

Comparison of Application of Jigsaw IV and Reverse Jigsaw Methods based on Students' Participation and Achievement

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ABSTRACT (10 PT)

The purpose of this research is to study the effects of Jigsaw IV and Reverse Jigsaw cooperative learning model from participation and achievement (cognitive abilities). The method used in this research was the experiment 2x2 factorial design. The population was students (X Class) of SMK N 3 Surakarta. This research used a cluster random sampling technique. The techniques of collecting data of this research were the interview, observation, questionnaire, and testing. The techniques of data analysis were used as a two-way analysis of variance. Based on this research, it could be concluded as follows: (1) there is a different influence between application of Jigsaw IV and Reverse Jigsaw cooperative learning model based on students' cognitive ability (Sig. = 0,045 < 0,05), (2) there is a different influence between the high and low category of students' participation toward cognitive ability (Sig. = 0,000 < 0,05), (3) there is an interaction between the influence of cooperative learning type Jigsaw IV and Reverse Jigsaw application and students' participation toward students' cognitive ability (Sig. = 0,027 < 0,05). The result of this research could be put into consideration for the teacher to application Jigsaw IV and Reverse Jigsaw cooperative learning model in the learning activity.

Keywords: Jigsaw IV, Reverse Jigsaw, Participation, Cognitive Ability

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1. INTRODUCTION

Vocational High School aims to produce alumnus who are ready to work and accustomed with working environment. However, the Central Statistics Agency's data revealed that VHG (Vocational High School) graduates has the highest unemployment rate, which is 8.92%, and followed by 7.92% of diploma level I-III graduates, 7.19% of SHS (Senior High School) graduates, 6.31% of University graduates, 5.18% of Middle School graduates and lastly, 2.67% of elementary school graduates (Hidayat, 2018). Head of the Central Statistics Agency, Suhariyanto, concluded that nowadays, the Vocational Curriculum still has a homework in answering or fulfilling the needs of working environment (Hidayat, 2018). Based on observations conducted at SMK (VHS) 3 Surakarta, learning activity held in X Multimedia class on Basic Graphic Design subject is still focused on the teacher and caused students to become passive. Moreover, the cognitive learning outcomes during the 1st Final Semester Exam shows that 66.20% of students did not pass the passing grade (KKM) on the mentioned subject. Therefore, the teacher needs to overcome this problem by planning learning activities in order to optimize students' participation and boost their cognitive abilities.

Slavin (2005: 103) stated that "Cooperative learning is the ideal solution to problems; presents opportunities to interact cooperatively and not superficially to students from different ethnic backgrounds". Cooperative learning models help to develop not only cognitive abilities but also on effective and psychomotor (Asmani, 2016: 57). Cooperative learning has an important goal, namely to provide knowledge, concepts, abilities, and necessary understanding (Slavin, 2005: 33). As one of cooperative learning, the Jigsaw method (Suratno, 2005) provides six versions of cooperative learning methods, including Jigsaw I, Jigsaw II, Jigsaw III, Jigsaw IV, Reverse Jigsaw, and Jigsaw Subjects that can be used by teachers for classroom learning (Timayi, et al., 2015). The learning model used in this study is the Jigsaw IV and Reverse Jigsaw methods. Both of these methods were chosen because they have difference in the way teaching is done by their peers. The Jigsaw IV method is a refinement of the previous Jigsaw and has several new features: introduction, quizzes, and re-teaching of

material (Timayi, et al, 2015). Meanwhile, Heeden (Samuel, 2018) concluded that the difference between Reverse Jigsaw and Jigsaw was in the Reverse Jigsaw technique which arranges students of expert groups to teach the entire class rather than returns them to their original groups to teach content. Juweto (2015) stated that Jigsaw offers various advantages, namely increasing motivation, skills, and achievements.

Most of the material in Basic Graphic Design subjects is in form of practice and application of cooperative learning models it can be useful to activate and improve cognitive abilities in maximizing learning process. Therefore, this study aims to provide information specific to teachers regarding the effect of applying the Jigsaw IV and Reverse Jigsaw cooperative learning models in terms of students' participation and cognitive abilities.

2. RESEARCH METHOD

The method used in this study is an experimental method with a 2X2 factorial design (AXB), in this form, there are two groups each chosen randomly, namely the experimental group and the control group. The population in this study were all students of class X Multimedia class of SMK N 3 Surakarta, amounting to 71 students consisting of X Multimedia 1 class amounting to 36 students and X Multimedia 2 totaling 35 students. While the sampling in this study used cluster random sampling, namely X Multimedia 1 as the control group and X Multimedia 2 as the experimental group at SMK Negeri 3 Surakarta. The control group applied the Reverse Jigsaw cooperative learning model and the experimental group applied the Jigsaw IV cooperative learning model.

This study used several data collection techniques, including interview, observation, questionnaire, and test. Interviews was used to find out the opinions of respondents regarding the learning methods applied. Observation was used to observe the participation of students in learning activities. The questionnaire was used to determine the level of student participation which is divided into two groups, namely the high category and the low category using the Likert scale. Test was used to measure the level of knowledge or understanding of students after learning something.

3. RESULT AND DISCUSSIONS

3.1. RESULT

For the results to be accounted for, the data analysis in this study must fulfill the analysis prerequisite test. The analysis prerequisite test in this study consisted of Balance Test, Normality Test, and Homogeneity Test. The test results show a sig value > 0.05. Then hypothesis testing can be done. Hypothesis testing is done by using two-way variance analysis to determine whether there is an influence or interaction between variables. The basic decision-making hypothesis test is if the value of Sig. < 0.05, which indicates an influence or interaction.

First Hypothesis Testing

H₀ : There is no difference influence between the application of Jigsaw IV and Reverse Jigsaw cooperative learning model based on students' cognitive ability.

H₁ : There is a different influence between the application of Jigsaw IV and Reverse Jigsaw cooperative learning model based on students' cognitive ability.

Table 1. Results of the First Hypothesis Analysis

Variance	Sig	Criteria	Decision	Information
Learning methods	0,045	< 0,05	There is influence	H ₁ accepted

Based on table 1 shows the value of sig 0.045 < 0.05, then H₀ is rejected and H₁ is accepted. So it can be concluded that there are differences in the influence between the use of the Jigsaw IV and Reverse Jigsaw cooperative learning models on students' cognitive abilities in Basic Graphic Design lessons. The results of this hypothesis are supported by interview data and compared with the posttest scores of students' cognitive abilities. Interviews were conducted on 10 participants consisting of 5 control groups and 5 experimental groups randomly selected

Table 2. Supporting Data of the First Hypothesis

Variance	Mean	Student Choices
Control	Pretest : 65,69 Posttest : 80,97	Reverse Jigsaw: 3 students Conventional: 2 students
Experiment	Pretest : 63,53 Posttest : 88,57	Jigsaw IV: 5 students Conventional: -

In table 2 shows the control class has an average cognitive ability value of 80.97. While in the results of interviews with participants in the control class, 2 students preferred conventional learning and 3 students preferred the method applied. In the experimental class has an average cognitive ability value of 80.97. While in the results of interviews with participants in the experimental class, all students tended to choose the learning method compared to conventional learning. This shows that there are differences in the influence between the use of Jigsaw IV and Reverse Jigsaw cooperative learning models on students' cognitive abilities in Basic Graphic Design lessons.

Second Hypothesis Testing

H_0 : There is no different influence between the high and low category of students' participation toward cognitive ability.

H_1 : There is a different influence between the high and low category of students' participation toward cognitive ability.

Table 3. Results of the Second Hypothesis Analysis

Variance	Sig	Criteria	Decision	Information
Participation	0,000	< 0,05	There is influence	H_1 accepted

Based on table 3 shows the value of sig 0,000 < 0,05, then H_0 is rejected and H_1 is accepted. So it can be concluded that there are differences in students' abilities and low categories of students in Basic Graphic Design subjects. This hypothesis is also supported by the results of observation and the results of tests of cognitive abilities. Retrieval of data by students observing learning by making observations.

Table 4. Supporting Data of the Second Hypothesis

Category	Group	Participation Level	Mean Cognitive Ability
Pretest	Control (Reverse Jigsaw)	High	72,06
		Low	60,59
	Experiment (Jigsaw IV)	High	73,04
		Low	58,57
Posttest	Control (Reverse Jigsaw)	High	85,00
		Low	66,88
	Experiment (Jigsaw IV)	High	94,11
		Low	66,43

Based on table 4 shows the average value of the control class pretest cognitive ability in high category students is 72.06 and in the low category students 60.59. While the average value of the control class posttest, in the high category students is 85.00 and in the low category students 66.88. In the experimental class the average value of the cognitive ability pretest in high category students was 73.04 and in the low category students 58.57. While the average value of the experimental class posttest, in the high category students is 94.11 and in the low category students 66.43. This shows that there are differences in the value of the cognitive abilities of

students who are included in the category of high participation and students who are in the low participation category.

Third Hypothesis Testing

H₀ : There is no interaction between the influence of cooperative learning type Jigsaw IV and Reverse Jigsaw application and students' participation toward students' cognitive ability.

H₁ : There is an interaction between the influence of cooperative learning type Jigsaw IV and Reverse Jigsaw application and students' participation toward students' cognitive ability.

Table 5. Results of the Third Hypothesis Analysis

Variance	Sig	Criteria	Decision	Information
Method and Participation	0,027	< 0,05	There is interaction	H ₁ accepted

Based on table 5 can be viewed sig value $0,027 < 0,05$, and H₀ is rejected and H₁ is accepted. it could be concluded there is an interaction between the influence of cooperative learning type Jigsaw IV and Reverse Jigsaw application and students' participation toward students' cognitive ability. The results of this hypothesis are also supported by the results of observational data and compared with the results of tests of students' cognitive abilities. Judging from the difference in the number or value of the participation category and the average cognitive ability before and after treatment.

Table 6. Supporting Data of the Third Hypothesis

Category	Group	Participation Level	Mean Cognitive Ability
Pretest	Control (Reverse Jigsaw)	High: 16 students	65,69
		Low: 20 students	
	Experiment (Jigsaw IV)	High: 12 students	63,53
		Low: 23 students	
Posttest	Control (Reverse Jigsaw)	High: 28 students	80,97
		Low: 8 students	
	Experiment (Jigsaw IV)	High: 28 students	88,57
		Low: 7 students	

Based on table 6, the number of students in the high category was 16 students and the low category was 20 students and an average cognitive value of 65.69. After being given the treatment, the number of high students rose to 28 students and the low category, students rose to 80.97 and the average value of cognitive values rose. In the experimental class, there were 12 students and the low category students who had an average cognitive value of 63.53. After being given the treatment the number of high students rose to 28 students and the low category 7 students and the average value of cognitive values rose to 88.57. This shows the interaction between learning methods and participation that has an impact on 'cognitive abilities' students.

3.2. DISCUSSIONS

The Influence of Using Jigsaw IV and Reverse Jigsaw Cooperative Learning Models on Student Cognitive Abilities.

Based on table 2, it is known that there is an increase in the value of cognitive abilities after the application of the method so that it can be concluded by applying the Jigsaw IV and Reverse Jigsaw cooperative learning models positively influencing students' cognitive abilities. Besides, it is known that the value of the cognitive ability of the Jigsaw IV cooperative model is greater than that of Reverse Jigsaw. This shows that the use of the Jigsaw IV cooperative model is more effective in improving students' cognitive abilities compared to Reverse Jigsaw.

The effectiveness of the method can also be seen as a conclusion from the interview data. In the control group, on average they felt they did not understand the material so that the impact on the task was tended to be slower than the experimental group. From 5 participants, two of them chose conventional learning. While in the experimental group, on average they felt they could better understand the learning material and they felt they were quicker to do the assignments because usually one task was completed in 2-3x meetings, with this learning they could complete four tasks in just four meetings. From 5 participants, no one choose conventional learning. Based on the results of this interview, it can be seen that the application of methods can affect students' cognitive abilities. Besides that, it can be seen that the effectiveness of the method applied, namely the application of the Jigsaw IV cooperative model has a better influence on improving cognitive abilities compared to the Reverse Jigsaw cooperative model.

The results of this study are supported by the conclusion of Rosyidah (2016) which states that the existence of treatment in learning encourages students to think active and make preparations before learning. Based on Susilo's conclusions (Suratno, 2005) that the Jigsaw cooperative learning model can improve the ability to master the subject matter because students feel responsible for conveying the results of the discussion information to their friends. In a study conducted by Ozdemir and Arslan, (2016) stated that the Jigsaw IV type of cooperative learning model is useful and effective in improving their cognitive abilities or understanding so that it influences students' academic achievement. This is also in line with the statement of Samuel (2018) that the Reverse Jigsaw cooperative learning model can increase interest, behavior, and achievement.

The results of this study reinforce previous research. Explanation of the positive influence of the use of Jigsaw IV and Reverse Jigsaw cooperative learning models on students' cognitive abilities can be interpreted that the use of this method has an important role in improving students' cognitive abilities. The use of this method uses small groups that enable them to think critically by discussing to understand each other's learning material. This is because students learn well in groups by working together to carry out responsibilities and strive for their friends to learn better. In line to teach small groups, namely develop problem-solving skills, developing social attitudes, a sense of responsibility, and developing leadership abilities (Dimiyati & Mudjiyono, 2013: 166).

Effect of High and Low Category Student Participation on the cognitive abilities of students in Basic Graphic Design subjects.

Based on table 4, it can be known that there is a difference in the acquisition of test value data based on the level of participation. From the observation data shows that the value of students who have high category participation is greater than students who have low category participation. Students who have high category participation tend to be more active and think critically in learning. They pay more attention to learning, actively discuss and complete tasks well. While students who have low category participation tend to be more passive in learning. They tend to play gadgets, games and not focus on learning.

There are views and opinions to strengthen the results of this hypothesis, in a summary of the study by Hedeem (2006) which quotes Barbara Gross Davis that students learn well when they are actively or participatory. Yamin (2007: 81) states "Continuous interaction creates experiences and desires to understand something new, which has not been understood, or that has not been experienced". In this statement, it can be seen that participation is a bridge for students to understand material actively through learning experiences so that learning objectives can be fulfilled. With active or participatory students in the learning process can stimulate and develop talent, think critically and solve problems in daily life (Yamin, 2007: 77). In this statement, it can also be seen that participation makes students motivated in developing their potential so that there are various aspects of the individual's quality improvement.

Influence Interactions Using Jigsaw IV and Reverse Jigsaw Cooperative Learning Models with Participation in Students' Cognitive Abilities.

Based on table 6, it can be seen that there is an interaction between the influence of the use of the Jigsaw IV and Reverse Jigsaw cooperative learning models with participation in students' cognitive abilities in Basic Graphic Design subjects. In the results of processing observation and test data, differences in participation and cognitive abilities of students were obtained before and after a learning method was applied. The data can be seen from the difference in the average value of the pretest and posttest values of cognitive abilities and the number of levels of student participation that have been categorized. The data shows that by applying the Jigsaw IV and Reverse Jigsaw cooperative learning models can increase student participation which influences their cognitive abilities. Besides, it can be concluded that the Jigsaw IV type of cooperative learning model is more effective in increasing students' participation and cognitive abilities.

This hypothesis is also reinforced by the results of interviews with 10 participants from both groups. In the control group, the average student did not understand the material. Factors that influence students who get an

explanation, they feel less clear and lack understanding because their friends are too fast in delivering the material. Besides, some students underestimate friends who are presentations and are not serious about learning. While the factors that influence students who give explanations, they tend to be impatient in practicing and explaining the material to all students in front of the class. So that the learning process becomes long and the tasks they collect are not as fast as the experimental group. With this matter, it can be seen that participation is still lacking so that it influences their cognitive abilities. While in the experimental group, on average they felt they could better understand the learning material. Factors that influence are intense explanations from group mates and feel they have a responsibility to teach each other in groups. Besides, they on average feel faster doing the task than usual. With this matter, it can be seen that participation is very good so that it influences his cognitive abilities

The cooperative strategy in its implementation has the basis of student-centered learning or Student Center Learning with which students will be more active in teaching and learning activities that have the potential to achieve better learning goals. The results of this study are supported by a summary of Hedeem (2006) research that quotes Barbara Gross Davis that students who work in small groups and collaboratively tend to learn more about what is taught and try to understand it. So learning that involves students teaching each other can improve critical thinking skills and the acquisition of learning outcomes. The ability to think critically can be obtained actively or participatively greeting discussion so that an understanding is formed in the student. According to Suratno (2005) who quotes Slavin that Jigsaw cooperative strategies can improve the learning process and student learning outcomes. In line with the statement Hedeem (2006) citing Myers and Lemon's conclusions, that jigsaw is an effective way of encouraging students to interact, exchange ideas with peers and foster confidence in the learning process.

4. CONCLUSION AND SUGGESTIONS

Conclusions

Based on the results of the research and discussion, conclusions were made:

- 1 There are differences in the influence between the use of Jigsaw IV and Reverse Jigsaw cooperative learning models on students' cognitive abilities in Basic Graphic Design subjects. It can be seen that the application of the Jigsaw IV type of cooperative learning model improves cognitive abilities better than the application of the Reverse Jigsaw cooperative learning model.
- 2 There are differences in influence between the participation of high-category students and low categories of cognitive abilities of students in Basic Graphic Design subjects. It can be seen that students who have a high level of participation have better cognitive abilities than students who have low participation rates.
- 3 There is an interaction between the influence of the use of Jigsaw IV and Reverse Jigsaw cooperative learning models with participation in students' cognitive abilities in Basic Graphic Design subjects. It can be seen that students who use the Jigsaw IV cooperative learning model and have high participation rates will have better cognitive abilities than students who use the Reverse Jigsaw cooperative learning model and have a low participation rate.

Suggestions

Based on this study, then the researchers put forward some suggestions as follows:

- 1 For teachers must use the right and varied learning methods and the Jigsaw IV method can be an alternative in learning Basic Graphic Design.
- 2 For schools to be able to motivate teachers to apply varied learning methods and facilitate or develop the Jigsaw IV method to improve learning competencies.
- 3 For further research can be used as a reference by adding other variables that are more complex and refine the measuring instrument for better results.

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