JPPIPA 9(11) (2023)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

The Effectiveness of Contextual Teaching Learning (CTL) and Problem Based Learning (PBL) Models in Class VI Science Subjects on Creativity and Learning Outcomes

Achmad Samsudin[1*], Tri Joko Raharjo[1], Widiasih[2]

[1] Master of Basic Education, Postgraduate Program, Open University, Semarang, Indonesia.
[2] Physics Study Program, Indonesia Open University, South Tangerang, Indonesia.

Received: September 12, 2023
Revised: October 18, 2023
Accepted: November 25, 2023
Published: November 30, 2023

Corresponding Author:
Achmad Samsudin
achmadsamsudin888@gmail.com

DOI: 10.29303/jppipa.v9i11.5290

Abstract: The aim of the research is to analyze the mastery of creativity and student learning outcomes through Contextual Teaching Learning (CTL), Problem Based Learning (PBL) and expository learning models, as well as knowing the differences in increasing creativity and learning outcomes after learning in the three learning models. The research design uses true–experimental research. The research sample is 21 class VI students at SDN 1 Tamanrejo and 22 students at SDN 2 Tamanrejo the experimental group, and 19 students at SDN Trimulyo as control group. Data analysis used one way anova and paired sample t-test. The results show that achievement of classical completeness in science learning outcomes with the CTL learning model = 85.7%; PBL = 63.5%; and expository = 15.8%. Increased learning creativity in the CTL learning model, learning creativity increased by 45.25%; PBL 34.52%; and expository 25.80%. The increase in student science learning outcomes in classes with the CTL learning model increased by 89.18%; PBL 73.17%; and expository 57.10%. The conclusion of the research shows that CTL model classes produce better learning creativity and complete science learning outcomes compared to classes that apply the PBL model and higher than those that apply the expository model.

Keywords: Creativity; Contextual teaching learning; Expository; Learning outcomes; Problem based learning

Introduction

Education is a process of changing the human mindset in obtaining knowledge that is beneficial to life. Many efforts have been made by the government to improve the quality of Indonesia's human resources on an ongoing basis (continuous quality improvement), one of which is by improving the quality of education (Novferma, 2016). Quality education is education that is able to carry out the process of maturing the quality of students from ignorance, incompetence, powerlessness, untruth, dishonesty, and from bad morals and faith.

Along with the times, one of the important things that every individual must have is education. Article 1 of Law Number 20 of 2003 concerning the National Education System, that national education has the function of developing capabilities and forming dignified national character and civilization in the context of educating the nation's life.

The success of teachers in educating students can be seen when students are able to achieve optimal results. This success does not only cover one subject, students are able to master and understand all the subjects that have been given by the teacher. One of them is science subject (Natural Science). Natural Science is an organized investigation to look for a pattern or regularity found in nature. Based on the Content Standards, science subjects aim to find out about nature systematically, so that natural science is not only

How to Cite:
Samsudin, A., Raharjo, T. J., & Widiasih. (2023). The Effectiveness of Contextual Teaching Learning (CTL) and Problem Based Learning (PBL) Models in Class VI Science Subjects on Creativity and Learning Outcomes. *Jurnal Penelitian Pendidikan IPA*, *9*(11), 9324–9331. https://doi.org/10.29303/jppipa.v9i11.5290

mastery of a collection of knowledge in the form of facts, concepts or principles but also a process of discovery.

Natural Science is expected to be a vehicle for students to learn about themselves and the environment, as well as prospects for further development in applying it in everyday life. Science subjects are fun subjects, because learning science means learning about the universe and its contents which involve the surrounding environment. Science Learning Activities for Elementary Schools begins with a program plan for determining minimum mastery criteria which is formulated through several elements including complexity, carrying capacity (facilities and teachers), and intake (student potential) so that the overall completeness limits of the programmed basic competencies will be determined.

The main problem that is often encountered, especially in learning science in elementary schools, is the low level of creativity and student learning outcomes. The implementation of science learning in schools is still mostly carried out conventionally (teacher-centered learning) and science learning outcomes are still very low when compared to other subjects (Muslim, 2020). This was also found when making observations at the elementary school which was the subject of the study, where science lessons were always presented verbally through lectures and textbook oriented activities, with very minimal student involvement so that they were less interesting to students and boring. Learning is more likely to be teacher-oriented.

Creativity referred to in research is learning creativity, namely the effort to master scientific material which is part of the activities towards a complete personality that leads to the creation of something new and different where in creating depends on the acquisition of received knowledge that benefits oneself or a group. The characteristics of students who have learning creativity are: happy to seek new experiences, have preoccupation with doing difficult assignments, have initiative, have high perseverance, tend to be critical of others, dare to express opinions and beliefs, always curious, sensitive or feeling, energetic and tenacious, likes multiple tasks, believes in oneself, has a sense of humor, has a sense of beauty, is forward-looking and full of imagination (Ali et al., 2019).

Preliminary research conducted at SDN 1 Tamanrejo, Sukorejo District, found that there was a discrepancy between real conditions and ideal conditions, especially in science subjects for class VI students. This school stipulates that the Minimum Completeness Criteria (MCC) for science subjects is 70 (seventy). The fact shows that there are many grade VI students at SDN 1 Tamanrejo, namely as many as 47.01% or as many as 8 students out of 17 students who score below the minimum standard of completeness. These conditions are identified in the list of values, analysis and remedial tests that have been carried out. Through observations using test instruments carried out by researchers, it was found that the results of creativity and student learning outcomes were still low, so they still needed to be improved. Various efforts have been made by various parties in preparing learning models to improve creativity and student learning outcomes, but maximum results have not been obtained. This is because the quality of learning is still low due to underdeveloped teacher professionalism. Learning is less meaningful because the learning model is not in accordance with the material being taught.

This is caused by several factors, including those related to teacher skills, student activities and the model applied by the teacher. In learning, teachers use methods that are still common such as discussion, question and answer and drill questions and have not used innovative learning models, so that science learning is less varied which results in students tending to have low interest which has an impact on low science learning outcomes.

Related to the problem of students' low science learning outcomes to date, it is time to improve the science learning process, especially regarding the models, approaches or techniques used in learning. Several kinds of learning models are expected to be able to overcome problems in science learning, including the Contextual Teaching and Learning (CTL), Problem Based Learning (PBL) and expository learning models as the control class.

CTL is a learning model that aims to help students see meaning in the academic material they study by connecting academic subjects with contexts in their daily lives, namely with the context of their personal, social, and cultural circumstances. To achieve this goal, there are eight components which include making meaningful connections, doing meaningful work, carrying out self-regulated learning, collaborating, critical and creative thinking, helping individuals to grow and develop, achieving high standards, and using authentic assessment (Johnson, 2014). Whereas PBL is teaching where students work on authentic problems to construct their own knowledge, develop inquiry and higher-order thinking skills, develop independence and self-confidence (Arends, 2018).

The effectiveness of the CTL model is proven in Yuliana's research (2019) Journal of UT with the title, that the CTL model is effective in learning science with the theme of the Special Characteristics of Animals and Plants. While the effectiveness of the PBL Learning Model is supported by research conducted by Diantari et al. (2014) that the Hypnoteaching-Based PBL Learning Model Influences Science Learning Outcomes.

In previous research, it was revealed that the CTL and PBL learning models had an effect on students' science learning outcomes, and did not reveal which learning model had a greater influence. However, this study seeks to reveal which learning model, namely CTL or PBL, has a greater influence on science learning outcomes. In addition, it also reveals the influence of the two learning models on student creativity. In this study also used the expository learning model as the control group in the comparison of the two learning models.

On the other hand, the expository model is the same as the lecture in terms of focusing activities on the teacher as the provider of information (learning load). But in the expository model, the teacher's dominance decreases a lot, because they don't tell stories continuously. The teacher speaks at the beginning of the lesson, explaining the material and sample questions, and only when necessary. Students don't just listen and take notes. But also make practice questions and ask questions if you don't understand. Teachers can check student work individually, explain again to students individually and classically (Suherman, 2014).

The aims of this research are as follows: To analyze the results of creativity and learning outcomes through CTL, PBL and expository learning models to achieve classical mastery. To find out the difference in increasing creativity results and learning outcomes after learning through Contextual Teaching Learning (CTL), Problem Based Learning (PBL) and expository learning models This research is important because this research compares learning creativity and student learning outcomes before and after learning through three learning models CTL, PBL and expository.

Method

The research design used a true experimental research, with a sample of 21 students in class VI at SDN 1 Tamanrejo and 22 students in class VI at SDN 2 Tamanrejo as the experimental group, 19 students in class VI at SDN Trimulyo as the control group. Cognitive tests were carried out to obtain data on the results of learning natural science material on the properties of magnets. The test was carried out twice, namely pretest and posttest. Data was taken using cognitive tests. To measure the achievement of the cognitive domain, tests are used in the form of multiple choice objective tests Assessment of student learning creativity by observing by the teacher is compiled based on the following indicators: the urge to learn, always ask good questions, give many ideas or suggestions for a problem, free in expressing opinions, have a sense of beauty, prominent in one of the fields of art, has his own opinion and can express it not easily influenced by others, great sense of humor, strong imagination power, high originality (appears in the expression of ideas), can work alone, enjoy trying new things, ability to develop an idea.

The instrument is said to be valid if it can reveal data from the variables studied correctly, using the product moment correlation formula. Reliability or reliability is the determination of a test when it is tested on the same subject, using the Alpha Cronbach formula (Arikunto, 2016). Data analysis uses one-way ANOVA and paired sample t-test.

Result and Discussion

Table 1. Descriptive Statistics of Student Learning Creativity in the Pretest and Posttest Experimental and Control Groups

Learning Creativity	Min	Max	Mean	Standard Deviation
Pretest Experiment 1 (CTL)	3	9	5.90	1.76
Posttest Experiment 1 (CTL)	6	12	8.57	1.29
Pretest Experiment 2 (PBL)	3	9	5.91	1.60
Posttest Experiment 2 (PBL)	6	11	7.95	1.29
Pretest) Control (Expository)	4	8	5.95	1.39
Posttest Control (Expository)	5	9	6.89	1.15

The three class groups before the treatment showed that the average pretest score was almost the same, namely the experimental group 1 (CTL) was 5.90 and the experimental group 2 (PBL) was 5.91 and in the control group (expository) was 5. 95. The highest value of learning creativity in the experimental group 1 (CTL) and experimental group 2 (PBL) is 9 while in the control group (expository) is 8. While the lowest score is experiment 1 (CTL) and experimental group 2 (PBL) is 3 while in the control group (expository) of 4. After the treatment, the results showed that the average posttest score was different, namely in the experimental group 1 (CTL) of 8.57 and the experimental group 2 (PBL) of 7.95 and in the control group (expository) of 6.89. The highest score for science learning outcomes in the experimental group 1 (CTL) was 85.71 and the experimental group 2 (PBL) was 88.57 while in the control group (expository) it was 9. While the lowest value was the lowest score in experiment 1 (CTL) and the experiment 2 (PBL) was 6 while in the control group (expository) was 5. The CTL

learning model got higher average results than the group with the PBL learning model and this model was higher than the expository learning model in science subjects. The experimental group 1 (CTL) has an average value of 8.57 and the experimental group 2 (PBL) has an average value of 7.95 while the control group has an average result of 5.95. The average difference between the three classes is as large as it can be concluded that the average student learning creativity using the CTL learning model is higher than the PBL learning model and the PBL learning model is higher than the expository model.

Table 2. Descriptive Statistics of Science Learning Outcomes of Students in the Pretest and Posttest of the Experimental and Control Groups

Science Learning Outcomes	Min	Max	Mean	Standard Deviation
Pretest Experiment 1 (CTL)	14.29	85.71	40.82	21.55
Posttest Experiment 1 (CTL)	65.71	88.57	77.28	6.79
Pretest Experiment 2 (PBL)	8.57	88.57	41.82	25.99
Posttest Experiment 2 (PBL)	51.43	88.57	72.47	10.04
Pretest Control (Expository)	5.71	85.71	40.30	21.86
Posttest Control (Expository)	48.57	85.71	63.31	10.66

The three class groups before the treatment showed that the average scores for science learning outcomes in the posttest were almost the same, namely in the experimental group 1 (CTL) of 40.82 and the experimental group 2 (PBL) of 41.82 and in the control group (expository) is equal to 40.30. The highest score in the experimental group 1 (CTL) was 85.71 and the experimental group 2 (PBL) was 88.57 while in the control group (expository) it was 85.71. Meanwhile, the lowest score was Experiment 1 (CTL) of 14.29 and Experimental Group 2 (PBL) of 8.57 while in the control group (expository) of 5.71. After the treatment, the results showed that the average posttest score was different, namely in the experimental group 1 (CTL) of 88.57 and the experimental group 2 (PBL) of 88.57 and in the control group (expository) was 85.71. The highest score in the experimental group 1 (CTL) was 85.71 and the experimental group 2 (PBL) was 88.57 while in the control group (expository) it was 85.71. Meanwhile, the lowest score was Experiment 1 (CTL) of 88.57 and Experimental Group 2 (PBL) of 88.57 while in the control group (expository) of 85.71. The average value of students' science learning outcomes from when the class group shows that the group using the CTL learning model gets higher average results than the group with the PBL learning model and this model is higher than that using the expository learning model in subjects IPA. The experimental group 1 (CTL) has an average value of 88.57 and the experimental group 2 (PBL) has an average value of 88.57 and the control group has an average result of 85.71. The average difference between the three classes is as large as it can be concluded that the average science learning outcomes of students using the CTL learning model are higher than the PBL learning model and the PBL learning model is higher than the expository model.

Table 3. Oneway Anova Learning Creativity Experiment Group 1, 2 and Control Group

Learning Creativity	F-test Value	sig.(p)	Mean			Information
			Exp 1 (CTL)	Exp 2 (PBL)	Control (Expo-sitory)	
Pretest	0.004	0.996	5.90	5.91	5.85	Not Significant
Posttest	9.15	0.000	8.57	7.95	6.89	Very Significant

There was no significant difference in students' learning creativity between experimental group 1 (CTL), experiment 2 (PBL) and control (Expository) at the time of pretest. This means that at the beginning or pretest between the three groups the students' learning creativity was no different. There is a very significant difference in students' learning creativity between experimental group 1 (CTL), experiment 2 (PBL) and control (Expository) at the time of the posttest. This means that at the end or posttest between the three groups have different student learning creativity, where student learning creativity in experimental group 1 (CTL) obtained an average value = 8.57 higher and experiment 2 (PBL) with an average value = 7.95 higher and control (Expository) with an average value = 6.89.

Table 4. Oneway Anova Science Learning Outcomes Experiment Group 1, 2 and Control Group

Science Learning Outcomes	F-test Value	sig.(p)	Mean			Information
			Exp 1 (CTL)	Wxp 2 (PBL)	Control (Expo-sitory)	
Pretest	0.023	0.978	40.82	41.82	40.30	Not Significant
Posttest	11.581	0.000	77.28	72.47	63.31	Very Significant

There was no significant difference in science learning outcomes between experimental group 1 (CTL), experiment 2 (PBL) and control (Expository) at the pretest. This means that at the beginning or pretest between the three groups the science learning outcomes were no different. There was a very significant difference in science learning outcomes between experimental 1 (CTL), experiment 2 (PBL) and control (Expository) groups at the time of the posttest. This means that at the end or posttest between the three groups had different science learning outcomes, where the science learning outcomes in the experimental group 1 (CTL) obtained an average value = 77.28 higher and experiment 2 (PBL) with an average value = 72.47 higher and control (Expository) with an average value = 63.31.

Table 5. Paired Sample T-Test Student Learning Creativity

Group	t-test Value	sig.(p)	Mean		Information
			Pretest	Posttest	
CTL	9.028	0.000	5.90	8.57	Very Significant
PBL	6.284	0.000	5.91	7.95	Very Significant
Exposi-tory	4.869	0.000	5.95	6.89	Very Significant

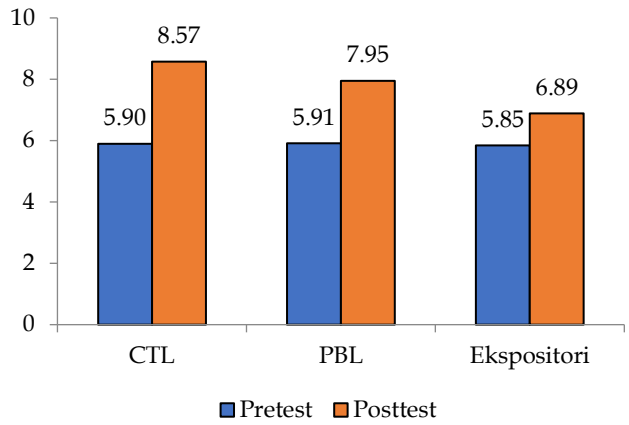

Figure 1. Comparison of student learning creativity

Paired sample t-test of students' learning creativity between pretest and posttest in experimental group 1 (CTL) shows that there is a very significant difference in students' learning creativity between pretest and posttest obtained values (t = 9.028 and p <0.01). There is a very significant difference in students' learning creativity between the pretest and posttest in the experimental group 1 (CTL), where the posttest score of 8.57 has a higher score than the pretest of 5.90. So, the learning creativity of students in the experimental group 1 using the CTL model increased by 2.67 or 45.25%. Paired sample t-test of students' learning creativity between pretest and posttest in experimental group 2 (PBL) showed that there was a very significant difference in students' learning creativity between pretest and posttest (t = 6.284 and p <0.01). There is a very significant difference in students' learning creativity between the pretest and posttest in the experimental group 2 (PBL), where the posttest score of 7.95 has a higher score than the pretest of 5.91. So the learning creativity of students in the experimental group 2 using the PBL model increased by 2.04 or 34.52%. Paired sample t-test of students' learning creativity between pretest and posttest in the control group (expository) showed that there was a very significant difference in students' learning creativity between pretest and posttest (t = 4.869 and p <0.01). There is a very significant difference in student learning creativity between the pretest and posttest in the control group (expository), where the posttest score of 6.89 has a higher score than the pretest of 5.95. So the learning creativity of students in the control group using the expository model increased by 0.94 or 25.80%.

Table 6. Paired Sample T-Test Science Learning Outcomes

Group	t-test Value	sig.(p)	Mean		Information
			Pretest	Posttest	
CTL	9.248	0.000	40.85	77.28	Very Significant
PBL	6.883	0.000	41.82	72.47	Very Significant
Exposi-tory	6.232	0.000	40.30	63.31	Very Significant

Paired sample t-test of science learning outcomes between pretest and posttest in experimental group 1 (CTL) showed that there was a very significant difference in science learning outcomes between pretest and posttest (t = 9.248 and p <0.01). There was a very significant difference in science learning outcomes between the pretest and posttest in the experimental group 1 (CTL), where the posttest score of 77.28 had a higher score than the pretest of 40.85. So the science learning outcomes in the experimental group 1 using the CTL model increased by 36.43 or 89.18%. This result is in line with Laili's research (2016), Sulfemi (2019), Miftachudin (2020), Kadmayana et al. (2021), Welerubun et al. (2022), Mazida et al. (2023), Yunus et al. (2022), Nisa et al. (2023) that the CTL model improves student learning outcomes.

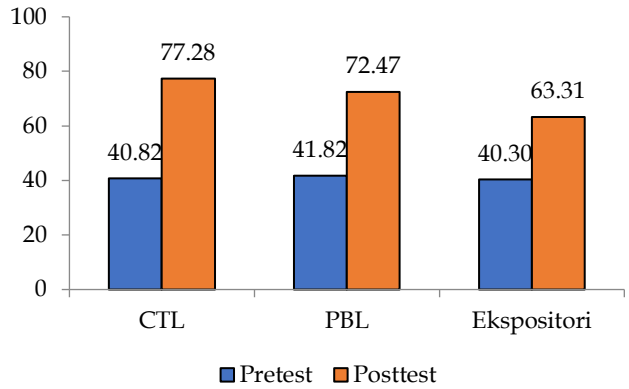

Figure 2. Comparison of science learning outcomes

Paired sample t-test of science learning outcomes between pretest and posttest in experimental group 2 (PBL) showed that there was a very significant difference in science learning outcomes between pretest and posttest (t = 6.883 and p <0.01). There was a very significant difference in science learning outcomes between the pretest and posttest in the experimental group 2 (PBL), where the posttest score of 72.42 had a higher score than the pretest of 41.82. So the science learning outcomes in the experimental group 2 using the PBL model increased by 30.60 or 73.17%. This result is in line with the research of Wijayanti et al. (2016), Yew et al. (2016), Mariya (2019), Nisa et al. (2019), Yunus et al. (2022), Sari et al. (2023), that the PBL model is effective in improving student learning outcomes.

Paired sample t-test of science learning outcomes between pretest and posttest in the control group (expository) showed that there was a very significant difference in students' science learning outcomes between pretest and posttest (t = 6.232 and p <0.01). There was a very significant difference in science learning outcomes between the pretest and posttest in the control (expository) group, where the posttest score of 63.31 had a higher score than the pretest of 40.30. So the learning creativity of students in the control group using the expository model increased by 23.01 or 57.10%.

The use of CTL, PBL and expository learning models produces different learning creativity and mastery of science learning outcomes. Through the CTL learning model, student learning creativity and mastery of science learning outcomes are better than the PBL learning model, and the PBL learning model is better than the expository learning model. The achievement of classical mastery of science learning outcomes with the CTL learning model reached 85.7% so that it has reached a mastery proportion of 75%. Meanwhile, the mastery achievement of the classical PBL learning model reached 63.5% and the expository learning model only reached 15.8% so that it had not yet reached the proportion of mastery of 75%.

There are differences in the increase in the results of learning creativity and science learning outcomes after learning through CTL, PBL and expository learning models. Through the CTL learning model students have increased student learning creativity and science learning outcomes which are better than the PBL learning model and higher than the expository model. The increase in student learning creativity in the experimental group 1 (CTL) was 45.25%, the experimental group 2 (PBL) was 34.52%, and the control group (expository) experienced an increase of 25.80%. While the increase in science learning outcomes in the experimental group 1 (CTL) was 89.18%, in the experimental group 2 (PBL) it increased by 73.17% and in the control group (expository) it experienced an increase of 57.10%. These results are in line with research by As-Sa'idah et al. (2022) with CTL learning outcomes being the best learning model in improving student learning outcomes.

In research it is known that the CTL learning model is the best learning model in increasing learning creativity and science learning outcomes in students. Where this model has several advantages such as: Learning is contextual so that it can emphasize the full thinking activities of students, both physically and mentally. Contextual learning can make students learn not by memorizing, but by experiencing the process in real life. Classes in context are not as a place to obtain information, but rather as a place to test the data they find in the field. The subject matter is determined by the students themselves and not the results of other people's gifts.

CTL concept whereby teachers present real-world situations into the classroom and encourage students to make connections between their knowledge and application in their lives as family and community members. The meaning and knowledge carried by an

individual are therefore, outcome of one's own experiences (Lotulung et al., 2018). CTL learning shows that learning will be more productive, where each student has a main role and function as the main actor in learning activities (Muhartini et al., 2023). CTL is also a holistic learning process and aims to motivate students to understand the meaning of the subject matter they are studying by associating the material with the context of everyday life (personal, social and cultural contexts) so that students have knowledge/skills that can be applied flexibly (transferred) from one problem to another (Shoimin, 2014). CTL is a learning concept that helps teachers relate the material taught to students' real-world situations and encourages students to make connections between the knowledge they have and its application in their lives as members of their families and communities (Aqib, 2013). CTL is a teaching-learning strategy that emphasizes the full process of student involvement in order to discover the material learned and relate it to real life situations that encourage students to apply it in their lives. The results can improve the student's achievement of competencies and give direct experience to students to conduct the research (Firdaus et al., 2018).

Student learning outcomes that applied CTL were better than science learning outcomes of students who applied PBL or conventional learning because contextual teaching and learning more emphasis on meaningful learning from real life that made it easier for students to understand. The teacher should be able to choose the appropriate model to be applied in science learning following the grade level so that science learning to optimally (Irvan et al., 2020).

Conclusion

The use of CTL, PBL and expository learning models produces different learning creativity and mastery of science learning outcomes. The best or highest results of creativity and science learning outcomes for students were achieved by students with the CTL learning model, followed by PBL learning and the worst or lowest was with the expository learning model.

Acknowledgments
Thank you to all those who have assisted in carrying out research activities and writing this article, to the supervisors of the Basic Education Masters Study Program at the Open University of TAPM UPBJJ Semarang, Expert Validators, Head of SDN 1 Tamanrejo, Head of SDN 2 Tamanrejo, and Head of SDN Trimulyo, Colleagues colleagues, and Class VI students.

Author Contributions
All authors in this article contributed to the process of completing the research. Samsudin as the first author contributed to the preparation of research design concepts, determining the methodology, collecting initial research data, processing data, writing research reports, writing articles. Tri Joko Raharjo directs the research flow, article content, initial data collection instrument validation, and article review, Widiasih validates data collection instruments, refines results and discussion.

Funding
All research funding independently.

Conflicts of Interest
The research in this article has no interest other than for scientific publications in the field of basic education.

References

Ali, M., & Ansori, M. (2019). *Psikologi Remaja, Perkembangan Peserta Didik*. Bumi Aksara.

Aqib, Z. (2013). *Model-Model, Media, dan Strategi Pembelajaran Kontekstual*. Yrama Widya.

Arends, R. (2018). *Learning to Teach: Belajar untuk Mengajar*. Yogyakarta: Pustaka Pelajar.

Arikunto, S. (2016). *Prosedur Penelitian, Suatu Pendekatan Praktik*. Rineka Cipta.

As-Sa'idah, M. M., & Dedih, U. da. M. (2022). Effectiveness of Contextual Learning Models, Problem-Based Learning, and Learning Outcomes. *Jurnal Pendidikan Agama Islam*, *2*(1), 1–15. https://doi.org/10.15575/jipai.v2i1.18786

Diantari, P. W., Negara, I. W., & I.G.A.O. (2014). Pengaruh Model Pembelajaran Problem Based Learning Berbasis Hypnoteaching terhadap Hasil Belajar Matematika Siswa Kelas V SD. *Jurnal Mimbar PGSD Universitas Pendidikan Ganesha Jurusan PGSD*, *2*(1), 1–10. https://doi.org/10.23887/jjpgsd.v2i1.3103

Firdaus, F., & Dewi, F. (2018). Application of Contextual Teaching and Learning (CTL) Components In Telecommunication Network Design and Optimization Course. *IJCER (International Journal of Chemistry Education Research)*, *2*(1), 24–33. https://doi.org/10.20885/ijcer.vol2.iss1.art5

Irvan, M. F., Jerusalem, M. A., & Habibullah, H. (2020). The Mathematics Learning Model's for Early Grade Students: Contextual or Problem-Based Learning. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *9*(3), 551. https://doi.org/10.24127/ajpm.v9i3.2779

Johnson, E. B. (2014). *Contextual Teaching and Learning Menjadikan Kegiatan Belajar Mengajar Mengasyikan dan Bermakna*. Kaifa.

Kadmayana, K., Halim, A., Mustafa, M., & Ilyas, S. (2021). Impact of Contextual Teaching Learning Model to Science Process Skills and Scientific Attitudes of Students. *Jurnal Penelitian Pendidikan*

IPA, *7*(3), 375–380. https://doi.org/10.29303/jppipa.v7i3.714

Laili, H. (2016). Keefektifan Pembelajaran dengan Pendekatan CTL dan PBL Ditinjau dari Motivasi dan Prestasi Belajar Matematika. *PYTHAGORAS: Jurnal Pendidikan Matematika*, *11*(1), 25. https://doi.org/10.21831/pg.v11i1.9679

Lotulung, C. F., Ibrahim, N., & Tumurang, H. (2018). Effectiveness of Learning Method Contextual Teaching Learning (CTL) for Increasing Learning Outcomes of Entrepreneurship Education. *Turkish Online Journal of Educational Technology - TOJET*, *17*(3), 37–46. Retrieved from https://files.eric.ed.gov/fulltext/EJ1184198

Mariya, M. (2019). Keefektifan Model Problem Based Learning untuk Meningkatkan Hasil Belajar IPA. *JURNAL PAJAR (Pendidikan Dan Pengajaran)*, *3*(6), 1247. https://doi.org/10.33578/pjr.v3i6.7883

Mazidah, N. R., & Sartika, S. B. (2023). Pengaruh Pendekatan Contextual Teaching and Learning (CTL) Terhadap Hasil Belajar Kognitif pada Mata Pelajaran IPA Kelas V di SDN Grabagan. *Jurnal Papeda: Jurnal Publikasi Pendidikan Dasar*, *5*(1), 9–16. Retrieved from https://doi.org/10.36232/jurnalpendidikandasar.v5i1.3192

Miftachudin, M. (2020). Efektivitas Ctl Dalam Pembelajaran Ipa Untuk Meningkatkan Hasil Belajar Siswa Kelas V Sekolah Dasar. *JISPE: Journal of Islamic Primary Education*, *1*(1), 29–36. https://doi.org/10.51875/jispe.v1i1.14

Muhartini, M. A., & Bakar, A. (2023). Pembelajaran Kontekstual dan Pembelajaran Problem Based Learning. *Lencana: Jurnal Inovasi Ilmu Pendidikan*, *1*(1), 66–77. https://doi.org/10.55606/lencana.v1i1.881

Nisa, I., & Ardani, A. (2023). Efektivitas Model Pembelajaran Contextual Teaching and Learning (CTL) Berbasis Outdoor Learning System Berbantuan Media Benda Konkret Terhadap Hasil Belajar. *Jurnal Dialektika*, *13*(1), 10146–10157. https://doi.org/10.58436/jdpgsd.v13i1.1410

Nisa, S. C., & Masriyah. (2019). Penerapan Model Pembelajaran Problem Based Learning (PBL) Dengan Pendekatan Kontekstual Dalam Menyelesaikan Masalah Matematika. MATHEdunesa. *Jurnal Ilmiah Pendidikan Matematika*, *8*(2), 428–435. https://doi.org/10.26740/mathedunesa.v8n2.p428-435

Novferma, N. (2016). Analisis kesulitan dan self-efficacy siswa SMP dalam pemecahan masalah matematika berbentuk soal cerita. *Jurnal Riset Pendidikan Matematika*, *3*(1), 76–87. https://doi.org/10.21831/jrpm.v3i1.10403

Sari, A. K., Handini, O., & Sarafuddin. (2023). Pengaruh Model Pembelajaran Problem Based Learning Berbasis HOTS Pada Pembelajaran IPAS Kelas IV di SD Negeri 02 Gawanan Tahun Pelajaran 2022 / 2023. *Journal on Education*, *06*(01), 809–823. Retrieved from https://jonedu.org/index.php/joe/article/view/2995

Shoimin, A. (2014). *68 Model Pembelajaran Inovatif Dalam Kurikulum 2013*. Ar-Ruzz Media.

Suherman, E. (2014). *Strategi Pembelajaran Matematika Kontemporer*. PT Remaja Rosdaka.

Sulfemi, W. B. (2019). Model Pembelajaran Contextual Teaching And Learning (CTL) Berbantu Media Miniatur Lingkungan Untuk Meningkatkan Hasil Belajar IPS. *Edunomic Jurnal Pendidikan Ekonomi*, *7*(2), 73. https://doi.org/10.33603/ejpe.v7i2.1970

Welerubun, R. C., Wambrauw, H. L., Jeni, J., Wolo, D., & Damopolii, I. (2022). Contextual Teaching and Learning in Learning Environmental Pollution: the Effect on Student Learning Outcomes. *Prima Magistra: Jurnal Ilmiah Kependidikan*, *3*(1), 106–115. https://doi.org/10.37478/jpm.v3i1.1487

Wijayanti, A., & Wulandari, T. (2016). Efektivitas Model CTL dan Model PBL Terhadap Hasil Belajar IPS. *Harmoni Sosial: Jurnal Pendidikan IPS*, *3*(2), 112–124. https://doi.org/10.21831/hsjpi.v3i2.7908

Yew, E. H. J., & Goh, K. (2016). Problem-Based Learning: An Overview of its Process and Impact on Learning. *Health Professions Education*, *2*(2), 75–79. https://doi.org/10.1016/j.hpe.2016.01.004

Yunus, N., Popoi, I., Ardiansyah, A., Moonti, U., & Maruwae, A. (2022). Pengaruh Penerapan Model Pembelajaran Contextual Teaching and Learning Terhadap Hasil Belajar Siswa Pada Mata Pelajaran IPS Terpadu Kelas VII MTs Negeri 1 Kota Gorontalo. *Aksara: Jurnal Ilmu Pendidikan Nonformal*, *8*(2), 1479. https://doi.org/10.37905/aksara.8.2.1479-1490.2022