

THE COMPARISON OF GROUP INVESTIGATION AND THINK PAIR SHARE WITH ASSESSMENT FOR LEARNING VIEWED FROM STUDENTS' SELF CONFIDENCE OF EIGHTH GRADE STUDENTS OF JUNIOR HIGH SCHOOL

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Abstract

This research was a quasi-experimental research with a factorial design 2×3 aims to determine the comparison of Group Investigation (GI) with Assessment for Learning (AfL) through peer-assessment (GI-AfL-Peer) and TPS with AfL through peer-assessment (TPS-AfL-Peer) viewed from self confidence for student's achievement in mathematics. The population of this research were all of Junior High School students 8th grade in Karanganyar Regency schools in academic year 2016/2017. Research samples obtained by stratified cluster random sampling. The data was collected by using methods of documentation, students' self confidence questionnaires, and mathematics achievement test. Data analysis technique used two way analysis of variance (ANOVA) with unequal cell. According to research result, it could be concluded that: (1) students' mathematics achievement which applied GI-AfL-Peer better than TPS-AfL-Peer, (2) mathematics achievement of students with high self confidence better than students' with medium and low self confidence, and mathematics achievement of students' with medium self confidence as good as students with low self confidence, (3) in each category of self confidence, students' mathematics achievement which applied GI-AfL-Peer better than TPS-AfL-Peer, (4) in each learning model, mathematics achievement of students with high self confidence better than students' with medium and low self confidence, and mathematics achievement of students' with medium self confidence as good as students with low self confidence.

Keywords: AfL, GI, peer-assessment, self confidence, students' mathematics achievement, TPS

Introduction

Science and technology are absolute requirements to increase the quality of human resources. Education is being the main means to organize and to create qualified human resources, both in formal institutions (school) or informal ones. The government has made a lot of efforts in order to enhance the quality of education in several ways including teacher's training, teacher's education qualification, curriculum renewal, and learning facilities allocation.

Moreover, one of subjects which has become the focus of quality education enhancement conducted by the government is mathematics. Mathematics is one of compulsory subjects in which the learning is undertaken from Elementary School to

Senior High School.

Education in fact has not been fully successful as expected. Many students are not able to absorb to the maximum the material presented by the teacher, one of them is on the level education Junior High School (JHS), in particular JHS in Karanganyar regency. Based on the National Bureau of Standards of Education, absorption of the results of the Nasional Exam on the students to ability “understand the operation form algebra, the concept of equations and inequalities linear, line equation, set, relation, function, system of linear equations, as well as its use in problem solving” is one of the absorption low, it was seen that the percentage in the Karanganyar regency (47,05%) was lower than the national level (57,28%). It shows the low results obtained students on such material, so required more research on the matter. In particular on relation and function. This is in mutual accord with the results of the study Dede dan Soybas (2011) state that, some of the students at each level have some difficulties in algebraic equations as in understanding the concept of function and determine the relationship between these equation and the concept of function.

The low mathematics achievement of students is caused by not only internal factor (self ability) but also external factor including the less effective and interesting learning process. Education practitioners, nowadays, tend to suggest applying learning process which follows cooperative learning model. Zakaria dan Iksan (2007: 35-39) state that “Cooperative learning is generally understood as learning that takes place in small groups where students share ideas and work collaboratively to complete a given task”. There are several types of cooperative learning that have been developed in learning process in schools. One of them is Group Investigation (GI) and Think Pair Share (TPS).

Knight and Bohlmeier in Okur and Doymus (2014: 110) assert that the group investigation technique was developed by Sharab and Sharan in 1989. in this technique, the class is divided into several groups that study in a different phase of a general issue. The study issue is then divided into working sections among the member of the groups, students pair up the information, arrangement, analysis, planning and integrate the data with the students in other groups. In this process, the teacher must be the leader of the class and ensure that students comprehend the explanations. GI learning model is also a learning which emphasizes the interaction collaboration among students in teams to conduct investigations, analyze data and make conclusions. each member of the group must contribute to the discussion so that the group is able to clarify and synthesize all the ideas.

Another type of cooperative learning is PS learning model. This learning model gives students chances to work independently and work cooperatively. According to Millis and Cattel in Kitaoka (2013), “In a think-pair-share activity, each student is asked individually to consider a problem first; then, students discuss the problem in pairs; finally each group develops a single answer”. Through those three main stages, it is expected that TPS learning model can make positive influences toward learning process.

In the process of learning by using two types of such, students can discuss with his friend to understand concepts studied, although with a technique or a different way. Based on these different techniques, teachers can observe the mathematics achievement of students based on those two types of learning model. Besides that, the researcher is interested to modify GI and TPS learning models with scoring process called Assessment for Learning (AfL) in order to optimize the applying of those learning models. Ronnie (2011: 95) explains that AfL has become an integral part from learning process in schools, and has found out the effective and efficient way to

give feedbacks. AfL can be carried out by giving training to students individually after doing discussion.

One way to actualize AfL is by doing peer-assessment. Assessment and feedback providing from the result of a student's work are done by other students. Thus, peer-assessment is able to give a deeper understanding about the subject material. Bostock (2005: 1) through his research expresses that both asserter and asserted students acquire numbers of benefit in positioning themselves as life-long leaning. Peer-assessment process encourages in creating student autonomy and higher level skills that can develop learning quality.

This research used GI and TPS learning models which are modified with AfL through peer-assessment. By this modification, students are expected to understand the material more deeply, be able to apply what they have learned during discussion, and also be able to give assessment to their mates with their knowledge.

Students' learning achievement is influenced by both internal and external factors. Learning model is one of external factors which influence the success of learning process. Besides that, students' learning achievement is also influenced by internal factor. Internal factor is a factor coming from the inside of students including self confidence.

Goel and Aggarwal (2012: 89) explain that "self confidence refers to a person's perceived ability to tackle situations successfully without learning on others and to have a positive self-evaluation. A self confidence person perceives himself to be socially competent, emotionally mature, intellectually, adequate, successful, satisfied, decisive, optimistic, independent, self reliant, self-assured, forward moving, fairly assertive and having leadership qualities."

The role of self confidence is to show the potentials in a person. Student's self confidence is needed in mathematics learning, both in learning by GI-AfL-peer and by TPS-AfL-peer. According to Hannula et al. (2004: 17), mathematics learning is influenced by mathematics related to students' certainty, particularly in self confidence. Students' self confidence is needed to find out and solve problems. Students with different level of self confidence in learning mathematics will result in different results.

The aims of research were to determine : (1) which had better learning achievement among students who taught by using learning model GI-AfL-peer or TPS-AfL-peer; (2) which had better learning achievement, students with self confidence of high, medium, or low; (3) at each of the self confidence level, which had better learning achievement among students who taught by using learning model GI-AfL-peer or TPS-AfL-peer; (4) at each of the learning model, which had better learning achievement, students with self confidence of high, medium, or low.

Finding and Discussion

Based on the observed problems, research type used in this research is quasi experimental research with factorial design 2x3 which is served in Table 1.

Table 1. *Research Design*

Learning Model	Self Confidence		
	High (b ₁)	Medium (b ₂)	Low (b ₃)
GI-AfL- peer (a ₁)	(ab) ₁₁	(ab) ₁₂	(ab) ₁₃
TPS-AfL-peer (a ₂)	(ab) ₂₁	(ab) ₂₂	(ab) ₂₃

The population of this research were all of Junior High School (JHS) students 8th grade in Karanganyar Regency in academic year 2016/2017. Research samples obtained by stratified cluster random sampling. After sampling process, it was obtained State JHS 1 Kebakkramat represented high group schools, State JHS 2 Jaten represented medium group schools, and State JHS 3 Gondangrejo represented low group schools.

The data was collected by using methods of documentation, students' self confidence questionnaires, and mathematics achievement test. Before performing the experiments, the normality test was performed, homogeneity test and balance test for the data of the initial ability of mathematics students used one way analysis of variance with unequal cell was also performed, as for the data of achievement learning mathematics analyzed used two way analysis of variance (ANOVA) with unequal cell after normality test and homogeneity test were first conducted. Normality test for data on initial ability and achievement data learning of mathematics was used the test of Liliefors and homogeneity test of variance of the population used the test of Bartlett. If the results of the ANOVA indicate that the null hypothesis was rejected, the done test. Post-anova used the Scheffe' method.

After normality test was taken, it was obtained samples from normal-distributed population. The result of homogeneity test was that the samples were from homogenous population. After that, equivalence test was taken, and it was obtained that samples on experiment group 1 and experiment group 2 were equal (having similar ability). Further test the research hypothesis. The average of each cells and marginal average served in Table 2.

Table 2. *Each Cells Average and Marginal Average*

Learning Model (A)	Self Confidence (B)			Marginal Average
	High (b_1)	Medium (b_2)	Low (b_3)	
GI-AfL- peer (a_1)	71,8333	66,0000	66,3784	67,5556
TPS-AfL-peer (a_2)	70,2857	61,3878	56,2105	62,9583
Marginal Average	71,0000	63,4023	62,9286	

The computation summary of two way analysis of variance with unequal cell is shown in Table 3.

Table 3. *Summary of Two Way Analysis of Variance with Unequal Cell*

Source	SS	df	MS	F_{obs}	F_{α}	Decision
Model (A)	1308,3516	1	1308,3516	7,7965	3,8911	H_{0A} rejected
Self. conf (B)	3049,9397	2	1524,9699	9,0873	3,0437	H_{0B} rejected
(A*B)	562,2455	2	281,1228	1,6752	3,0437	H_{0AB} accepted
Error	31716,5409	189	167,8124			
Total	36637,0777	194				

Based on Table 3, it can be concluded that (a) there are different mathematics achievements between students applied GI-AfL-peer and students applied TPS-AfL-peer, (b) there are different mathematics achievements among students with high self confidence, medium self confidence, and low self confidence, (c) there is no interactions between learning models and students' self confidence toward

mathematics achievement of students.

Based on the result of anava calculation, it can be determined that H_{0A} was rejected. It means that there were different mathematics achievements of students between the two learning models. Thus, by concerning on marginal average in Table 2, it can be concluded that GI-AfL-peer better than TPS-AfL-peer regarding the result of students' mathematics achievement.

Based on the calculation of anava, the H_{0B} was rejected. It means that there were different mathematics achievements of students in terms of self confidence level. Therefore, furthered anava test was needed to conduct by Scheffe method. The calculation of furthered anava inter-column average test is shown in Table 4.

Table 4. *Result of Inter-Column Average Multiple Comparison Test*

Comparison	F_{obs}	F_{α}	Decision of test
$\mu_1 = \mu_2$	11,1956	6,0874	H_0 rejected
$\mu_1 = \mu_3$	10,4675	6,0874	H_0 rejected
$\mu_2 = \mu_3$	0,0456	6,0874	H_0 accepted

Based on Table 4 and b concerning on Table 2, it was obtained that (a) mathematics achievement of students with high level of self confidence was better than students with medium level of self confidence, (b) mathematics achievement of students with high level of self confidence was better than students with low self confidence, (c) mathematics achievement of students with medium self confidence was as good as students with low self confidence.

Based on the calculation of anava, it was obtained that H_{0AB} was accepted, so there was no interaction between learning models and students' level of self confidence. Therefore, furthered anava inter-cell test was unnecessarily carried out. In each level of self confidence, the conclusion can be determined from the characteristics of its marginal average or inter-cell main effect. In each level of self confidence, GI-AfL-peer learning model provided mathematics learning achievement better than TPS-AfL-peer learning model. In each learning models, the conclusion can be determined from the characteristics of its marginal average or inter-column main effect. In each learning models, students with high confidence self of achievement learning mathematics better than students with medium and low confidence self, and students with medium and low self confidence achievement learning mathematics is equally well.

Conclusions

Based on the results of the research and data analysis from the research that had been conducted, it can be concluded that: (1) students' mathematics achievement which applied GI-AfL-Peer was better than TPS-AfL-Peer, (2) mathematics achievement of students with high self confidence was better than students with medium and low self confidence, and mathematics achievement of students with medium self confidence was as good as students with low self confidence, (3) in each category of self

confidence, students' mathematics achievement which applied GI-AfL-Peer was better than TPS-AfL-Peer, (4) in each learning model, mathematics achievement of students with high self confidence was better than students with medium and low self confidence, and mathematics achievement of students with medium self confidence was as good as students with low self confidence.

References

- Akcay, O. & Doymus, K. (2014). The Effect of Different methods of Cooperative Learning Model on Academic Achievement in Physics. *Journal of Turkish Science Education*, 11 (40), 17-30.
- Bostock., S. (2005). Student Peer Assessment. *Northern Illinois University*, 3 (3), 1-5.
- Dede, Y. & Soybas, D. (2011). Preservice Mathematics Teachers' Experiences about Function and Equation Concepts. *Eurasia Journal of Mathematics and Technology Education*, 7 (2). 89-102.
- Goel, M. & Aggarwal, P. (2012). A Comparative Study of Self Confidence of Single Child and Child with Sibling. *International Journal of Research in Social Sciences*, 2 (3), 89 – 98.
- Hannula, M. S., Maijala, H., & Pehkonen, E. (2004). Development of Understanding and Self-Confidence in Mathematics; Grade 5 – 8. *Proceedings of 28th Conference of international group for the Psychology of Mathematics Education*, 3, 17-24.
- Kitaoka, H. (2013). Teaching methods that Help Economics Students to be Effective Problem Solves. *International Journal of Arts and Commerce*, 2 (1), 101-110.
- Ronnie, A. (2011). Using a VLE to Enhance 'Assessment For Learning' Mathematics In School Sector. *International Journal of Managing Information Technology*, 3 (3), 93-103.
- Zakaria, E. & Iksan Z. (2007). Promoting Cooperative Learning in Science and Mathematic. *Eurasia Journal of Mathematic, Sciences & Technology Education*, 6 (2), 35-39.