STUDENTS' SCIENCE LITERACY ON DISCUSSION-BASED CONTEXTUAL APPROACHES OF HUMAN REPRODUCTIVE SYSTEM LEARNING

Yeni Mulyaningsih[a,1,*]**, Chaerul Rochman**[b,2]**, Adam Malik**[b,3]**, Tri Wahyu Agustina**[b,4]**,
Yulia Sukmawardani**[b,5]**, Nur Hamidah**[c,6]**, Nurul Annisa**[d,7]

[a] *Madrasah Aliyah Negeri 2 Bandung City, Jl. Cipadung 57, Bandung, 40614, Indonesia*
[b] *Study Program of Natural Sciences Education, Graduate School of UIN Sunan Gunung Djati, Jl. A. H. Nasution 105, Bandung, 40614, Indonesia*
[c] *Department of Biology Education, Faculty of Mathematics and Natural Sciences Education, Universitas Pendidikan Indonesia, Jl. Dr. Setiabudhi 229, Bandung 40154 Indonesia*
[d] *Institute of Education, College of Humanities and Social Sciences, National Yang Ming Chiao Tung University, Taiwan*

[1] *yenimulyaningsih74038@gmail.com*[*]*; *[2] *chaerulrochman99@uinsgd.ac.id; *[3] *adamuin@gmail.com; *[3] *ninaagustina11@yahoo.com;*
[3] *yulia.sukmawardani@yahoo.co.id; *[3] *izunhamidah@upi.edu; *[3] *nurulannisa.hs10@nycu.edu.tw*
*Corresponding author

ARTICLE INFO	ABSTRACT
	The aim of this study was to enhance students' science literacy through a discussion-based contextual approach in the learning of the human reproductive system. This quantitative research employed an experimental method with a quasi-experimental posttest-only design. The study involved 60 students, with 30 students each in class XI MIPA 4 serving as the experimental group and class XI MIPA 5 serving as the control group. The control group received instruction through a conceptual approach-based lecture method, whereas the experimental group engaged in learning through a contextual approach-based discussion method. The research instrument comprised 10 open-ended science literacy questions pertaining to the human reproductive system. The data were analyzed using an independent t-test with SPSS version 26. The results indicated that the data were both normally distributed and homogeneous. Furthermore, a significant difference was observed between the control and experimental groups, with a *t*-count value of 4.118, which is greater than the *t*-table value of 1.671. In conclusion, the study demonstrates that the human reproductive system can be effectively taught through contextual experiences relevant to students' lives, thereby enhancing their science literacy skills.

INTRODUCTION

The quality of learning is determined by several factors, including the availability of learning facilities, the presence of qualified teachers, the dedication of students, and a conducive learning environment. The learning process involves various approaches, methods, and models, often supported by learning media (Widodo, 2021). Therefore, the selection of an appropriate learning approach is a critical initial step that must be carefully planned and prepared to ensure a quality learning process.

A learning approach can be defined as the starting point or perspective from which the learning process is viewed (Abdullah, 2017; Basir, 2017). In essence, the approach serves as a strategy to achieve the desired goals when designing learning experiences (Widodo, 2021). One type of student-oriented learning approach is the contextual approach. This approach encourages students to engage directly with real-world conditions, allowing them to construct their knowledge based on personal experiences (Nurhaedah, 2012).

Biology subjects hold significant direct relevance to students' lives. However, the current implementation of biology learning often remains textbook-based, without integrating the context of students' daily experiences. For example, in the topic of the "Reproductive System", students are typically taught conceptual content such as the structure of reproductive organs and the process of fertilization (Retno et al., 2016). Contextual aspects, such as reproductive organ health and physiological changes in the reproductive system during adolescence, are not thoroughly discussed. The contextual approach was chosen to address this gap, as it extends learning beyond mere concepts, helping students find greater relevance in the material being taught at school.

The contextual approach has been successfully applied in numerous studies (Ansari, 2014; Noviyanti, 2017; Nurhaedah, 2012). It is known to develop various competencies in students, including critical thinking, creativity, thinking styles, and positive attitudes and actions towards the environment (Mukayatun et al., 2013; Rahmatan, 2017; Restanti et al., 2013; Sulianto, 2008). Other research has demonstrated that learning outcomes and the quality of learning improve with the contextual approach (Dongoran, 2019; Irwandi, 2013; Sudarisman, 2013; Syahril, 2018), thereby indirectly increasing student motivation and enthusiasm for learning (Irhami, 2019). Despite these benefits, there is a lack of research specifically addressing the impact of contextual approaches on students' science literacy regarding the reproductive system. This study aims to fill that gap.

Contextual Teaching and Learning (CTL) aligns with the goals of modern science education, which emphasize conceptual understanding, science process skills, and the application of science in real life. Although CTL has great potential, its effectiveness depends on proper implementation. CTL focuses on actively building students' knowledge, rather than passive information reception. It encourages students to test ideas, seek answers, and develop their understanding through exploration, discussion, and reflection. This approach is consistent with the principles of scientific literacy, which require individuals to analyze information, evaluate arguments, and form their own conclusions (National Academies of Sciences, Engineering, and Medicine, 2018). Teachers should design well-structured CTL learning experiences, choose relevant contexts, and provide adequate support to students to maximize its effectiveness.

Literacy essentially emphasizes four interrelated components: knowledge, context, competence, and attitude. The Organization for Economic Co-operation and Development (OECD) clearly states that science literacy involves the ability to apply knowledge in identifying questions, building new knowledge, providing scientific explanations, drawing scientific conclusions, and developing a reflective mindset. This enables individuals to participate in addressing scientific issues and ideas relevant to everyday life. However, the results of the 2018 Program for International Student Assessment (PISA) evaluation revealed that Indonesian students scored only 396 in science literacy, ranking 70th out of 78 countries (OECD, 2019). This underscores the need to enhance science literacy among Indonesian students through effective learning processes. Given the various foundational ideas and results from previous studies, this discussion-based contextual approach was selected to investigate its impact on students' science literacy, specifically in the context of the reproductive system.

METHOD

This quantitative research employs an experimental method with a quasi-experimental posttest-only design. The control class received instruction using a lecture method based on a conceptual approach, while the experimental class engaged in learning through a discussion method based on a contextual approach. The detailed research design is illustrated in Figure 1.

The study was conducted with 60 students, divided into two groups of 30 each: class XI MIPA 4 as the experimental group and class XI MIPA 5 as the control group. The sample was selected through a random sampling technique. The research instrument consisted of 10 open-ended questions on the reproductive system material. Open-ended questions allow respondents to provide unrestricted and unstructured answers, thereby reducing the possibility of researcher bias in interpreting responses. Unlike closed questions, which can inadvertently lead respondents to specific answers and affect research results, open-ended questions facilitate more accurate and unbiased data collection (American Psychological Association, 2020).

The instrument designed to assess science literacy comprised seven indicators: (1) identifying valid scientific opinions, (2) conducting effective literature searches, (3) understanding research design elements and their impact on findings and conclusions, (4) accurately creating graphs from data, (5) solving problems using quantitative skills, including basic statistics, (6) understanding and interpreting basic statistics, and (7) making inferences, predictions, and drawing conclusions based on quantitative data (Adnan et al., 2021; Gormally et al., 2012). The instrument underwent expert validation tests and was deemed suitable for use. Utilizing a limited number of open-ended questions can enhance objectivity in the assessment.

The research procedure began with the implementation of the learning process in both the control and experimental classes. The control class received instruction through a lecture-based conceptual approach, while the experimental class engaged in learning through a discussion-based contextual approach. Each approach was implemented over three meetings.

In the experimental class, the teacher divided students into groups and instructed them to write down all contextual phenomena, problems, or questions related to the reproductive system that they had experienced or wanted to learn more about. These writings were then collected and exchanged with other groups for discussion. The teacher guided the students to present their findings based on literacy activities, i.e. (1) identifying valid scientific opinions, (2) conducting effective literature searches, (3) understanding research design elements and their impact on findings and conclusions, (4) creating accurate graphs from data, (5) solving problems using quantitative skills, including basic statistics, (6) understanding and interpreting basic statistics, and (7) making inferences, predictions, and drawing conclusions based on quantitative data.
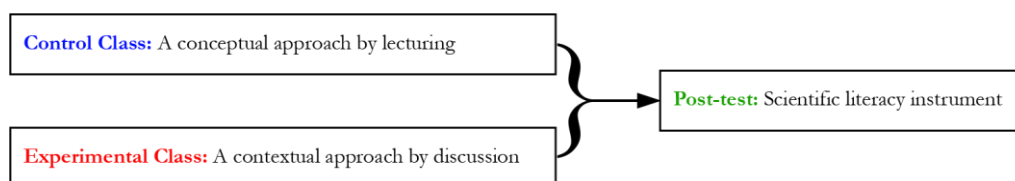
Figure 1. Quasi research design experimental-posttest only.

During the third meeting, the teacher confirmed the results of the discussions and the students' literacy regarding the questions they addressed. The final procedure involved administering an evaluation to measure the students' science literacy during a single meeting. Each meeting consisted of two 45-minute lessons.

The research data were analyzed using an independent t-test with SPSS version 26. Prior to this, the data were tested for normality using the Kolmogorov-Smirnov test and for homogeneity using Levene's test. The results of these analyses were used to determine the influence of the discussion-based contextual approach on students' science literacy in both the control and experimental classes.

RESULTS

A total of 60 evaluation data points were obtained from the results of student literacy instruments on reproductive system material (*n*-control = 30; *n*-experiment = 30). Data were collected following the implementation of the contextual approach based on discussions in the experimental class and the lecture-based conceptual approach in the control class. The data were found to be normal and homogeneous, with a *t*-count value of 4.118. The research results are presented in Table 1.

The study investigated the impact of a discussion-based contextual approach on students' science literacy regarding the reproductive system. The results, shown in Table 1, indicate a significant difference in the average science literacy scores between the experimental class and the control class. This suggests that the contextual approach positively influences students' science literacy. These findings align with Puspita (2019), who reported that a contextual approach can enhance elementary school students' science literacy. Furthermore, Jannah et al. (2019) found that university students also believe that science literacy can be developed through contextual learning.

Several other studies have corroborated these findings, demonstrating that a contextual approach can moderately increase students' science literacy (Maknun, 2014; Masfufah & Ellianawati, 2020; Sari et al., 2022). Maknun (2014) integrated discussion-based contextual learning with socioscientific issues, noting that this approach not only improved science literacy but also enhanced the quality of students' arguments. Similarly, Masfufah and Ellianawati (2020) incorporated ethnoscience content into the contextual approach. These studies collectively address the concern that one of the factors contributing to low science literacy among students is the lack of contextual learning (Suparya et al., 2022). Therefore, consistently relating learning material to real-world contexts can gradually improve students' science literacy.

DISCUSSION

Learning strategies through a contextual approach can be integrated with various models, methods, media, and teaching materials. For example, contextual approaches have been successfully integrated into discovery model learning (Zuriatni et al., 2020), problem-based learning, and inquiry models (Mursalin & Setiaji, 2021). Additionally, contextual strategies can be combined with experimental methods, field studies, and demonstrations (Murwani & Wibowo, 2013; Putra, 2017; Saregar et al., 2013). Media such as worksheets and contextual-based videos are also effective in contextual learning (Nengsi et al., 2021; Nurhasanah et al., 2020; Suantiani & Wiarta, 2022).

Contextual approaches can be implemented through various methods, including field studies, experiments, discussions, assignments, and more. However, for topics like the health of reproductive organs and physiological changes in the reproductive system during adolescence, discussion is particularly effective. According to Widodo (2021), discussions help develop students' abilities to communicate, argue, and interact with individuals from diverse backgrounds. Discussions are valuable because they address problems that do not have a single correct answer but allow for multiple perspectives.

The application of the discussion method provides dual benefits: acquiring knowledge and gaining invaluable discussion experience. Through discussion, students learn how to communicate and negotiate to achieve common goals while respecting diverse viewpoints. Additionally, students are required to use science literacy skills to find data supporting their arguments, which is crucial for applying science in daily life (Suryani et al., 2017). Science literacy skills are essential for students in the 21st century (Deming et al., 2012).

Research also shows that contextual learning enhances student motivation, especially when the discussion themes relate to real-life contexts. For instance, students in the experimental class can discuss physiological changes during adolescence, prompting them to seek scientific data to support their questions. This increase in motivation aligns with Irhami (2019), who suggests that contextual learning indirectly boosts student enthusiasm for learning.

A contextual approach is also known to develop various competencies in students, such as critical thinking, creativity, thinking styles, and attitudes towards the environment. It improves learning outcomes and the overall quality of learning (Dongoran, 2019; Irwandi, 2013; Mukayatun et al., 2013; Rahmatan, 2017; Restanti et al., 2013; Sudarisman, 2013; Sulianto, 2008; Syahril, 2018). Therefore, teachers should implement contextual approaches more frequently in their teaching and learning activities.

Table 1. Research results.

Testing	Results		Interpretation
Normality	Sig. Control	: 0.170	Sig. > 0.05, then the data is declared normally distributed
	Sig. Experiment	: 0.200	Sig. > 0.05, then the data is declared normally distributed
Homogeneity	Significance	: 0.831	Sig. > 0.05, then the data is declared homogeneous
Independent *t*-test	*t*-count	: 4.118	*t*-count > *t*-table (1.671), then there is a significant difference between the control and experimental classes

CONCLUSION

The study found that a discussion-based contextual approach significantly affected students' science literacy in learning about the human reproductive system. This effect is evidenced by a significant difference between the average science literacy evaluation results of the control and experimental classes, with a *t*-count value of 4.118, which is greater than the *t*-table value of 1.671. Students reported that the reproductive system material presented in a contextual manner was relevant to their everyday lives. This relevance motivated students to engage in literacy activities and participate in discussions to exchange arguments based on their findings. The contextual presentation of the reproductive system material, combined with the discussion method, effectively encouraged students to delve deeper into the subject matter, enhancing their science literacy. The results suggest that teaching reproductive system material through contextual experiences relevant to students' lives is an efficient way to train and improve students' science literacy.

ACKNOWLEDGMENTS

FUNDING AGENCIES

AUTHOR CONTRIBUTIONS

YM was involved in conceptualizing the study, designing the methodology, conducting research, and drafting the original manuscript. CR, AM, TWA, and YS contributed to the validation processes, reviewed the manuscript, and provided overall supervision for the project. NH and NA participated in conducting formal analysis and editing the manuscript.

CONFLICT OF INTEREST STATEMENT

There is no conflict of interest to be declared.

REFERENCES

Abdullah, A. (2017). Pendekatan dan model pembelajaran yang mengaktifkan siswa. *Edureligia: Jurnal Pendidikan Agama Islam*, *1*(1), 45–62. https://doi.org/10.33650/edureligia.v1i2.45

Adnan, A., Mulbar, U., Sugiarti, S., & Bahri, A. (2021, February). Biology science literacy of junior high school students in South Sulawesi, Indonesia. In *Journal of Physics: Conference Series* (Vol. 1752, No. 1, p. 012084). https://doi.org/10.1088/1742-6596/1752/1/012084

American Psychological Association. (2020). *Publication manual of the American Psychological Association* (7th ed.). Washington, DC: American Psychological Association.

Ansari, A. (2014). Penerapan pendekatan pembelajaran aktif, kreatif, efektif dan menyenangkan (PAKEM) dan kontekstual dalam mengatasikesulitan belajar siswa pada pembelajaran pendidikan kewarganegaraan di SMA Muhammadiyah 2 Banjarmasin. *Jurnal Pendidikan Kewarganegaraan*, *4*(8), 594–599. http://doi.org/10.20527/kewarganegaraan.v4i8.411

Basir, M. (2017). *Pendekatan pembelajaran*. Sengkang, Indonesia: Lampena Intimedia.

Deming, J. C., O'Donnell, J. R., & Malone, C. J. (2012). Scientific literacy: Resurrecting the phoenix with thinking skills. *Science Educator*, *21*(2), 10–17.

Dongoran, J. (2019). Upaya meningkatkan hasil belajar biologi siswa melalui pendekatan kontekstual dengan media powerpoint. *School Education Journal PGSD FIP UNIMED*, *9*(1), 1–7. https://doi.org/10.24114/sejpgsd.v9i1.13681

Gormally, C., Brickman, P., & Lutz, M. (2012). Developing a test of scientific literacy skills (TOSLS): Measuring undergraduates' evaluation of scientific information and arguments. *CBE—Life Sciences Education*, *11*(4), 364–377. https://doi.org/10.1187/cbe.12-03-0026

Irhami, S. N. (2019). Implementasi pendekatan kontekstual untuk meningkatkan gairah siswa dalam pembelajaran biologi di Madrasah Aliyah Negeri 02 Banyumas. *Jurnal Kependidikan*, *7*(1), 30–42. https://doi.org/10.24090/jk.v7i1.2827

Irwandi, I. (2013). Pengaruh pendekatan kontekstual terhadap hasil belajar biologi siswa SMA. *Jurnal Ilmu Pendidikan Universitas Negeri Malang*, *19*(1), 100–105. http://doi.org/10.17977/jip.v19i1.3761

Jannah, U. M., Rohmah, S. A., & Noor, F. M. (2019). Analisis penerapan pembelajaran kimia organik berkonteks isu sosiosainstifik untuk meningkatkan literasi sains mahasiswa IPA. *Thabiea: Journal of Natural Science Teaching*, *2*(1), 45–50. https://doi.org/10.21043/thabiea.v2i1.5491

Maknun, D. (2014). Penerapan pembelajaran kontekstual untuk meningkatkan literasi sains dan kualitas argumentasi siswa Pondok Pesantren Daarul Uluum PUI Majalengka pada diskusi sosiosaintifik IPA. *Jurnal Tarbiyah*, *21*(1), 119–148. http://doi.org/10.30829/tar.v21i1.221

Masfufah, F. H., & Ellianawati, E. (2020). Peningkatan literasi sains siswa melalui pendekatan contextual teaching and learning (CTL) bermuatan etnosains. *UPEJ Unnes Physics Education Journal*, *9*(2), 129–138. https://doi.org/10.15294/upej.v9i2.41918

Mukayatun, M., Sugiyarto, S., & Karyanto, P. (2013). Pembelajaran biologi dengan pendekatan CTL dengan teknik network tree dan spider concept map ditinjau dari kreativitas dan gaya berpikir peserta didik. *Inkuiri*, *2*(01), 14–24. https://doi.org/10.20961/inkuiri.v2i01.9752

Mursalin, E., & Setiaji, A. B. (2021, December). Menumbuhkan kepedulian lingkungan melalui literasi sains: Penggunaan pendekatan dan model pembelajaran yang efektif. In *E-Prosiding Seminar Nasional Pendidikan Jurusan Tarbiyah FTIK IAIN Palangka Raya* (Vol. 1, No. 1). https://e-proceedings.iain-palangkaraya.ac.id/index.php/SNPJTFTIK/article/view/696

Murwani, S., & Wibowo, Y. (2013). Pengaruh pendekatan contextual teaching and learning dengan metode eksperimen lapangan dan eksperimen laboratorium terhadap prestasi belajar siswa kelas X SMA N 2 Yogyakarta. *Jurnal Pendidikan Matematika dan Sains*, *1*(2), 134–139. http://doi.org/10.21831/jpms.v1i2.2481

National Academies of Sciences, Engineering, and Medicine. (2018). *Indicators for monitoring undergraduate STEM education*. Washington, DC: The National Academies Press.

Nengsi, S., Zulyetti, D., & Nelvi, M. H. (2021). Pengembangan LKS Biologi dengan pendekatan kontekstual materi sistem ekskresi siswa kelas XI. *Jurnal Edukasi*, *1*(1), 12–28. https://jurnaledukasi.stkipabdi.ac.id/index.php/JED/article/view/12

Noviyanti, E. (2017). Pendekatan saintifik dan kontekstual dalam pembelajaran literasi sains di sekolah dasar. In *Aktualisasi kurikulum 2013 di sekolah dasar melalui gerakan literasi sekolah untuk menyiapkan generasi unggul dan berbudi pekerti*. Proceedings of the National Conference Study Program of Primary Teacher Education, Faculty of Education and Teacher Training, Universitas Muria Kudus (pp. 43–55). Kudus, Indonesia. https://eprints.umk.ac.id/7379/9/6_Erna_Unissula.pdf

Nurhaedah, N. (2012). IbM pendekatan kontekstual (contextual teaching and learning/CTL) dalam pembelajaran bagi guru-guru di SDN Inpres Bira 2 Bontoa Makassar. *Jurnal Publikasi Pendidikan, 2*(2), 153–159. https://core.ac.uk/download/pdf/304760984.pdf

Nurhasanah, N., Denny, Y. R., & Utami, I. S. (2020). Penerapan media pembelajaran majalah fisika "Physicsmagz" berbasis contextual learning untuk meningkatakan kemampuan literasi sains. *SPEKTRA: Jurnal Kajian Pendidikan Sains*, *6*(1), 53–63. http://doi.org/10.32699/spektra.v6i1.129

OECD. (2019), *PISA 2018 Results (Volume I): What students know and can do*. Paris, France: OECD Publishing. https://doi.org/10.1787/5f07c754-en.

Puspita, A. (2019). Efektivitas pendekatan kontekstual untuk meningkatkan keterampilan literasi sains siswa sekolah dasar. *Eduproxima (Jurnal Ilmiah Pendidikan IPA)*, *1*(1), 1–8. https://doi.org/10.29100/eduproxima.v1i1.1024

Putra, F. G. (2017). Eksperimentasi pendekatan kontekstual berbantuan Hands on Activity (HoA) terhadap kemampuan pemecahan masalah matematik. *Al-Jabar: Jurnal Pendidikan Matematika*, *8*(1), 73–80. http://doi.org/10.24042/ajpm.v8i1.1148

Rahmatan, H. (2017). Pengembangan model pembelajaran problem based instruction (PBI) pada materi pencemaran lingkungan untuk meningkatkan tindakan peduli terhadap lingkungan di Madrasah Aliyah Negeri Darussalam Kabupaten Aceh Besar. *BIOTIK: Jurnal Ilmiah Biologi Teknologi dan Kependidikan*, *3*(1), 21–26. http://dx.doi.org/10.22373/biotik.v3i1.988

Restanti, R., Sarwanto, S., & Sudarisman, S. (2013). Pembelajaran biologi dengan pendekatan CTL (contextual teaching and learning) melalui model formal dan informal Hands on Activities ditinjau dari kreativitas siswa dan sikap peduli lingkungan. *Inkuiri: Jurnal Pendidikan IPA*, *2*(02), 193–203. https://jurnal.fkip.uns.ac.id/index.php/inkuiri/article/view/3821/2697

Retno, Y., Rusdi, R., & Amalia, A. (2016). Pengaruh model pembelajaran concept attainment terhadap kemampuan komunikasi dan pemahaman konsep siswa pada materi sistem reproduksi. *Biosfer: Jurnal Pendidikan Biologi*, *9*(2), 1–5. http://journal.unj.ac.id/unj/index.php/biosfer/article/view/5558

Saregar, A., Sunarno, W., & Cari, C. (2013). Pembelajaran fisika kontekstual melalui metode eksperimen dan demonstrasi diskusi menggunakan multimedia interaktif ditinjau dari sikap ilmiah dan kemampuan verbal siswa. *Inkuiri: Jurnal Pendidikan IPA*, *2*(2), 100–113. https://doi.org/10.20961/inkuiri.v2i02.9754

Sari, E. R., Saputro, E. F. H., & Lestari, N. (2022). Pembelajaran kontekstual untuk melatih kemampuan literasi sains siswa. *Quantum: Jurnal Pembelajaran IPA dan Aplikasinya*, *2*(1), 1–4. https://doi.org/10.46368/qjpia.v2i1.551

Suantiani, N. M. A., & Wiarta, I. W. (2022). Video pembelajaran berbasis pendekatan kontekstual pada muatan matematika. *Jurnal Penelitian dan Pengembangan Pendidikan*, *6*(1), 64–71. https://doi.org/10.23887/jppp.v6i1.45455

Sudarisman, S. (2013). Implementasi pendekatan kontekstual dengan variasi metode berbasis masalah untuk meningkatkan kualitas pembelajaran biologi. *Jurnal Pendidikan IPA Indonesia*, *2*(1), 23–30. https://doi.org/10.15294/jpii.v2i1.2506

Sulianto, J. (2008). Pendekatan kontekstual dalam pembelajaran matematika untuk meningkatkan berpikir kritis pada siswa sekolah dasar. *Pythagoras: Jurnal Matematika dan Pendidikan Matematika*, *4*(2), 14–25. http://doi.org/10.21831/pg.v4i2.555

Suparya, I. K., Suastra, I. W., & Arnyana, I. B. P. (2022). Rendahnya literasi sains: Faktor penyebab dan alternatif solusinya. *Jurnal Ilmiah Pendidikan Citra Bakti*, *9*(1), 153–166. https://doi.org/10.38048/jipcb.v9i1.580

Suryani, A. I., Jufri, A. W., & Setiadi, D. (2017). Pengaruh model pembelajaran 5E terintegrasi pendekatan saintifik terhadap kemampuan literasi sains siswa SMPN 1 Kuripan tahun ajaran 2016/2017. *Jurnal Pijar MIPA*, *12*(1), 39–43. https://doi.org/10.29303/jpm.v12i1.339

Syahril, S. (2018). Peningkatan hasil belajar IPA dengan menggunakan pendekatan konstruktivisme pada siswa kelas VI SD Negeri 21 Batang Anai. *JRTI (Jurnal Riset Tindakan Indonesia)*, *3*(1), 34–46. https://doi.org/10.29210/3003126000

Widodo, A. (2021). *Pembelajaran ilmu pengetahuan alam: Dasar-dasar untuk praktik*. Bandung, Indonesia: UPI Press.

Zuriatni, Y., Budiasih, E., & Sumari, S. (2020, April). The effectiveness of guided discovery with contextual approach learning model for increasing students scientific literacy in (the topic of) reaction rate. In *AIP Conference Proceedings* (Vol. 2215, No. 1). AIP Publishing. https://doi.org/10.1063/5.0000754