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The Effect of Instructional Methods (Lecture-Discussion versus Group Discussion) and Teaching Talent on Teacher Trainees Student Learning Outcomes

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Abstract

The aim of this study is to examine difference in the effect of instructional methods (lecture-discussion versus group discussion) and teaching talent on theacher trainees student learning outcomes. It was conducted by a quasi-experimental design using the factorialized (2 x 2) version of the nonequivalent control group design. The subjects were 168 students as teachers trainees from eight study programs in Faculty of Teacher Training and Education, University of Jember, Indonesia. Data collected were analyzed by two-way Analysis of Variances (ANOVA). Results of the study showed that (1) the learning outcomes of students taught by the lecture-discussion method were different from those of students taught by the group discussion method with F test of 111.864, significant at p<.05 and the relatively strong effect size of .406. The group discussion method was proven to be more effective in improving the student learning outcomes than the lecture-discussion method; (2) the difference in teaching talent affected difference in student learning outcomes with F test of 128.708, significant at p <.05 and the relatively strong effect size of .440. Students with higher teaching talent tended to achieve higher learning outcomes among both groups of students taught using either lecture-discussion or group discussion methods. However, students with lower teaching talent tended to achieve lower learning outcomes among both groups of students taught using either lecture-discussion or group discussion methods; (3) the interaction of lecture-discussion vs group discussion methods and teaching talent significantly affected student learning outcomes with F test of 91.713, significant at p<.05 and the relatively strong effect size of .359.
Keywords: instructional methods, teaching talent, student learning outcomes

1. Introduction

One of the tasks of instructional scientists is to develop a descriptive theory of instruction. The descriptive theory of learning and instruction as proposed by Reigeluth (1983), Reigeluth & Merrill (1978, 1979), explains that the effectiveness of learning outcomes as a instructional variable can be predicted or estimated based on effect of the interaction of instructional methods and conditions. Therefore, scope of a method, generality of a method, precision of a method, power of a method, and consistency of a method should be scrutinized continuously. This study focused on power of a method (a continuum from low to high). The variable of instructional method in the study is the instructional strategy of lecture-discussion versus group discussion.

Along with the descriptive theory of instruction, teaching methods must be linked with one of the components of instructional condition, i.e. the characteristics of students, because the understanding of the characteristics of students is the main thing to consider before choosing the teaching methods (Fry, Ketteridge & Marshall, 2014), affects the effectiveness of learning process (Seels & Richey , 1994; Reiser & Dempsey, 2011), has impact on the effectiveness of learning (Ardhana, 1999), and as a foothold for prescribing optimal learning methods in order to achieve specific learning outcomes (Degeng, 2013). The variable of the characteristics of students in this study is the teaching talents.

In the study, lecture-discussion method is the teaching method that is designed to help students understanding the organized body of knowledge, i.e. the topics that relate the facts, concepts, principles, and procedures, and make the relationship between them explicit and clear (Eggen & Kauchak, 2007; Rosenshine, 1987). Core of the lecture-discussion is a repetitive cycle of presenting the information and monitoring the comprehension combined with integration. After the first cycle was complete, the second cycle occurs, then the third cycle, and so on until the learning ended. Each cycle includes a brief presentation, the monitoring of comprehension, presentation, and integration (Eggen & Kauchak, 2012). The term 'lecture-discussion' describes the application designed to address weaknesses and refers to a modification of conventional lecture method—by interspersing

the short period of presenting information by questions asked by teachers systematically—that is very behavioristic in nature based on cognitive learning theory, i.e. the information processing theory and constructivism (Eggen & Kauchak, 2007; Eggen & Kauchak, 2012; Jacobsen, Eggen & Kauchak, 2009). Operationally, the manipulation of the lecture-discussion includes four steps as follows: (1) introduction and review; (2) the presentation of information: (3) the monitoring of comprehension; and (4) integration which ends with the closing.

Ishaq and Rani (2011)'s paper, concludes that the discussion and constructivism methods of teaching adults in adult education programmes are some of the methods of teaching adults that when properly utilized could give adult learners a sense of belonging. Moreover, it could promote learners' confidence and participation in the adult learning program. Although the data from Igwebuike and Atomatofa (2013), showed that do not provide support for the superiority of the discussion method over fieldtrips in enhancing the achievement of students in integrated science lessons, but the effectiveness of the discussion, especially group discussion relevant were retested by comparing the method with equivalent teaching methods, i.e., lecture-discussion.

In the study, group discussion method is it in which two or more students express, present, explain and argue their knowledge, experiences, opinions and feelings (Rahman, et al., 2011); a situation in which students, or students and lecture, chat and share information, ideas, opinions, or work for the solution of problem (Cruickshank, Jenkins & Metcalf, 2012). Discussion is a intructional strategy that involves students to share ideas on a general topic (Eggen & Kauchak, 2012), or a strategy that utilizes the interaction of lecture-students and among students as the primary means to achieve the learning objectives (Jacobsen, Eggen & Kauchak, 2009). In the study, group discussion is small group discussion with members from four to six people (Slavin, 2009). Small group discussion is selected as it was proven to be more effective than a large class discussion (Bennett et al., 2005; Stephen & Stephen, 2005; Kelly & Stafford, 1993; Fry, Ketteridge & Marshall, 2014). Operationally, the manipulation of group discussion method includes three steps (syntax) as follows: (1) introduction: lecturer gives one issue in each of all groups as the opening of discussion; (2) exploration: students explore topics, clarify thinking, and take a position; and (3) closing: summarize the main points in the discussion.

In the study, teaching talents is the form of thoughts, feelings, and naturally repetitive behaviors that can be applied as productive things (Buckingham & Clifton, 2001). Teaching talents means the strong or weak specific potential ability owned by a prospective teacher before he/she decided to choose the teaching profession as a way of life. The teaching talent can be tracked through answers to the question why he/she wanted to teach (Cruickshank, Jenkins & Metcalf, 2012), and through the models of talent recruitment, strengthening, and enhancement (Curtis & Wurtzel, 2010). Prospective teacher's teaching talent is measured through the teaching talent questionnaires. A total score of measurement results of the teaching talent questionnaires reflect the strong or weak teaching talent, which consists of indicators as follows: (1) preferences to the teaching profession (Cruickshank, Jenkins & Metcalf, 2012); (2) educational communication ability; (3) empathy for the child; and (4) learner human (Adopted from The Gallup Organization).

In the study, student learning outcome is ability or competence owned or controlled by the students after they acquire or receive a learning experience (Miller, Linn & Gronlund, 2009). Generally, it refers to all effects that can be used as indicator of the value of learning method under different conditions (Reigeluth, 1983). Specifically, it refers to a retention rate, i.e. the number of performance that is still able to show by the student after a certain period of time (Degeng, 2013). Using theoretician's conception of memory, it refers to the amount of information that is still able to remember or retrieve again by students after a certain period of time. Indicators of the retention rate used in the study are based on Merrill (1983)'s taxonomy of Component Display Theory (CDT), i.e. remembering and retrieving the facts, concepts, principles, and procedures of learning theory and instruction. Student learning outcomes are measured by the achievement test of the subject of standardized learning and instruction.

2. Research Method

2.1. Research Design

As argued by Degeng (2013), and Setyosari (2013), the type of study that most closely express the causal relationship between variables is an experimental study. The study used a quasi-experimental study with two independent variables (instructional methods and teaching talent) and each having two dimensions (lecture-discussion versus group discussion; strong and weak teaching talents), so that it used a factorialized (2 x 2) version of the nonequivalent control group design (Tuckman, 1999: 174).

2.2. Subjects

Subjects of the study included 168 students of 2015-2016 in Faculty of Teacher Training and Education, University of Jember, Indonesia. A total of 84 students was divided into two classes used as the experimental group, while a total of 84 students was divided into two classes used as the control group. The students were from eight study programs, i.e.: Educational Sciences of Mathematics, Physics, Biology, Economics, History, Language and Indonesian Literature, English, and Elementary School Teacher, who took the subject of Learning and Instruction.

2.3. Data Collection and Analysis

The two classes of experimental group were treated using lecture-discussion instructional strategy, while the two classes of control group were treated using group discussion strategy. Collection of data on teaching talents was done using teaching talent questionnaires designed based on Buckingham and Clifton (2001)'s model, while collection of data on the student learning outcomes was done using a standardized achievement test at the end of the experiments which took over eight times of @ 100' in a face-to-face meeting. Data collected were analyzed by two-way Analysis of Variances (ANOVA).

2.4. Hypothesis

The following hypotheses were tested:

- The learning outcomes of students taught by the lecture-discussion method were different from those of students taught by the group discussion;
- The difference in teaching talent affected difference in student learning outcomes;
- The interaction of lecture-discussion vs group discussion instructional methods and teaching talent significantly affected student learning outcomes.

3. Results and Discussion

3.1. Hypothesis Testing 1

Based on Table 1 below, the results of Test of Between-Subjects Effects can be interpreted that for the first main effect, the teaching methods had F value of 111.864, significant at $p < .05$. So it can be concluded that there was difference in effect of the independent variables of lecture-discussion and group discussion methods on student learning outcomes.

Table 1. Tests of between-subjects effects

Dependent Variable: ScoreTest

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	6140,711[a]	3	2046,904	114,198	,000	,676	342,593	1,000
Intercept	68328,088	1	68328,088	3812,058	,000	,959	3812,058	1,000
Mehods	2005,071	1	2005,071	111,864	,000	,406	111,864	1,000
Talent	2306,992	1	2306,992	128,708	,000	,440	128,708	1,000
Mehods * Talent	1643,884	1	1643,884	91,713	,000	,359	91,713	1,000
Error	2939,569	164	17,924					
Total	78661,000	168						
Corrected Total	9080,280	167						

a. R Squared = .676 (Adjusted R Squared = .670)
b. Computed using alpha = .05

The conclusion that the treatment by lecture-discussion and group discussion methods resulted in difference in student learning outcomes was supported by the statistical data on of results of pairwise comparisons as output of Estimated Marginal Means as outlined in Table 2 below. The table shows that the treatment by using different instructional methods resulted in different mean of learning outcomes. The difference was significant at $p < .05$, meaning that the mean of student learning outcomes in the control group treated by using the group discussion method was 23.9643 higher than that of student learning outcomes in the experimental group treated by using the lecture-discussion, i.e. 16.7381. Based on the results of t test, the difference between scores was 7.2262,

significant at p <.05.

Table 2. Parameter estimates

Dependent Variable: ScoreTest

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval		Partial Eta Squared	Noncent. Parameter	Observed Power[b]
					Lower Bound	Upper Bound			
Intercept	30,477	,638	47,751	,000	29,217	31,738	,933	47,751	1,000
[Mehods=1]	-13,175	,908	-14,512	,000	-14,968	-11,382	,562	14,512	1,000
[Mehods=2]	0[a]	.	.	.	.	.	.	.	.
[Talent=1]	-13,677	,925	-14,788	,000	-15,504	-11,851	,571	14,788	1,000
[Talent=2]	0[a]	.	.	.	.	.	.	.	.
[Mehods=1] * [Talent=1]	12,521	1,307	9,577	,000	9,940	15,103	,359	9,577	1,000
[Mehods=1] * [Talent=2]	0[a]	.	.	.	.	.	.	.	.
[Mehods=2] * [Talent=1]	0[a]	.	.	.	.	.	.	.	.
[Mehods=2] * [Talent=2]	0[a]	.	.	.	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

b. Computed using alpha = .05

Furthermore, it can be seen that effect size (Partial Eta Squared) generated from the model for the instructional methods was very good (.406). The value was >.26 (Cohen, 1988), so that the effect size of methods can be included into the 'strong' category. Based on the results of t test with coefficient of -14.12 as shown in Table 2, it appears that the group discussion methods significantly affected the student learning outcomes with the effect size of 56.2%. Therefore, it can be interpreted that in the study the group discussion teaching method proved to be still more effective than the lecture-discussion method to improve student learning outcome.

The empirical fact in line with the opinion of the Bourner & Flowers (1999)'s research, which states that in order to achieve different learning objectives required the implementation of a combination of different methods so that learning can be effective. The results also reinforce the opinion of Odundo & Gunga (2013)'s research, which says that the learning outcomes could be explained through the use of various methods of learning.

The results of this study are also in line with the opinion Kang'ahi, et.al. (2012)'s research, which resulted in the conclusion that the learning outcomes learners rely heavily on learning methods. The results of this study also supporting Al-Agili, et.al. (2012)'s study, which found the use of methods of teaching and learning practice has a significant positive correlation with learning outcomes.

3.2. Hypothesis Testing 2

Based on Table 1, the results of Test of Between-Subjects Effects can be interpreted that for the second main effects, the teaching talents had F value of 128.708, significant at p <.05. So it can be concluded that there was difference in effect of the independent variable among the subjects with strong and weak teaching talents on the student learning outcomes.

The conclusion that strong and weak teaching talents resulted in difference in student learning outcomes was supported by statistical data on the results of pairwise comparisons as output of Estimated Marginal Means as presented in Table 2. The table shows that different teaching talents resulted in different mean of student learning outcomes. The difference was significant at p <.05. The conclusion was also supported by data that the mean score of learning outcomes among students with strong learning talents was 23.9655 higher than that among students with weak learning talents, i.e. 16.4691. Based on t test, the difference of scores was 7.4964, significant at p <.05.

Furthermore, it can be seen that effect size (Partial Eta Squared) generated from the model for the teaching talents was very good (.406). The value was >.26 (Cohen, 1988), so that the effect size of teaching talents can be included into the 'strong' category. Based on the results of t test with coefficient of -14.78 as shown in Table 2, it appears that the strong teaching talents significantly affected the student learning outcomes with the effect size of 57.1%.,. Therefore, it can be interpreted that in the study the strong teaching talents proved to be still more

effective than the weak teaching talents to improve the student learning outcome.

The empirical fact in line with the opinion Ushakumari (2011)'s study, which states that there is a significant correlation between teaching talent to learning outcomes. Opinion research has become urgent attention because as has been investigated Jena (2012), differences in teaching talents also have a positive relationship with the teaching competence.

Therefore, this study was conducted on prospective teachers, the results of this study are consistent with the opinion of the Sajan (2010)'s research, which states that teaching talent is the main determinant as well as a significant predictor for the effectiveness of teachers. Therefore, he suggested that the test teaching talent becomes a part of the entrance test education teacher candidates.

3.3. Hypothesis Testing 3

Based on Table 1, the results of Test of Between-Subjects Effects can be interpreted that for the interaction of variables, F values was 91.713, significant at $p < .05$. It means that the interaction of teaching methods (lecture-discussion versus group discussion) and the teaching talents had significant effect on the student learning outcomes. The conclusion was supported by results of profile plots as output of Estimated Marginal Means as described by Figure 1 below.

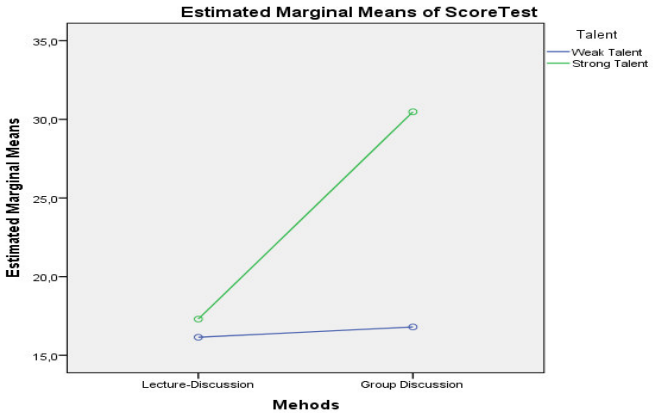

Figure 1. Profile Plots

Figure 1 shows that the students treated using lecture-discussion and group discussion instructional methods and the strong teaching talents tended to have higher learning outcomes. It can also be interpreted that the students treated using lecture-discussion and group discussion instructional methods but with the weak teaching talents tended to have lower learning outcomes.

Furthermore, it can be seen that the effect size (Partial Eta Squared) generated from the model for instructional methods and teaching talents was .359 greater than .26. Therefore, it can be concluded the effect size can be included into 'strong' category. It means that the data were in accordance with the actual condition and the study can be replicated (Cohen, 1988). Meanwhile, the value of adjusted R^2 was .670, meaning that the two independent variables of learning methods and teaching talents can explain the student learning outcomes. Thus, 67% of the variation in student learning outcomes could be explained by the learning methods and teaching talents.

4. Conclusion

Based on hypothesis testing, the learning outcomes of students taught by the lecture-discussion method were different from those of students taught by the group discussion; the difference in teaching talent affected difference in student learning outcomes; the interaction of lecture-discussion vs group discussion instructional methods and teaching talent significantly affected student learning outcomes.

In accordance with the results of the third hypothesis testing, the results of this study support and in line with the conceptual framework of research that builds on a descriptive theory of instructional as proposed by Reigeluth (1983), Reigeluth & Merrill (1978, 1979), also in line with the opinion of Degeng (2013).

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