

The Effectiveness of Problem Based Learning in Term of Student Character on Statistics Lesson

M Farid Narrulloh^{1*}, Mas Dhoriful Huda Maghfiroh²

^{1,2} Mathematic Education, Universitas KH. A. Wahab Hasbullah

*Email: faridnasrulloh@unwaha.ac.id

ABSTRACT

This study aims to determine the effectiveness of the application of Problem Based Learning in developing students' character in statistical material. The approach used in this research is a quantitative approach with a quasi-experimental type of research. This study used all students of class VII A and VII B of SMP Negeri 2 Sumobito which were divided into two groups, namely class VII A as the experimental group and class VII B as the control group. The instruments used in this study were tests, questionnaires. The test is used to determine the student's ability while the questionnaire is to determine the student's character in Problem Based Learning. The prerequisite test used in this study used a normality test and a homogeneity test with $\alpha = 0.05$. Hypothesis testing in this study used independent sample t-test on IBM SPSS.21 for windows. The results of the study indicate that the Problem Based Learning model has a positive and significant effect on the development of students' character

Keywords: *problem based learning; student character; statistics.*

INTRODUCTION

The function and purpose of education in Indonesia based on the Law on the National Education System Number 20 of 2003 article 3 is to develop capabilities and shape the character and civilization of a dignified nation in the context of educating the nation's life, aiming to develop the potential of students to become human beings who believe and are pious. The Almighty, has noble character, is healthy, knowledgeable, capable, creative, independent, and becomes a democratic and responsible citizen. Therefore, teachers and schools need to create learning that supports the formation of potential in accordance with the objectives and functions of the law. One of the main goals and functions of national education is to create students who have noble, creative, independent, noble character. This is because character building is very important in building a better generation of the nation. Character building from an early age is not only taught in the home environment, but in the school environment in various subjects the teacher places more emphasis on inculcating good character in students. One of them is in mathematics. Mathematics lessons are very important and very influential lessons in everyday life, both in the development of science and technology, as well as in the context of forming students' positive characters (Khotimah & Nafi'ah, 2022).

The formation of students' positive character in mathematics can be applied in various mathematics subjects, one of which is statistics. statistics is one of the mathematics learning materials at the junior high school level (Satiti *et al.*, 2022). Statistics is the study of planning, collecting, analyzing, interpreting, and presenting data. Statistics material is taught in even semester VII class. Statistics is a branch of mathematics that is closely related to the economy, industry and business in everyday life. In everyday life, they often use mathematical calculations to carry out buying and selling activities, counting votes in general elections, calculating business profits and so on. But in reality students still often have difficulty learning and applying statistical material in real life.

Based on the results of an interview with a grade VII A and VII B math teacher at SMP Negeri 2 Sumobito on Monday, April 12, 2021, it was stated that there are still many students who do not understand statistics material in everyday life. This is evidenced on Tuesday, April 20, 2021 from the results of the pretest showing that many students do not understand and determine the average, median, and calculation of presentation in a data. In addition, learning is

still glued to the teacher. Even though teachers have implemented various learning models. And the lack of positive character of students in participating in mathematics learning because it is considered difficult. And do not understand the questions presented so that students have difficulty in solving a problem. Therefore, the problem-based learning model according to Nasrulloh & Umardiyah, (2020) that Problem Based Learning Model Learning is the main focus in this research because this model includes one of the recommended models for applied in the learning process.

This Problem Based Learning model is student-centered where students are given a problem that must be solved by students. So that students are expected to be able to play an active role in channeling knowledge, ideas and receiving ideas from others. According to Azizah et al. (2019) the learning process (PBL), students want to know to solve real-world problems by interpreting the ideas they have using mathematical critical thinking skills. The use of learning media that is in accordance with the material is a means to streamline the process of delivering material to students. The syntax or steps in the PBL learning model Shofiyah & Wulandari (2018) in general as follows:

Table 1. Syntax Problem Based Learning

Phase	Behavior teacher
phase 1 Orient students to problem	Teacher informs learning objectives, describe important logistical requirements, and motivate them to engage in problem-solving activities of their own choosing.
phase 2 Organizing students for study	The teacher helps students determine and organize assignments study related to the problem.
phase 3 help self-investigation and group	The teacher encourages students to collect appropriate information, carry out experiments, seek explanations and solutions
phase 4 Develop and serve work and show it off	Teachers assist students in planning and preparing appropriate student work such as reports
phase 5 Analyze and evaluate problem solving process.	The teacher helps students to reflect or investigate and the processes they use

METHOD

The approach used in this study is a quantitative approach with experimental methods, namely, quasi-experiments using the Nonequivalent Control Group Design. This research was conducted at SMP Negeri 2 Sumobito. This research was carried out in mathematics learning in the even semester of the 2020/2021 academic year adjusted to the subject matter chosen in this study, namely social arithmetic material. The population in this study used all students of class VII A and VII B. The samples used were all students of class VII A and VII B SMP Negeri 2 Sumobito which were divided into class VII A as the experimental group and class VII B as the control group. Data collection techniques used, namely tests, questionnaires, and observations. The instruments used include: tests to determine students' abilities, questionnaires to determine student character in mathematics learning activities, observations for syntax implementation.

The instruments that have been compiled are then tested for validity and instrument reliability tests. Validity testing in this study was carried out by 2 validators, namely lecturers as material experts and mathematics teachers as media experts. Reliability test is used to measure the level of determination of an instrument. Technical analysis of the data used in this study is the normality test using the Kolmogorov-Smirnov test, homogeneity test using Levene's test, hypothesis testing using the Independent Sample t-Test. The questionnaire will be tested for validity and reliability to determine the level of validity of the items in the questionnaire statement. Test the validity of the questionnaire using a correlation test while the reliability test using Cronbach's Alpha with a 95% confidence interval with the help of IBM SPSS.21 for Windows.

RESULT AND DISCUSSION

Result

Based on the research that has been done, the data obtained from the results of the pretest and posttest of the two groups, namely the experimental group and the control group. The data obtained from the two groups are:

- Pretest and Posttest Results of Experimental Group and Control Group Before being given different treatment between the experimental group and the control group, the results of the pretest data calculation from the two groups were obtained. In general, it can be seen in table 2.

Table 2. Pretest results

Pretest results of the experimental group and the control group		
statistics	experimental class	control class
Lowest Value	40	30
The highest score	90	91
Mean (x)	82.40	60.04
Amount of data	23	23

- After being given different treatment between the experimental group and the control group, the results of the posttest data calculation from the two groups were obtained. In general, it can be seen in table 3.

Table 3. Posttest results

Posttest results of the experimental group and the control group		
statistics	experimental class	control class
Lowest Value	60	50
The highest score	100	90
Mean (x)	89.22	78.13
Amount of data	23	23

Based on Table 3, it can be seen that the posttest results in the experimental group were higher than the posttest results in the control group. This can be interpreted that there is an increase in student abilities due to the application of problem-based learning in developing student character in statistics.

- Sample Prerequisite Test

The sample prerequisite test is carried out using the data pretest and posttest which includes normality test and homogeneity test. The normality test in this study used the Kolmogorov Smirnov test, while the homogeneity test used the Levene Statistic test.

Table 4. Normality test using Kolmogorov-Smirnov test using SPSS.21 windows

class	kolmogorov-smirnova		
	Statistic	df	sig.
result pre eksperiment	0.141	23	.200*
post eksperiment	0.367	23	.200*
pre control	0.156	23	.200*
post control	0.337	23	.200*

Based on Table 4 shows that the results of the pretest and posttest data of the control group and the experimental group have a significance value $> 0,05$, meaning that the data is normally distributed.

Table 5. Homogeneity test using Levene Statistic test using SPSS.21 windows

Levene Statistic	df1	df2	Sig.
.880	1	44	.353

Based on Table 5, the sig Based of Mean value is $0.353 > 0.05$, so it can be concluded that the data variance is homogeneous.

- Hypothesis testing

Hypothesis testing in this study uses the independent sample t-test. This test was conducted to determine whether there was a significant difference between the pretest scores of the two groups.

Table 6. Results of independent Sample t-Test

data type	group	df	mean	t	sig. (2-tailed)
posttest	experiment	44	89.2174	3.184	0.003
	control	43.107	78.1304	3.184	0.003

Based on Table 6, the results of the t-test in the posttest obtained a sig. (2-tailed) value of $0.003 < 0.05$. It can be concluded that there is a significant difference between the posttest results of the experimental class and the control class.

Table 7. Questionnaire Reliability Tes

Croncach's Alpha	N of Items
.782	18

Based on Table 7, the results of Cronbach's Alpha of 0.988 mean that the questionnaire is reliable because 0.782 is greater than 0.6. Meanwhile, based on the results of the validation analysis of the statement items using the correlation test, the questionnaire was declared valid because of the significance value $0.00 < 0.05$ with corrected items total correlation price ≥ 0.66 . The results of student character development which include honest, disciplined, confident, thorough, religious, polite, tolerance in the application of Problem Based Learning can be seen in Figure 1.

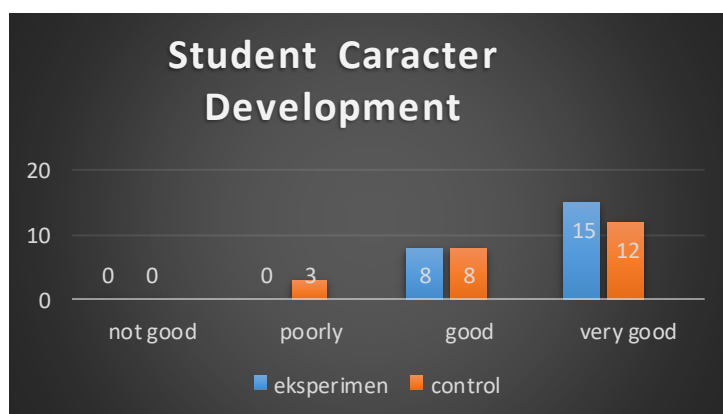


Figure 1. Histogram of student character development in learning

Discussion

This study aims to determine how the effect of the application of problem-based learning models in the development of students' character in statistical material. In the experimental group a problem-based learning model was applied, while in the control group conventional learning was applied. The research activity was carried out on April 20, 2021 at SMP Negeri 2 Sumobito, precisely for students in grades VII A and VII B on Statistics material. This research was carried out in 4 meetings, the first meeting of the control group students and the experimental group before being given treatment was given a test to determine the ability and character of students in solving a problem. The next meeting the experimental group was given treatment. While the control group still uses the conventional learning model. In the

learning process students are required to get used to praying before starting learning, then students are required to be active, fill in attendance, students are emphasized to actively ask questions, students are emphasized to solve a problem carefully, honestly, and responsibly.

The data described is the data of students' mathematics test results obtained from the experimental group and the control group. Data on students' mathematical ability tests were carried out before and after being given treatment in both the control group and the experimental group. In the experimental group there was an increase in the average value before and after being given treatment, from 82,40 to 89,22. However, the control group also experienced an increase in the average score from 60,04 to 78.13 So the increase value between the experimental group and the control group is very different. The description above provides information that students' abilities can be increased by applying the problem-based learning model.

The instrument in this study is a test. Where the test is used as a means of measuring the level of students' mathematical ability, the instrument in this study was validated by one mathematics teacher and one lecturer. From the validation results, the experts stated that the instrument was suitable for use without revision. Furthermore, this research was conducted at SMP Negeri 2 Sumobito in class VII A and VII B. This study used two groups, where class VII A was the experimental group and Class VII B was the control group. The control group used a learning model that is usually applied by mathematics teachers. The experimental group used the Problem Based Learning model. At the pretest the experimental group got a minimum score that was different from the control class which was 40 and the minimum score in the control group was 30. Meanwhile, at the posttest the experimental group got a minimum score of 60, while the control group got a score of 50. group, that the experimental group has a maximum score greater than the control group. Based on observations, both groups showed a coherent solution step. However, the control group had a lower level of accuracy than the experimental group. The data collection process is carried out when students still do not understand how to solve problems using the correct concepts in the process.

It is said to use the correct concept if students solve problems can be seen from how to solve problems by using coherent concepts, as well as being thorough in presenting solutions. For example, students have not included things that can help solve the problems they face, for example being known, asked, and answered. This is able to increase students' knowledge, and can grow the character of students who are initially not careful, eventually become more thorough in solving the problems given. And after being treated by both the experimental group and the control group, when doing the posttest the experimental group students showed an increase in problem solving given by using the appropriate settlement steps. and meticulous in presenting solutions. For example, students have not included things that can help solve the problems they face, for example being known, asked, and answered. This is able to increase students' knowledge, and can grow the character of students who are initially not careful, eventually become more thorough in solving the problems given. And after being treated by both the experimental group and the control group, when doing the posttest the experimental group students showed an increase in problem solving given by using the appropriate settlement steps. and meticulous in presenting solutions.

Based on the hypothesis test using the independent sample t-Test test on the posttest data of the experimental group and the control group, the results showed that there were significant differences in students' knowledge and abilities. It can be seen that the significance value $0.00 > 0.05$. Until H_0 rejected and H_a accepted means that the knowledge and abilities of the experimental group students are higher than the control group. This is due to the application of the problem-based learning model in the experimental group. In line with Samsuddin (2018) which proves that the problem-based learning model shows that the knowledge of the experimental group students is higher than the control group with an average posttest result of the experimental group 78.84 while the control group is 75.73.

The results of the descriptive analysis showed that mathematics learning with statistical material with a problem-based learning model had a positive effect on the development of students' character and abilities in learning mathematics. This can be seen from the initial conditions of students before and after being given treatment. Based on the average of students before and after being given treatment, it increased. Research by Cahyaningsih & Ghufroon (2016) explains that problem-based learning models affect students' creative character and problem-based learning models affect students' critical thinking characters. Based on the results of the pretest, posttest and data analysis of student statements, it showed

that students' abilities, student learning outcomes, and student character in the experimental group were higher than the control group.

CONCLUSION

Based on the data analysis and discussion, it can be concluded that the application of the Problem Based Learning model (Problem Based Learning) in class VII A students effectively supports learning and can develop students' character towards learning materials. The results of calculations using the Independent Sample t-Test show that sig.(2-tailed) is $0.00 \leq 0.05$. Thus, it can be concluded that H_0 is rejected and H_a is accepted, that is, there is a difference between the results of the pretest and the results of the posttest so that the problem-based learning model has a positive effect on developing students' learning abilities. character in social statistics material in class VII A SMP Negeri 2 Sumobito.

REFERENCES

- Azizah, L. I. R., Sugiyanti, S., & Happy, N. (2019). Efektivitas Model Pembelajaran Problem-Based Learning (PBL) dan Guided Inquiry terhadap Kemampuan Berpikir Kritis Matematis Siswa. *Imajiner: Jurnal Matematika dan Pendidikan Matematika*, 1(4), 30–36. <https://doi.org/10.26877/imajiner.v1i4.3853>
- Cahyaningsih, U., & Ghufron, A. (2016). Pengaruh Penggunaan Model Problem Based Learning Terhadap Karakter Kreatif dan Berpikir Kritis Dalam Pembelajaran Matematika. *Jurnal Pendidikan Karakter*, 1, Article 1. <https://doi.org/10.21831/jpk.v0i1.10736>
- Khotimah, K., & Nafi'ah, M. I. (2022). Penerapan Kelas Virtual Sevima Edlink dengan Pendekatan Realistik untuk Memecahkan Masalah Matematika Kelas XI MAN 3 Jombang. *EDUSCOPE: Jurnal Pendidikan, Pembelajaran, dan Teknologi*, 7(2), 55-62.
- Nasrulloh, M. F., & Umardiyah, F. (2020). Penerapan Problem Based Learning ditinjau dari Prestasi Belajar Mahasiswa Pendidikan Matematika Mata Kuliah Statistika Probabilitas. *Jurnal Eduscope*, 05(02). <https://doi.org/10.32764/eduscope.v5i2.763>
- Samsuddin, S. (2018). *Efektivitas Model Problem Based Learning (PBL) dengan menggunakan Pendekatan Saintifik terhadap Hasil Belajar Matematika Siswa Kelas VII SMP Muhammadiyah Lajoa Kabupaten Soppeng*. Tidak diterbitkan. Universitas Islam Negeri Alauddin Makassar.
- Satiti, W. S., Istiqomah, I. N., & Khotimah, K. (2022). LKPD Berbasis Discovery-Learning Pada Materi Luas Permukaan dan Volume Prisma dan Limas. *JoEMS (Journal of Education and Management Studies)*, 5(3), 15-21.
- Shofiyah, N., & Wulandari, F. E. (2018). Model Problem Based Learning (PBL) dalam Melatih Scientific Reasoning Siswa. *Jurnal Penelitian Pendidikan IPA*, 3(1), 33–38. <https://doi.org/10.26740/jppipa.v3n1.p33-38>