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The Use of *Probing Prompting Learning* (PPL) and *Inside Outside Circle* (IOC) Model to Learning Outcome of Plane Figure Material

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Abstract

This study aims to discover: (1) the difference of the learning outcomes of plane (geometry) material between the use of Probing Prompting Learning (PPL) model and Inside Outside Circle (IOC) model; (2) the difference of the learning outcomes of plane figure material between students with high prior knowledge and students with low prior knowledge; (3) the influence of the interaction between the models and students' prior knowledge towards the learning outcomes of plane figure material. This study uses true experimental design as the research design. The population of the study consists of students from two elementary school in Surabaya in total of 134 students. The instruments used in this study are the prior knowledge test and the learning result test. The data analysis method used to test and to verify the hypotheses was two-way ANOVA test. The result of the study indicates that: (1) there is a difference in the learning outcomes of plane figure material between the PPL model and the IOC model; (2) there is a difference in the learning outcomes of plane figure material for students with high prior knowledge and low prior knowledge; (3) there is a correlation between the model and prior knowledge towards the learning outcomes of plane figure material.

Keywords:
Learning outcomes
Plane figure
Prior knowledge
PPL model
IOC model
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1. Introduction

Education has always been regarded as one of the benchmarks in discovering whether a country is developing for the quality of a country's education and is determined by the quality of its human resources. It can be said that the purpose of education is only achieved when the human resources of a country is of high quality. Indonesia is regarded as one of the countries which have low education quality that is caused by several factors. This can be inferred from a study by Nurcahyanti (2011) which states that the biggest factors which make the education quality in Indonesia low is that the way the education is administered which is not effectively conceived. The teaching in Indonesia is also of less efficiency which is caused by the fact that the implementation of learning in Indonesia prioritizes the results over the process which in turn renders the standardization of education instability. Thus, it takes several factors to improve the quality of education. One of which is the quality of the teachers since learning is, in essence, a process of interaction between teachers and students. Teachers have a very significant role for their job is to organize how the learning is implemented in order for the learning process to be interesting and innovative. One way is by using a learning model that can stimulate the students to actively engage in the learning process. The selection of the learning model should be adjusted to the needs and characteristics of the learning materials. Moreover, the use of the

learning model must be in line with the flow of modern learning in keeping with the advancement of technology of information and communication. In choosing a model, we must also prioritize the notion of constructivism in which students' activeness is vital in developing their ability to build knowledge. This constructivism learning is suitable to be implemented in learning mathematics because learning mathematics in school not only is intended so that students are skilled in using mathematics but to also provide experiences to students with the emphasis on logical reasoning in the application of mathematics in everyday life. According to Sa'dijah (2006) thesis and journal reports show that the constructivism learning approach has the potential to develop students' math skills, which involves students to be active in the thinking process. In learning mathematics, administering the plane (geometry) material that is more oriented to everyday life and closely related to the formulas will tend to be successful if the learning model implemented in the learning process is appropriate so that students can develop their skills in solving a problem. According to studies by Aviory (2011) and Mauke, Sudana, and Suastra (2013) using the appropriate learning process can help students in understanding concepts and solving mathematical problems so that learning objectives can be achieved.

The above findings are relevant to the conditions in the field taken from the preliminary questionnaire results of 134 students of two elementary schools in Surabaya which shows that 62% of the students considered mathematics as a difficult subject and 67% of the student state that the plane material is difficult to understand. The students' difficulties in understanding mathematics subjects especially in the plane material are mainly caused by the tendencies of the teachers to implement conventional learning models. Based on the findings, the implementation of learning should be supported by innovative learning models so as to enable students to be active in learning. From these problems, the selection of *Probing Prompting Learning* (PPL) model and *Inside Outside Circle* (IOC) model is suitable for the plane figure material for both models involve students' activity in teaching and learning activities.

Probing Prompting Learning (PPL) is a derivative of the PBM (Problem Based Learning) model. From this learning model, students are expected to develop their ability so that they can become more creative and more critical in solving problems related to learning mathematics, especially in the plane material that is closely related in everyday life because one of the goals of learning mathematics of plane material is to educate and develop students 'creativity as well as to develop students' thinking ways so that they can think critically and discover new knowledge

In the *Probing Prompting Learning* (PPL) model, starts from the questioning and answering process that is done to the students randomly where the student must be able to participate in answering questions given by the teacher so that students cannot avoid the learning process because the students will be involved in the learning process every time. Since the classroom atmosphere will be tense, the teacher should ask questions with a friendly face and with a soft tone so that the classroom atmosphere becomes more comfortable and fun. Herawati (2013) in a study by Fatmawati (2016) mentions the steps of the *Probing Prompting Learning* (PPL) model, which are: (1) the teacher exposes the students to new situations, e.g. by looking at pictures, formulas or situations related to the issues to be discussed; (2) the teacher poses the problem according to the learning objectives; (3) the teacher waits for a while to give the students an opportunity to find answers or conduct small discussions; (4) the teacher appoints some students to answer questions; (5) if the answer is correct, then the same question is asked to the other students to ensure that all students are involved in the learning process, but if the answer is incorrect then the teacher asks another question that leads students in thinking towards the original question; and (6) the teacher asks the final question as a differentiator.

From the mentioned steps above, it can be inferred that the *Probing Prompting Learning* (PPL) model is able to influence the process of assimilation and accommodation so as to form the pattern of reasoning in students' thinking. In addition, interactions among the students which occur in the learning activity can provide opportunities for students to engage in groups in solving problems together. Fatmawati (2016) explains that the use of *Probing Prompting Learning* (PPL) model can improve student's learning results in grade 3 elementary school mathematics subject which reaches an average of 83.75. In addition, Mayasari (2014) states that improving students' mathematics communication skills learning through *Probing Prompting Learning* (PPL) technique tends to be more effective than the one without the use of *Probing Prompting Learning* (PPL) techniques.

Inside Outside Circle (IOC) is a model that allows students to be active in the learning process. Susanto (2016) states that the *Inside Outside Circle* (IOC) model is a cooperative learning model that is implemented by forming large groups which form a small and big circle system where students share information with different partners in a brief and orderly manner.

From the statement above, it can be concluded that the *Inside Outside Circle* (IOC) model is a model that is closely related to the game of inner circle and the outer circle where the game is divided into two groups: groups inside the inner circle and groups inside the outer circle to share information. In addition, all students involved with this inner and outer circle game can make all the students in the class to be involved in the game, which in turn makes all students become active in the learning process. This can influence the development of student communication skills so that the learning activity becomes more fun and to prevent

students from feeling uninterested in the learning process. Wijaya and Sari (2017) states that the *Inside Outside Circle* (IOC) technique can cause a significant effect on students' speaking skills.

In addition to the learning model, it is extremely important to have the knowledge of the student's initial ability before the learning takes place because this initial ability is included in the learning component. According to Margana (2010) learning has four components: (1) analysis of field of study; (2) diagnosis of students' initial ability; (3) learning process; (4) measurement of learning results.

Initial ability is one of the foundations that influence the learning process possessed by every individual. According to a study by Herawati (2013) the student's initial ability is considered one of the internal factors which affect student's learning achievement. This is because initial ability could be used to describe students' readiness in following a lesson. Initial ability could also be seen as a relevant skill possessed by a student before attending a learning activity. Thus, it could be said that initial ability should be considered as a prerequisite which has to be mastered by students before attending a learning activity. According to Purwaningrum (2016) it is important for teachers to be aware of the students' initial ability in mathematics before starting the learning activity. It is useful to know whether the students have the prerequisite knowledge to follow the learning activity and to know the extent to which the students already know the material to be presented so that the teacher could design a better lesson plan. Hanum (2008) states that initial math skill is a cognitive ability that a student possesses before taking part in mathematics lesson and is a prerequisite for them to learn a new or advanced lesson.

In learning, there are several factors which could influence the learning results, which are: (1) internal factors; (2) external factors; (3) instrumental factors. Learning model and initial ability are also a few factors that could influence student learning results. This is supported by Aritohang (2008) which states that factors which could influence learning results are: (1) internal factors: interest, motivation such as ideals, student learning ability, environmental conditions, dynamic elements and teachers' effort in the learning activity.

Based on the problems mentioned above the researcher presents several hypotheses, namely; (1) there is a difference in the learning results of plane material between the *Probing Prompting Learning* (PPL) model and the *Inside Outside Circle* (IOC) model; (2) there is a difference in the learning results of plane material for students with high initial ability and low initial ability; (3) there is a correlation between the model and initial ability towards the learning results of plane material

2. Method

In this study, the researchers employed true experimental research design. There are three possible variables considering the existence of moderator variable is *Probing Prompting Learning* (PPL) model and *Inside Outside Circle* (IOC) model which affects the independent variable (initial ability) and the dependent variable (learning result).

This study was conducted in January to March 2018 within two groups, namely control group and experimental group. The population was two elementary schools in Surabaya. The sample in this study was 134 students consisting of four classes, two classes from *SD Negeri 1 Cerme Kidul* and two classes from *SD Negeri Cerme Lor* using Propotional Random Sampling Technique so that the sample used was 67 students. Class 4A of *SD Negeri 1 Cerme Kidul* and *SD Negeri 1 Cerme Lor* as control group using *Inside Outside Circle* (IOC) model while the experimental group activities were conducted in Class 4B *SD Negeri 1 Cerme Kidul* and *SD Negeri Cerme Lor* by using *Probing Prompting Learning* (PPL) model. The four classes have a homogeneous (*equivalent*) ability so that determining the control group and experimental group can be done randomly.
The design used in this study is presented in Table 1.

Table-1. Study Design.

Group	Pre-test	Initial Ability	Treatment	Post-test
Control	O1	Y1,Y2	X1	O2
Experimental	O3	Y1,Y2	X2	O4

Description:
X1 : *Probing Prompting Learning* (PPL) Treatment
X2 : *Inside Outside Circle* (IOC) Treatment
O1=O3 : *Pre-Test*
O2=O4 : *Post-Test*
Y1 : High Initial Ability
Y2 : Low Initial Ability

The steps taken in this study are as follows: Conducting Pre-test by using the instrument in the form of 20 multiple choice questions in grade 4 students of plane material in order to determine the initial ability possessed by the students. The pre-test was conducted once before the learning process is done using the *Inside Outside Circle* (IOC) model in the control group and the *Probing Prompting Learning* (PPL) model in the experimental group; the control learning process of the control group is done in the Class 4A in both *SD Negeri 1 Cerme Kidul* and *SD Negeri Cerme Lor* using *Inside Outside Circle* (IOC) model, while the experimental learning process of the experimental group is done in grade 4B in both *SD Negeri 1 Cerme Kidul* and *SD Negeri Cerme Lor* using *Probing Prompting Learning* (PPL) model; Post-test was conducted by using the instrument in

the form of evaluation of learning results in line with the indicators to be achieved in the learning process with 20 multiple choice questions. Post-tests were conducted after the learning process in the control group and experimental group using the *Inside Outside Circle* (IOC) model and the *Probing Prompting Learning* (PPL) model respectively were done in order to determine the students' achievement in class.

The research instruments used are pre-test and post-test, each with 20 multiple choice questions. The data collection techniques are: (1) the quality of research instruments related to the level of validity and reliability; (2) Quality of data collection related to the accuracy of the means used to collect data. Data analysis is a classification of data based on the variables and types of respondents, tabulating the data based on the variables of all respondents, presenting the data of each studied variable, by performing calculations in order to verify the hypothesis that has been tested.

Based on the problems presented, this study uses descriptive statistical analysis. Before the data is analysed, it is necessary to verify the prerequisite analysis in the form of normality test and homogeneity test, which are described as follows:

Normality test is conducted with the aim of discovering whether the obtained data is normally distributed or not. The homogeneity test of variance was used to determine whether the data analysed by criterion were homogeneous, the data has homogeneous variance if F count <F1 / 2 (n-1) (n-2). To test the hypothesis, the data must have homogeneous variance.

After conducting the prerequisite test, the two-way ANOVA test is administered (Sugiono, 2015). This study uses two-way ANOVA test which is technical analysis to discover the influence of factor A and B in response to the dependent variable. In the analysis of variance these two factors can also be used to find out whether there is a meaningful correlation between the two factors. This is what motivates the researcher to discover the influence of the learning model and the students' initial ability which is factors A and B towards the learning results, which also leads into the discovery of the correlation between the two factors. In this study, the hypothesis was analysed using SPSS 22.

3. Results and Discussion

3.1. Results

Based on the data collection, prior to describing the data of the research, it is verified beforehand using validity test and reliability test on the pre-test instruments and the post-test instruments.

This validity test is used to measure the validity of a question. Problems are said to be valid if there is a match between the items of test questions with the intent of doing the measurement. In this research, the validity test is done by Product Moment or Pearson correlation analysis.

The criterion used is considered significant if the result of the validity is less than 0.05 (5%), therefore the item is considered valid. Meanwhile, the criteria used are considered insignificant if the result of validity is greater than 0.05 (5%), so it can be concluded that the item is considered invalid. Validity test can be seen in Table 1 for the test results of initial ability validity and test results of the validity of learning results can be seen in Table 3. The reliability test is used to determine whether a test can be trusted or not. This test is performed on the items of questions that have been declared valid on the validity test. To measure reliability, the researchers used the Cronbach Alpha value. If the Cronbach Alpha coefficient is greater than 0.60 then the test instrument is reliable.

After determining the validity and reliability test, the researcher performs normality and homogeneity test. Normality test is used to find out whether the data is normally or abnormally distributed. Normality test is done based on Kolmogrov-Smirnov test with the help of SPSS 22 for windows program. Normality is met if the value of valve sig. > 0.05, but if the value is sig valve. <0.05, then the research data is not from a normally distributed population. Meanwhile, homogeneity test is done to test whether residual variant is homogeneous or not homogeneous. If the variance of residual homogeneous then the data obtained is also homogeneous.

After that, the researchers perform hypothesis test by using two-way ANOVA with the purpose to prove whether the hypothesis is in accordance with the result of the research conducted. Validity test on prior knowledge test instrument which are 20 items have a probability of correlation or significant value less than 0.05 (5%). So it can be concluded that the test can be declared as valid without the reliability test on the prior knowledge test instrument has a Cronbach's Alpha value of 0.920, which is greater than 0.60 so it can be concluded that the test can be declared as valid. The validity test on the learning outcomes test instrument shows that the 20 test items that have a probability of correlation or significant value less than 0.05 (5%). So it can be concluded that the test can be declared as valid without reliability test on test instrument of learning outcomes has a Cronbach's Alpha value of 0,926, which is bigger than 0,60. So it can be concluded that the instrument of learning can be declared as reliable.

The normality test is administered to determine whether or not the data is normally distributed. Normality test is conducted using Kolmogrov-Smirnov test with the aid of SPSS 2.2 for windows program. Normality is met if the value of valve sig. > 0.05, but if the value is sig valve. <0.05, then the research data will be considered to be not from a normally distributed population. Based on test result for normality test, the P value in Table 7 get a score of 0,07> 0,05 so that H0 is accepted, which means that the residual is normal.

Homogeneity is used to verify whether the residual variant is homogeneous or not homogeneous. If the variance of residual was homogeneous, then the data obtained is also considered homogeneous. Based on the result of the test, the P Value in Table 8 is 0,053>0,050 so that H0 is accepted, which means that the residual is homogeneous.

Table-2. Table Tests of Between-Subject Effects Two Varian.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	6339.117[a]	3	2113.039	46.175	.000
Intercept	701647.782	1	701647.782	15332.845	.000
Initial Ability Model	3964.608	1	3964.608	86.637	.000
	1217.524	1	1217.524	26.606	.000
Initial Ability Model	203.998	1	203.998	4.458	.037
Error	5948.942	130	45.761		
Total	772050.000	134			
Corrected Total	12288.060	133			

a. R Squared = .516 (Adjusted R Squared = .505).

Based on Table 2, it can be seen that in the first hypothesis testing, the value of F count on the learning model is 86.637 with a significance or probability of 0.000. since the probability is <0.005 then H0 is rejected and HI is accepted. In the second hypothesis testing, the value of F count for the initial ability is equal to 26.606 with the significance or probability value of 0.000. Since the probability is <0.005 then H0 is rejected and HI is accepted. In the third hypothesis testing, the value of F count for the correlation between learning model and initial ability of students is 4.458 with a significance or probability of 0.037 Since the probability is <0.005 then H0 is rejected and HI is accepted. From the results of the three hypotheses, it can be concluded that the learning model and initial ability could influence the learning results. Therefore, it can be said that there are differences in learning results on plane material based on learning models and initial ability possessed by students.

3.2. Discussion

Prior to conducting hypothesis research, validity and reliability test were conducted to find out whether the test instrument used was valid and reliable. After being declared valid and reliable, the researcher conducted the research in accordance with the research design in which Class 4A used the *Inside Outside Circle* (IOC) model while Class 4B class used the *Probing Prompting Learning* (PPL) model. The students were chosen randomly because the four classes had equal/homogeneous ability. After conducting the research and discovering the results of *pre-test* and *post-test*, the researcher performs statistical description to describe the result. To determine the results of the hypothesis, the researcher performs prerequisite test beforehand which are normality and homogeneity test. After the hypothesis has been proven normal and valid, the researchers finally conducted a two-way ANOVA test using SPSS 22. During the two-way ANOVA test, it is discovered that there is a difference in learning results between using the PPL model and IOC model, which is consistent with the first hypothesis. This can be seen as the F count value of the learning model is 86,637 with a sig. value of 0,000, which is less than 0,05, which concludes that H_0 is rejected and H_I is accepted. It can be concluded that there is a difference in learning results value between PPL and IOC. In this finding, the PPL model has an average of 81.34 while the IOC model has an average of 69.25. The difference of value is caused by some complications when using the IOC model. The game of inner and outer circle takes too long of a time and there is also the lack of understanding of how the game works from the students which greatly hinders the delivery of the materials. Therefore, it takes more than one research cycle in order for the students to better understand the game of inner and outer circle. Just like a previous study by Murni (2016) it takes three cycles of research for the application of IOC to be able to improve the students' learning interest in mathematics which could influence their learning result.

In addition to the learning model, the initial ability possessed by students also influences the differences in student learning results, which is consistent with the second hypothesis. This can be proven by the result of F count value for the initial ability, which is 26,606 with a sig. value 0,000. Since the sig. value is less than 0.05, it can be declared that H0 is rejected and HI is accepted. From the result of the second hypothesis, it can be interpreted that students with high initial ability get higher learning results compared to students with low initial ability which get a lower learning results.

As the first hypothesis and the second hypothesis are equally influential, this, in turn, affects the third hypothesis in which the value of F count for the third hypothesis reaches 4.458 with a significant value of 0.037 that is smaller than 0.05. So, it can be seen from this result that there is correlation between learning models, abilities and learning results. Therefore, there are differences in learning results in learning using the model of PPL and IoC in terms of initial ability for the learning model and the ability possessed by students influence the learning results. This means that H0 is rejected and HI is accepted.

4. Conclusion and Suggestion

4.1. Conclusion

From this research, it can be concluded that: (1) there is a difference in the learning results of plane material between the PPL model and the IOC model; (2) there is a difference in the learning results of plane material for students with high initial ability and low initial ability; (3) there is a correlation between the model and initial ability towards the learning results of plane material.

4.2. Suggestions

Based on the conclusion of the research, some suggestions are given: (1) teachers can use the PPL and IOC model to improve student learning based on initial ability; (2) students with low initial ability should be given additional questions in order for them to better understand the material presented; (3) for further research, more than one cycle of IOC model is required and students with low initial ability should be given further understanding of the subject.

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