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The Effect of Problem Based Learning and Discovery on The Science Literacy of Grade IV Students on The Material of Substance Form Displacement in The Gugus Palapa of District Kaliwungu

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Abstract: This study aims to examine the effect of Problem Based Learning (PBL) and Discovery Learning on the science literacy of fourth-grade students in learning the concept of substance forms and their changes within the Merdeka Curriculum context. The research employs a quasi-experimental approach using a non-equivalent control group pretest–posttest design, involving 85 students selected through purposive sampling across three elementary schools in the Gugus Palapa, Kaliwungu District. Data were collected using validated and reliable test instruments and analyzed through normality, homogeneity, and t-test procedures. The findings reveal that both PBL and Discovery Learning significantly improve students' science literacy compared to conventional methods, with PBL demonstrating a higher mean posttest score (85.40) than Discovery Learning (78.88) and the control class (63.14), indicating stronger effectiveness in fostering critical thinking and problem-solving skills. The study implies that student-centered learning models—particularly PBL—serve as powerful pedagogical pathways to elevate science literacy, urging educators to move beyond transmissive teaching toward inquiry-driven, contextualized, and cognitively engaging learning environments.

Keywords: Problem Based Learning, Discovery Learning, science literacy, elementary education, Merdeka Curriculum, quasi-experimental design

1. Introductions

The curriculum is a very important component of education. Indonesia is now starting to implement the latest curriculum, namely the Merdeka Curriculum which is an improvement on the previous curriculum. The implementation of the Merdeka Curriculum is carried out in stages, adjusted to the readiness of each education unit. In the 2022/2023 school year, the Merdeka Curriculum began to be implemented for grades I and IV in elementary schools. IV in elementary school. The Merdeka Curriculum is present as an effort to restore education in Indonesia, namely, to learning loss and learning gap due to the Covid-19 pandemic. Learning loss is a condition of losing a small or large portion of knowledge and skills in academic development. Knowledge and skills in academic development which is usually caused by the cessation of the learning process in education. learning process in the world of education. 2 Learning loss will also have an impact on the increasing learning gap between students in Indonesia. The existence of the pandemic also causes learning gaps among learners which are influenced by the existence of the pandemic also causes a learning gap among learners which is influenced by learners' circumstances, family conditions, and also economic conditions.

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The Merdeka Curriculum prioritizes essential content, so that students can understand concepts and mastery of competencies with sufficient time (Nurani, et al, 2022: 2). In accordance with as it is called, the Merdeka Curriculum seeks to liberate or give freedom to teachers in using various teaching tools to suit the needs of students. Teachers in using various teaching tools to suit the needs and characteristics of students. The process The learning process in the Merdeka Curriculum directs students to feel free to think, freedom to innovate, learn independently and creatively, and freedom to learn for happiness (Daga, 2021). Basically, the Merdeka Curriculum seeks to provide independence for educators and learners to create a learning climate that suits their needs in order to create a better learning environment for them. create a learning climate that suits their needs in order to improve the quality of learning.

In accordance with BSKAP decision letter Number 008/H/KR/2022 regarding the learning outcomes of the Merdeka Curriculum, it is stated that IPAS subjects help students increase awareness and awareness of the importance of learning. Learning outcomes, states that IPAS subjects help learners to increase awareness and curiosity about natural and social phenomena that occur in the surrounding environment. Curiosity about natural and social phenomena that occur in the surrounding environment. Curiosity curiosity that arises in learners is able to guide their understanding of how the universe works and how it relates to human life. How the universe works and how it relates to human life. Through the understanding gained, learners can identify various problems and are able to provide appropriate solutions. IPAS learning will familiarize learners to build scientific attitudes (high curiosity, thinking critically, analytical and draw appropriate conclusions). Science literacy is the ability to understand science including knowledge, skills, and attitudes in creating critical thinking and contributing to the resolution of science issues (Sutrisna, 2021). creating critical thinking and contributing to the resolution of science issues (Sutrisna, 2021).

Literacy is the ability to reason related to the ability to analyze, synthesize, and evaluate information that can be integrated in classroom lessons. information that can be integrated in classroom lessons. According to Shihab, the benefits of literacy include various aspects of development, not only from the cognitive realm, but also includes social, language and emotions because literacy is closely related to learning and decision-making skills, as well as adjustment to the environment. One of the characteristics of today's society and will be in the future is the amount of information, the information, a digitized life, and jobs that require a high level of reasoning, all of which require literacy.

In learning science, a careful mindset is needed to be logical and express opinions (Pertiwi et al., 2018), 2018). The purpose of learning science is to apply science concepts in learning to solve problems.

Problems and implement them in life. This causes science literacy to be needed in science learning. Then in learning science, science process skills are also needed, namely the expertise of someone looking for science with science independently (Mardianti et al, 2020). Science process skills are needed to develop students' abilities in science education. Knowledge will last long if students are trained in developing knowledge. Science learning requires science literacy and science process skills.

All elementary schools in the Gugus Palapa in district of Kaliwungu have implemented the Merdeka Curriculum at grades I to VI. The IPAS learning process in the school has been carried out quite well, but there are still some shortcomings that have an impact on students' low mastery of knowledge competencies. Based on the results of interviews on July 19, 2022 with several fourth grade teachers in several schools in the Palapa Cluster, it was explained that most students did not master IPAS learning. Students' analytical skills in IPAS learning are considered to be lacking. The material in IPAS learning that is difficult to understand and often causes misconceptions is abiotic material or discusses natural phenomena related to surrounding objects.

Based on observations made in early August 2024 in several schools in the Palapa cluster, it shows that the average percentage of daily IPAS scores on the material on the form of substances and their changes has not been able to reach the good category based on the predetermined assessment reference benchmark (PAP) (70). More than 50% of student scores are below PAP. At SDN Bangkalan 1 Krapyak, the class average score was 53 in the IPAS lesson.

2. Literature Study

Based on the description above, the researcher will conduct a study with the title "The Effect of Problem Based Learning and Discovery Learning on the Science Literacy of Grade IV Students on the Material of Substance Form and Its Transfer in the Palapa Cluster, Kaliwungu Sub-district".

2.1 Definition of Problem Based Learning (PBL)

Problem-based learning is a learning model that uses real problems accompanied by activities to summarize information, assess its logic and validity in a context to be applied in overcoming problems and creating a better understanding of learning material (Alatas & Fauziah, 2020). Problem Based Learning (PBL) is a learning activity that makes students the center of learning to study a material by finding solutions to problems (Zulfa et al., 2022). Problem Based Learning learning model is a learning model that makes problems and questions the focus of learning so that it stimulates students to get involved in solving them (Widiana et al., 2020). The Problem Based Learning learning model is defined as a learning model with a stimulus in the form of authentic problems with the aim that students can develop thinking and problem solving skills (Hafizah & Nurhaliza, 2021).

Problem-based learning model is a learning model designed so that students gain important knowledge, which makes them proficient in solving problems, and have their own learning model and have the skills to participate in teams (As'ari et al, 2017: 23). According to Paloloang (2014), Problem Based Learning is a learning model focused on organized learning experiences including investigation and problem solving, especially problems related to everyday life. Problem-based learning model is a learning model that is a learning model that trains students to use problem-solving skills (Putra, et al, 2012: 22).

According to As'ari, et al (2017: 27) the implementation steps of the problem-based learning model have five phases, namely: (1) Orient students to the problem, (2) Organize students (3) Guide individual and group investigations (4) Develop and present work (5) Analyze and evaluate the problem solving process. The syntax of Problem Based Learning is presented as a table 1 below:

Table 1. Syntax of Problem Based Learning Model

Stages	Teacher Activities	Learner Activities
Problem orientation	The teacher shows a phenomenon that can be used as a stimulus for students to discover	Learners formulate a problem based on a phenomenon that is presented by the teacher.
Organizing activities	The teacher forms groups of learners to investigate and find solutions to problems.	Learners join in accordance with the predetermined groups then begin to organize the investigation to find solutions to problems.
Mentoring inquiry	The teacher monitors the work of each group to provide input and guidance on the method chosen in solving the problem whether it is effective or not.	Learners conduct investigations and search for information to find solutions to existing problems. Information search can be done through the literature review method, interviews, observations, and so on.
Presenting results	The teacher gives the opportunity to group to present solutions to problems.	Learners with their group present work in the form of solutions to problems that have been formulated at the beginning of learning.
Analysis and evaluation	The teacher guides the discussion between groups and invites all learners to analyze and evaluate the solutions presented by other groups.	Learners together with their group receive feedback in the form of evaluation and analysis of the advantages and disadvantages of other groups on the solutions produced to overcome problems.

Based on the explanation above, the steps of problem-based learning in this study As'ari, et al (2017: 27) are 1) Orient students to the problem, 2) Organizing students, 3) Guiding individual and group investigations, 4) Developing and presenting work, 5) Analyzing and evaluating the problem-solving process.

2.2 Definition of Discovery Learning

The discovery model is a learning model developed based on the view of constructivism. According to Kurniasih & Sani (2014: 64) discovery learning is defined as a learning process that occurs when learning material is not presented in its final form, but students are expected to organize it themselves. Furthermore, Sani (2014: 97) revealed that discovery is finding concepts through a series of data or information obtained through observation or experiment. A further statement was made by Hosnan (2014: 282) that discovery learning is a model to develop an active way of learning by discovering for themselves, investigating for themselves, then the results obtained will be loyal and long-lasting in memory. Wilcox (Hosnan, 2014: 281) states that in discovery learning, students are encouraged to learn mostly through their own active engagement with concepts and principles and teachers encourage students to have experiences and conduct experiments that allow them to discover principles for themselves.

Bell (in Hosnan, 2014: 284) suggests some specific objectives of discovery learning, which are as follows.

1. In discovery students have the opportunity to be actively involved in learning. Reality shows that many students' participation in learning increases when discovery is used.
2. Through discovery learning, students learn to find patterns in concrete and abstract situations, as well as extrapolate additional information provided.
3. Students also learn to formulate non-ambiguous questioning strategies and to use questioning to elicit information that is useful in discovering.

4. Discovery learning helps students form effective ways of working together, sharing information, and listening to and using the ideas of others.
5. There are several facts that show that skills, concepts and principles learned through discovery are more meaningful. Skills learned in discovery learning situations are, in some cases, more easily transferred to new activities and applied in new learning situations.

2.3 Definition of Science Literacy

Science literacy is defined as the ability to apply the knowledge and skills possessed to analyze and think critically and communicate the results of their reasoning on problems faced in everyday life (Rusilowati, 2018). Science literacy is the ability to understand, inform and implement science in the process of solving a problem (Daniah, 2020). Science literacy is the ability to understand science including knowledge, skills, and attitudes in creating critical thinking and contributing to the resolution of science issues (Sutrisna, 2021). Science literacy is defined as the ability to use scientific principles and knowledge in order to understand natural phenomena that occur.

Based on several opinions from experts about science literacy, it can be concluded that science literacy is one of the important 21st century skills possessed by a person to use science as knowledge, skills, and attitudes that can be applied as a form of contribution in solving problems or issues related to science that occur in everyday life. In short, someone who has science literacy is someone who is "literate" in science, so that they can explain scientific phenomena that occur in everyday life and use this scientific knowledge to make decisions in the form of solutions and solve real problems.

Science literacy aims to form a person who is accustomed to thinking critically, sensitive to the environment, and able to apply their scientific knowledge to solve real problems that occur and are experienced by many people (Zulfa & Haryanto, 2021).

2.4 Science Literacy Indicators

To measure the level of science literacy ability in a person, there are several indicators that become the benchmark of science literacy ability. PISA in 2015 conducted an assessment related to the science literacy skills of students based on four aspects, namely context, knowledge, competence, and attitude which are further explained in the PISA 2015 Science Literacy Assessment Aspects.

Table 2. Aspects of PISA 2015 Science Literacy Assessment

No.	Stages of Critical Thinking	Indicator
1	Context	Current and past personal, local, and global issues that require an understanding of science and technology (health, environmental quality, natural resources).
2	Knowledge (understanding of key facts, concepts, and theories that form the basis of scientific knowledge)	a. Content knowledge (knowledge related to the occurrence of natural or science and technology phenomena and their impact on life) b. Procedural knowledge (knowledge related to how science concepts and ideas are discovered and can support the process of collecting, analyzing, and interpreting data) c. Epistemic knowledge (knowledge related to the rationale underlying science discovery procedures and the conceptual truth of science concepts and ideas.
3	Competence	a. Ability to explain scientific phenomena b. Ability to evaluate and design scientific discoveries c. Ability to interpret data and evidence in a

The four aspects of science assessed by PISA are interconnected. For example, in terms of explaining scientific phenomena, it requires content knowledge. Meanwhile, the competency to evaluate and design scientific discoveries and assess scientific approaches requires more than just content knowledge, but also requires procedural knowledge and epistemic knowledge.

2.5 Forms of Substances and Their Displacement

2.5.1 Mass and Volume

The universe we live in is made up of a lot of matter. Matter is anything that has mass and occupies space. Some matter is in the form of living things like us (humans), animals, plants, fungi and bacteria. There are also non-living things or what we often call objects, such as books, blackboards, clouds, sky, soil etc.

Mass is the quantity of an object. When an object has mass, it is matter. The mass of one object can be different from the mass of another object. For example, the mass of 1 egg is certainly different from the mass of 1 piece of clothing. The difference in mass between one object and another is caused by the amount of substance in the object. For example, when nothing is placed on the scales, both scales will be balanced. However, when an object such as a pebble is placed on one of the scales, the scales will tilt to one side. This shows that the pebble or object placed on the scale has mass.

2.5.2 Substance Form

Discussing the change of form in an object will not be separated from the discussion of the substance itself. Grameds must have often encountered objects that easily change shape. To experience the process of changing its form, the substance usually has properties or characteristics before or after the change of form. The following are the properties of objects that Grameds need to know to change their form, such as solid objects, liquid objects, gaseous objects.Changes in the form of Substances

In general, there are six changes in the form of objects, namely melting, freezing, evaporating, condensing, sublimating, and crystallizing. Examples of changes in the form of objects can be found in everyday life. The following is an explanation of each change in the form of objects and examplesThe form of substances can change, such as ice cream eaten by Banu, from solid form to liquid form. In this article, we'll discuss some of the best ways to make the most of your time in the kitchen, and how to make the most of your time in the kitchen.

3. Methodology

The research method is a scientific way to get data with specific purposes and uses (Sugiyono, 2019). According to Rahardjo, (2017) the research method is a way to obtain and seek truth that is tentative, not absolute truth. The result is scientific truth. Scientific truth is a truth that is open to be continuously tested, criticized and even revised. Therefore, there is no best method to find the truth, but what exists is the right method for certain purposes according to the existing phenomena.

The research design used in this study was in the form of a non-equivalent control group design (pretest-posttest control group design without randomization), the researcher used this experimental method to use the Pre-Experimental Design experimental form, OneGroup Pretest-Posttest experimental design. According to Soegiyono (2019: 21) the style of this design has a pre-test before treatment. This makes it easier to assess the results of treatment more accurately, because the treatment is compared to the situation before it was undertaken. So the results of the treatment given by the researcher can be seen more thoroughly and precisely, because the researcher can compare in the atmosphere before giving treatment, and after giving treatment Where in this design the test is carried out twice, namely before the experiment / initial test (O1, 02, and O3). Called pretest, and after the experiment / final test (O4, 05, and O6) called posttest. The difference between O1 and O2 is assumed to be from the treatment (experiment).

Table 3. Research design

Group	Pretest	Treatment	Postes	Improved
$E1$	$O1$	$X1$	$O2$	$Y1$
$E2$	$O3$	$X2$	$O4$	$Y2$
K	$O5$	X	06	$Y3$

Population is a generalization area consisting of objects or subjects that have certain qualities and characteristics set by researchers to study and then draw conclusions (Sugiyono, 2017: 297).The population in this study were all fourth grade students of public elementary schools in Gugus Palapa, Kaliwungu District.

Table 4. Research Population

No.	Location	Number of Learners
1	SDN 1 Bakalan Krapyak:	22
2	SDN 2 Bakalan Krapyak	20
3	SDN 3 Bakalan Krapyak	27
4	SD 1 Prambatan Kidul	16
	Total	85

The sampling technique is purposive sampling. According to Sugiyono (2018: 85) that purposive sampling is a data source sampling technique with certain considerations. The reason for using purposive sampling technique is because not all samples have criteria that match the phenomenon under study. Therefore, the author chose the Purposive Sampling technique which sets certain considerations or criteria that must be met by the samples used in this study. These considerations are that the 3 schools have all used the independent curriculum, have almost the same student characteristics, facilities and infrastructure are also the same. And the level of ability of students from the three schools is almost the same. The following is the number of samples from the study.

Table 5. Research Sample

No.	Research Location	Number of Students	Description
1	SDN 1 Bakalan Krapyak:	22	Conventional
2	SDN 2 Bakalan Krapyak	20	problem based learning
3	SDN 3 Bakalan Krapyak	26	discoverylearning

To test the validity of each item, it was tested on 30 fourth grade students outside the sample, namely at SDN 3Prambatan Kidul. The validity calculation is calculated by the product moment formula through the SPSS version 23 application with the analyze – scale – reliability analysis menu. The results of rcount n are then consulted with Ttable which is obtained the critical price of r product moment. If rxy>Table means the item is valid and if Ixy <Table means the item is invalid.

The criteria for a research instrument is said to be reliable using this technique, if the reliability coefficient r1>0.6. The reliability classification used.

Table 6. Reliability Categories

Limitations	**Category**
0,80-1,000	Very high
0,60-0,799	High
0,40-0,599	Simply
0,20-0,399	Low
0,00-0,199	Very low

The calculation of the reliability of the critical thinking ability test questions was carried out with the help of the SPSS Statistic 23 program. The results of the reliability test are as follows:

Table 7. Problem Reliability Test Results

Variables	Alpha Coefficient Cronbach's	Decision
20 Questions	0,914	Reliable / very high

Based on the reliability test table, it shows that of the 20 limited description questions, Cronbach's alpha is 0.914. which means 0.914>0.6.. so it is declared reliable. The reliability category is included in the very high category.

The level of difficulty is the quality or quality of each test item. Questions that have a level of difficulty can be seen from the answers of students. To calculate the level / difficulty index of each item.

Table 8. Criteria for Level of Difficulty

Difficulty Index	**Criteria**
0,00-0,30	Difficult
0,31-0,70	Medium
0,71-1,00	Easy

4. Finding

This research was conducted in 3 schools in one cluster, namely SDN 1 Bakalan Krapyak, SDN 2 Bakalan Krapyak, and SDN 3 Bakalan Krapyak in the Gugus Palapa of district Kaliwungu, Kudus Regency. The research sample was class IV in the 3 elementary schools. The implementation of research in these schools is certainly carried out at the same time, but is adjusted to the conditions of each school. This research begins with the implementation of instrument trials carried out at SDN 3 Prambatan Kidul which is located in a different cluster from the elementary school that is the sample of this study.

The data obtained in this study consisted of data from the pre-test and post-test results, in the control class and experimental class. The pre test results are used as data to measure the initial competence of science literacy, and the post test results are used to measure the ability of science literacy after implementing learning activities in terms of concept understanding (learning outcomes) in control and experimental classes. The data that researchers describe above, attached to each test and will be used to test the research hypothesis that has been formulated previously. The results of data description analysis are:

Table 9. Pre Test and Post Test Data Analysis

	Class Control	**PBL Class**	**Class Discovery**	**Control Class**	**PBL Class**	**Class Discovery**
Sample Quantity	22	20	26	22	20	26
Mean	40.09	36.10	42.38	63.14	85.40	78.88
Std.Deviation	14.658	13.026	15.541	9.280	11.780	10.491
Minimum	13	13	19	50	56	63
Maximum	69	56	75	81	100	100
Sum	882	722	1102	1389	1708	2051

The post test scores showed that the average score of the control class was 63.14. the problem-based learning class was 85.40 and the discovery learning class was 79.15. This shows that the average of the control class is still below the KKM and the experimental class is above the KKM. This means that the problem-based learning and discovery learning learning models are able to improve students' science literacy skills as indicated by the class average posttest score. Based on the data above, a bar chart can be made for the pre and post test results of each class.

The analysis prerequisite test consists of normality test, data homogeneity test. This prassyrat test is used to test whether the research data is suitable for hypothesis testing, carried out before hypothesis testing.

The normality test in this study used SPSS with the Saphiro-Wilk test normality test The use of the Saphiro-Wilk test is because the number of samples from each class is ≤ 50. The results of the normality test of the pre-test and post-test scores.

The homogeneity test or variance equality test is intended to determine whether the groups in the sample have the same variance or not. If the research data is normally distributed then the homogeneity test is carried out.

The results of the homogeneity test of the post test scores show that the sig count of the dick class and the experimental class (Based on Mean) is 0.156 and the significance value is 0.05, so the sig count> 0.05. From these results it is concluded that the post test scores in the control class and experimental class in this study have the same or homogeneous variance.

Based on the results of the t test hypothesis 1 shows: t count is 6.836 while t table with df = 40 is 2.0210 then 6.836> 2.0210. (tcount> t-table), then Ha is accepted. The sig (2-tailed) value is 0.00 with a significance level of 0.05, then the value of 0.00 <0.05. (sig (2-tailed) < significance) then Ho is rejected and Ha is accepted. Because Ha is accepted, hypothesis 1 is proven, that is, there is a significant effect of Problem Based Learning application on science literacy of fourth grade students on the material of substance form and its transfer in Palapa Cluster, Kaliwungu Sub-district.

Based on the results of the t test hypothesis 2 shows: t count is 6.278 while t table with df = 46 is 2.0129 then 6.278> 2.0129. (tcount> t-table), then Ha is accepted. The sig (2-tailed) value is 0.00 with a significance level of 0.05, then the value of 0.00 <0.05. (sig (2-tailed) < significance) then Ho is rejected and Ha is accepted so that hypothesis 2 is proven, namely there is a significant effect of the application of discovery learning on the science literacy of fourth grade students on the material of the form of substances and their transfer in the Palapa Cluster, Kaliwungu District.

5. Discussion

This study aims to determine the effect of the application of Problem Based Learning (PBL) and Discovery Learning on the science literacy of fourth grade students on the material of the form of substances and their transfer in the Palapa Cluster, Kaliwungu District. This research was conducted on fourth grade students in Gugugs Palapa, Kaliwungu Kudus Subdistrict. The following is a discussion of the research results of each hypothesis.

In the data on the average pre-test and post-test scores in the Problem Based Learning and direct learning classes, there is a difference. This difference shows that there is an increase of 23.05 in the control class and 49.3 in the problem-based learning class. From this result, it can be seen that problem-based learning has increased students' science literacy higher than direct learning. This shows that the effectiveness of problem-based learning is better than the control class. The concept understanding of students who follow the problem-based learning model is better than students who follow conventional learning.

The results of the analysis of the average pre-test and post-test scores in the discovery learning class experienced the same increase as in the control class. The increase in the average value in the guided inquiry class was 36.5. This increase is much higher than the increase in the average value in the control class. Students' science literacy between the experimental and control classes is different because students learn through exploration and inquiry. discovery as a source of learning or learning is not only material sourced from the teacher and during the learning process students are assisted with practicum that can facilitate students in understanding the subject matter.

Based on the results of the gain score test analysis, it can be seen that the learning process with the discovery learning model can improve students' science literacy with a fairly effective category. The discovery learning model was chosen because it has advantages, including the knowledge gained through the discovery process in this method is very personal and powerful because it strengthens understanding, memory and transfer (Mawardi and Mariati: 2016). The description of the research results above means that it is in accordance with the opinions of experts who state that the discovery learning model is more effective for improving the science literacy of the material of the form of objects and their displacement compared to the conventional model. In addition to being in accordance with the opinions of experts, it is also relevant to several studies that have been conducted previously.

The average score of the problem-based learning class experienced a better increase than the discovery learning class. The better increase is because problem-based learning and discovery learning emphasize student activities. Students are seen as subjects of learning so that they must participate actively in learning. While in direct learning children are considered as objects of education so that all activities are centered on the teacher. The results of the t-test in hypothesis 3 and the N-gain test show that there is a difference in the effect of problem-based learning and discovery learning on the science literacy of grade IV students even though it is not significant. Discovery Learning is a learning model that emphasizes the ability of students to find information and understand learning concepts on their own based on their abilities while still being guided and supervised by the teacher to ensure that the information they get is accurate (Nurmawati et al., 2022). This model teaches students to be able to find information and understand learning concepts independently according to their abilities. Fostering students in using reasoning skills based on their knowledge and representing the results of their analysis to draw conclusions or decisions as an understanding of the learning concepts they have obtained. From the results of previous research and studies, it shows that the problem-based learning model compared to discovery learning is able to improve students' thinking skills so that it can be implemented to improve science literacy and hypothesis 3 is proven. Hypothesis 3 obtained data that problem-based learning and discovery learning models can improve the science literacy of fourth grade students better than direct learning.

6. Conclusion and Recommendation

Based on the results of the research and discussion that has been carried out with the title of the effect of problem-based learning and discovery learning on the science literacy of fourth grade students on the material of the form of substances and their transfer in the Palapa Cluster, Kaliwungu District. it can be concluded that:

1. There is an effect of problem-based learning on science literacy of fourth grade students on the material of substance form and its transfer in Palapa Cluster, Kaliwungu Sub-district. This is because problem-based learning is able to direct students to understand the problem and involve students actively in solving science problems.
2. There is an effect of discovery learning on science literacy of fourth grade students on the material of substance form and its transfer in Palapa Cluster, Kaliwungu Sub-district. This is because discovery learning is able to make learning more meaningful, because it covers three aspects namely cognitive, affective, and psychomotor experiencing balanced development. and students
3. There is a difference in the effect of problem-based learning and discovery learning on science literacy of fourth grade students on the material of the form of substances and their displacement in the Palapa Cluster, Kaliwungu District. Based on the average value of the effectiveness of the problem-based learning model) is better than the discovery learning model and direct teaching on science literacy of fourth grade students on the material of the form of substances and their displacement.

Based on the conclusions analyzed and the research above, the researcher provides the following suggestions:

1.For Teachers

Based on the research results, teachers should use problem-based learning to improve students' science literacy.
Teachers should be able to develop learning models that are adapted to local characters in schools.
Teachers must be able to innovate in learning both methods, learning models, administration and learning media.

Teachers must be able to make learning more meaningful in the hearts of students so teachers must be more creative in learning.
Improve competence for teachers, especially pedagogical competence, so that they can carry out learning optimally and can improve student learning achievement so that learning objectives are achieved.
Actively participate in KKG activities, training and seminars to increase experience and knowledge in order to improve teaching skills.

2.For Students
Students must be active in every learning activity, because student activeness in the classroom will liven up the classroom atmosphere which has the potential to improve science literacy.
Students can utilize and use facilities in schools and the environment actively and independently to improve their knowledge and skills.

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Conflict of Interest

The authors declare there is no conflict of interest.

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