APPLICATION: Applied science in Learning Research
Vol. 5 No. 1 June 2025, Page. 1 - 10
E-ISSN: 2797-0655

Children Learning in Science Model Integrated with Project-Based Worksheets on Students' Science Process Skills

Rahim Alam[1], Ila Israwaty[2], Wawan Krismanto[3*]
[1,2,3] Department of Elementary Teacher Education, Faculty of Education
Universitas Negeri Makassar
*Email: wawan.krismanto@unm.ac.id

Abstract : *The research aims to determine the effect of the Children Learning In Science (CLIS) model integrated with project-based worksheets on students' Science Process Skills (SPS). The approach in this study is a quantitative with a quasi-experimental research type using the Post-test Only Control Group Design. The population is fifth-grade students of SDN 3 Parepare, and the sample used in this study were all students in class V.1 as an experimental class and class V.3 as a control class. Data were obtained by an essay SPS test. The data analysis used was the Independent Sample T-test. The results showed that in the experimental class, in addition to being guided by project-based worksheets, each learning syntax has directed students to carry out project completion procedures using their SPS, such as observing, concluding, classifying, making predictions, and communicating the results. Based on the inferential statistical analysis with the T-Test, it produces a Sig value (2tailed) = 0.000 <0.05. Therefore, H0 is rejected, and H1 is accepted. Thus, there is a difference in SPS in the control and experimental classes. The conclusion is that there is an influence of the CLIS learning model of project-based worksheets on students' SPS.*

Keywords : *CLIS; Project learning; Science skills*

INTRODUCTION

Science is a very important field of study from been studied since elementary school level. Science provides opportunities for students to gain real experience in the process of developing a basic understanding of knowledge about nature. For this reason, in elementary school science learning, students are directed to explore and investigate concepts, facts, and phenomena in the surrounding environment. According to Sari(2021), science learning for students at the elementary school level is not only aimed at providing introductory activities and learning about concepts but science learning is used in order to help improve the development of potential in students, one of which is the development of students' scientific attitudes.

Science learning, in the context of the Merdeka Curriculum integrated into the science subject, has the task of fostering students' scientific attitudes, which include curiosity, credibility, accuracy, and openness to new ideas, not only in the field of educational science but in everyday life these attitudes become very important (Kemendikbudristek, 2022). Through experiments and activities in science learning, students will gain knowledge to link the theories they get with real practices so that by getting used to carrying out lesson activities that involve students in real life, there is a skill that develops through science learning, namely science process skills (SPS).

According to (Fitriana et al., 2019), Science Process Skills are defined as the ability to develop and acquire knowledge in the learning process. Furthermore, according to Angelia et al. (2022), Science Process Skills are defined as a type of ability that needs to be mastered in the process of receiving material containing elements of science or natural sciences; students with strong scientific abilities will find it easier to understand the topics they are studying and will develop organized strategies to deal with problems in everyday life. This is what underlies teachers to improve Science Process Skills and makes them very important; these skills will provide students with adequate provisions to deal with various future challenges in the field of education. According to Wola et al. (2023), Science Process Skills are not limited to the educational environment; these abilities are also relevant in everyday life situations, and these skills help students overcome everyday obstacles. Activities that trigger student participation and direct involvement are important things that must be done to improve these skills.

Several aspects can influence low SPS. According to Nurdiansah et al. (2024), the low level of students' SPS is caused by a low science background and minimal laboratory facilities. Furthermore, according to Khotimah & Supratiyoko (2023), the low level of students' SPS is caused by various factors such as limited skills possessed by teachers and the use of methods, models, and teaching materials that have not been able to effectively play a role in improving and developing the skills concerned.

Based on the literature review, it was found that to overcome low students' SPS, several alternatives or solutions can be applied through the science learning process in elementary schools. According to Ngana et al. (2021), brainstorming can be an alternative method to develop SPS in learning activities. In addition, according to Fatimah et al. (2019), the contextual learning model is also considered capable of developing students' SPS. Another alternative, according to Yuliati (2016), problem-oriented learning in elementary schools can be an effort to increase students' SPS.

Another alternative is the Children Learning In Science (CLIS) learning model (Sugandi et al., 2021). The CLIS model is a model specifically designed for science learning for children. This learning model is considered an alternative because it can facilitate the development of students' SPS. According to Sumampow (2024), there are five stages in implementing the CLIS model: orientation, idea generation, idea rearrangement, idea application, and idea consolidation. Furthermore, according to this model supports direct involvement so that learning activities are student-oriented; this model utilizes facilities from the surrounding environment to be used as learning resources. Therefore, this model is suitable for improving elementary school students' SPS.

It has been emphasized in the previous paragraph that the focus of learning natural and social sciences (IPAS on Merdeka Curriculum) in elementary schools, apart from introducing concepts, is to foster scientific attitudes in students. To facilitate the development of scientific attitudes, an IPAS learning model along with relevant student worksheets is needed. to facilitate. Several previous studies have also conducted research related to this. However, there is still a research gap, namely that previous researchers are still limited in testing the integration between a learning model and student worksheets, especially specific project-based worksheets.

Worksheets, will guide students to carry out a project and ultimately produce a product or work. According to Nomleni et al.(2024), the application of project-based worksheets in learning activities focuses on student-oriented activities in giving project assignments; its use in the classroom will encourage students' motivation to be more creative in making the project work. Furthermore, according to Israwaty et al.(2023), the application of project-based learning will be an active learning subject and foster student initiative in learning. The characteristic of project-based learning is that a product is produced as goods or services.

Therefore, it is important to reveal the implementation of the integration of the CLIS model with project-based worksheets in elementary school science learning in order to improve students' science process skills in an experimental study. This experiment is important to be conducted in order to truly know the effectiveness of the CLIS model integrated with project-based worksheets. Of course, in this case, the worksheets used must follow a validation process before being used as a treatment in the experiment. Previous researchers are still limited in testing the integration between a learning model and student worksheets, especially specific project-based worksheets and this study is to complete the research gaps. In addition, integrating the CLIS model with project-based worksheets can be an innovation or novelty of this study as additional literature on improving students' science process skills, especially in elementary schools. This study will try to answer the following problem formulations. First, how are the science process skills of students at SDN 3 Parepare in the experimental and control classes? Second, how does the CLIS model integrated with project-based worksheets affect students' science process skills?

METHOD

This study applies a quantitative approach. Syahroni (2022), explains that the quantitative approach as a type of approach is related to data in the form of numbers, tables, and graphs that are quantitative. Similar to this, this approach is also numerical and number-based in data analysis. The type of research used in this study is Quasi Experiment, with the independent variable being the CLIS learning model integrated with project-based worksheets and the dependent variable being students' SPS.

This study used a quasi-experimental design co, commonly known as a pseudo-experiment, with the Posttest-only Control Group method in two classes, namely the experimental and control classes. The experimental class was given treatment by applying the CLIS Project-Based Worksheet learning model in the learning process. Figure 1 shows an example of a CLIS Project-Based Worksheet used as a treatment in an experimental class. In the control class applied the conventional model, learning uses a textbook-based discovery model, as teachers use every day in class during science learning. The population of this study was all 99 students of class V SDN 3 Parepare, including students of class V.1, class V.2, and class V.3. The sample in this study was all 31 students of class V.1 and 35 students of class V.3.

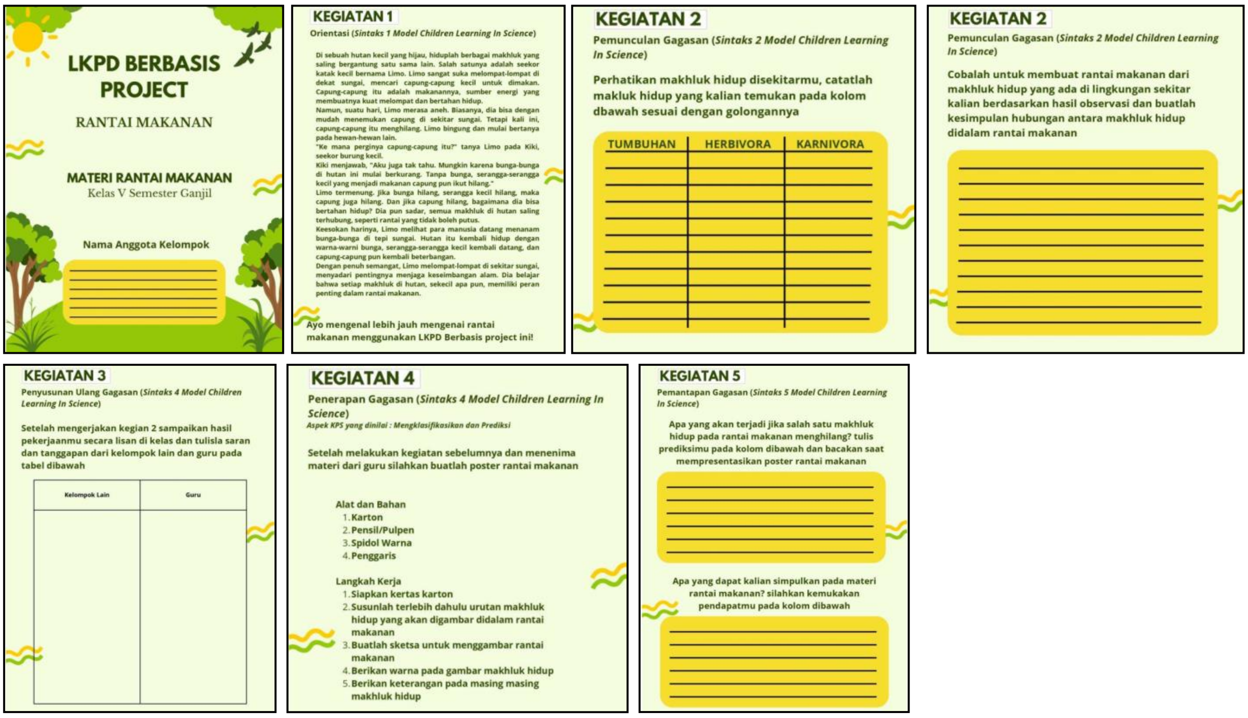

Figure 1. An Example of a CLIS Project-Based Worksheet Used as a Treatment in an Experimental Class

Data collection was carried out using a SPS test developed by the researcher, adjusting each question item to the SPS indicators covered in the material (see **Table 1**). The SPS indicators consist of students' abilities in observing, classifying, predicting, concluding, communicating, and (Ulmiah et al., 2016). The SPS test has gone through a series of validations, namely content and construct validation through validation by elementary school science learning experts and educational evaluation experts. The data analysis technique for this study was descriptive and inferential statistical data analysis. Inferential statistical for a hypothesis test was conducted using the Independent Samples T-Test method with the help of SPSS software version 26. The hypothesis are H_0: there is not an influence of the CLIS learning model of project-based worksheets on students' SPS; H_1: there is an influence of the CLIS learning model of project-based worksheets on students' SPS. If the sig value ≤ 0.05, it means that the CLIS learning model has an effect on students' SPS.

Table 1. SPS Indicators Test

Indicators	Question Type	Example assignment
Observing	Essay assignment	Perhatikan makhluk hidup disekitarmu, catatlah makluk hidup yang kalian temukan pada kolom dbawah sesuai dengan golongannya Makhluk Hidup / Peran
Classifying	Essay assignment	
Concluding	Essay assignment	buatlah kesimpulan Peran masing masing makhluk hidup didalam rantai makanan sesuai hasil observasi
Predicting	Essay assignment	Apa yang akan terjadi jika salah satu makhluk hidup pada rantai makanan menghilang? tulis prediksimu pada kolom dibawah dan bacakan saat mempresentasikan poster rantai makanan
Communicating	Essay assignment	Setelah mengerjakan kegian 2 sampaikan hasil pekerjaanmu secara lisan di kelas dan tulisla saran dan tanggapan dari kelompok lain dan guru pada tabel dibawah

RESULT AND DISCUSSION

Result

Science Process Skills in Experimental and Control Classes

Descriptive statistical analysis techniques describe the level of students' SPS in classes that implement the CLIS Project-Based Worksheet learning model (Experimental class) and in classes that use conventional learning (control class). The descriptive statistics of the final SPS scores of students in the experimental and control classes in class V of SDN 3 Parepare can be seen in the Table 2.

Table 2. DescriptiveStatistics of Student's SPS Data

Descriptive Analysis	Experimental Class	Control Class
Number of Samples	31	35
Mean	77.84	66.64
Median	76.67	70
Modus	76.67	60 & 70
Range	26.7	43.33
Standard Deviation	7.57998	9.79916
Varians	57.456	96.024
Maksimum	90	83.33
Minimum	63.3	40

After further analysis, students' SPS levels in the experimental and control classes can be categorized as Tabel 3.

Table 3. Results of Student's SPS Levels Categories in The Experimental and Control Classes

Grade	Number of Students in Experimental Class	Number of Students in Control Class	Categories
86-100	6	0	Very Good
71-85	22	9	Good
56-70	3	24	Enough
40-55	0	2	Poor
0-39	0	0	Very Poor

The Influence of CLIS Model Integrated with Project-Based Worksheets on Students' Science Process Skills

To determine the influence of the CLIS learning model integrated with project-based worksheets, a hypothesis test was conducted using an independent sample T-test assisted by SPSS version 26 software. Table 4 is a summary table of SPSS data.

Table 4. Independent Sample T-test results

		Levene's Test For Equality of Variance			
		F	Sig	T	Sig (2-tailled)
Science Process Skills	*Equal variances Assumed*	1.671	0.201	4.611	0.000

The results of inferential statistical analysis were carried out for hypothesis testing. Previously, prerequisite tests consisting of normality and homogeneity tests were carried out. The normality and homogeneity test results showed that the data had been normally distributed and homogeneous. Furthermore, a hypothesis test was carried out using the Independent Sample T-test; the results showed a significance value (2-tailed) of less than 0.05, which was 0.000, and a t count of 4.611. In this case, the t count is greater than the t table (4.611> 1.169). Based on these two criteria, it can be concluded that H_0 is rejected and H_1 is accepted. This means a significant difference exists between students' SPS in the experimental and control classes.

Discussion

Science Process Skills in Experimental and Control Classes

Based on descriptive statistical analysis, it can be shown that the SPS of students in the experimental class are higher than those of the control class. In other words, there is a difference in students' science process skills in classes implementing learning with the CLIS learning model integrated with project-based worksheets and classes with conventional learning. The implementation of CLIS models in experimental classes makes students more actively involved. During learning, students express their ideas and opinions so that the learning process in the classroom becomes more active and not monotonous. This is to the concept fromWidyatmoko(2023), which states that the CLIS model is a model that seeks to develop ideas or ideas owned by students so that interactive learning is created. In addition to implementing the CLIS learning model, researchers also integrate it with project-based worksheets with the aim that students can apply the ideas obtained from learning to a project or work so that the SPS indicators can increase. The projects created are drawing and making a miniature food chain.

In the learning in the experimental class, the development of SPS is evident, which is seen in every syntax activity or learning step. These activities encourage students to use SPS. Ajul et al. (2019) stated that CLIS model learning emphasizes students ' ability to develop ideas and solve problems and encourages students to carry out activities according to the phenomena being studied to influence efforts to develop students' SPS positively.

In the first syntax, namely orientation, students are introduced to the material to be studied; in this step, students are prepared to follow learning with a student-focused model (student-centered), which will hone the achievement of students' SPS. In the second syntax, namely the emergence of ideas, the indicators of achieving the honed SPS are the indicators of observing and concluding. Students are assigned to observe the images and the surrounding environment and conclude the relationship between the data found. In the third and fourth syntax, namely rearranging ideas and implementing ideas, the indicators that are honed are classifying and communicating; in this step, students begin working on the given project; students must be able to group the objects given to form an interesting work, in this material the project created is a picture of a food chain poster and a miniature food chain. In the fifth syntax, namely the consolidation of ideas, the indicators of the achievement of the SPS that are honed are predictions; in this step, after students have finished presenting the results of their projects, students will be given questions that require the ability to make estimates or predictions.

Based on the descriptive statistical analysis, students' SPS in the experimental class are relatively high. While in the control class, whose learning process only uses a conventional model, namely implementing lecture and assignment methods, the five indicators of SPS cannot be honed optimally. Activities involving the five indicators of science process skills in the control class are limited; students cannot further explore their SPS because class activities are only lectures and assignments, and no activities encourage students to develop their SPS. The results show that the level of achievement of students' SPS in the control class is included in the moderate category or lower compared to the experimental class.

The Influence of CLIS Model Integrated with Project-Based Worksheets on Students' Science Process Skills

In the experimental class, students showed high involvement during the learning process, as seen when carrying out activities in the project-based worksheets during the learning process; in addition, student involvement in the learning process in the experimental class was also seen when students actively engaged in discussions, carried out activities such as projects, decision making, and group activities. The higher the involvement of students in the learning process through various activities such as discussions, experiments, group activities, and decision-making, the more it will encourage an increase in their science process skills. This aligns with the explanation Lestari et al. (2017), which states that several activities can improve students' SPS, such as discussions, experiments, group activities, and decision-making.

In the experimental learning class that integrates the CLIS learning model with a worksheet containing project activities, students are required to collaborate in the learning process and be creative in compiling project assignments, which are important aspects of SPS, so that by carrying out project activities in the learning process, students' SPS will be honed. Umara et al. (2018),explained that project-based learning will be able to guide students to train themselves to think complexly and be able to relate the lessons learned in the form of skills that are often associated with real life such as SPS. Hamidah et al.(2023), also explained that project-based learning can affect students' level of SPS.

Learning in the experimental class becomes more meaningful because students carry out real activities, namely observing, concluding, grouping, creating work, and presenting work in two meetings; in addition to improving SPS, this meaningful learning can create an interactive learning environment so that students feel involved and motivated to continue learning. In this case,Rochmawati et al.(2022), explain that meaningful learning is one of the important things that have the potential to improve SPS because, with meaningful learning, students will be directed to find their concepts to be learned can be creative in learning activities based on the concepts that have been learned to make learning more interactive and meaningful.

Based on the results of the hypothesis test and the description above, there are differences in students' SPS in the experimental class that received treatment in the form of a CLIS learning model integrated with project-based worksheets with the control class. The CLIS learning model integrated with project-based worksheets influences students' SPS. This is in line with previous research conducted by Nurseha et al.(2015) which stated that the CLIS model could encourage students to be actively involved and encourage an increase in students' SPS. Research by Ajul et al.(2019), also confirmed that the CLIS model effectively improves students'

SPS and understanding of science concepts. Another study, Suhanda & Suryanto (2018), also stated that project-based learning can significantly improve students' SPS, as evidenced by the increase in students' scores on each indicator of SPS.

CONCLUSIONS

Based on the formulation of the problem, the research results, and the discussion, it can be concluded that the SPS of students in classes that use the CLIS learning model integrated with worksheet project-based is better than that of students in classes that use the conventional model. Second, the hypothesis test shows a significant difference in SPS between the two classes. Thus, the CLIS learning model integrated with worksheet project-based influences students' SPS. Based on this research, several things can be suggested. Suppose teachers want to use the CLIS learning model integrated with worksheet project-based. In that case, teachers must improve their creativity in designing activities in the learning process to be appropriate and truly facilitate the development of SPS indicators. In addition, it is truly by the science learning material that will be taught. Schools should consider using an interactive and interesting science learning model such as the CLIS model because it can positively contribute to students' understanding, especially in developing SPS. Further researchers can develop worksheet for this project-based CLIS model with more variations on other science learning materials through development research. They can further study efforts to improve students' SPS in science learning through other more relevant and contemporary learning models.

REFERENCES

Ajul, L., Ain, N., & Hudha, M. N. (2019). Metode Pembelajaran Children Learning in Science (CLIS): Efektifkah Meningkatkan Keterampilan Proses Sains dan Pemahaman Konsep Fisika? *Jurnal Riset Pendidikan Fisika*, *4*(2), 98–103.

Angelia, Y., Supeno, S., & Suparti, S. (2022). Keterampilan Proses Sains Siswa Sekolah Dasar dalam Pembelajaran IPA Menggunakan Model Pembelajaran Inkuiri. *Jurnal Basicedu*, *6*(5), 8296–8303. https://doi.org/10.31004/basicedu.v6i5.3692

Fatimah, S., Wahyuningsih, S., & Syamsuddin, M. M. (2019). Penerapan Model Pembelajaran Kontekstual Untuk Meningkatkan Keterampilan Proses Sains Pada Anak Usia 4-5 Tahun. *Kumara Cendekia*, *7*(3), 324. https://doi.org/10.20961/kc.v7i3.37613

Fitriana, Kurniawati, Y., & Utami, L. (2019). Analisis Keterampilan Proses Sains Peserta Didik Pada Materi Laju Reaksi Melalui Model Pembelajaran Bounded Inquiry Laboratory. *JTK: Jurnal Tadris Kimiya*, *4*(2), 226–236. https://doi.org/10.15575/jtk.v4i2.5669

Hamidah, N., Alamsyah, M. R. N., & Kusumaningrum, S. B. C. (2023). Pengaruh Model Pembelajaran Berbasis Proyek Terhadap Keterampilan Proses Sains Dan Motivasi Belajar Siswa SMA Negeri 1 Candimulyo Pada Materi Perubahan Lingkungan. *Jurnal Inovasi Pendidikan*, *1*(2), 129–142. https://doi.org/10.60132/jip.v1i2.37

Israwaty, I., Sultan, M. A., & Alwi, A. (2023). Penerapan Model Pembelajaran Project Based Learning (PjBL) Untuk Meningkatkan Hasil Belajar Siswa Tentang Muatan IPA di Kelas V UPTD SD Negeri 111 Barru. *Jurnal Pendidikan Dan Pembelajaran Sekolah Dasar*, *2*(1), 97–106. https://doi.org/10.26858/jppsd.v2i1.45975

Kemendikbudristek. (2022). *Capaian Pembelajaran Mata Pelajaran Ilmu Pengetahuan Alam dan Sosial (IPAS) Fase A – Fase C untuk SD/MI/Program Paket A*. Badan Standar Kurikulum dan Asesmen Pendidikan. https://kurikulum.kemdikbud.go.id/file/cp/dasmen/13.%20CP%20IPAS.pdf

Khotimah, K., & Supratiyoko, K. (2023). Peningkatan Keterampilan Proses Sains Siswa Melalui Model Pembelajaran Problem Based Learning. *LAMBDA : Jurnal Ilmiah Pendidikan MIPA Dan Aplikasinya*, *3*(1), 13–21. https://doi.org/10.58218/lambda.v3i1.533

Lestari, S. N. A. P. A., Jayadinata, A. K., & Aeni, A. N. (2017). Meningkatkan Keterampilan Proses Sains Siswa Pada Materi Sifat-Sifat Cahaya Melalui Pembelajaran Inkuiri. *Junal Pena Ilmiah*, *2*(1), 621–630.

Ngana, S. N., Manu, T. S. N., & Paulus, T. (2021). Peningkatan Keterampilan Proses Sains Siswa Melalui Penerapan Metode Brainstorming Di SmpN 20 Kota Kupang Tahun Pelajaran 2019/2020. *Indigenous Biologi Jurnal Pendidikan Dan Sains Biologi*, *4*(2), 63–70. https://doi.org/10.33323/indigenous.v4i2.163

Nomleni, F. T., Boimau, H., & Bullu, N. I. (2024). Penggunaan LKPD Berbasis Proyek Terhadap Hasil Belajar Siswa SMP Negeri 3 Amanuban Tegah. *Jurnal Pendidikan Dan Sains Biologi*, *7*(2), 57–62. https://doi.org/10.33323/indigenous.v7i2.593

Nurdiansah, I., Surahman, E., Makiyah, Y. S., & Kurnia, E. (2024). The Effect of Laboratory-Based Blended-Project Based Learning Model on The Science Process Skills of Students. *Jurnal Pendidikan Fisika Indonesia*, *20*(1), 74–84. https://doi.org/10.15294/jpfi.v20i1.43491

Nurseha, Darsikin, & Werdhiana, I. K. (2015). Pengaruh Model Pembelajaran Children Learning In Science Terhadap Keterampilan Proses Sains Dan Pemahaman Konsep Tentang Getaran Dan Gelombang Pada Kelas VII SMP Negeri 5 Marawola. *E-Jurnam Mitra Sains*, *3*(1), 9–19. https://doi.org/10.22487/mitrasains.v3i1.34

Rochmawati, U., Muslim, A., Rochmawati, U., Muslim, A., & Purwokerto, U. M. (2022). Penerapan Model CLIS (Children Learning in Science) untuk Meningkatkan Keterampilan Proses Sains Siswa Kelas IV SD. *Jurnal Pedagogik Pendidikan Dasar*, *9*(2), 67–76. https://doi.org/10.17509/jppd.v9i2.48661

Sari, W. A. S. (2021). Pentingnya Sains dan Peran Orangtua dalam Pengajaran Sains kepada Anak di Rumah. *Journal Ashil: Jurnal Pendidikan Anak Usia Dini*, *1*(1), 52–66. https://doi.org/10.33367/piaud.v1i1.1572

Sugandi, D., Syach, A., & Nur Fadilah, I. (2021). Model Pembelajaran Children'S Learning in Science (Clis) Terhadap Kemampuan Berpikir Kreatif Siswa Pada Mata Pelajaran Ipa. *Jurnal Tahsinia*, *2*(2), 107–113. https://doi.org/10.57171/jt.v2i2.297

Suhanda, & Suryanto, S. (2018). Penerapan Pembelajaran Kimia Berbasis Proyek Untuk Meningkatkan Keterampilan Proses Sains Siswa Kelas X Sma Negeri 2 Purworejo. *Jurnal Inovasi Pendidikan Kimia*, *12*(2), 2137–2148. https://doi.org/10.15294/jipk.v12i2.15471

Sumampow, Z. F. (2024). *Pengembangan Kurikulum*. Selat Media.

Syahroni, M. I. (2022). Prosedur Penelitian Kuantitatif. *Jurnal Al-Musthafa STIT Al-Aziziyah Lombok Barat*, *2*(3), 43–56.

Umara, C. Z., Nurmaliah, C., & Khairil, K. (2018). Penerapan Model Pembelajaran Berbasis Proyek untuk Meningkatkan Keterampilan Proses Sains Siswa pada Konsep Pencemaran Lingkungan di SMP. *BIOTIK: Jurnal Ilmiah Biologi Teknologi Dan Kependidikan*, *4*(2), 163. https://doi.org/10.22373/biotik.v4i2.1085

Widyatmoko, A. (2023). *Teori Pembelajaran IPA*. PT. Nasya Expanding Management.

Wola, B. R., Rungkat, J. A., & Harindah, G. M. D. (2023). Science process skills of prospective science teachers' in practicum activity at the laboratory. *Jurnal Inovasi Pendidikan IPA*, *9*(1), 50–61. https://doi.org/10.21831/jipi.v9i1.52974

Yuliati, Y. (2016). Peningkatan Keterampilan Proses Sains Siswa Sekolah Dasar Melalui Model Pembelajaran Berbasis Masalah. *Jurnal Cakrawala Pendas*, *2*(2), 71–83. https://doi.org/10.31949/jcp.v2i2.335