

Application of the Project Based Learning (PjBL) Learning Model to Improve Students' Critical Thinking Abilities in Science Subjects

Nurdin Muhamad¹, Tea Nida Na'afilah², Anton^{3✉}

^{1,2,3} Univeritas Garut, Indonesia

✉ anton@uniga.ac.id

Received: 26-04-2024

Revised: 30-05-2024

Accepted: 02-06-2024

ABSTRACT

This research aims to determine the implementation and improvement of students' critical thinking abilities in science learning by implementing the project based learning (PjBL) learning model in class 5 of SDN Kersamenak 1 Garut. In this research, the method used was experimental quantitative research with the sample in this research involving all grade 5 students. The sample in this research involved all grade 5 students with data collection techniques used pretest-posttest, questionnaires and documentation. The results of this research show that the application of the Project Based Learning (PjBL) model can improve students' critical thinking skills in science learning. To see an increase in students' critical thinking abilities in science learning, this can be seen from students' critical thinking abilities using the application of the Project Based Learning (PjBL) model in class V at SDN Kersamenak 1. In the pretest results, they got an average score of 49.1 while the The average posttest result is 84.8 so it can be concluded from the results of the pretest and posttest comparison that there is an increase in students' critical thinking abilities. There are also N-Gain test results which show a figure of 0.71, which means high value.

Keywords: PjBL learning, critical thinking skills, students

INTRODUCTION

Education is a deliberate and organized effort to build a conducive environment and instructional methodology that empowers students to



proactively cultivate their talents for ethical and moral integrity, self-control, individuality, intelligence, virtuous attitudes, and expertise¹. In the learning process there are developments and changes to the curriculum to achieve the results of the learning process, currently several schools are still using the 2013 curriculum. The 2013 curriculum must identify the young generation of Indonesian technology who as a result of this country's technology live with a talented lifestyle and are a young generation of faith, virtuous, cultured, innovative and advanced and able to contribute their strength and ideas to the development of the nation, state and world. where academic performance standards are updated frequently.

The current curriculum is directed at fostering critical thinking skills. In the 2013 curriculum, learning is integrated into a thematic system². The learning model that is in line with the learning content highlighted by kurtilas prioritizes the learning process and is linked to the use of students' active learning patterns³. The 2013 curriculum contains several scientific disciplines, one of which is Natural Sciences (IPA). Science is an important topic that students must master to gain knowledge about the facts, ideas and procedures involved in creating something. Students will be able to respond to developments in science and technology by being proactive, logical, creative and independent with this knowledge. If instructors can design an acceptable and ideal learning environment, students will learn science in a way that prohibits getting products⁴. Currently, various innovative learning models have been developed to be applied in the science learning process in elementary schools. In science learning, to master science, students must have 21st century skills⁵.

According to Sulaeman, in the 21st century, students undergoing education must have the 4C skills or skills, which refer to critical thinking, communication, creativity and collaboration. If translated it means critical

¹ ¹ -Undang_Republik_Indonesia_Nomor_22_Tahun_2006¹.

² 2020 Pratiwi & Setyanigtyas, *Eka Titik Pratimi*, *Eunice Widyanti Setyaningtyas*², 2020, IV <<https://Jbasic.Org/Index.Php/Basicedu>>.

³ Evi Susanti, 'Kemampuan Berpikir Kritis Siswa Sdn Margorejo VI Surabaya Melalui Model Jigsaw', *Bioedusiana*, 4.2 (2019), 55–64 <<https://doi.org/10.34289/285232>>.

⁴ Iszur Fahrezi, Mohammad Taufiq, and Pendidikan Guru Sekolah Dasar, 'Meta-Analisis Pengaruh Model Pembelajaran Project Based Learning Terhadap Hasil Belajar Siswa Pada Mata Pelajaran IPA Sekolah Dasar', 3.3 (2020) <<https://doi.org/10.23887/jppg.v3i3>>.

⁵ Jurnal Penelitian Pendidikan and others, 'Keefektifan Model Project Based Learning Terhadap Peningkatan Hasil Belajar Ipa Di Sekolah Dasar The Effectiveness Of The Project-Based Learning Model Towards Increasing Science Learning Outcomes In Elementary School', 8.2 (2021) <<https://doi.org/10.25134/pedagogi.v8i2.4882>>.

thinking, communication, creativity and collaboration ⁶. According to Alfonso, students need to be taught how to think critically because their critical thinking skills greatly influence the success of learning ⁷.

One of the most significant skills that must be instilled in students is critical thinking if they are to overcome the problems they encounter with scientific topics. To optimize the acquisition of knowledge in the classroom, planning, conducive facilities and advanced learning methods are needed that foster learning experiences in the classroom. The use of creative and unique learning models is a successful strategy for improving science learning achievement ⁸.

Learning models related to learning strategies and learning objectives that will be implemented are part of the educational learning system ⁹. The application of the project-based learning (PjBL) paradigm is a creative and inventive way for students to develop their critical thinking skills. The project based learning model was developed by John Dewey, which involves each student in educational tasks aimed at solving problems both independently and in teams ¹⁰.

The Project Based Learning (PjBL) learning model is a model that creates a product that can encourage students' creativity and critical thinking skills in the learning process so that students can really understand the material being studied.

RESEARCH METHODS

This research uses quantitative research. This research is included in the experimental research category. Experimental research is a quantitative technique used to ascertain, under controlled conditions, the influence of the independent variable (treatment) on the dependent variable (outcome). This research uses a

⁶ Nita Dinda Putriyanti, Tati Sumiati, and Suko Pratomo, *Renjana Pendidikan 1: Prosiding Seminar Nasional Pendidikan Dasar PGSD Kampus UPI Di Purwakarta 2021 Tersedia Daring Pada: [Http://Proceedings.Upi.Edu/Index.Php/Semnaspgsdpnk](http://Proceedings.Upi.Edu/Index.Php/Semnaspgsdpnk) Pengaruh Model Project Based Learning Terhadap Kemampuan Berpikir Kritis Siswa Pada Pembelajaran IPA* <<http://proceedings.upi.edu/index.php/semnaspgsdpnk>>.

⁷ Suyit Ratno And Others, 'Penerapan Model Pembelajaran Project Based Learning Untuk Meningkatkan Kemampuan Berpikir Kritis Siswa Sd Pada Pembelajaran Ipa', *School Education Journal Pgsd Fip Unimed*, 12.4 (2022), 339–45 <<https://doi.org/10.24114/sejpgsd.v12i4.40996>>.

⁸ Susilo Dan Ramdiati, 'Media Publikasi Pada Bidang Pendidikan Dasar', *Jurnal Cakrawala Pendas*, 5.1 (2019), 1–7.

⁹ Putri Khoerunnisa, & Syifa, And Masyhuril Aqwal, *Analisis Model-Model Pembelajaran, Jurnal Pendidikan Dasar*, 2020, IV <<https://ejournal.stitpn.ac.id/index.php/fondatia>>.

¹⁰ Almahida Aureola Dywan And Others, *Efektivitas Model Pembelajaran Project Based Learning Berbasis Stem Dan Tidak Berbasis Stem Terhadap Keterampilan Berpikir Kritis Siswa*, 2020, IV <<https://jbasic.org/index.php/basicedu>>.

pre-experimental design. Because the researcher uses one class as an experimental class, this research uses a pre-experimental design in the form of one group pretest-posttest. Because the study design included a pretest before treatment and a posttest after treatment, researchers were able to compare findings before and after treatment, which made the results of the study treatment more accurate. By comparing the pretest and posttest results, this design was put into practice.

RESULT AND DISCUSSION

The first analysis is the results of an interview with one of the fifth grade students at SDN Kersamenak 1 in implementing the Project Based Learning (PjBL) model in science subjects. From the results of interviews with students regarding the implementation of the Project Based Learning (PjBL) model in improving students' critical thinking skills in science subjects in accordance with the critical thinking ability indicators presented by Ennis, namely abbreviated as FRISCO F (focus), R (Reason), I (Inference), S (Situation) and C (Clarity) and according to the stages of the Project Based Learning (PjBL) model, namely Planning, Creating (implementation) and Processing ¹¹.

The next data analysis is analyzing the data results from the pretest and posttest. The first is the data normality test carried out to find out whether the sample studied has a normal distribution or not. Based on the results of normality data processing for the experimental class with a total sample of 27 students with a normal distribution. It can be proven by normality test results with the following criteria:

1. If the significant value of the normality test is <0.05 then Ho is accepted and Ha is rejected, meaning that the sample is not normally distributed.
2. If the significant value of the normality test is > 0.05 then Ha is accepted and Ho is rejected, meaning that the sample is normally distributed.

The results of the normality test on the pretest and posttest can be seen in the table below:

Table 1 : Normality Results

Class	Result	Conclusion
Experiment Pretest	0,086	Normal
Experiment Posttest	0,095	Normal

¹¹ R. H. Ennis, 'No Title', *He Nature of Critical Thinking : An Outline of Critical Thinking Dispositions and Abilities.*, 2011, Emeritus Proffessor: University of Illinois.

Based on the results of the normality test in the pretest, the value was 0.086, which means it is greater than 0.05 and has a normal distribution. And the results of the posttest normality test which had been given treatment applying the Project Based Learning (PjBL) model to the experimental class obtained a value of 0.095, which means it is greater than 0.05 and has a normal distribution.

After knowing the normality results of the pretest and posttest, the next step is to test homogeneity, but because this research uses one class, it does not use a homogeneity test, because homogeneity aims to show that two or more groups of data samples are taken from a population that has the same variance. Because this research uses one class, it does not carry out a homogeneity test and goes straight to the t test stage.

Based on this, hypothesis testing is carried out using parametric t test statistics with the following test criteria:

1. If the significant value of the t test is > 0.05 then H_0 is accepted and H_a is rejected, meaning there is no influence between the independent variable and the dependent variable.
2. If the significant value of the t test is < 0.05 then H_a is accepted and H_0 is rejected, meaning that there is an influence between the independent variable and the dependent variable.

Table 2 : t -test Results

Pretest	Equal Variances Assumed Sig (2-Tailed)	0,000
Posttest	Equal Variances Assumed Sig (2-Tailed)	0,000

After carrying out the t test on the pretest treatment, the results were Equal Variances Assumed Sig (2-Tailed) 0.00 so that it can be explained as $0.00 > 0.05$ which means that H_a is accepted, which means there are differences in students' critical thinking abilities. And after knowing the normality results of the posttest, the next step, namely the t test on the posttest, got a result of Equal Variances Assumed Sig (2-Tailed) 0.00 so that it can be explained as $0.00 > 0.05$ which means that H_a is accepted, which means there is an increase in critical thinking skills. in science learning using the Project Based Learning (PjBL) learning model.

Strengthened by the N-Gain calculation, namely to determine the increase in learning outcomes between before and after learning. The N-Gain test results can be seen below :

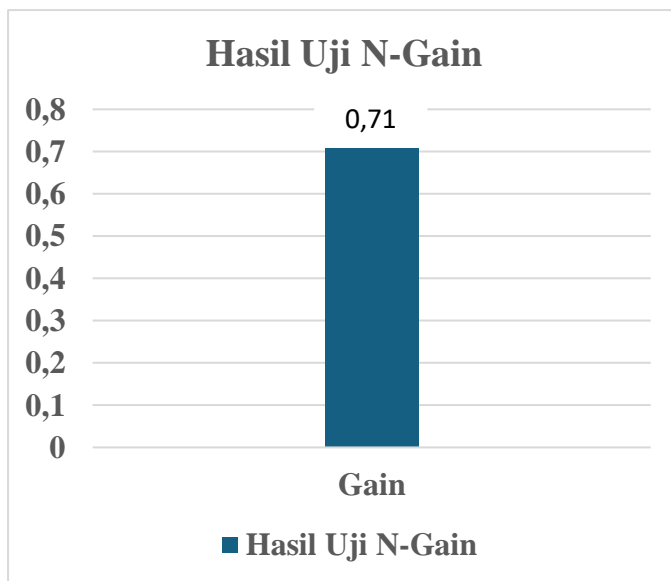


Figure 1:
of N-Gain
Based
N-Gain
in the graph
the

Graph
Results
on the
results
above,

experimental class found a result of 0.71, which means 71% and the interpretation is medium. So it can be concluded that the experimental class with treatment using the Project Based Learning (PjBl) model has increased students' critical thinking skills in science.

Apart from knowing the process or implementation of the Project Based Learning (PjBl) model with interview instruments. Students are also given a questionnaire instrument to determine students' responses to the Project Based Learning (PjBl) model. From the results of the questionnaire obtained, it can be interpreted that students' responses to the Project Based Learning (PjBl) model have a value of 81.8%, which means Good. And the application of the Project Based Learning (PjBl) model can be used to improve students' critical thinking in science and have good responses.

CONCLUSION

The project based learning (PjBl) learning model can improve critical thinking skills in science learning in elementary school students with improvements resulting from the N-Gain test which shows a figure of 0.71, which means high value. Apart from that, to find out students' responses to the project based learning model, it can be seen from the results of questionnaire analysis which obtained an average score of 81.8%, which means good.

REFERENCES

- Aureola Dywan, Almahida, Gamaliel Septian Airlanda, Universitas Kristen Satya Wacana, And Jawa Tengah, *Efektivitas Model Pembelajaran Project Based Learning Berbasis Stem Dan Tidak Berbasis Stem Terhadap Keterampilan Berpikir Kritis Siswa*, 2020, IV <<https://Jbasic.Org/Index.Php/Basicedu>>
- Ennis, R. H., 'No Title', *He Nature Of Critcal Thinking: An Outline Of Critical Thinking Dispositions And Abilities.*, 2011, Emeritus Proffesor: University Of Illinois.
- Fahrezi, Iszur, Mohammad Taufiq, And Pendidikan Guru Sekolah Dasar, 'Meta-Analisis Pengaruh Model Pembelajaran Project Based Learning Terhadap Hasil Belajar Siswa Pada Mata Pelajaran Ipa Sekolah Dasar', 3.3 (2020) <<https://doi.org/10.23887/jippg.v3i3>>
- Khoerunnisa, Putri, & Syifa, And Masyhuril Aqwal, *Analisis Model-Model Pembelajaran, Jurnal Pendidikan Dasar*, 2020, IV <<https://ejournal.stipn.ac.id/index.php/fondatia>>
- Anton, Asif Maulana Muhammad, Lingga Shevila Wigar, Muhammad Faridz Tauzirie, & Syifa Nur Fauziah. (2024). Aksi Generasi Digital yang Berkarakter dan Toleran. *Jurnal Intelek Dan Cendekiawan Nusantara*, 1(2), 679–686. Retrieved from <https://jicnusantara.com/index.php/jicn/article/view/97>
- Penelitian Pendidikan, Jurnal, Nurul Nisah, Aan Widiyono, And Nia Nur Lailiyah, 'Keefektifan Model Project Based Learning Terhadap Peningkatan Hasil Belajar Ipa Di Sekolah Dasar The Effectiveness Of The Project-Based Learning Model Towards Increasing Science Learning Outcomes In Elementary School', 8.2 (2021) <<https://doi.org/10.25134/pedagogi.v8i2.4882>>
- Pratiwi & Setyanigtyas, 2020, *Eka Titik Pratiwi¹, Eunice Widyanti Setyanigtyas²*, 2020, IV <<https://Jbasic.Org/Index.Php/Basicedu>>
- Ijudin, Yasya Fauzan Wakila. 2022. *Implementing Active Learning to Increase Student's Learning Interest in Islamic Religious Education. Jurnal Pendidikan Islam. Vol 8, No 1 (2022, Jurnal Pendidikan Islam*
- Putriyanti, Nita Dinda, Tati Sumiati, And Suko Pratomo, *Renjana Pendidikan 1: Prosiding Seminar Nasional Pendidikan Dasar Pgsd Kampus Upi Di Purwakarta 2021 Tersedia Daring Pada: <http://proceedings.upi.edu/index.php/semnaspgsdpwk> Pengaruh Model Project Based Learning Terhadap Kemampuan Berpikir Kritis Siswa Pada Pembelajaran Ipa* <<http://proceedings.upi.edu/index.php/semnaspgsdpwk>>
- Ratno, Suyit, Mutiara Lubis, Etika Suri, Feby Handari, And Lamria Siringoringo, 'Penerapan Model Pembelajaran Project Based Learning Untuk

Meningkatkan Kemampuan Berpikir Kritis Siswa Sd Pada Pembelajaran Ipa', *School Education Journal Pgsd Fip Unimed*, 12.4 (2022), 339–45
<<https://doi.org/10.24114/sejpgsd.v12i4.40996>>

Susanti, Evi, 'Kemampuan Berpikir Kritis Siswa Sdn Margorejo Vi Surabaya Melalui Model Jigsaw', *Bioedusiana*, 4.2 (2019), 55–64
<<https://doi.org/10.34289/285232>>

Anton, Muhammad Miftahuddin, Ilham Hasanudin, Ariel Sihabudin Aonillah, Muhamad Irfan Athoillah, Muhamad Zaki Ridho, & Rangga Azyan. (2024). Integrasi Islam Moderat dalam Upaya Melestarikan dan Menjaga Kehidupan Terhadap Perusakan Alam. *Jurnal Intelek Dan Cendekiawan Nusantara*, 1(1), 481–487. Retrieved from <https://jicnusantara.com/index.php/jicn/article/view/59>

Susilo Dan Ramdiati, 'Media Publikasi Pada Bidang Pendidikan Dasar', *Jurnal Cakrawala Pendas*, 5.1 (2019), 1–7

Undang-Undang_Republik_Indonesia_Nomor_22_Tahun_2006'.

Sugiyono. (2014). *Metode Penelitian Kuantitatif, Kualitatif dan R&D*. Bandung; Alfabeta.