that H_o was rejected and H_1 was accepted. It can be stated that there was a very significant interaction effect between learning strategies and critical thinking ability viewed from students' learning achievement of industrial sociology. It can also be interpreted as the influence of learning strategies on learning achievement of industrial sociology which depended on the critical thinking ability.

The existence of a significant interaction effect between the learning strategies and the critical thinking ability and the difference in learning achievement, then a multiple *comparation test* was carried out. This test was intended to determine the mean groups score (cell) which is significantly different. The next analysis was done by using *Dunnet* t test; (a) Simple effect test for B1 (difference between A1 and B1) that was $t\left(A_1B_1 - A_2B_1\right)$ and (b) Simple effect test for B2 (the difference between A1 and B2) that was $t\left(A_1B_2 - A_2B_2\right)$. The test results were at a significant level α = .05 with db = n1 + n2 = 8 + 8 = 16, summarized in table 06 below:

TABLE II. The Results Significance Differences of the Mean Learning Achievement of Industrial Sociology with *Dunnet* T

Groups	t_{test}	t_{table}	Note
A_1B_1 and A_2B_1	5.117	2.119	$t_{test} > t_{table}$
A_1B and A_2B_2	1.197	2.119	$t_{test} < t_{table}$

The results of calculations using *dunnet* t test, as produced in Table 06 above, it can be described: (a) t = 5.12 > t table = 2.12 then H_o was rejected and H_a was accepted. The students' learning achievement of industrial sociology that had high critical thinking ability taught using Group Investigation (GI) was better than the students' learning achievement of industrial sociology that had high critical thinking ability taught using Direct Instruction (DI). (b) t_{test} = 1.20 <t table = 2.12 then H_o was rejected and H_a was accepted. The students' learning achievement of industrial sociology that had low critical

thinking ability taught using Direct Instruction (DI) was better than the students' learning achievement of industrial sociology that had low critical thinking ability taught using strategies Group Investigation (GI).

Based on the results of testing hypotheses with two-way ANAVA analysis, followed by the *Dunnet* t_{test} above, it was stated that: (1) the students' learning achievement of industrial sociology taught using Group Investigation strategy was higher than those of the students' learning achievement of industrial sociology taught using direct instruction was significantly effective. (2) There was an effect of interaction between learning strategies and the critical thinking ability viewed from the students' learning achievement of industrial sociology were significantly effective. (3) For students who had high critical thinking ability taught using group investigation learning strategy had higher the students' learning achievement of industrial sociology compared with the students who had high critical thinking ability taught using direct instruction learning strategy was significantly effective. (4) For students who have low critical thinking ability taught using direct instruction learning strategy had higher students' learning achievement of industrial sociology compared with students who had low critical thinking ability taught using Investigation Group learning strategy was significantly effective.

B. Discussion

Based on the results of testing hypotheses, it can be stated the discussion of the research as follows:

1) Students who had high critical thinking ability and taught using group investigation learning strategy had better than learning achievement of industrial sociology using direct instruction learning strategy: The group investigation learning strategy emphasized critical and high-level thinking ability, where students actively built their own learning through their own research. In this study, each student's brain arranged new information in its own way. Thus, the group instruction learning strategy was very appropriate to be applied to the students who had high-level thinking ability, where students were independently able to actively built their own learning through their own research. In this way, each student's brain arranged new information in its own way. The results of the Chaung study show that students who have higher critical thinking skills and problem solving abilities will have a higher level of clinical competence [6]. Academic education can be used to improve critical thinking of nursing majors [7]. The results of Mansoor Fahim and Ali Komijani's research also assessed the Critical Thinking Ability significant to increasing vocabulary in EFL [8].

In addition to the factors that determine the above, the factors that assess the teacher also contribute to the students' critical thinking ability [9].

Unlike the group investigation learning strategy, direct instruction that prioritized learning activities that were still centered on the lecturer (teacher centered), the development of subject matter was not contextual, this strategy was considered to be adapted to the sociology material that was material that describes the phenomena or problems that occurred in society. Thus, the use of student strategies did not have the opportunity to think critically, because the learning time was dominated by lecturers to explain lecture material and also students were seized with feelings of fear and shame to criticize the explanation delivered by the lecturer.

2) Students who had low critical thinking ability and taught using direct instruction learning strategy had better than learning achievement of industrial sociology using group investigation learning strategy: The group investigation strategy (GI) was not suitable to be applied to students who had low thinking ability, because the group investigation (GI) learning strategy made students as investigators namely investigating problems to find answers, so that students who had high critical thinking ability were needed.

The results of Ya-Ting C. Yang and Wan-Chi's research show that critical thinking skills can be raised by applying varied learning strategies. The use of telling story learning strategies and critical thinking skills can improve student learning outcomes [10].

Improving Critical Thinking The ability of students can also be done through online learning. This is in line with the results of research that show that students' critical thinking skills can be improved through online discussion forums [11].

Direct instruction provided structured learning and guided training students to improve students' understanding of the material and answer questions, especially by providing opportunities to ask questions and discuss with fellow students providing opportunities for students to see a problem from various perspectives. Thus, it can be expected that the learning achievement of industrial sociology groups of students who had low critical thinking treated by group investigation (GI) learning strategy were lower than the group of students given direct instruction (DI) learning strategy.

IV. CONCLUSION

The conclusion of this study was the learning achievement of industrial sociology students who had high critical thinking ability taught using group investigation (GI) learning strategy were better than the learning achievement of industrial sociology students who had high critical thinking ability taught using direct instruction learning strategy (DI). Furthermore, the learning achievement of industrial sociology students who had low critical thinking ability taught using direct instruction (DI) learning strategy were better than the learning achievement of industrial sociology students who had low critical thinking ability taught using group investigation (GI) learning strategy.

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