Daya Matematis : Jurnal Inovasi Pendidikan Matematika
Volume, 10 Nomor 1 March 2022 Hal. 25-31
p-ISSN:2541-4232 dan e-ISSN: 2354-7146

COMPARISON OF THE PROBLEM BASED LEARNING (PBL) MODEL WITH THE DISCOVERY-INQUIRY FOR THE STUDENT MATHEMATICS LEARNING MODEL AT SMPN 3 SINJAI

Latri Aras[1], Ramlan Mahmud[2] Nurlalela latif[3]
[1] Universitas Negeri Makassar
Email: latriaras@gmail.com
[2] Pendidikan Matematika, STKIP YPUP Makassar
Email: ramlan.mm@unm.ac.id
[2] Universitas Negeri Makassar
Email:nurlaelalatif@gmail.com

(***Received***:10-1-2022; ***Reviewed:*** 12-1-2022; ***Revised:*** 23-02-2022; ***Accepted:*** 24-02-2022; ***Published:*** 12-03-2022)

Abstract
This research is to find out the comparism of the Problem Based Learning (PBL) model with the Discovery-Inquiry model on the 7th grade students of SMP Negeri 3 Sinjai year 2020/2021. This research used two classes chosen by Purposive Sampling technique. Both classes were given different treatments with the same material, that was One Variable Linear Equations. To obtain the data, the researcher used a test which had been tested through validity test and reliability test. After that, the data were analyzed with normality test, homogeneity test, and hypothesis test (Independent Sample T-Test). The result of this research indicated that there are some differences in the learning result using the Problem Based Learning (PBL) model and the Discovery-Inquiry model on the 7th grade students of SMP Negeri 3 Sinjai year 2020/2021The average grades of the class using the Problem Based Learning model was higher than the Discovery-Inquiry model. This result indicates that the Problem Based Learning model is better than the Discovery-Inquiry model.

Keywords: Learning Result; Problem Based Learning (PBL); Discovery-Inquiry; Purposive Sampling Technique

INTRODUCTION

Mathematics is eye existing lessons in level education base up to college high. Not only just count numbers , math originated from different ideas about math, depends from experience , knowledge of each and what happened in his life everyday . According to Fanu in (Agustin, 2014), the required elements in study mathematics is ability identify sequences, abilities use symbols, abstract, ability arithmetic, spatial ability, ability use logic , and *short term and long term memory*. Learning mathematics is a process of giving experience study about mathematics to student through activity planned by the teacher (Winarso & Dewi, 2017). Through learning mathematics , teacher as facilitator must capable help student in find your own idea for complete various problem mathematics he studied . Study mathematics this aim for push students to be able solve various problem mathematics based on a rational , logical process as well as critical thinking (Burton, 2012). However most facts on the ground , students think that study mathematics is one scary thing and inclined avoid it , even they looking at mathematics is one eye the most complicated lesson (Ristanty , Dinnullah, & Farida, 2017). Student often get difficulty in dominate the problem that exists in math . Not

only that course , learning conventional and less interactive cause many student not enough interested and passive for study math .

One teacher 's efforts to resolve problem in learning mathematics this that is with apply a learning model that involves student for active in learning math. Learning model is something the design in it describe a learning process that can implemented by the teacher in transfer knowledge nor values to students (Suprihatiningrum, 2016). learning model _ play a role important to success activity study teach . So, teachers are required for capable select and develop learning models mathematics in accordance with destination wanted learning _ achieved , as well capable increase results study students . Learning models that can direct student for active in get knowledge alone including learning models *Problem Based Learning* (PBL) and learning models *Discovery-Inquiry* .

Problem Based Learning (PBL) is a learning model that allows student good by individual nor group active seek , dig and find draft as well as principle by holistic and trying blend a number of tree discussion (Sugiyanto, 2010). Learning model *Problem Based Learning* (PBL) can interpreted as Suite activity emphasizing learning to the completion process problem faced by scientific (Sanjaya, 2008). As for the problems that are presented to student must authentic , relevant , and meaningful in life students . Applying the *Problem Based Learning* (PBL) model will get a number of advantages , including blend Theory so that understanding more comprehensive , teach Skills solve problem (Anitah, 2009). *Problem Based Learning* (PBL) is designed for help student develop Skills think and solve problem , study adult role with experience it through situation real , and be independent (Arends, 2013)learner.

Learning models *Discovery Inquiry* is method learning that combines learning models *discovery* and *inquiry*. Discovery learning involves student active through concepts and principles , and teachers encourage student for get experience with To do possible activities _ they find concepts and principles for self they alone (Suprijono, 2011). Learning model ideas *discovery* appears from desire for give pleasure to student in " find " something by them alone , with follow traces of scientists . Student will feel happy in follow learning , because awaken curiosity and motivate student for work Keep going until find answer. inside student *discovery* pushed for study alone by independent . Besides that , *discovery* has advantages including helping student for fix and improve cognitive skills and processes (Ilahi, 2012). The knowledge gained is very personal and powerful because strengthen understanding , memory , and transfer (Melani, Harlita, & Sugiharto, 2012). Meanwhile , Inquiry is expansion from the *discovery* process where In the *inquiry* process there are more processes tall levels , such as formulation problem, design experiment , implementation experimentation, data collection , data analysis and withdrawal conclusion . In inquiry learning , students To do investigation on the problem real by active characterized with activity like examination, exploration and investigation (McBride, et al., 2004). Furthermore , the *Discovery-Inquiry model* is a learning model where student get his knowledge alone through observation , experiment and solving problem . Steps in the learning model *discovery-inquiry* is stimulation *(stimulation),* formulation problem *(problem statement),* data collection *(data collection),* data analysis *(data processing)* , verification *(verification)* , and generalization *(generalization)* (Nugraha , Kirana, and Saepuzaman , 2014) .

Using the right learning model will support the learning process students , improve activity and interaction Among students and teachers as well as between student that . Election method appropriate learning is very influential in create atmosphere class for more

meaningful (*meaningful learning*) so that grow interests and students more active in class . This thing naturally will give influence on results learn more maximum

METHODS

Study this is study with approach quantitative . While , Type research used is experiment quasi -experimental (*quasi-experimental*). Study held at SMP Negeri 3 Sinjai year 2020/2021 school. Population in study this is whole student class VII at SMPN 3 Sinjai totaled 290 grouped by parallel with total 9 classes . Sample used taken from population with technique *purposive sampling,* so that obtained class VII-B as class Experiment 1 given Treatment of *Problem Based Learning* (PBL) and VII-C models as class Experiment 2 given *Discovery-Inquiry* model treatment. There is two variable in study this that is variable independent and variable tied. Variable free in study this are the *Problem Based Learning* (PBL) model and the *Discovery-Inquiry model* . Whereas variable tied up is results study. Instruments used in study this is tests and documentation . Test in study this conducted in 2 stages that is at the beginning learning (*pretest*) is given for knowing results learning owned student before treatment and at the end learning (*posttest*) is given for knowing results study student after treatment . Before given to sample more formerly validity and reliability tests were carried out . Validation instrument results study mathematics carried out by 2 validators consisting of from expert learning and expert material . Question the test already validated by the validator later tested to students outside class research . For count validity item question use formula correlation *product moment* and reliability test use *Alpha Cronbach.*

The analysis technique performed namely hypothesis testing using the *Independent Sample T-Test test.* Before test analysis done, sample must pre-requisite test namely normality test and homogeneity test. Normality test using the *Kolmogorov-Smirnov* test and homogeneity test using *Levene* 's test *with* significance of 0.05 .Instruments used _ in study this is test among others as following :

a. Pretest

For collect the necessary data in study this used technique *pretest. Pretest* given for knowing results learning owned _ student before given treatment . Form question *pretest* that is a description of 4 items matter .

b. Posttest

Posttest given for knowing results learning owned _ student after given treatment . Test results given _ class experiment 1 after use *Problem Based Learning* (PBL) and class experiment 2 after using the *Discovery-Inquiry model* which will analyzed . Form question *posttest* that is a description of 4 items matter .

Temporary data analysis on research this include :

Normality Test

Normality test is a statistical test used for knowing is a data normally distributed or no . Normality test in study this use statistics *Kolmogorov-Smirnov* at level significance (α = 5% or = 0.05) with *IBM SPSS Statistics 22* program help . Hypothesis for normality test is as following :

Ho: sample originated from normally distributed population .

Ha: sample originated from population that does not normally distributed .

As for the base taking decision a data normally distributed or no , if score significance (sig.) > 0.05 then Ho is not rejected and if score significance (sig.) < 0.05 then then Ho is rejected (Priyatno, 2012).

Homogeneity Test

Test this used for test is sample study this originated from homogeneous population _ or no . Homogeneity test in study this use *Levene's test* on level significance (α = 5% or = 0.05) with *IBM SPSS Statistics 22* program help . Hypothesis for homogeneity test is as following :
Ho: variance on each group the same (homogeneous).
Ha: variance on each group no same (no homogeneous).
-up basis the decision of the data homogeneous or no is if score significance (sig.) > 0.05 then Ho is not rejected and if score significance (sig.) < 0.05 then then Ho is rejected (Priyatno, 2012).

Hypothesis Test
Test the hypothesis on research this used for knowing difference results study using the learning model *Problem Based Learning* (PBL) and *Discovery-Inquiry* for students Class VII at SMPN 3 Sinjai Year Teachings 2020/2021. In test hypothesis study use *IBM SPSS Statistics 22* and engineering analysis used *Independent* Test _ *Sample T-Test* .

The hypothesis that will tested on results study student is as following :

Ha: There is a difference results study using the learning model *Problem Based Learning* (PBL) and *Discovery-Inquiry* for students Class VII at SMPN 3 Sinjai Year Teachings 2020/2021.

Ho: No there is difference results study using the learning model *Problem Based Learning* (PBL) and *Discovery-Inquiry* for students Class VII at SMPN 3 Sinjai Year Teachings 2020/2021

Meanwhile , the criteria testing hypothesis namely :

If the significance is <0.05, then Ha is not rejected .
If the significance is > 0.05, then Ha is rejected .

RESULT AND DISCUSSION
Result
Learning model math in class Experiment 1 is given a learning model *Problem Based Learning* (PBL). The steps of the *Problem Based Learning* (PBL) model are 1) Provide orientation about problem to students , 2) Organizing student for researching (learning), 3) Helping investigation / guiding investigation individual/group , 4) Develop and present results works , 5) Analyzing and evaluating the process of overcoming (solving) problems . Theory learning used _ that is One Variable Linear Equation (PLSV). Lessons done _ with discussion group . Each group given a problem that will solved by together by each group . After discussion group , representative group present results discussion ahead _ class . Stage end in the learning model *Problem Based Learning* (PBL) is evaluation. At stage this is the teacher discussing what have represented by representatives group and give Theory strengthening about One Variable Linear Equation (PLSV) solution .

Learning model math in class Experiment 2 is given the *Discovery-Inquiry model* . The steps of the *Discovery-Inquiry* model are 1) *Stimulation* (stimulation), 2) *Problem statement* (identification) problem), 3) *Data collection* (data collection), 4) *Verifi - cation* (evidence), 5) *Generalization* (interesting conclusion). Lessons done with discussion group. Student will involved direct in the process of discussion that will cause student active in learning so that learning will more effective. After discussion group, representative group present results discussion ahead class. Then the teacher guides student for formulate conclusion together with give related questions about material that has been studied that is One Variable Linear Equation (PLSV).

Test results study conducted twice, namely at the beginning learning (*pretest*) before treatment and at the end learning (*posttest*) after treatment . Form question *pretest* and *posttest* are descriptions , each of which consists of of 4 items related questions with Theory One Variable Linear Equation (PLSV). Question test must tested try more formerly before given to sample . Researcher conduct validity and reliability tests for knowing quality question test. Instrument validator consist from two lecturer expert from the Mathematics Education Program , Kanjuruhan University , Malang. Researcher has revise instrument based on the advice given lecturer expert . After conducted validation by lecturer expert , question the test already declared valid by the validator then tested to 11 students outside class research .Test results question test the analyzed use help *IBM SPSS Statistics 22* for knowing validity and reliability from every item matter . From the validity test , 4 items question declared valid and can used . Likewise with reliability test , 4 items question declared reliable .After analysis test performed item questions that state valid and reliable , then researcher To do data collection or research . From research that has conducted obtained score results study students on both class to be analyzed . Analysis concerning the normality test , homogeneity test , and hypothesis testing .

Normality test in research this using the *Kolmogorov-Smirnov* test with level 0.05 significance .Class *pretest* scores Experiment 1 has significance 0,109 and class Experiment 2 has significance 0,183. From the two calculation results, it can be seen that the significance value of > 0,05. While on the *posttest* for class Experiment 1 has significance 0,200and the experimental class 2 has a significance 0,096. From the two calculation results, it can be seen that the significance value > 0,05for each class is found that Ho is not rejected which means sample originated from normally distributed population . This thing in line with Trihendradi (2010: 84) that the data is normally distributed if score significance > 0,05. Thus, it can be seen that the data is normally distributed. Next homogeneity test was carried out use *Levene's test* on the value of *pretest,* obtained that score significance 0,397, where 0,397 > 0,05. This thing in line with (Trihendradi, 2010) that the data has homogeneous variance _ if score significance > 0,05. So that could concluded that Ho is not rejected sample data originated from population that has homogeneous variance _ because score significance > 0,05.

After To do testing normality and homogeneity , can concluded that second sample that is class VII-B as class experiment 1 and class VII-C as class Experiment 2 is normally distributed and homogeneous . Hypothesis test conducted for knowing there is whether or not difference learning model *Problem Based Learning* (PBL) and learning models *Discovery-Inquiry* to results study student using *Independent* test *Sample T-Test* with help *IBM SPSS Statistics 22* . Hypothesis test results *pretest* shows that no there is a difference results study on both class .

Table 2. Hypothesis Test Results *Pretest*

Source	Sig.	Results	Decision
Yield value study	0.856	0,856 > 0,05	Ha rejected

In table 2 it is obtained that score significance > 0,05, that is, 0,856 > 0,05so that it can be stated that Ho no rejected and Ha rejected . This thing could interpreted that no there is difference results study using the learning model *Problem Based Learning* (PBL) and

Discovery-Inquiry for students class VII at SMPN 3 Sinjai Year Teachings 2020/2021 school .Temporary the results of hypothesis testing on the *posttest* given in the table following this .

Table 3. Hypothesis Test Results *Posttest*

Source	Sig.	Results	Decision
Yield value study	0.013	0,013 < 0,05	Ha no rejected

In table 3 , we get that score significance < 0,05, that is, 0,013 < 0,05so that it can be stated that Ho rejected and Ha no rejected . This thing could interpreted that there is difference results study using the learning model *Problem Based Learning* (PBL) and *Discovery-Inquiry* for students class VII at SMPN 3 Sinjai year Teachings 2020/2021school . Based on the hypothesis test carried out on the pretest and posttest , it was obtained that before given treatment second class no there is difference results study and after given treatment there is difference results study on both class that .

Besides that , before given average treatment on both class no there is significant difference . Study results class *pretest* experiment 1 that is 58,935, while the experimental class 2 is 59,484. After being given the treatment, both classes were given a *posttest* for see results study students . Based on results *posttest* obtained average results study class experiment 1 that is 79,839, while the experimental class 2 is 71,613. The histogram graph of the average grades of student learning outcomes using the learning model *Problem Based Learning* (PBL) and *Discovery-Inquiry* are as following .

Research results this in line with study previously done by (Nurfeni, 2014) got conclusion that more use of *Problem Based Learning* (PBL) models take effect to results study student compared with *Problem Posing* and methods lecture . This thing showed with class average result with the *Problem Based Learning* (PBL) model, namely: 80,31, the class with the *Problem Posing model* is 75,08 and class with method lecture that is 71,80.In addition, from the research results(Pranoto, Harlita, & Santoso, 2017) there is difference liveliness students on the application of *Problem Based Learning* (PBL) and *Discovery Learning* models . Average value of activity students in class experiment 1 with the application of the *Problem Based Learning* (PBL) model is more tall compared class experiment 2 which applies the *Discovery Learning* model . This thing in accordance with statement (Darsono, 2007) that from a number of influencing factors results study students, one of them is liveliness students Based on results research and supported by research previously so obtained that results study from application of learning models *Problem Based Learning* (PBL) more superior compared with application of learning models *Discovery-Inquiry.*

CONCLUSIONS AND SUGGESTIONS

Based on results and discussion research presented before, the conclusions that can be taken among others:

1. Hypothesis testing of the posttest results data carried out after activity learning using *Problem Based Learning* (PBL) and *Discovery-Inquiry* models obtained score significance < 0.05 that is 0.013 <0.05 which can be interpreted that there is difference Among students

studying _ with a learning model and students who learn with the model against results study student class VII at SMPN 3 Sinjai Year Teachings 2020/2021

2. Learning model *Problem Based Learning* (PBL) more good compared with learning model *Discovery-Inquiry.* That thing could seen in the calculation of the average results study student Among second class . Average yield study mathematics students who are given a learning model *Problem Based Learning* (PBL), namely 79,839, higher 8,226than the average mathematics learning outcomes of students who were given the *Discovery-Inquiry learning model* that is 71,613.

REFFERENCE

Agustin, M. 2014. *Learning Problems and Learning Innovation.* Bandung: PT. Refika Aditama.

Anitah, WS 2009. *Learning Strategies in Elementary School.* Jakarta: Open University.

Arends, RI 2013. *Learning to Teach.* Jogjakarta : Humanika Salemba.

Burton, L. 2012. *Learning mathematics: From hierarchies to networks.* London: Routledge.

Darsono, M. 2007. *Learning and Learning.* Semarang: Ikip Semarang.

Divine, MT 2012. *Discovery-Inquiry Learning Strategy and Mental Vocational Skills.* Yogyakarta: Diva Press.

McBride, JW, et al . 2004. Using an inquiry approach to teach science to secondary school science teachers. *Physics Education Journal* . 39(5):434- 439.

Melani, R., Harlita, & Sugiharto, B. 2012. The Effect of Guide Discovery-Inquiry Method on Scientific Attitudes and Biological Cognitive Learning Outcomes of Students at SMA Negeri 7 Surakarta in the 2011/2012 Academic Year. *Journal of Biological Education.* 4 (1):97-105.

Nugraha , MG, KH Kirana, and D. Saepuzaman . 2014. Effectiveness of Learning Model Discoveryinquiry For Increase Skills Think Rational Student . *PROCEDURE OF THE NATIONAL PHYSICS SEMINAR (E- JOURNAL) SNF2014* . Vol. 3:43-47

Nurfeni, RA 2014. *Differences in Problem Based Learning (PBL) and Problem Posing Models in terms of Learning Outcomes of Biology VIII SMP Negeri 3 Colomadu Karanganyar 2013/2014 Academic Year. Thesis.* Semarang: Faculty of Teacher Training and Education UMS.

Pranoto, Harlita, & Santoso, S. 2017. Comparison of Problem Based Learning (PBL) and Guided Discovery-Inquiry Models on the Activity of Class X High School Students. *BIOEDUCATION.* 10 (1):18-22.

Priyatno, D. 2012. *The Fast Way to Learn Data Analysis with SPSS 20.* Yogyakarta: ANDI.

Ristanty, E., Dinnullah, RN, & Farida, N. 2017. Application of the Guided Inquiry Learning Model on Quadrilateral and Triangle Materials on Understanding Mathematical Concepts at Soerjo Alam Islamic Junior High School. *Pi:Mathematics Education Journal.* 1 (1):8-14.

Sanjaya, W. 2008. *Educational Process Standard Oriented Learning Strategy.* Jakarta: Prenada Media Group.

Suprihatiningrum, J. 2016. *Learning Strategies.* Yogyakarta: Ar-ruzz Media.