



# The Effect of Problem Based Learning Model toward the Ability of Science Literacy in 3<sup>rd</sup> Grade Students

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**Abstract:** The purpose of this study was to analyze how much influence the use of a problem-based learning model on the ability of science literacy learners in Learning Natural Sciences class III Makassar State Elementary School. This study uses the experimental method, and the form of research is a quasi-experiment. With the design of posttest only control design, and sampling techniques using purposive sampling. Based on the results of data analysis, the average post-test in the experimental class was 33.82 while in the control class was 23.18. Hypothesis test results using T-test with Mann Withney formula, obtained by Asymp. Sig (2-tailed) 0.014. The value of asymptotic significance in the calculation of the t-test is smaller than the significance level of 0.05, thus the HA is accepted, so that from the test results there is a significant influence between the results of scientific literacy students who use problem-based learning model.

**Keywords:** Learning model; Problem based learning; Scientific literacy

## Introduction

Everyone should have scientific knowledge that includes scientific knowledge, scientific process skills and scientific literacy. The development of scientific culture is important. Everyone should have scientific knowledge that includes scientific knowledge, scientific process skills and scientific literacy. With scientific literacy, individuals or communities can use their knowledge to identify questions and draw evidence-based conclusions to make decisions about nature and changes through people (Apriana, 2023). Scientific literacy according to the PISA explanation is defined as the ability of individuals to devote attention to topics related to science and scientific ideas as a form of individual reflection (Khery, 2022). Science literacy is the quality of learners in understanding everyday problems associated with the material that has been studied, so as to be able to be positive and sensitive about themselves and the environment, and involve them in problem solving so that they have a broader perspective and

better sensitivity in making scientific decisions about themselves and their environment (Ulfa, 2017).

One way to improve science literacy that teachers can do is to apply a learning model that is able to encourage students to build their concepts, through a contextual scientific approach. But the fact is that in schools, learning is carried out without the participation of students to play an active role in learning, especially in developing the process of scientific literacy (Aiman & Ahmad, 2020). Science Learning places more emphasis on cognitive learning outcomes, and yet many teachers aim at habituation and improvement of science literacy ability. Teachers are more just transferring their knowledge to students, without allowing students to build and develop their knowledge. Learning conditions like this, make learners not have the opportunity to develop a scientific attitude to improve the ability of scientific literacy.

Problem based learning is an educational process that challenges students to learn and solve real-world problems as a team (Hotimah, 2020). This problem-based learning Model is widely used in subjects by

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teachers to train the ability and analyze and sensitivity of students to their environment. Science subjects become one of the subjects that are suitable to be studied using a problem based learning model. In this regard, in carrying out this learning model, teachers and students must have an interest in high literacy. This is because, to find a solution to a problem in the material studied must be through the assessment and references that support it (Aiman & Ahmad, 2020).

Based on the results of observations obtained at SDN 08 Makassar, there are several problems found in science learning, especially related to scientific literacy which is still very low. This is because when the learning process is carried out there is no participation of students to play an active role in learning, especially developing the process of science literacy. Then the learning is still focused on the teacher is still less actively involved learners, causing most learners not able to connect the material with the knowledge they have in everyday life. Seeing such conditions, there must be special innovations for science learning to make it easier for learners to improve literacy skills in applying science concepts so that maximum results are achieved.

Problem Based Learning (PBL) is learning that emphasizes inquiry. For the first time, PBL was implemented in 1950 at the Medical School of McMaster University in Canada. Baden (2004) states that PBL is a situation where learners are faced with problem situations, incomplete information, and questions that have no answers. Problem-based learning is a learning style designed to stimulate students' higher-level thinking in real-world problem-oriented situations, including learning (Eviani, 2014). Based on the understanding of the problem-based learning model that has been presented, it can be understood that the problem-based learning model is a learning model that emphasizes stimulating questions or problems that stimulate learners to think.

Problem-based learning is a model that allows students to develop and refine their thinking through group planning or group work, enabling students to improve, test, and grow (Susilo et al., 2012; Sunaryo, 2014; Susanto, 2014; Utomo et al., 2014; Salma & Amin, 2014; Supiandi & Julung, 2016; Mufangati & Juarsa, 2018). Characteristics of problem-based learning include the first problem becomes the starting point for learning, the second problem arising in the unstructured real world, the third problem requiring multiple perspectives, the fourth problem posing a challenge to the knowledge, attitudes, and abilities of students, who then need to identify learning needs and other learning areas, the fifth learning becomes self-directed they show, the sixth use of different media, data sources, and analysis is a key part of PBL, the seventh teaching

collaboration, communication, collaboration, the eighth analysis, problem-solving skills, and improving developmental progress is important (Defiyanti & Sumarni, 2020; Amalia et al., 2020; Amini et al., 2021; Hidayanti & Wulandari, 2023). To find solutions to problems based on knowledge, and lastly to open up the PBL system, including curriculum integration and completeness (Shadiq, 2010; Kemdikbud, 2013; Bandi et al., 2015).

The use of the PBL model can allow students to be active and independent in the collection of knowledge. In addition, PBL can improve problem-solving skills because it provides problems that require students to analyze the problems they face and find solutions (Saputri & Febriani, 2017; Oktaviani & Tari, 2018; Herdiawan et al., 2019; Budiarti & Airlanda, 2019; Ramadhani, 2021; Hagi & Mawardi, 2021; Permata et al., 2022). The appropriate learning Model for overcoming the problems that occur is problem-based. The reason for using this teaching model is that students learn to remember, apply and carry out the learning process. Students are given free therapy to practice problem-solving skills.

The previous research by Aiman et al. (2020) is related to this research, which stated that the main aim of this research was to determine the increase in scientific literacy skills of students who studied the PBL model and were taught the expository method. Quasi experimental research and post-test only control group design. Scientific literacy data is obtained through tests. The conclusion is that the PBL model increases scientific literacy in 5<sup>th</sup> grade students of Muhammadiyah Elementary School, Kupang.

Based on the description of the background above, it can be revealed that the problem-based learning model is thought to influence science learning, especially scientific literacy. However, the magnitude of this influence is not yet known. Therefore, it is necessary to research "The Effect of Problem Based Learning Model toward the Ability of Science Literacy in 3<sup>rd</sup> Grade Students."

## Method

This study uses quantitative research. Quantitative research is research whose activities are the collection, processing, analysis and presentation of data based on objective quantitative or quantitative analysis to solve a problem or test a hypothesis to develop general principles (Duli, 2019). This research is a quasi-experimental research which only uses a posttest design. There are two types of groups in quasi-experimental research, namely the control group and the experimental group (Sugiyono, 2013). Quasi-experimental research

design posttest only control design emphasizes the comparison of treatment between the two groups, namely the control group with the experimental group, which experimental group is a group that is given special treatment, in this study video tutorial (as an independent variable), while the control group did not get special treatment, does not use video tutorials.

The use of quasi-experiment is because in the field of education is often difficult to conduct experiments purely because in this case the subject (students) is not something that can be moved, treated, and arranged exactly how in experimental research.

**Table 1.** Post-Test Design Only

Group	Treatment	Post-Test
R1	X	O2
R2		O4

Description:

R1 = experimental group

R2 = control group

X = treatment using a problem-based learning model

O2 = test for the experimental group

O4 = test for the control group

In this research, researchers used non-probability sampling techniques. Non-probability sampling is a sampling method that is not random. Then the researchers also chose a sampling technique with the type of saturation sampling or saturated samples. Saturation sampling is used when all members of the population are used as a sample. Because the total number of students amounted to 56 students, the researchers will take samples and conduct research Class III SDN Makassar 08 Pagi with a total of 56 students.

Test product integrity in the form of certificates and related issues. In this research, the validity test uses construct validity. Validity is an examination of a particular method and the uniqueness of research. Data analysis was conducted using test requirements analysis consisting of two types of tests, namely normality test and homogeneity test. As for hypothesis testing using T-tests.

## Result and Discussion

The research that has been carried out by the researchers obtained some data that can then be analyzed to determine the results of research and hypotheses obtained. Testing the requirements of this analysis is done by testing the normality and homogeneity of the data that has been obtained.

### Normality Test

A normality test was conducted on each group to determine whether the population of normally distributed data or not. All calculations were performed using computer assistance with the Statistical Package for Social Science (SPSS) version 26 with one Sample test Sapiro-Wilk Test. The criteria of the data are said to be normally distributed by looking at the significance of  $p > 0.05$ , but if the significance value of  $p < 0.05$  then the data is not normally distributed. More details can be seen in Table 2.

**Table 2.** Normality Test

Group	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Experimental class	0.13	28	0.20	0.97	28	0.75
Control class	0.13	28	0.20	0.97	28	0.66

Normality test results obtained value  $p = 0.750$  for the experimental class and  $p = 0.667$  for the control class. This shows that  $p > \alpha = 0.05$ . Thus, the score data of students from both groups (experimental class and control class) there is an influence of the problem-based learning model on the ability of science literacy students in Grade III SDN Makassar 08 Pagi.

### Homogeneity Test

The homogeneity test criteria are if the value of significance  $p > 0.05$  then the data is declared homogeneous and if the value of significance  $p < 0.05$  then the data is declared inhomogeneous. Homogeneity test of population variance data learning outcomes to write expository text for the population of this study, using the Test of Homogeneity of Variances. More details can be seen in Table 3.

**Table 3.** Homogeneity Test

	Levene statistic	df1	df2	Sig.
Based on mean	4.34	1	54	0.04
Based on median	4.23	1	54	0.04
Based on median and with adjusted df	4.23	1	46.96	0.04
Based on trimmed mean	4.35	1	54	0.04

Calculation of homogeneity of population variance obtained by the value of  $p = 0.042$  where  $p > \alpha = 0.05$ . Based on the results of these calculations, it is concluded that the population variance is an abnormally distributed data (inhomogeneous). Due to the test prerequisites on the test homogenates distributed data is not normal, then testing this hypothesis using the Mann Whitney Test, to determine the difference in the achievement of student competence in the effect of problem based learning model on the ability of scientific

literacy and groups that do not perform problem based learning model on the ability of scientific literacy in SDN Makassar 08 Pagi. After tests of hypothesis include tests of normality and homogeneity, the next step is the t-test to test the hypothesis.

*T- Test*

This test was conducted using an independent sample t-test to determine the difference in the achievement of student competence in the effect of problem based learning model on the ability of scientific literacy and groups that do not perform problem based learning model on the ability of scientific literacy in SDN Makassar 08 Pagi. In other words, compare the average of two unrelated groups, namely the results in the experimental group and the control group. In this study, the t-test was conducted with the help of SPSS Statistic 26. For the significance level of 0.05. When the value is received (s.) 0.05. Hypotheses in this study are as follows:

Ho: there is no difference in the effect of the problem-based learning model on the ability of science literacy and groups that do not do the Problem Based Learning model on the ability of science literacy in SDN Makassar 08 Pagi.

Ha: there are differences in the effect of problem-based learning models on scientific literacy skills and groups that do not do Problem Based Learning models on scientific literacy skills at SDN Makassar 08 Pagi.

In this study, researchers plan to use the independent sample t-test. Because the prerequisite test on the distributed data homogeneity test is not normal, testing this hypothesis using the Whitney Test, to determine the difference in the effect of the problem-based learning model on the ability of scientific literacy and groups that do not perform problem-based learning model on the ability of scientific literacy in SDN Makassar 08 Pagi. The purpose of the Mann-Whitney test is to determine whether there are differences in two unpaired samples. The Mann-Whitney test is a non-parametric statistic, so the Mann-Whitney test does not require normally distributed and homogeneous survey data. As for the decision criteria, if the Whitney value of asymp.sig is <0.05, then the hypothesis is accepted. However, the hypothesis is rejected if the value of asymp.sig > 0.05.

**Table 4.** Table Rank Mann Whitney

Group	N	Mean rank	Sum of ranks
Experimental class	28	33.82	947.00
Control class	28	23.18	649.00
Total	56		

From the above table, we can conclude that the mean value of the experimental class is 33.82 and the

mean value of the control class is 23.18. Therefore, the mean value of the experimental class is higher than that of the control class.

**Table 5.** Table Statistics Mann Whitney

	Student scores
Mann-whitney u	243.000
Wilcoxon w	649.000
Z	-2.451
Asymp. Sig. (2-tailed)	0.01

Based on the Mann-Whitney test, it can be concluded that Ho is rejected because the GIS value is obtained. (2-tailed) by 0.0 which means smaller than 0.05. That is, there are differences in the achievement of student competence in the effect of problem-based learning models on the ability of scientific literacy (experimental class) and groups that do not do Problem-Based Learning models on the ability of scientific literacy (Control class) at SDN Makassar 08 Pagi. The conclusion that can be drawn is that the use of a problem based learning model is an effective learning method used in improving students ' scientific literacy skills. Analysis of posttest results in the experimental group and control group using Mann-Whitney t-test. The improvement of the experimental group results is influenced by the methods used in the study, namely the use of problem based learning models can improve students' scientific literacy skills.

**Conclusion**

There are results obtained from the t-test calculation using Mann Whitney with Asymp. Sig (2-tailed) 0.014. The significance Asymp value in the t-test calculation is smaller than the significance level of 0.05, so from the test results, there is a significant influence on the scientific literacy results of students who use the problem-based learning model. The problem-based learning model can have an influence on student learning outcomes in science literacy for class III students at SDN Makasar 08 Pagi which can be seen from the students' average score. The average score obtained for class III A as the experimental class or the class that uses the problem-based learning model gets an average score of 33.82 and the average score obtained for class II B as the control class or the class that does not use the problem-based learning model gets the average value is 23.18. From this average value, it can be concluded that the average scientific literacy results of students who use the problem-based learning model are much higher than the average scientific literacy abilities of those who do not use the problem-based learning model.



**Author Contributions**

Uswatun Hasanah conceptualized the research idea, designed of methodology, analyzed data, conducted a research and investigation process, management and coordination responsibility; Prima Mutia Sari conducted literature review and provided critical feedback on the manuscript.

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**Conflicts of Interest**

The author declared no conflict of interest.

**References**

- Aiman, U., & Ahmad, R. A. R. (2020). Model Pembelajaran Berbasis Masalah (PBL) terhadap Literasi Sains Siswa Kelas V Sekolah Dasar. *Jurnal Pendidikan Dasar Flobamorata*, 1, 1-5. <https://doi.org/10.51494/jpdf.v1i1.195>
- Amalia, F., Reffiane, F., & Subekti, E. E. (2020). Pengaruh Model Problem-Based Learning (PBL) Berbasis Etnosains terhadap Hasil Belajar IPA di Sekolah Dasar. *DWIJALOKA: Jurnal Pendidikan Dasar dan Menengah*, 1(3), 362-369. <https://doi.org/10.35473/dwijaloka.v1i3.694>
- Amini, J. N., Irwandi, D., & Bahriah, E. S. (2021). The Effectiveness of Problem-Based Learning Model Based on Ethnoscience on Student'S Critical Thinking Skills. *JCER (Journal of Chemistry Education Research)*, 5(2), 77-87. <https://doi.org/10.26740/jcer.v5n2.p77-87>
- Apriana, I. W. D. (2023). Pengaruh Model Heuristik Vee Berorientasi Etnografi terhadap Berpikir Kritis dan Literasi Sains Siswa Sekolah Dasar. *JIKAP PGSD: Jurnal Ilmiah Ilmu Kependidikan*, 7(2), 234-241. <https://doi.org/10.26858/jkp.v7i2.42538>
- Baden, C. H. M. S. (2004). *Foundations of Problem-based Learning*. London: Open University Press.
- Bandi, N. T. L., Hasnawati, H., & Ikman, I. (2015). Pengaruh Model Pembelajaran Berbasis Masalah terhadap Hasil belajar Matematika Siswa Kelas VIII SMP Negeri 12 Kendari. *Jurnal Penelitian Pendidikan Matematika*, 3(3), 69-82. <http://dx.doi.org/10.36709/jppm.v3i3.3022>
- Budiarti, I., & Airlanda, G. S. (2019). Penerapan Model Problem Based Learning Berbasis Kearifan Lokal untuk Meningkatkan Keterampilan Berpikir Kritis. *Jurnal Riset Teknologi dan Inovasi Pendidikan*, 2(1), 167-183. Retrieved from <https://journal.rekarta.co.id/index.php/jartika/article/download/278/271>
- Defiyanti, D., & Sumarni, W. (2020). Analisis Kemampuan Berpikir Kritis setelah Penerapan Problem-Based Learning Berbantuan Lembar Kerja Peserta Didik Bermuatan Etnosains. *Phenomenon: Jurnal Pendidikan MIPA*, 9(2), 206-218. <https://doi.org/10.21580/phen.2019.9.2.4200>
- Duli, N. (2019). *Metodologi Penelitian Kuantitatif: Beberapa Konsep Dasar untuk Penulisan Skripsi & Analisis Data Dengan SPSS (1st ed.)*. Yogyakarta: Deepublish Publisher.
- Eviani, S. U. (2014). Pengaruh Model Pembelajaran Berbasis Masalah terhadap Kemampuan Literasi Sains IPA Kelas V SD. *Jurnal Pendidikan dan Pembelajaran Katulistiwa*, 3(7), 1-13. <http://dx.doi.org/10.26418/jppk.v3i7.5862>
- Hagi, N. A., & Mawardi, M. (2021). Model Problem Based Learning untuk Meningkatkan Keterampilan Berpikir Kreatif Siswa Sekolah Dasar. *Jurnal Ilmu Pendidikan*, 3(2), 463-471. <https://doi.org/10.31004/edukatif.v3i2.325>
- Herdiawan, H., Langitasari, I., & Solfarina, S. (2019). Penerapan PBL untuk Meningkatkan Keterampilan Berpikir Kreatif Siswa pada Konsep Koloid. *Jurnal Kimia dan Pendidikan*, 4(1), 24-35. <http://dx.doi.org/10.30870/educhemia.v4i1.4867>
- Hidayanti, I., & Wulandari, F. (2023). The Effect of Problem-Based Learning Based Ethnoscience on Science Literacy Ability of Elementary School. *Edunesia Jurnal Ilmiah Pendidikan*, 4(3), 967-982. <https://doi.org/10.51276/edu.v4i3.475>
- Hotimah, H. (2020). Penerapan Metode Pembelajaran Problem Based Learning dalam Meningkatkan Kemampuan Bercerita pada Siswa Sekolah Dasar. *Jurnal Edukasi*, 7(3), 5-11. <https://doi.org/10.19184/jukasi.v7i3.21599>
- Kemdikbud. (2013). *Pendekatan Scientific (Ilmiah) dalam Pembelajaran*. Jakarta: Pusbangprodik.
- Khery, M. S. Y. (2022). Konseptualisasi Literasi Sains Mengacu pada Kerangka sains PISA Sejak Tahun 2000. *Educatoria: Jurnal Ilmiah Ilmu Pendidikan*, 200-231. <https://doi.org/10.36312/ejiip.v2i4.117>
- Mufangati, U. A., & Juarsa, O. (2018). Penerapan Model Problem Based Learning untuk Meningkatkan Kemampuan Memecahkan Masalah Soal. *TRIADIK*, 17(1), 32-45. <https://doi.org/10.33369/triadik.v17i1.11113>
- Oktaviani, L., & Tari, N. (2018). Penerapan Model Pembelajaran Berbasis Masalah untuk Meningkatkan Kemampuan Pemecahan Masalah IPA pada Siswa Kelas VI SD No 5 Jineng Dalem. *Jurnal Ilmu Pendidikan*, 5, 9-14. <https://doi.org/10.17509/pdgia.v16i1.10718>
- Permata, S. A. I., Sunarno, W., & Harlita, H. (2022). The Effect of the Problem Based Learning and Double Loop Problem Solving Learning Models on Problem Solving Ability in Term of Creative Thinking on Environmental Pollution Material.

- Jurnal Penelitian Pendidikan IPA*, 8(6), 2647–2653.  
<https://doi.org/10.29303/jppipa.v8i6.1996>
- Ramadhani, H. P. (2021). Peningkatan Kemampuan Pemecahan Masalah Pembelajaran IPA tentang Siklus Air melalui Model Pembelajaran Problem Based Learning. *Jurnal Ilmiah Kependidikan*, 9(1), 148–153. <https://doi.org/10.20961/jkc.v9i1.53803>
- Salma, U., & Amin, S. M. (2014). Profil Kemampuan Estimasi Siswa Sekolah Dasar dalam Menyelesaikan Soal Cerita. *Jurnal Pendidikan Matematika*, 3(1), 172-180. Retrieved from <http://ejournal.unesa.ac.id/index.php/mathedunesa/article/view/7325>
- Saputri, D. A., & Febriani, S. (2017). Pengaruh Model Problem Based Learning (PBL) terhadap Kemampuan Pemecahan Masalah Peserta Didik pada Mata Pelajaran Biologi Materi Pencemaran Lingkungan Kelas X MIA SMAN 6 Bandar Lampung. *Jurnal Tadris Pendidikan Biologi*, 8(1), 40–52. <https://doi.org/10.24042/biosf.v8i1.1262>
- Shadiq, F. (2010). *Pembelajaran Matematika dengan Pendekatan Realistik di SMP*. Jakarta: Kemendiknas.
- Sugiyono, S. (2013). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Jakarta: Alfabeta.
- Sunaryo, Y. (2014). Model Pembelajaran Berbasis Masalah untuk Meningkatkan Kemampuan Berpikir Kritis dan Kreatif Matematik Siswa SMA di Kota Tasikmalaya. *Jurnal Pendidikan dan Keguruan*, 1(2), 41–51. Retrieved from <https://www.neliti.com/publications/209679/model-pembelajaran-berbasis-masalah-untuk-meningkatkan-kemampuan-berpikir-kritis>
- Supiandi, M. I., & Julung, H. (2016). Pengaruh Model Problem Based Learning (PBL) terhadap Kemampuan Memecahkan Masalah dan Hasil Belajar Kognitif Siswa Biologi SMA. *Jurnal Pendidikan Sains*, 4(2), 60–64. <http://dx.doi.org/10.17977/jps.v4i2.8183>
- Susanto, A. (2014). *Teori Belajar dan Pembelajaran di Sekolah Dasar*. Jakarta: Kencana.
- Susilo, A. B., Wiyanto, W., & Supartono, S. (2012). Model Pembelajaran IPA Berbasis Masalah untuk Meningkatkan Motivasi Belajar dan Berpikir Kritis Siswa SMP. *Unnes Science Education Journal*, 1(1), 12–20. <https://doi.org/10.15294/usej.v1i1.849>
- Ulfa, E. S. U. (2017). Pengaruh Model Discovery Learning pada Mata Pelajaran IPA Terpadu terhadap Penguasaan Literasi Sains Siswa. *Prosiding SNFA (Seminar Nasional Fisika dan Aplikasinya)*, 257-268. <https://doi.org/10.20961/prosidingsnfa.v2i0.16408>
- Utomo, T., Wahyuni, D., & Hariyadi, S. (2014). Pengaruh Model Pembelajaran Berbasis Masalah (Problem Based Learning) terhadap Pemahaman Konsep dan Kemampuan Berpikir Kreatif Siswa (Siswa Kelas VIII Semester Gasal SMPN 1 Sumbermalang Kabupaten Situbondo Tahun Ajaran 2012/2013). *Jurnal Edukasi Unej*, 1(1), 5–9. <https://doi.org/10.19184/jukasi.v1i1.1025>