The Effect of the Use of Problem Based Learning *(PBL) Based on Student Worksheets (LKPD)* on the Mastery of Science Concepts in Class V Ecosystem Materials

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a r t i c l e i n f o	**a b s t r a c t**
	The background of this research is that there is no influence on the use of teaching materials in accordance with curriculum provisions, target characteristics, and problem solving demands and the application of the Problem Based Learning (PBL) model provided by teachers in learning has not been fully listed to increase students' understanding. The purpose of this study was to determine the effect of Problem Based Learning (PBL) student worksheets on Ecosystem Component Material by utilizing scientific literacy on ecosystem material (water cycle) at SDN Cipedak 05 Pagi, South Jakarta. The research method used is the experimental method with the approach used in this study is a quantitative approach. The form of the design is "pre-test and post-test one group design". The results of the study showed the following: 1) Using the PBL-based LKPD showed a result of 85 with a good category or predicate value B. 2) Mastery of the Natural Science concept with a high tendency of 6 people or 18.8%, medium category of 21 people or 65.6% and the low category is 5 people or 15.6%. Thus it can be concluded that the mastery of the science concept in class V SDN Cipedak 05 Jakarta, is classified as the medium category. 3) In the Discussion there is a sig.(2-tailed) value of 0.000 <0.05. it was concluded that Ha was accepted, so that there was a significant influence on the use of Student Worksheets (LKPD) Based on Problem Based Learning (PBL) on the mastery of the science concept in class V students at SDN Cipedak 05 Pagi Jakarta.

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i n f o a r t i k e l	**a b s t r a k**
	Penelitian ini dilatarbelakangi karena belum adanya pengaruh penggunaan bahan ajar yang sesuai dengan ketentuan kurikulum, karakteristik sasaran, dan tuntutan pemecahan masalah serta penerapan model *Problem Based Learning* (PBL) yang diberikan guru dalam pembelajaran belum sepenuhnya tercantum untuk meningkatkan pemahaman peserta didik. Tujuan dari penelitian ini adalah bertujuan untuk mengetahui pengaruh lembar kerja peserta didik (LKPD) Berbasis *Problem Based Learning* (PBL) pada Materi Komponen Ekosistem dengan memanfaatkan literasi sains pada materi ekosistem (siklus air) di SDN Cipedak 05 Pagi Jakarta Selatan. Metode penelitian yang digunakan metode eksperimen dengan pendekatan yang digunakan dalam penelitian ini adalah pendekatan Kuantitatif, Bentuk dari desainnya adalah "*pre-test and post-test one group design*". Hasil penelitian menunjukkan sebagai berikut: 1) Pada penggunaan LKPD berbasi PBL menunjukkan hasil sebesar 85 dengan kategori baik atau predikat nilai B. 2) Penguasaan konsep IPA besar kecenderungan variabel dengan kategori tinggi sebanyak 6 orang atau 18,8%, kategori sedang sebanyak 21 orang atau 65,6% dan kategori rendah sebanyak 5 orang atau 15,6%. Dengan demikian dapat diambil kesimpulan bahwa penguasaan konsep IPA dikelas V SDN Cipedak 05 Jakarta, tergolong kategori sedang. 3) Pada Pembahasan terdapat nilai sig.(2-tailed) sebesar 0,000 < 0,05. disimpulkan bahwa Ha diterima, sehingga terdapat pengaruh yang signifikan pada penggunaan Lembar Kerja Peserta Didik (LKPD) Berbasis Problem Based Learning (PBL) terhadap penguasaan konsep IPA pada siswa kelas V SDN Cipedak 05 Pagi Jakarta.

INTRODUCTION

Indonesia is a developing country that is intensively developing. For development purposes, of course, quality human resources are needed. One of the efforts that can be made to build good human resources is through education. It is hoped that through this education, individuals can be created who are able to follow the development of science and technology that can support the development needs of Indonesia. (Ayu et al., 2021) High-quality human resources who have expertise, who are able to work together with others, think critically, skilled, creative, understand various cultures, have the ability to communicate, computer skills, and are able to learn independently.

Various efforts have been made by the government to improve the quality of education in Indonesia, one of which is by improving the curriculum, to make learning in schools based on a scientific approach, so learning in the 2013 curriculum is arranged. The 2013 curriculum emphasizes the formation of productive, creative, and innovative human beings. The development of the 2013 curriculum aims to improve the quality of education by balancing soft skills and hard skills through attitudes, knowledge, and skills as well as the formation of productive, creative, and innovative human beings as development capital. According to Suardi, learning is a process in which there is interaction between students, educators, and learning resources in a learning environment in order to achieve the process of acquiring knowledge and knowledge, mastering skills and behaviors, and forming attitudes and beliefs in students. According to Darmadi (2017), in order to support this process, it is necessary to have a learning pattern in the form of a conceptual framework with a systematic procedure used to achieve learning objectives which can be called a learning model.

Initial observations and interviews were also carried out with one of the educators (class teachers) who teaches in one of the V classes at SDN Cipedak 05 Pagi Jakarta, who said that judging from the average results of the odd semester exams below the Maximum Completeness Criteria (KKM) score, so that the students' learning outcomes are still not as

expected. This is based on the data obtained, the average score of the odd semester exam in 2021-2022 was from 11 out of 32 students who got a score above the KKM, while 21 out of 32 students got a score below the school KKM. This shows that students' lack of understanding, especially the concept of science in understanding a material, so it requires reasoning and problem *solving*. In addition to the use of the right learning model, the role of learning media can also make students active. According to Ibrahim et al., (2020) that learning media can arouse students' motivation to learn and greatly help the effectiveness of the learning process. This is in line with the opinion (Frihatmi, 2019) that effective learning media can foster students' interest in a concept. One of the alternative media that can be used is teaching media in the form of Student Worksheets (LKPD).

According to Prastowo (2018), the learning and learning process is an important element in education, because in the learning and learning process there is a transformation of science and technology experienced by students. Results of Observation interviews with teachers at SDN Cipedak 05 Pagi South Jakarta, where the *Problem Based Learning* (PBL) learning model has been applied but the application is not in accordance with the syntax. The application carried out by teachers is to only insert in the form of discourse on problems related to learning materials and conduct oral questions and answers to students about these problems. The use of LKPD in this learning model has not been carried out by teachers, including in the Ecosystem (Water Cycle) material. Teachers' lack of understanding related to the creation of LKPD is also one of the factors in the lack of effectiveness in the use of media.

Because LKPD is based on *Problem Based Learning* (PBL) will involve all students learning actively. It is hoped that with learning to use LKPD, the student learning system will be more active, even though the process of making it takes a lot of time. However, in the learning process using LKPD it will be easier for students to understand, students will not be passive in learning activities with very diverse learning models, one of the learning models that researchers are developing, namely LKPD Science-based *Problem Based Learning* (PBL). With various learning models, the learning process will be more fun, so that fostering a sense of desire to learn in students increases. (Alimul Muniroh, 2019)

Based on the background that has been described, through the syntax of scientific activities of the problem-based learning model presented in the form of LKPD, it is hoped that students can solve problems related to the water cycle in Indonesia. Students are directed to solve problems in daily life by seeking and applying their knowledge independently, so that they can improve their science literacy skills. Thus, the researcher is interested in conducting a study entitled "The effect of the use of Problem Based Learning (PBL)-Based Student Worksheets (LKPD) on the mastery of science concepts in class V Ecosystem Materials at SDN Cipedak 05 Pagi South Jakarta".

THEORETICAL STUDIES
1. Student Worksheets

According to Safriandono, "Student Worksheets (LKS) or Student Worksheets (LKPD) are sheets of paper that essentially contain information and instructions from teachers to students so that they can do a learning activity themselves through practice or do assignments and exercises related to the material taught to achieve teaching goals." Prastowo revealed, "LKS is a printed teaching material in the form of sheets of paper containing materials, summaries, and instructions for the implementation of learning tasks that must be done by students, which refers to the basic competencies that must be achieved". Worksheets (LK) or worksheets (LT) are intended to trigger and help students carry out learning activities in order to master an understanding, skill, and/or attitude. In addition, the use of LK/LT can help direct learning so that it is more efficient and effective. Student worksheets are something that is printed and can be used as a source of learning materials, in which there are

a series of assignments, study instructions, and task completion procedures. LKS or Theme Book is also a learning tool that must be prepared and developed by educators before learning to accelerate the process of understanding the concepts being taught.

LKPD in helping to support learning has its purpose and function. The objectives of LKPD are: 1) Train students to think more carefully in learning. 2) Developing students' interest in learning, for example with teachers developing LKPD that is more colorful and illustrated so that it becomes interactive for students, 3) Strengthening learning goals to achieve learning indicators, and 4) Helping students to achieve learning goals. The function of the LKPD is to help students to achieve learning goals and to facilitate the implementation of learning.

2. *Problem Based Learning*

The Problem Based Learning (PBL) model is basically a learning model that presents or creates a problem that can be investigated and analyzed by students, then students find solutions to the problem. According to BPSDM (in Eva Sapinatul Bahriah), "The problem-based learning model is one of the learning models that presents contextual problems that can stimulate students' creativity to find concepts and solve problems in daily life". Problem-based learning is a learning model designed and developed by teachers to develop students' ability to solve problems. Problem-based learning can be defined as the entirety of learning to give rise to problem-solving thinking, starting from the beginning of synthesized learning and organized in problem situations.

Amir (2016) stated that the PBL model has 7 steps in the learning process that are understood and carried out by small groups in learning. The seven steps are, (1) clarifying terms and concepts that are not clear; (2) formulate problems; (3) analyze problems; (4) organize ideas and analyze ideas systematically and deeply; (5) formulate learning objectives; (6) seeking additional information from other sources (outside of group discussions); (7) combine or synthesize new information and test it, and make reports.

3. **Science Concept**

Science is a translation of natural science which can be interpreted literally as a science that studies everything about the phenomena that exist in nature, both living things and inanimate objects. Science can be described in several sciences such as astronomy, chemistry, mineralogy, meteorology, physiology, and biology. Science is not obtained from the results of human thought, but science is the result of observation and experimentation of a natural phenomenon that exists on earth.

Natural Sciences (IPA) is related to how to find out about nature systematically, so that science is not only the mastery of a collection of knowledge in the form of facts, concepts or principles but also a process of discovery. Science cannot stand alone, because natural phenomena are related to each other which is arranged in a system that explains each other and is a whole unit. Science is a science that deals with systematic natural and material phenomena that are arranged in an orderly, general manner and in the form of a collection of the results of systematic observations and experiments arranged in a unified system.

Every learning must have the goal of developing the cognitive, affective and psychomotor aspects of students as well as science at the elementary school level, the objectives are as follows: 1) Gain confidence in the greatness of God Almighty based on the existence, beauty, and order of His creation. 2) Develop knowledge and understanding of science concepts that are useful and can be applied in daily life. 3) Develop curiosity, positive attitudes, and awareness about the interdependent relationship between science, the environment, technology, and society. 4) Develop process skills to investigate the environment, solve problems and make decisions. 5) Increase awareness to participate in maintaining, maintaining, and preserving the natural environment. 6) Increase awareness to

appreciate nature and all its order as one of God's creations. 7) Acquire knowledge, concepts and science skills as the basis for continuing education to the junior high school/MTs level.

RESEARCH METHODS

This study aims to: (1) The researcher can find out the use of Problem Based Learning (PBL) Based Student Worksheets (LKPD) on the concept of Science Ecosystem Component Materials (Water Cycle) Class V at SDN Cipedak 05 AM (2) The researcher can find out the mastery of the concept of Science Ecosystem Component Materials (Water Cycle) Class V at SDN Cipedak 05 AM (3) The researcher can find out the effect of the use of Problem Based Learning (PBL) Based Student Worksheets (LKPD) on the mastery of the concept Science Material "Ecosystem Components (Water Cycle) Class V at SDN Cipedak 05 AM

The approach used in this study is a quantitative approach with the method used in this study being an experimental method. According to Sugiyono (2017), the experimental research method can be interpreted as a research method used to find the effect of treatment on others under controlled conditions. The design used in this study is a pre-experiment (*non-design*) which is not a serious experiment, because there are still external variables that affect the formation of dependent variables. Meanwhile, the form of the design is "*pre-test* and *post-test one group design*", which is research using only one experimental class without a comparison class or control class. The data collection techniques used are tests, observations and documentation during science learning. The subjects in this study are science teachers and class V students.

RESULTS AND DISCUSSION
1. Use of Prolem Based Learning *Based Student Worksheets*

Table 1. Results of Observation Sheet on the Use of PBL-based LKPD

No.	Indicator	Assessment Score (1-4)
1.	Teachers present problems to students	4
2.	The teacher helps the students to organize study tasks with their groups	4
3.	The teacher encourages the students to get precise, accurate information, and carry out experiments and look for explanations and solutions.	3
4.	Teacher Assist students in planning and preparing the right products such as reports etc.	3
5.	Teachers help students to reflect on the results investigation and the process.	3
Acquisition Value		**17**

Based on the results of the research carried out, the results of the teacher's observation sheet in the use of Problem Based Learning-based Student Worksheets were obtained, which was 17, which according to the score calculation was as follows

$$Skor\ perhitungan = \frac{17}{20} \times 100$$
$$Skor\ perhitungan = 85$$

The total calculation score obtained is 85 so that it is included in the good category or the predicate of B value in accordance with the provisions of the criteria in the following table.

Table 2. Test Criteria for the use of PBL-based LKPD

Value Range	Value	Information
90 – 100	A	Excellent
76 – 89	B	Good
61 – 75	C	Pretty Good
<60	D	Not Good

Based on the results of the research carried out, the results of the teacher's observation sheet in the use of *Problem Based Learning-based* Student Worksheets were obtained, which was 17, where according to the calculation of the total calculation score obtained was 85 so that it was included in the good category or the predicate of a B value in accordance with the provisions of the criteria in the table. In the results of the research findings that have been described, the researcher analyzed and obtained results that the use of PBL-based LKPD through teacher observation sheets obtained results in the good category. This shows that according to Ibrahim et al., (2020) learning media can motivate students to learn and greatly help the effectiveness of the learning process. This is in line with the opinion (Frihatmi, 2019) that effective learning media can foster students' interest in a concept. One of the alternative media that can be used is teaching media in the form of Student Worksheets (LKPD). So that if used properly and effectively by teachers, it will create an appropriate and good learning process.

2.   Analysis of Mastery of Science Concepts

In this study, data processing results related to the assessment of learning outcomes using Problem Based Learning-based Student Worksheets in class V are presented.
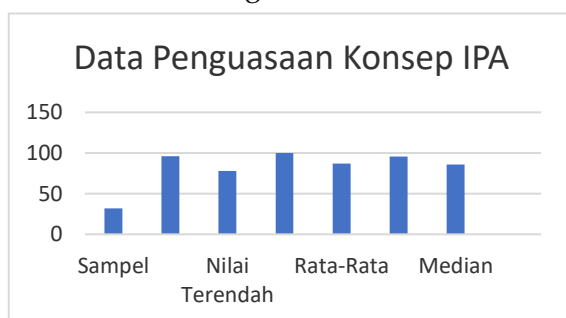
Graph 1. Data on Mastery of Science Concepts

Based on the results of the research conducted, score data on the use of Problem Based Learning based on Student Worksheets *was* obtained, where the highest score was 96 and the lowest score was 78. The mean value (M) = 87, mode (Mo) = 95.8, median (Me) = 86 and standard deviation (SD) = 5.17. Then, for descriptive data, it is continued by making it into a frequency distribution. Before creating a group frequency distribution, first look for ranges, intervals and classes. Here's the calculation to find ranges, intervals and classes.

$Range = Nilai\ Tertinggi - Nilai\ Terendah$

$Range = 96 - 78 = 18$

Then, the class calculation is as follows.

$$Kelas = 1 + 3,3 \log n$$
$$Kelas = 1 + 3,3 \log 60 = 6,87$$

Regarding many classes, 6 or 7 can be chosen, in this case the study chose many classes as many as 6. Then, the calculation of the class length is as follows.

$$Panjang\ kelas = \frac{Range}{Banyak\ Kelas}$$
$$Panjang\ kelas = \frac{18}{6} = 3$$

Furthermore, categorization can be carried out on the use of *Problem Based Learning-based Student Worksheets* to determine the mastery of science concepts with the use of Problem Based Learning-based Student Worksheets. Then in the categorization of mastery of science concepts in class V of SDN Cipedak 05 South Jakarta, it can be done by using the table of grade categorization requirements with the following provisions:

Based on the provisions of the table above, the classification of the score of the tendency to master the concept of science can be calculated by using the Problem Based Learning based Student Worksheet in class V of SDN Cipedak 05 Jakarta. For more details, you can see the table below.
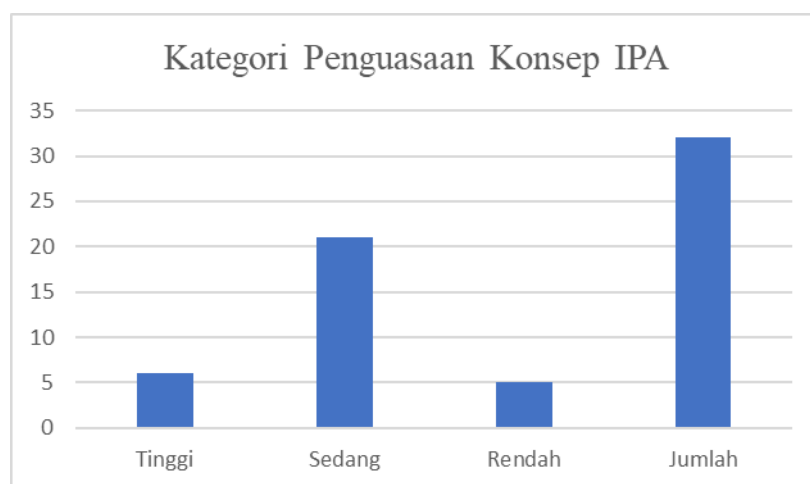
Graph 2. Categorization of Mastery of Science Concepts

From the table above, it can be seen that the category of variable tendency for mastering the concept of science with the high category is 6 people or 18.8%, the medium category is 21 people or 65.6% and the low category is 5 people or 15.6%. Thus, it can be concluded that the mastery of the concept of science in class V of SDN Cipedak 05 Jakarta, is classified as a medium category.

In the results of the research findings that have been described, the researcher analyzed and obtained results that the category of tendency to impact the mastery of science concepts with the high category was 6 people or 18.8%, the medium category was 21 people or 65.6% and the low category was 5 people or 15.6%. Thus, it can be concluded that the mastery of the concept of science in class V of SDN Cipedak 05 Jakarta, is classified as a medium category. This clearly has an impact on the mastery of the concept of science in class V because many students whose scores are above 78 are arguably the minimum criteria in the school. It can also be seen from the average score, which is 87 which is a good score. It is clear that LKPD

can provide a stimulus to students to be able to accelerate the understanding or mastery of science concepts where LKPD is a learning tool that must be prepared and developed by educators before learning to accelerate the process of understanding the concepts taught. (Yaumi, 2018)

This is in line with research by Swiyadnya, et al. (2021) which showed that the LKPD-assisted *Problem Based Learning* model is effective in improving the learning outcomes of students' science lesson content. LKPD is one of the learning media that can be used as a learning support so that students can improve learning outcomes, this is in accordance with Azhar Arsyad (2013) who said that this media is able to be a good medium for learning so that it can increase the achievement value of students in the classroom.

This study proves the influence of LKPD on the development of students' abilities so that LKPD measures the cognitive, affective and psychomotor skills of students where according to Syamsi, et al (2022) the use of electronic LKS can improve students' abilities and develop their intellect so that they have high thinking power and other important skills needed in the current Industrial Era. Likewise, research by Gusyanti and Sujarwo (2021) states that LKPD based on *Problem Based Learning* is very interesting to be used in the teaching and learning process so that it can improve student learning outcomes. So it is very relevant that the use of PBL-based LKPS can provide effective and efficient learning and be influential for students in learning science concepts.

3.   The Effect of the Use of Problem Based Learning *(PBL) Based on Student Worksheets (LKPD)* **on the Mastery of Science Concepts**

The research was conducted using *pretest* and *posttest* test questions to determine the influence of the Mastery of Science Concepts in the form of essay questions as many as 15 questions, thus it can be said that the Science Concept Mastery question items can be used in research and can be used as a measuring tool.
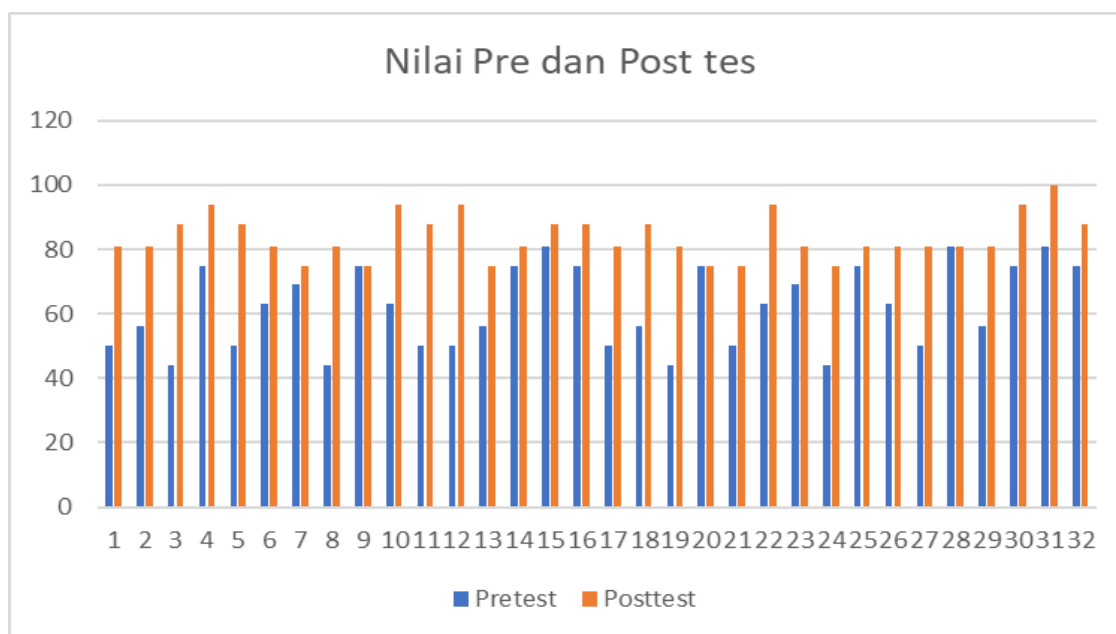
Graph 3. Pre and Post Test Score Graph

From the chart above, the following recapitulation is obtained;
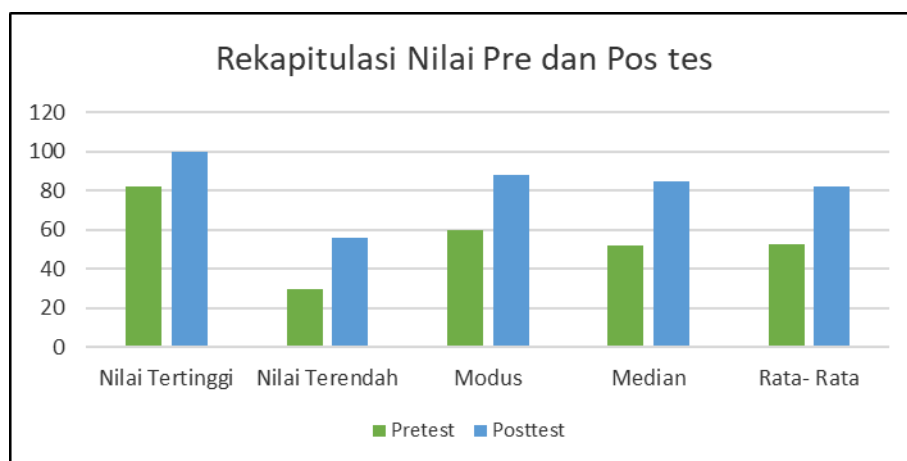
Graph 4. Pretest and Posttest Score Recapitulation Graph

Based on the graph image, the results of *the pretest* and *posttest assessments can be seen* where the highest score in the *pretest* is 80 and *the posttest* is 100. The lowest score in the *pretest* was 30 and *the posttest* was 56. Then, the mode in the *pretest* is 60 and *the posttest* is 88. The median in the *pretest* was 52 and *the posttest* was 85 and the average score in the *pretest* was 62 and the average *posttest* score was 84.

The normality test is carried out to determine whether the data obtained is normally distributed or not. The normality test in this study was carried out with the Shapiro-Wilk test using the SPSS 20 for Windows program with a significance level of 0.05. After data processing, the output display can be seen in the following table.

Table 3. Tests of Normality

	Shapiro-Wilk		
	Statistic	Df	Sig.
Pretest	.958	38	.169
Posttest	.951	38	.097

* This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Based on the results of the normality test output using the Shapiro-Wilk test in Table 4.2, the significance value in the data significance column of the initial test value (*pretest*) is 0.169 and the final test (*posttest)* is 0.097. Because the significance value of the two tests is greater than 0.05, namely 0.169 > 0.05 and 0.097>0.05, it can be said that *the Pretest* and *Posttest values* are normally distributed.

Based on the normality test of the distribution of *pretest* and *posttest value data*, it is distributed normally, so the analysis is continued by testing the homogeneity of two variances between *pretest* and *posttest* value data, using the Levene test using the SPSS 20 for Windows program with a significance level of 0.05. After data processing, the output display can be seen in the following table.

Table 4. Test of Homogeneity of Variances

Levene Statistic	df1	df2	Its elf.
.693	1	62	.408

From Table 4.4, it is stated to be homogeneous if the significance is > 0.05. Based on the results of the output table of the homogeneity test of *Pretest* and *Posttest* value data, it can be seen that the significance value is 0.408. Because the significance value is greater than 0.05, which is 0.408 > 0.05, the data is declared homogeneous.

Table 5. Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Hours of deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pretest - Posttest	-28.469	19.574	3.460	-35.526	-21.411	-8.227	31	.000

The results of the hypothesis test in this study used an independent t test so that data was obtained that there was a significant influence of the use of Problem Based Learning-based Student Worksheets (LKPD) on the Mastery of Science Concepts because a significant level of 0.000 < 0.05 was obtained which showed that H0 was rejected. This is in line with the research conducted by Adilla, Malis and Siska, Angreni (2023) based on data analysis with a t-test carried out at a confidence level of 95% obtained from the t-test calculation results for *post test data* obtained a t-value calculated > t table, which is 9.26 > 2.00. So it can be stated that the hypothesis is accepted. From this study, it can be concluded that PBL-based LKPD makes a difference in student learning outcomes. In the posttest results, the experimental class was 82.22 and the control class was 65.14. So it is proven that there is an influence of the use of PBL-based LKPD on the mastery of science concepts.

This is also proven by the research of Indah Wati (2018) showing that the success indicator is achieved, there is an increase in student learning outcomes in classroom learning activities by using *the problem based learning model* of thermal energy materials in grade IV students of MI Nurur Rohmah. So it is clear that the *problem-based learning* model has a great impact on student learning where according to BPSDM (in Eva Sapinatul Bahriah), the problem-based learning model is one of the learning models that presents contextual problems that can stimulate students' creativity to find concepts and solve problems in daily life.

The researcher made an LKPD which is used with a *Problem Based Learning model* where HOTS is used in the content of the LKPD to be able to stimulate students to be interested in learning, this is in accordance with the research of Syamsi, et al (2022), namely the results of the use of SEW (*Student Electronic Worksheet*) for the effective implementation of HOTS, where students' HOTS abilities can be improved in various ways. One of them is that teachers can present an interesting SEW because it will have an impact on more active learning. The activeness of students working on SEW (*Student Electronic Worksheet*) provides an opportunity

to improve HOTS following the learning of the current century. The learning process using the Problem Based Learning-based Student Worksheet (LKPD) method can make students play an active role in the learning process, discuss with classmates, try to solve a problem from a problem that is found to be a practice that directly involves students so that students are able to understand problems and know phenomena related to the concept of science that they encounter in daily life.

CONCLUSION

Based on a series of studies that have been conducted, the researcher can conclude that several things include the following: 1) In the use of PBL-based LKPD, the results were 85 with the good category or the predicate of B. 2) The mastery of the concept of science has a large tendency to variables with a high category of 6 people or 18.8%, the medium category as many as 21 people or 65.6% and the low category as many as 5 people or 15.6%. Thus, it can be concluded that the mastery of the concept of science in class V of SDN Cipedak 05 Jakarta, is classified as a medium category. 3) In the Discussion there is a value of sig. (2-tailed) by 0.000 < 0.05. It was concluded that Ha was accepted, so that there was a significant influence on the use of Problem Based Learning (PBL)-Based Student Worksheets (LKPD) on the mastery of science concepts in grade V students of SDN Cipedak 05 Pagi Jakarta.

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