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Is Problem Based Learning Assisted by Pop Up Book Effective in Improving Problem Solving Ability and Attitude of Curiosity?

RA. Savira Ardani[1]* & Lola Pinto Amaral[2]
[1]Universitas Muhammadiyah Surakarta, Surakarta, Indonesia
[2]Santa Maria Goretti Senior High School, Viqueque, Timor Leste
*Email & Phone: saviraardani733@gmail.com; +6287700817518

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Abstract

***Backgrounds:**. This study aims to determine the effect of the PBL model with the help of pop up book media on the ability to solve problems and the attitude of curiosity in the fourth grade corner material of MIN 2 Sukoharjo (Islamic Elementary School 2 Sukoharjo), Indonesia.*

***Methods:**This research uses quantitative research with experimental research design which includes control and experimental classes. The control class uses the thematic learning model, while the experimental class uses the PBL learning model with the help of pop up book media. Data collection techniques through observation, documentation, tests and questionnaires. Data analysis technique using t-test and multiple classification ANOVA test.*

***Results:**. Based on the results of data analysis, the value of tcount > ttable was obtained, namely the t-test of 5.14 > 5.14 and 4.37 > 2.04 while the ANOVA test was 2.49 > 2.44. Thus, it can be said that the PBL model assisted by pop up book media has an effect on the ability to solve problems and the attitude of curiosity in the fourth grade corner material of MIN 2 Sukoharjo.*

***Implications:**The implications of this research are: First, primary school principals in Indonesia must provide policies that support developing learning models and making learning media more creative and innovative. Second, teachers must provide models and media that are more creative and innovative to overcome the low problem solving abilities and curiosity of students.*

***Novelty:**This study reveals the implementation of the influence of the PBL model on problem solving and students' curiosity attitudes.*

INTRODUCTION

Curiosity is a natural feeling for humans, especially at the age of children. Children are a very young age to know many things and don't have much experience. This causes children to become subjects who have high curiosity. Children will certainly do various things to find out about things or everything that they just encountered.

The determining factor for student success in learning other than the learning model is the appropriate media used by the teacher in teaching and learning activities. According to Rusnilawati, et al (2018: 198) learning media are tools used in learning as well as a means to convey messages from learning sources to recipients of learning messages (students). Meanwhile, according to Musfiqon (2012: 28) learning media is defined as physical and non-physical aids that are deliberately used as intermediaries for teachers and students in understanding learning material to make it more effective and efficient. Learning material so that it is more quickly accepted by students as a whole and attracts students' interest in further learning. The use of learning media that can help students solve problems and an attitude of curiosity is pop up book media.

The application of the PBL model is considered very suitable for use in elementary mathematicsThe teacher only functions as a facilitator for students to be able to understand what is conveyed so that students can solve their own problems. Similar to the opinion of Suharia (2013: 77) that PBL is a learning model that encourages students to get to know how to learn and work together in groups to find solutions to problems in life. The application of media and the use of appropriate learning models or the appropriate way of implementing teaching and learning activities makes students' curiosity increase and are able to solve problems on their own. Not only that, in this case, it is able to make students active in learning and achieve learning goals.

Seeing the conditions that occurred at MIN 02 Sukoharjo, Central Java, Indonesia, several grade IV students did not understand problem solving in angle material. These students still find it difficult because the teacher only teaches with the lecture method and only uses makeshift media. So that students easily get bored with the material. Children are also reluctant to ask questions even though they do not understand the material. The teacher also does not repeat it so that students understand better. Students are only given practice questions to find out how much they understand the angle material. The following is an example of a question given to students "find the size of the angle formed by the following two needles 14.00, 18.00" students look confused proving that students have not understood the solution to the problem

The results of research in the field and information from class IV MIN 2 Sukoharjo teachers revealed that students did not like mathematics. This is due to several factors, namely (1) the lack of teacher-student interaction, (2) the use of strategies, models, approaches and learning methods that are not appropriate and the teacher only uses makeshift media so that students tend to get bored and lack enthusiasm in learning, (3) The teacher's lack of creativity in making media so that the attitude of student curiosity is lacking.

Relevant previous research, namely byGunantara, Suarjana, & Riastini (2014)regarding the application of the PBL (PBL) learning model to improve the Mathematics problem solving abilities of fifth grade students. Second, research by Taufik and Adiastuti (2017) concerning the development of Mathematics learning tools assisted by PBL-based Pop Up Book visual aids to improve students' spatial abilities. Third, by Solehuzain and Dwidayati (2017) regarding the ability to think creatively and curiosity in PBL models with open ended problems. Fourth, by Mariani & Kusumawardani (2014) about the effectiveness of learning by PBL assisted Mathematics pop up book against the spatial ability in grade VIII on Geometry subject matter. Fifth, bySusilo, Sujadi and Indriati (2018) about developing a media visual design of pop up Mathematics book as a supporting tool in inquiry-based learning for learning three-dimensional figures. Sixth, by Fadella, Sugiarto and Prabowo

(2014) regarding the effectiveness of problem-based learning assisted by Mathematical comics on problem-solving abilities and students' curiosity. Seventh, by Ruchaedi and Baehaki (2016) regarding the effect of PBL on problem-solving heuristic abilities and mathematical attitudes of elementary school students. Eighth, by Zany, Laihat and Toybah (2018) related to the effect of the PBL model on the material types of angles and angle sizes on the learning outcomes of fifth grade students at SD Islam Al-Alifah Palembang. Ninth, by Kurino (2020) regarding the PBL model in Mathematics lessons in Elementary Schools.

METHODS

Type and Design

This research is a quasi-experimental research type. Quasi experiments or better known as quasi-experiments are studies that are used to predict conditions that can be achieved through actual experiments but there is no control or manipulation of all relevant variables. This study uses a control group pretest and posttest design. Where in this design both the experimental group and the control group were subjected to O^1 and O^2, but only the experimental group received X treatment (Arifin, 2011:78).

Data and Data Sources

The samples in this study were 30 students in class IVB and 31 students in class IVA which were the experimental class subjected to the PBL learning model. Because there are 2 samples, the comparison test of two independent samples uses the t separated variance formula where the variance is not homogeneous.

Data collection techniques

Data collection techniques used in this study include (a) Observation. The results of the observation of the implementation carried out in this study were obtained based on observations on the learning process of class IV MIN 2 Sukoharjo. (b) Test. The tests in this study were in the form of pre-test and post-test description questions which were used to determine students' initial and final abilities. (c) Documentation. Documentation in the research is in the form of lesson plans (RPP) used to implement the PBL learning model and school profile information sheets used to find out the names of students and teachers at MIN 2 Sukoharjo as a research location, as well as photos and videos used as evidence that it has been implemented. this research. d) Questionnaire. The questionnaire in this study was used to measure the attitude variable of students' curiosity.

Data Collection Techniques & Instruments in this study used an Instrument Test which included a validity test which was a test of the validity of a research instrument. According to Sugiyono (2015: 377), a valid instrument is a measuring tool to obtain valid data and also as a measuring tool for what is being measured. Then the Reliability Test which refers to the level of reliability of something. Reliability is related to trust, consistency, or accountability (Soegeng, 2017: 163).

RESULTS

Table 1. Experimental Class Normality Test

Variable	Class	Mark Icount	Mark ltable α = 5%	Information
Problem solving ability	Pretest	0.218	0.161	Normal
	Posttest	0.211		Normal
Attitude of Curiosity	Pretest	0.162		Normal
	Posttest	0.163		Normal

According to the normality test results (Table 1), it can be seen that Lcount > Ltable, so it can be concluded that the sample data for each variable is normally distributed.

Table 2. Control Class Normality Test

Variable	Class	Lcount value	Ltable value α = 5%	Information
Problem solving ability	Pretest	0.168	0.159	Normal
	Posttest	1,031		Normal
Attitude of Curiosity	Pretest	0.171		Normal
	Posttest	0.159		Normal

From the Table 2, it can be seen that Lcount > Ltable so it can be concluded that the pre-test and posttest data for the experimental class and the control class are normally distributed.

Table 3. Homogeneity Test

Variable	Class	Mark Fcount	Ftable value α = 5%	Information
Problem solving skill	Pretest	1.16	2.66	Inhomogeneous
	Posttest	1.30		Inhomogeneous
Attitude of curiosity	Pretest	0.69		Inhomogeneous
	Posttest	0.70		Inhomogeneous

From the results of the data homogeneity test analysis of the two variables obtained Fcount < Ftable. This shows that the variances of the pretest and posttest data from the control class and the experimental class are not homogeneous.

Table 4. Hypothesis 1 t-test

Variable	tcount value	ttable value A = 5%
Problem solving skill	5,14	2.04

From the Table 4, shows that the value of tcount > ttable is 5.14 > 2.04, which means that Ho is rejected and Ha is accepted. So it can be concluded that the ability to solve problems in learning mathematics on corner material for class IV at MIN 2 Sukoharjo using the PBL model assisted by Pop Up Book media is better than the conventional learning model assisted by teaching materials.

Table 5. Hypothesis 2 t-test

Variable	tcount value	ttable value α = 5%
Attitude of Curiosity	4.37	2.04

The Table 5, shows that the value of tcount > ttable, which is 4.37 > 2.04, which means that Ho is rejected and Ha is accepted. It can be concluded that the attitude of curiosity in learning mathematics corner material for class VI at MIN 2 Sukoharjo using the PBL model assisted by Pop Up Book media is better than conventional learning models assisted by teaching materials.

Table 6. Anava test

Variable	tcount value	ttable value α =5%
Problem solving ability	37.05	3.92
Attitude of curiosity	1079,5	3.92
Ability to solve problems and attitude of Curiosity	2.49	2.44

Conclusion: a) Ho is rejected and Ha is accepted. From the Table 6, it can be concluded that the ability to solve problems in learning mathematics on angle measurement material for class IV at MIN 2 Sukoharjo assisted by Pop Up Book media is better than conventional learning models assisted by textbooks. b) Ho is rejected and Ha is accepted. It can be concluded that the attitude of curiosity in learning mathematics on angle measurement material for class IV MIN 2 Sukoharjo assisted by Pop Up Book media is better than the conventional learning model assisted by textbooks. c) Ho is rejected and Ha is accepted.

Table 7. Learning Implementation Implementation Data

Learning	Score	Category
First	90.47%	Very good
Second	100%	Very good
Third	95.23%	Very good

In the first lesson the score obtained was 19 points and a score of 90.47% was obtained in the very good category, the points that had not been conveyed were that in the preliminary activities the teacher should check the neatness of the students and in the closing activities the teacher should summarize the learning material. In the second study the score obtained was 21 points and a score of 100% was obtained in the very good category, all points were conveyed during learning. Whereas in the third lesson the score obtained was 20 points and a score of 95.23% was obtained in the very good category, the points that had not been conveyed were that in the preliminary activities the teacher should provide motivation to students.

From these data, the average score of the three studies was 95.23 in the very good category.

DISCUSSION

The study aims to determine whether there is an influence of the PBL learning model assisted by Pop Up Book media compared to the thematic learning model assisted by teaching materials. The research was carried out at MIN 2 Sukoharjo using 2 classes, namely the experimental class and the control class. In the experimental class, the PBL learning model was applied, while the controls applied thematic learning assisted by teaching materials. This conclusion is known by comparing the results of the instruments in the form of description questions and questionnaires for the experimental class and the control class. The results of the pretest homogeneity between the experimental class and the control class on the ability to solve problems and the attitude of curiosity were not homogeneous.

The experimental class was continued by conducting learning using the PBL learning model assisted by Pop Up Book media which was held in 3 meetings. While in the control class the researcher provided a thematic learning model assisted by teaching materials. after the two classes were both given learning, both classes were given a posttest in the form of description questions and a questionnaire to find out the value of problem solving ability and curiosity after being given treatment.

The data obtained after being given a pretest, namely the average value for problem solving ability in the experimental class was 14.83 and the control class was 10.16 while the average value for curiosity in the experimental class was 55.93 and in the control class of 55.38. From these averages it can be seen that the initial abilities of each are almost the same. After that, the data was collected through the posttest where the average problem solving ability for the experimental class was 19.9 and the control class was 13.35, while the average curiosity attitude for the experimental class was 63.63 and the control class was 60. 45.

The ability to solve problems in learning mathematics on angle measurement material for class IV at MIN 2 Sukoharjo with the PBL learning model assisted by Pop Up Book media is better than the thematic learning model assisted with teaching materials. To test problem-solving abilities in learning mathematics, angle measurement material for class IV MIN 2 Sukoharjo with the PBL learning model assisted by Pop Up Book media is better than the thematic learning model assisted with teaching materials using the separated variance formula t-test because the number of samples is not the same and the variance is not homogeneous. From the results of data analysis, it was obtained that the tcount was 5.14 for tables with a significant level of 0.05, which was 2.04, because tcount > table, then Ho was rejected and Ha was accepted.

It can be concluded that the ability to solve problems in learning mathematics on angle measurement material for class IV at MIN 02 Sukoharjo with the PBL learning model assisted by Pop Up Book Media is better than the thematic learning model assisted with teaching materials. The results of this study are in line with the opinions of Diding Ruchaedi and Ilham Baehaki (2016) in their research which concluded that learning PBL (PBL) has increased the ability of heuristic problem-solving strategies and better mathematical attitudes compared to students who receive conventional mathematics learning. In addition, the same as previous research conductedby Gunantara, et al (2014) that the results of the study indicate that the PBL (PBL) learning model can improve problem solving abilities in Mathematics subjects. Besides that, the same as previous research conducted by Saiful et al (2011: 9) concluded that the mathematical solving abilities of students who took part in learning with the PBL model were better than students who took part in learning as a whole and based on the categories of students' mathematical abilities (high, medium, low).

Learning using the PBL learning model assisted by Pop Up Book media has a positive effect, especially on the ability to solve problems in angle measurement material. This can be proven by observing the implementation of learning, where in learning students can work on practice questions easily, high enthusiasm from each student. The use of Pop Up Book media also adds to students' interest and attention in receiving learning, because it looks more interesting, fun and makes it easier for students to understand the material.

The attitude of curiosity in learning mathematics on angle measurement material for class IV at MIN 2 Sukoharjo using the PBL learning model assisted by Pop Up Book media is better than the thematic learning model assisted by teaching materials. The attitude of curiosity in learning mathematics on angle measurement material for class IV at MIN 2 Sukoharjo with the PBL learning model assisted by Pop Up Book media was tested using the separated variance formula t-test because the number of samples is not the same and the variance is not homogeneous. From the results of data analysis, it was obtained that the tcount was 4.37 for t table with a significant level of 0.05, it was obtained 2.04 because tcount > ttable, then Ho was rejected and Ha was accepted.

So it can be concluded that the attitude of curiosity in learning mathematics on angle measurement material for class IV MIN 2 Sukoharjo with the Pop Up Book-assisted PBL learning model is better than the thematic learning model assisted with teaching materials. This is in line with research conducted by Fadella et al (2014: 86) that the problem-solving skills and curiosity of experimental class students with the PBL learning model are better

than control class students with conventional learning assisted by teaching materials. In addition, other research conducted by Solehuzain et al (2017: 103) shows that PBL learning has a significant influence on curiosity and problem-solving abilities.

The PBL learning model assisted by Pop Up Book media can explain more real images, making it easier for students to understand. The experimental class is interested in learning with media images that are displayed with Pop Up Books. They are quick to respond and give positive reactions to what the teacher says. For example, when the teacher distributes media, students are immediately happy and curious. Especially when there is material that has never been taught, students simultaneously ask how to use the media. When the teacher repeated it again the students immediately answered with enthusiasm. This shows that there is an influence of the PBL model assisted by Pop Up Book media on problem solving abilities and the high curiosity of students. The PBL learning model assisted by Pop Up Book media contains moving images that can attract students and become the center of attention. Students focus on paying attention to the teacher and the Pop Up Book media. .

Problem-solving ability and curiosity in learning mathematics on angle measurement material for class IV MIN 2 Sukoharjo with the PBL learning model assisted by Pop Up Book media is better than the thematic learning model assisted with teaching materials,

The researcher also tested the relationship between problem solving ability and curiosity in learning mathematics on angle measurement material for grade IV at MIN 2 Sukoharjo with the PBL learning model assisted by Pop Up Book media better than the thematic learning model assisted with teaching materials. Researchers used the multiple classification anava test. From the results of data analysis, it was obtained that tcount was 2.49 and ttable was 2.44 with a significant level of 0.05, because tcount > ttable then Ho was rejected Ha was accepted.

So it can be concluded that the ability to solve problems and the attitude of curiosity in learning mathematics on angle measurement material for class IV at MIN 2 Sukoharjo with the PBL learning model assisted by Pop Up Book media is better than the thematic learning model assisted with teaching materials. This is in accordance with research conducted by Zany et al (2018) which shows that the PBL learning model on material types of angles and angle sizes has a significant effect on the learning outcomes of class V SD Islam Al-Alifah Palembang. In addition, another study conducted by Kurino (2020) shows that one of the meaningful learning is using a mathematics learning model that can stimulate students' curiosity in learning, one of which is using the PBL learning model.

Problem solving abilities are often in the form of story problems. The use of the problem-based learning PBL model makes it easier for students to understand story problems based on their daily lives.

CONCLUSION

Based on the results of the discussion that has been described, the following conclusions can be drawn: (1) The ability to solve problems in learning mathematics on angle measurement material for grade IV at MIN 2 Sukoharjo with the PBL learning model assisted by Pop Up Book media is better than the thematic learning model assisted with teaching materials.(2) The attitude of curiosity in learning mathematics on angle measurement material for grade IV at MIN 2 Sukoharjo with the PBL learning model assisted by Pop Up Book media is better than thematic learning assisted by teaching materials (3) problem solving abilities and an attitude of curiosity in learning mathematics material for class IV angle measurement at MIN 2 Sukoharjo with the PBL learning model assisted by Pop Up Book media is better than the thematic learning model assisted with teaching materials.

The school needs to adopt policies that support the use of the PBL learning model assisted by Pop Up Book media in learning. One example of a supportive policy is for

example by holding training for teachers in developing learning models and making learning media.

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