

**IMPLEMENTATION OF PROBLEM BASED LEARNING MODEL (PBL)
AND DISCOVERY (DL) IN LEARNING MATHEMATICS VIEWED FROM
STUDENT ACTIVITY**



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PERNYATAAN

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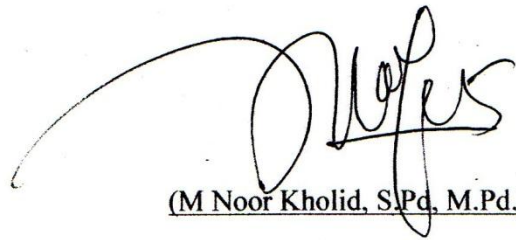
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IMPLEMENTATION OF PROBLEM BASED LEARNING MODEL (PBL) AND DISCOVERY (DL) IN LEARNING MATHEMATICS VIEWED FROM STUDENT ACTIVITY

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ABSTRACT

The purpose of this study was to determine: (1) The effect of using models of Problem Based Learning (PBL) and Discovery Learning (DL) on student achievement, (2) The effect of the activity on students achievement, (3) The interaction between learning models and activities on student achievement. The population in this study is all of the 7th Muhammadiyah 5th Surakarta Junior High School academic year 2014/2015. The sample's research consisted of two classes totaling 62 student. The sampling technique used random cluster sampling. Data collection techniques through tests, questionnaires, and documentation. Data were analyzed using two-way analysis of variance with different cells. The results obtained from the analysis of data with a significance level $\alpha = 5\%$ are: (1) Learning model affect on students achievement. (2) There is no effect in student's activities for student achievement. (3) There are interaction between learning model and activities on student achievement.

Key word: Problem Based Learning (PBL) model, Discovery Learning (DL) model, student's learning activeness

INTRODUCTION

Mathematics is one of the subject that considered to be difficult and scary for every learning process, especially when the students get the topic on the issues related to problem solving. Students tend to be passive and less active when receiving the subjects of Mathematics, it is difficult for teachers to develop students' analytical skills in receiving the material. One of the factor that determines the success of the learning process is a learning model. Now a days there are many teachers who embrace the old paradigm, a lot of teachers considers in learning process only transfer the knowledge from teacher to student.

Achievements is an assessment of education about the development and the progress of students with regard to mastery of learning materials that presented and

value (Harahap in Hamdani, 2011: 138). The low achievements of learning mathematics can be caused the students lack of disiplin in arranging time to study mathematics. The behavior of students who cannot manage the time to carry out learning activities suitable with the need, regulated, or expected. Using the effective and efficient time in learning is direct effect to the results of the study.

Learning model that can be applied to develop the achievement of learning mathematics is a model of learning Problem Based Learning (PBL) and Discovery Learning (DL). Model Problem Based Learning (PBL) is one of the learning models in association with contextual learning. In an effort to encourage creative thinking in mathematics used in a situation problem concept of matter in a situation of task. Model Problem Based Learning is a process or individual efforts to respond or address the impediments or obstacles when an answer is not obvious (Tatag Yuli, 2008:5-6).

While the Discovery Learning model (DL) M. Taher (2014: 9) defined as a learning process that occurs when learners are not presented with a lesson in its final form, but it is expected that learners are able to organize their own learning results themselves. Discovery Learning (DL) more emphasis on the discovery of the concept or principle which was previously unknown. In applying the model of learning by Discovery learning (DL) teachers act as mentors by giving the opportunity to the students to learn actively, as the opinions of teachers should be able to guide and direct the learning activity for learners suitable with the purpose.

Besides learning model, student activity also plays a role in the success of the learning process. In the learning activities of all knowledge is basically obtained from the student's own efforts, so that students activities in the learning process so treated.

For research results Abdelrahman Abdelrahman Mahmoud Kamel (2014) with the title of The Effect of Using Discovery Learning Strategy in Teaching grammatical Rules to First Year General Secondary Student Achievement and Their Developing on meta cognitive Skills, said that the discovery learning method learning succeeded in improving student learning outcomes. While the results of research conducted by Fatimah (2012) in the journal entitled "Communication Ability and Mathematical Problem Solving Through Problem Based Learning",

concluded that the problem solving ability of students to apply the model of Problem Based Learning (PBL) in learning Elementary Statistics better than the regular learning. Research results Nurul Waqidatun (2009) entitled increase student activity in learning mathematics through the approach of Take and Give, infer an increase in the activity of learning that can be seen from the activity of a given reading material, answering questions, move forward a class, do the problems and questions or ideas.

Based on the above line of thought, the hypothesis proposed in this study as follows: (1) There is the effect in using Problem Based Learning (PBL) model and Discovery Learning (DL) for students achievement in learning mathematics, (2) There is an effect of activity on students achievement in learning mathematics and (3) There is the interaction of using both learning models and activity on the students achievement in learning mathematics.

This study aims to determine the effect of using learning models and activities for the student achievement. The hypothesis in this study are as follows: (1) There is the effect in using Problem Based Learning (PBL) model and Discovery Learning (DL) for students achievement in learning mathematics, (2) There is an effect of activity on students achievement in learning mathematics and (3) There is the interaction of using both learning models and activity on the students achievement in learning mathematics.

RESEARCH METHODS

The research that conducted an experimental research, namely the research done on the purpose to seek the emergence of variables, in this case is the application of Problem Based Learning (PBL) and Discovery Learning (DL) model in terms of student activity, to further is controlled and observed its influence in learning outcomes of Mathematics. Implementation of the experiments in this study is using two groups namely using Problem Based Learning (PBL) and using Discovery Learning (DL) model.

In this study the samples were taken by probability sampling techniques (cluster random sampling technique), where the population is divided into several groups based on area or specific groups (clusters) and finally taken entirely at random as samples. Thus, each subject received the same opportunity to be sampled. Before

given treatment, test the balance between the experimental class and the control class. This test is performed to determine whether the two classes of experimental classes and control classes have a balanced state or not, in other words to determine whether there are significant differences in average that mean both sample are same or not. And the normality test with significance level of 5% and a homogeneity test with significance level of 5% between the experimental class with the control class.

The differences of achievement results in activity of student are known through the test method in evaluating the success of Problem Based Learning (PBL) and Discovery Learning (DL) model on student achievement. While the questionnaire method is used to determine how much influence the level of student activity in learning mathematics on student achievement. But earlier, about the test and questionnaire items should be tested whether it is feasible to use in research. The test used is a test of validity and reliability and questionnaire item. To determine the validity of each item in strument used Product Moment correlation formula and while the reliability of the test used to determine the alpha formula

In addition, methods of documentation used to determine the involvement of students' attendance is study. In improving student achievement Problem Based Learning (PBL) and Discovery Learning (DL) model is recommended as an alternative to the teacher in the classroom.

The technique of analysis data used in this study is a statistical technique to test variance analysis of two paths. Before doing the analysis of variance, previously prerequisite analysis of variance, namely: (1) test for normality is intended to determine whether the samples come from populations with normal distribution or not, then one of the normality test is Liliefors test. (2) Test of homogeneity of variance is a test to determine whether the study of population has the same variance. This test using Bartlett method with statistic test Chi square.

RESULTS AND DISCUSSION

Based on the results of balance test known that the experimental class and control class have the same ability. Normality test results showed that each sample comes from a normal distributed population. Homogeneity test results also showed that the population has had a homogeneous variance.

After the test prerequisites are fulfilled, tested the hypothesis using two ways variance analysis with different cell with significance level of 5%. As for the results two-way analysis of variance calculation with different cell presented in the following table.

Table1
Results of Two-Way Analysis of Variance with different Cell

Variance Source	JK	dk	RK	F	F_{tabel}	Diction H_0
Learning Model (A)	1648.01	1	1648.01	20.82	4.00	H_0 Rejected
Activeness (B)	408.52	2	204.26	2.58	3.15	H_0 Accepted
Interaction (AB)	518.6	2	259.3	3.28	3.15	H_0 Rejected
Error	4431.88	56	79.14	-	-	-
Total	7007	61	-	-	-	-

Based on the calculation of variance analysis of two different cell with significance level of 5% was obtained $F_A = 20,82 > F_{table} = 4,00$, then H_{0A} rejected. This shows that there are significant learning model Problem Based Learning (PBL) and Discovery Learning (DL) on the subject of mathematics achievement triangle.

Tatang Herman (2007: 52) states that learning model Problem Based Learning (PBL) is open and Problem Based Learning (PBL) is structured are significantly better in improving the ability to think mathematically high level of student learning than the conventional (regular). Other factors that cause learning achievement of students by learning with a model Problem Based Learning (PBL), namely: learning model Problem Based Learning (PBL) is designed to help students develop the skills to think and solve problems. Thus, the teacher's role is as a giver of problems, facilitating the investigation and dialogue, as well as to motivate students in learning (Sugiman, 2006: 7).

According Hayyu (2014) increase in student test results completeness classic more than 75% and a score of solving the problem of students included in the category of "GOOD". With the application of learning methods of problem based

learning can improve student learning outcomes Muhammadiyah 1th Malang Junior High School. Learning mathematics using discovery learning method goes according to plan has been designed and made students become more active and better understand the material being taught. (Prysta, 2013)

Based on the analysis above it can be concluded that there are significant differences in academic achievement between students who are subject to a learning model Problem Based Learning (PBL) and students who are subject to a learning model of Discovery Learning (DL). In the use of the learning model Problem Based Learning (PBL), students can more easily understand the material being taught.

Further interpretation of the results in Table 1 indicate that H_{0B} accepted because $F_B = 2.58 < F_{table} = 3.15$. This shows that there is no influence students' activity (High, Medium, Low) to mathematics learning achievement subject triangle, it is necessary to further test the post anava.

According Marina (2012: 2) states that the activity of students in learning is one of the factors that influence the success of student learning. The low activity of students is less attractive math teacher in providing the material so as to make students become bored with math, less provide opportunities for students to participate actively, monotonous delivery of content and the dominance of the teacher in the learning process is still high. As a result, the activity is less than optimal study mathematics and learn the behavior of others as pleasant class atmosphere in the learning of mathematics is hardly visible, so the learning achievement of students is less.

Dwi and Iswahyudi (2012: 329) says that by looking at the weak point that occurs in a minority of students regarding the basic concepts of exponents we need to hold a fundamental explanation on students who experience barriers by utilizing the friends who have understood the basic concept of the exponent to explain. The need to be activated expert group discussions and group of origin so that students better understand the material covered.

Next interpretation of the results in Table 1 indicate that H_{0AB} rejected, because $F_{AB} = 3.82 > F_{table} = 3.15$, it is necessary to further test the post anava. To perform

further tests sought beforehand mean marginal and average each cell. The results of the calculation of the average of the researchers data presented in Table 2 as follows.

Table2
Summary of Comparisons the Double Cell

Comparisons	H_0	F_{obs}	$5F_{0.05;5,56}$	Diction
First	$\mu_{11} = \mu_{21}$	1,76	(5)(2,37) = 11,85	Accepted
	$\mu_{12} = \mu_{22}$	18,9	(5)(2,37) = 11,85	Rejected
	$\mu_{13} = \mu_{23}$	4,08	(5)(2,37) = 11,85	Accepted
Second	$\mu_{11} = \mu_{12}$	9,67	(5)(2,37) = 11,85	Accepted
	$\mu_{12} = \mu_{13}$	5,79	(5)(2,37) = 11,85	Accepted
	$\mu_{11} = \mu_{13}$	0,61	(5)(2,37) = 11,85	Accepted
Third	$\mu_{21} = \mu_{22}$	0,04	(5)(2,37) = 11,85	Accepted
	$\mu_{22} = \mu_{23}$	0,02	(5)(2,37) = 11,85	Accepted
	$\mu_{21} = \mu_{23}$	0,0017	(5)(2,37) = 11,85	Accepted

From table 2 can be described as follows: (1) The first comparison comparing the two learning models at level of activeness (high, medium, and low). The Problem Based Learning (PBL) model and Discovery Learning (DL) model it is different results if imposed on students who have medium activeness, but not so the results when given to those with high and low activeness. By looking at the average of each can be concluded that the Problem Based Learning (PBL) model is more effective than the Discovery Learning (DL) model, only if it is given to students who have medium activeness, (2) The second comparison comparing the level of activeness (high, medium, and low) on the model of Problem Based Learning (PBL). For students who are given Problem Based Learning (PBL) model, each different levels of students' activeness get the same average achievement. Research results Armin Hary (2011) where there are differences in student achievement in creativity moderate or low. Based on conditions in the field, students still confused and difficulty in answering the question on the questionnaire. and (3) third Comparison compare the activity levels high, medium, and low on the Discovery Learning (DL) model. For students who were given a lesson by Discovery Learning (DL) model,

each of the different levels of active students get average achievement is no different. and (3) The third comparison comparing the level activity (high, medium, and low) on the Discovery Learning (DL) model. For students who are given a lesson by Discovery Learning (DL) model, each different levels of students' activeness get the same average achievement.

Table3
Averages Ability and Activeness Student Achievement

Class	ActivenessStudent			Total
	High	Medium	Low	
PBL	58.46	71.43	61.25	63.71
DL	53.50	52.73	53.33	53.19
Total	37.32	41.39	38.19	

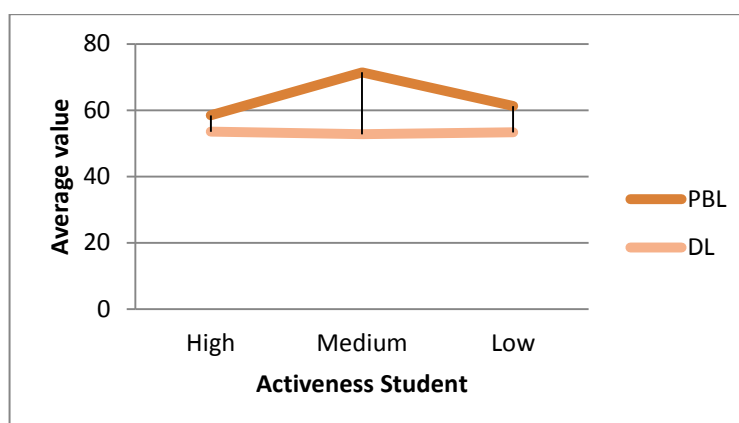


Figure1

Graph Histogram Averages Ability and Activeness Student Achievement

Students are given instruction by using Problem Based Learning (PBL) model as well as students who are given teaching Discovery Learning (DL) model has the same good achievement for each category of mathematics learning activeness of high, medium and low. Students who have studied high activeness have better achievement than students who have studied the activity of both medium and low student to teaching using Problem Based Learning (PBL) model and Discovery Learning (DL) model. Thus it can be concluded that for students who were given a lesson by Problem Based Learning (PBL) model, students who have a high level of

activity of obtaining the average learning achievement better than the average of the same student achievement and for students who are given Discovery Learning (DL) model, students who have a high level of activity of the average gain better learning achievement compared with the average student achievement is the same.

The interaction between the model of learning by learning activeness possibly because students have the activeness in participating in activities to learn mathematics and serious in doing their jobs. In accordance with the opinion of Melvin L. Silberman (2009: 23) active learning is the learning process that includes aspects of hearing, seeing discuss, implement and teach it to others.

CONCLUSION

Based on the results of the data analysis and discussion that has been done in the previous chapter with a significance level of 5%, this can be concluded that: (1) There is a learning model influence on student achievement. Problem Based Learning (PBL) model is better than Discovery Learning (DL) model, (2) There is no effect in student's activities for student achievement. (3) There is a learning model of interaction and activeness on student achievement, then the comparison between learning model Problem Based Learning (PBL) and Discovery Learning (DL). By looking at average respective have concluded that the Problem Based Learning (PBL) model and the activity is more effective than Discovery Learning (DL) model, only if it is given to students who have moderate activeness.

BIBLIOGRAPHY

Armin Hary. 2011. *Efektifitas Pembelajaran Matematika Menggunakan Pendekatan Quantum Learning dan Pendekatan Contextual Teaching and Learning pada Pokok Bahasan Statistika ditinjau dari Kreativitas Belajar Peserta Didik SMA di Kota Palangkaraya*. Tesis S2. Tidak dipublikasikan. Program Pascasarjana UNS. Surakarta.

- Fatimah, Fatia. 2012. "Kemampuan Komunikasi Matematis dan Pemecahan Masalah Melalui Problem Based Learning", *Jurnal Penelitian dan Evaluasi Pendidikan*/Vol. 16, No. 1.
- Hamdani. 2011. *Strategi Belajar Mengajar*. Bandung: Pustaka Setia.
- Hayyu, Fadillah Nur. 2014. *Peningkatan Hasil Belajar Matematika Melalui Metode Problem Based Learning*. Jurnal Penelitian Pendidikan, Volume 1, Nomor 1, Juni 2014, htm. 33-39.
- Herman, T. (2006). *Pembelajaran Berbasis Masalah untuk Meningkatkan Kemampuan Berpikir Matematis Tingkat Tinggi Siswa SMP*. Bandung: Universitas Pendidikan Indonesia.
- Herman, Tatang. 2007. *Pembelajaran Berbasis Masalah untuk Meningkatkan Kemampuan Berpikir Matematis Tingkat Tinggi Siswa Sekolah Menengah Pertama*. Educationist No. I Vol. I Januari 2007, ISSN 1907-8838.
- Iswahyudi. 2012. *Meningkatkan Hasil Belajar Matematika Siswa Melalui Metode Pembelajaran Jigsaw Berbantuan CD Pembelajaran Materi Ekponen*. Jurnal ISBN: 978-602-18809-0-6.
- Mahmoud, Abdelrahman Kamel Abdelrahman. 2014. "The Effect of Using Discovery learning Strategy in Teaching Grammatical Rules to First Year General Secondary Student on Developing Their Achievement and Metacognitive Skills". International Journal of Innovation and Scientific Research ISSN 2351-8014 Vol. 5 No. 2 Jul. 2014, pp. 146-153. Egypt: Fayoum University.
- Marina, Putriyanti. *Peningkatkan Keaktifan dan Prestasi Belajar Matematika Melalui Penerapan Pendekatan Open Ended*. E-jurnal Dinas Pendidikan Kota Surabaya ISSN: 2337-3253 Volume 6.
- Prysta, Widhiyani. 2013. *Pembelajaran Matematika Melalui Metode Discovery Learning Untuk Meningkatkan Aktivitas dan Hasil Belajar Siswa*. Skripsi
- Taher M. 2014. *Implementasi Model Pembelajaran yang Relevan dengan Pendekatan Ilmiah pada Kurikulum 2013*. (<http://sumul.kemenag.go.id/>).