International Journal on Education Insight
Vol. 7, No. 1, January 2026, pp. 25-32
e-ISSN: 2722-2691 p-ISSN: 2722-2683 DOI: 10.12928/ijei.v7i1.15596
ORIGINAL RESEARCH PAPER

Addressing the low students' cognitive learning outcomes in Biology using CTL model: A case from SMA N 14 Kota Jambi

Santo V Simatupang [1,*], Ervan Johan Wicaksana [1], Desfaur Natalia [1]

[1] Department of Biology Education, Universitas Jambi, Muaro Jambi, Indonesia
*Corresponding author

Abstract
Education plays an important role in developing students' thinking abilities as reflected in their learning outcomes. This research aims to examine the effect of the contextual teaching and learning (CTL) model on the students' cognitive learning outcomes, which refer to conceptual understanding and cognitive thinking skills across Bloom's taxonomy levels. This research employed a quasi-experimental design using a non-randomized control group pretest–posttest design. We involved two groups of senior high school students, each consisted of 30 students. The experiment group was taught using the CTL model, while the control group was taught using the problem-based learning (PBL) model. Data were collected through pretest and posttest instruments. The results showed that the experimental class achieved a higher mean posttest score (55.24) than the control class (36.27). One-Way ANCOVA analysis indicated that the CTL model had a significant effect in improving the students' cognitive learning outcomes in Biology.

Keywords: cognitive learning outcomes, contextual teaching and learning, problem-based learning

How to cite: Simatupang, S. V., Wicaksana, E. J., & Natalia, D. (2026). Addressing the low students' cognitive learning outcomes in Biology using CTL model: A case from SMA N 14 Kota Jambi. *International Journal on Education Insight, 7*(1), 25-32. https://doi.org/10.12928/ijei.v7i1.15596

Article history: Received 12/01/2026, Accepted 01/02/2026, Published 08/02/2026

Correspondence address: Department of Biology Education, Universitas Jambi, Jl. Jambi-Muara Bulian, KM.15, Mendalo Darat, Jambi Luar Kota, Muaro Jambi, Indonesia. E-mail: santosiburian3@gmail.com

INTRODUCTION

Biology learning requires students not only to memorize concepts but also to understand, analyze, and relate biological phenomena to real-life situations (Suryanda, 2024), because Biology concepts are closely linked to everyday phenomena and therefore demand learning processes that promote active engagement, inquiry-based activities, and contextual understanding (Ulfah et al., 2021; Nurwahidah, 2023). However, in practice, Biology learning is often dominated by theoretical explanations and teacher-centered approaches, which limit students' opportunities to actively construct knowledge and negatively affect motivation and learning outcomes (Hanaris, 2023).

Based on preliminary data collected at SMAN 14 Kota Jambi through questionnaires and documentation, it was found that 65% of students experienced difficulties in understanding Biology material, while 50.5% of students obtained low cognitive learning outcomes, indicating that the learning process has not yet facilitated deep conceptual understanding (Mariati, 2018). These quantitative findings were reinforced by interview results with Biology teachers, which revealed that students tended to be passive during lessons, relied heavily on teacher explanations, and had difficulty connecting abstract Biology concepts, particularly virus material, to real-life contexts; moreover, although the Merdeka Curriculum has been implemented using the Problem Based Learning (PBL) model, its application has not been effective in increasing students' motivation and cognitive learning outcomes, a condition also reported in previous

studies related to less contextual learning approaches (Ningtyas & Pradikto, 2025; Hanaris, 2023).

Cognitive learning outcomes are closely related to students' thinking abilities, which are classified into Lower-Order Thinking Skills (LOTS) and Higher-Order Thinking Skills (HOTS) (Ginting et al., 2024), where LOTS includes remembering, understanding, and applying (C1–C3), characterized by recalling facts and basic comprehension, while HOTS includes analyzing and evaluating. (C4–C5), which involve critical thinking, problem-solving, and the ability to connect concepts across contexts (Ginting et al., 2024).

This study only uses indicators C1-C5 because the absence of C6 (creating) in this study is due to the results of the instrument validation process. Based on the validity analysis, only test items measuring cognitive levels C1–C5 met the validity criteria and were therefore used in data analysis, while items intended to assess C6 did not meet the required validity standards and were excluded. As a result, the measurement of students' cognitive learning outcomes in this study was limited to levels C1–C5, which are sufficient to represent students' conceptual understanding and higher-order thinking within the scope of the validated instrument.

Unfortunately, learning activities in schools often emphasize LOTS, resulting in students' limited ability to analyze and interpret biological phenomena (Ihsan & Hasruddin, 2024). Learning outcomes are strongly influenced by external factors, particularly the learning models and strategies used by teachers (Hanaris, 2023), and conventional teacher-centered learning models have been shown to reduce student motivation and participation, leading to superficial understanding and low cognitive achievement (Ningtyas & Pradikto, 2025), as also observed at SMAN 14 Kota Jambi where students' average cognitive learning outcomes and analytical abilities remain low (Kurniawan et al., 2025).

Considering the characteristics of Biology learning and the identified problems, an alternative learning model that promotes meaningful and contextual learning is needed, namely Contextual Teaching and Learning (CTL), which connects learning material with real-life situations and encourages students to apply knowledge in their daily lives (Astuti & Najuba, 2024).

Previous studies have shown that CTL can improve students' understanding, motivation, and learning engagement by helping learners relate abstract concepts to real situations (Side & Munawwarah, 2025; Afifah et al., 2025; Zulfania et al., 2025; Dulyapit & Nurmala, 2025), and that contextual learning promotes active participation and meaningful learning compared to conventional approaches (Miranda & Melisa, 2025). Although CTL has been widely applied in various educational contexts, its implementation in Biology learning that emphasizes higher-order thinking skills within the Merdeka Curriculum framework remains limited (Kurniawan et al., 2025); therefore, based on learning problems identified through questionnaires, documentation, and interviews, this study proposes the implementation of the Contextual Teaching and Learning (CTL) model as a solution to improve students' cognitive learning outcomes in Biology, particularly on virus material at SMAN 14 Kota Jambi.

RESEARCH METHOD

This study employed a quantitative approach using a quasi-experimental design with a Non-Randomized Control Group Pretest–Posttest Design conducted at SMAN 14 Kota Jambi from early to late November 2025 on virus material. The population consisted of all tenth-grade students, and cluster random sampling was used because the school does not implement superior or tracking classes; all classes are formed heterogeneously with relatively equal academic abilities, making each class comparable in terms of students' cognitive potential, while individual randomization was not feasible within the existing class structure (Amin et al., 2023). Two intact classes were selected as samples: Class X E1 as the control group and Class X E6 as the experimental group, each consisting of 30 students. Prior to treatment, both groups were given a pretest to measure initial cognitive ability, which was later tested using ANCOVA.

The experimental group received instruction using the Contextual Teaching and Learning (CTL) model over four instructional meetings, where learning activities were designed to connect virus concepts with real-life contexts through contextual problem orientation, group discussions, guided inquiry, and reflection activities supported by contextual worksheet developed for this study, with the teacher acting as a facilitator. In contrast, the control group was taught using the conventional approach combined with the school's usual Problem Based Learning (PBL) implementation, which relied more on teacher explanation and textbook-based activities without explicit contextual worksheet or structured reflection.

After the instructional treatment, both groups were administered a posttest to measure students' cognitive learning outcomes, and the data were analyzed using descriptive statistics and One-Way ANCOVA. To support the description of the learning process, documentation in the form of classroom activity photographs and screenshots of the worksheet used in the experimental class is included.

RESULTS AND DISCUSSION

Contextual learning allows students to connect biological concepts to their environment. This approach, which connects the material to everyday life, helps students build a better understanding (Efriyani & Aryani, 2024; Rizaldi et al., 2021). This approach, which connects the material to everyday life, helps students build a better understanding (Dewi et al., 2024). The implementation of this approach is expected to make learning outcomes more meaningful, and the contextual approach to the educational process encourages students' motivation to improve their learning outcomes (Hamid et al., 2024).

Table 1. Percentage of students' cognitive learning outcomes based on cognitive levels (C1–C5)

Cognitive	Control Group		Experiment Group	
Level	Percentage (%)	Category	Percentage (%)	Category
C1	13.25	Very Poor	14.30	Very Poor
C2	10.20	Very Poor	11.50	Very Poor
C3	9.39	Very Poor	9.78	Very Poor
C4	8.25	Very Poor	9.35	Very Poor
C5	5.30	Very Poor	6.30	Very Poor

Table 1 shows students' cognitive learning outcomes in both classes across cognitive levels C1–C5. The results indicate that the lowest achievement occurs at higher cognitive levels, particularly C5 (evaluating), which falls into the very poor category in both groups, showing students' difficulty in analytical and evaluative thinking. Lower levels (C1–C3) also remain in the very poor category, indicating limited basic conceptual mastery. However, the experimental class consistently achieved higher percentages than the control class across all cognitive levels, suggesting that the Contextual Teaching and Learning (CTL) model contributes to better cognitive performance.

Biology learning requires high-level thinking skills, the ability to process information, and a learning process that allows students to connect concepts to real-world phenomena (Ihsan & Hasruddin, 2024). Therefore, the learning model used significantly determines the quality of student understanding. Contextual Teaching and Learning (CTL), a constructivist-based learning model, is designed to help students construct meaning through direct experience, observation, and activities closely related to their life contexts. Unlike conventional or teacher-centered approaches, CTL emphasizes the process of discovering, reasoning, connecting, and applying concepts in real-world situations, thus deepening student understanding and gaining deeper meaning (Ester et al., 2023).

The quasi-experimental research conducted at SMAN 14 Jambi City from early November to late November 2025, focusing on Virus material, has yielded findings indicating a significant difference in the improvement of cognitive learning outcomes between the group taught using the CTL model and the group taught using the conventional PBL model.

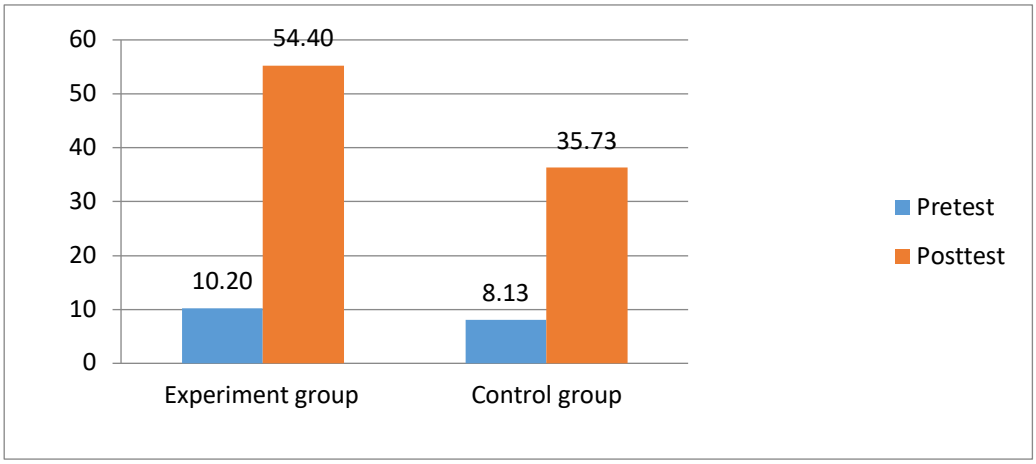

Figure 1. Comparison of average pretest and posttest scores between the control group and experiment group.

Figure 1 illustrates the comparison of average pretest and posttest scores between the control and experimental classes. The graph shows that although both groups experienced an increase in posttest scores, the experimental class demonstrated a substantially higher improvement compared to the control class. This difference indicates that students who were taught using the CTL model achieved better cognitive learning outcomes than those who received conventional/PBL instruction. The higher gain in the experimental group suggests that contextual learning activities, such as connecting virus material to real-life phenomena and guided inquiry using worksheet, were effective in enhancing students' understanding and cognitive engagement. This finding aligns with previous studies reporting that CTL promotes meaningful learning and improves cognitive achievement more effectively than traditional approaches (Astuti & Najuba, 2024; Side & Munawwarah, 2025).

Descriptive analysis showed that the mean pre-test score for the control group (X E1) was 8.06, slightly lower than the experimental group (X E6) mean of 10.20. Although this initial difference existed descriptively, it was statistically controlled in subsequent analysis. Following the differential treatment, the mean post-test scores for both groups increased, but with a wide disparity: the control group reached a mean of 36.27, while the experimental group successfully achieved a significantly higher mean of 55.24. This substantially greater increase in the experimental group provided a strong initial indication of the CTL model's superiority (See Figure 2). To measure the effectiveness of the learning models in enhancing cognitive learning outcomes (C1-C5 domain), the Normalized N−Gain score was calculated. The results showed that the control group achieved an average N-Gain score of 0.30 (classified as medium), while the experimental group achieved a higher average N-Gain score of 0.50 (classified as medium to high). Inferential statistics were then applied using Analysis of Covariance (ANCOVA), with the pre-test score acting as a covariate to control for the influence of students' initial abilities.

Several previous studies have supported the effectiveness of the CTL model in improving biology learning outcomes. A study by Syafitri et al. (2025) found that students taught using the CTL model achieved significantly higher learning outcomes compared to those taught using conventional approaches.

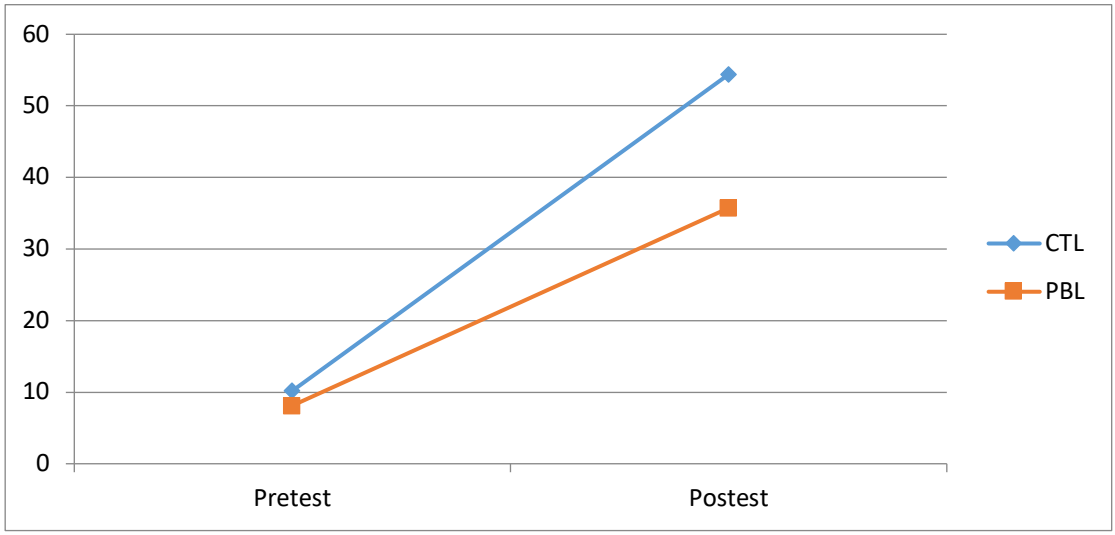

Figure 2. Plot diagram of the average pretest and posttest scores of the CTL and PBL classes.

Another study by Rivan and Sari (2024) demonstrated that CTL improved biology learning outcomes for students regardless of their initial knowledge level, suggesting that CTL can address challenges faced by learners with varying starting competencies. Research by Telaumbanua et al. (2022) revealed that CTL enhanced the relevance and engagement in biology learning, contributing positively to student achievement. Similarly, classroom action research conducted by Nurmailis (2021) showed that CTL significantly improved students' understanding of biology concepts, while Surata's study indicated that CTL increased student learning activity, an important predictor of cognitive achievement. These findings align with the present study, indicating that CTL is a robust solution to improving cognitive learning outcomes in biology.

Tabel 2. Adjusted mean scores of students' cognitive learning outcomes

Groups	Adjusted Mean	Std Error	95% Lower Bound	95% Upper Bound
Control	36.105	2.831	30.436	41.774
Experiment	54.028	2.831	48.359	59.697

In addition to Table 2, The ANCOVA test confirmed a highly significant influence of the CTL Model on students' cognitive learning outcomes ($p<0.05$, e.g., $p=0.000$). This statistical evidence definitively rejects the null hypothesis and proves that the striking difference in post-test means was purely attributable to the difference in the learning models implemented, having neutralized the effect of initial student ability. The high effectiveness of the CTL Model (N-Gain 0.50) over the conventional/PBL model (N-Gain 0.30) can be interpreted as CTL successfully addressing the root cause of the identified low learning outcomes at SMAN 14 Jambi, namely passive, teacher-centered learning and a lack of real-world material relevance.

By emphasizing Authentic Learning, the CTL Model allowed students to connect the abstract Virus material to relevant daily health and environmental issues, thereby deepening conceptual understanding (C1-C3). Furthermore, the model encourages active inquiry and data analysis (C4-C5), which directly contributed to the superior post-test scores in the experimental group. Thus, the implementation of CTL proved effective in facilitating a significant increase in students' cognitive learning outcomes. Several studies have demonstrated the effectiveness of the Contextual Teaching and Learning (CTL) model in improving cognitive learning outcomes in science and biology learning. For example, a study using CTL with animation and environmental

media showed significant improvements in students' cognitive and affective achievements. Another quasi-experimental study reported that CTL produced higher learning outcomes compared to PBL in science subjects.

Additionally, CTL has been shown to enhance classroom activity and learning outcomes, and a study on SMA Biology learners confirmed its effectiveness in improving student achievement. These findings support the present study's results that CTL significantly enhances students' cognitive learning outcomes. In conclusion, the Ancova analysis confirms a significant influence of the Contextual Teaching and Learning (CTL) Model on the cognitive learning outcomes of tenth-grade students at SMAN 14 Jambi City on the Virus material. The CTL Model proved to be superior and more effective than the conventional/PBL model. The implication of this finding is that the CTL Model holds immense potential as a primary approach to combat low cognitive learning outcomes, especially for Biology subjects requiring contextual and deep conceptual understanding. Suggestions include encouraging teachers to adopt the CTL model as an alternative, particularly for abstract material, and advising future researchers to broaden the variables studied to include non-cognitive aspects such as motivation or critical thinking skills.

CONCLUSION

Based on the results of the Analysis of Covariance (ANCOVA) on post-test scores, utilizing the pre-test as a covariate, this research concludes that there is a highly significant influence of the Contextual Teaching and Learning (CTL) model implementation on the cognitive learning outcomes of Class X students at SMAN 14 Kota Jambi on the virus material. The CTL Model proved to be superior and more effective compared to the conventional/PBL model, evidenced by the experimental group's post-test mean of 55.24 and an N−Gain score of 0.50, surpassing the control group's mean of 36.27 and N−Gain of 0.30. These results definitively show that the difference in students' cognitive learning outcomes (C1–C5 domain) is attributable to the CTL Model, which successfully connected the abstract virus concepts to real-world contexts and fostered higher-order cognitive activity, after neutralizing the influence of students' initial abilities. The implication of this finding is that the CTL model can be considered a potent and recommended teaching approach for widespread adoption in schools to address issues of low cognitive learning outcomes, particularly in Biology subjects that require contextual understanding. It is suggested that teachers implement the CTL model as an alternative to enhance student engagement and competency achievement, and that future researchers expand this study by examining non-cognitive aspects (such as motivation and critical thinking) to gain a more comprehensive view of the CTL model's impact.

ACKNOWLEDGEMENT

The author would like to express sincere gratitude to Universitas Jambi (UNJA) for providing academic support and research facilities.

DECLARATION

Author contribution

All authors contribute in the research and/or writing the paper, and approved the final manuscript.

Santo V Simatupang	Conceptualizing the research idea, leading the investigation, setting up the methodology, analyzing the data, and writing the original draft.
Ervan Johan Wicaksana	Assisting the investigation, reviewing the validity of the methodology, supervising the data collection, and enriching the data analysis.
Desfaur Natalia	Assisting the investigation, reviewing the validity of the methodology, supervising the data collection, and enriching the data analysis.

Funding
This research did not receive any funding.

Conflict of interest
All authors declare that they have no competing interests.

Ethics declaration
We as authors acknowledge that this work has been written based on ethical research that conforms with the regulations of our institutions and that we have obtained the permission from the relevant institutes when collecting data. We support the International Journal on Education Insight (IJEI) in maintaining the high standards of personal conduct, practicing honesty in all our professional practices and endeavors.

The use of artificial intelligence
We do not use any generative AI tools to write any part of this paper.

Additional information
Not available.

REFERENCES

Afifah, R. U., Iskandar, S., Marisa, D., & Oktriana, S. I. (2025). Analisis strategi pembelajaran dalam meningkatkan efektivitas pembelajaran. *Pendas: Jurnal Ilmiah Pendidikan Dasar, 10*(2), 234–245. https://doi.org/10.23969/jp.v10i02.25615

Amin, N. F., Garancang, S., & Abunawas, K. (2023). Konsep umum populasi dan sampel dalam penelitian. *Pilar, 14*(1), 15-31. https://doi.org/10.26618/whw41w62

Astuti, R., & Najuba, N. (2024). Penggunaan model pembelajaran contextual teaching and learning (CTL) untuk meningkatkan hasil belajar dan keaktifan siswa. *Prima Magistra: Jurnal Ilmiah Kependidikan, 5*(1), 1-7. https://doi.org/10.37478/jpm.v5i1.3141

Dulyapit, A., & Nurmala, Y. (2025). Model contextual teaching and learning (CTL) sebagai pendekatan inovatif dalam pendidikan di madrasah ibtidaiyah. *Al-Adawat: Jurnal Pendidikan Madrasah Ibtidaiyah, 4*(01), 45-51. https://doi.org/10.33752/aldawat.v4i01.8491

Dewi, N. S., Wati, A., & Farhurohman, O. (2024). Implementasi model pembelajaran contextual teaching and learning (CTL) untuk meningkatkan hasil belajar siswa pada pembelajaran IPS Kelas 4 MI. *CENDEKIA: Jurnal Ilmu Sosial, Bahasa dan Pendidikan, 4*(4), 280-289. https://doi.org/10.55606/cendekia.v4i4.3318

Efriyani, R., & Aryani, Z. (2024). Penerapan model pembelajaran kontekstual (CTL) dalam pembelajaran IPA di sekolah dasar. *Jurnal Insan Cita Pendidikan, 2*(2), 1-4. https://doi.org/10.00000/ay072814

Ester, K., Sakka, F. S., Mamonto, F., Mangolo, A. E., Bawole, R., & Mamonto, S. (2023). Model pembelajaran contextual teaching and learning (CTL) di SD GMIM II Sarongsong. *Jurnal Ilmiah Wahana Pendidikan, 9*(20), 967-973. https://doi.org/10.5281/zenodo.10421051

Ginting, R. P., Wicaksana, E. J., & Natalia, D. (2024). The effect of PjBl model on creative thinking ability and higher-order cognitive outcomes in high school. *JPBI (Jurnal Pendidikan Biologi Indonesia), 10*(3), 1148-1160.

Hamid, J., Pebriyan, & Gusmaneli. (2024). Pembelajaran kontekstual: Solusi Untuk meningkatkan kualitas pendidikan. *Realisasi: Ilmu Pendidikan, Seni Rupa dan Desain, 1*(3), 1–12. https://doi.org/10.62383/realisasi.v1i3.113

Hanaris, F. (2023). Peran guru dalam meningkatkan motivasi belajar siswa: Strategi dan pendekatan yang efektif. *Jurnal Kajian Pendidikan dan Psikologi, 1*(1), 1-11. https://doi.org/10.61397/jkpp.v1i1.9

Ihsan, R., & Hasruddin. (2024). Analisis kemampuan berpikir tingkat tinggi dan literasi biologi siswa pada materi virus di kelas X SMA Negeri 1 Labuhan Deli. *Jurnal Sains dan Teknologi, 1*(2), 35–42.

Kurniawan, S., Sugiarno, Y., & Rahman, M. A. (2025). Analisis kurikulum biologi berbasis konteks lingkungan pendekatan holistik dalam pembelajaran sains di SMA Antartika Sidoarjo. *Science Education and Development Journal Archives, 3(*1), 27–36. https://doi.org/10.59923/sendja.v3i1.415

Mariati, M. (2018). Penerapan alat evaluasi pembelajaran bertingkat berdasarkan taksonomi Bloom dalam meningkatkan kemampuan berfikir mahasiswa. *Liabilities (Jurnal Pendidikan Akuntansi), 1*(2), 95-111. https://doi.org/10.30596/liabilities.v1i2.2328

Miranda, S., & Melisa, A. O. (2025). Penerapan metode pembelajaran berbasis proyek dalam meningkatkan hasil belajar biologi: Tinjauan literatur. *BEST Journal (Biology Education, Sains and Technology), 8(*1), 134-140. https://doi.org/10.30743/best.v8i1.10529

Ningtyas, S. Z., & Pradikto, S. (2025). Pengaruh metode pembelajaran konvensional dan game terhadap pembelajaran KWU dalam meningkatkan minat belajar SMAN 4 Pasuruan. *Jurnal Kajian dan Penelitian Umum, 3*(1), 115-124. https://doi.org/10.47861/jkpu-nalanda.v3i1.1507

Nurmailis. (2021). Improving students' learning outcomes in biology through the contextual teaching and learning model by year VII-A students of MTs N 1 West Aceh. *PEDAGOGI: Jurnal Ilmiah Pendidikan, 7*(1), 56–62. https://doi.org/10.47662/pedagogi.v7i1.403

Nurwahidah, N. (2023). Upaya meningkatkan aktivitas belajar, keterampilan berpikir kritis, dan pemahaman konsep biologi siswa melalui penerapan model pembelajaran berbasis masalah. *Ainara Journal (Jurnal Penelitian dan PKM Bidang Ilmu Pendidikan),* *4*(1), 11-21. https://doi.org/10.54371/ainj.v4i1.232

Rivan, Y. M., & Sari, M. Y. R. (2024). Pengaruh model pembelajaran contextual teaching and learning (CTL) dan pengetahuan awal terhadap hasil belajar biologi siswa SMA 1 Solok Selatan. *Jurnal Genta Mulia, 15*(2), 92-97. https://ejournal.uncm.ac.id/index.php/gm/article/view/1308

Rizaldi, D. R., Andayani, Y., Doyan, A., Makhrus, M., Fatimah, Z., & Nurhayati, E. (2021). The use of Betel leaf in Nyirih tradition: Analyzing an ethnoscience-based learning material. *International Journal on Education Insight, 2*(1), 29-36. https://doi.org/10.12928/ijei.v2i1.3579

Side, S., & Munawwarah, M. (2025). Pembelajaran berbasis studi kasus dalam pendidikan kimia: pemahaman dan analisis, evaluasi motivasi, keterlibatan mahasiswa. *SCIENCE: Jurnal Inovasi Pendidikan Matematika dan IPA, 5*(1), 321-332. https://doi.org/10.51878/science.v5i1.4616

Suryanda, A. (2024). Eksplorasi strategi inovatif pembelajaran biologi di abad 21. *Jurnal Pendidikan dan Pembelajaran, 3*(1), 102–107. https://doi.org/10.54259/diajar.v3i1.2270

Syafitri, N. A., Jailani, Nasution, R., Makkadafi, S. P., & Masitah. (2025). Pengaruh model pembelajaran CTL (Contextual Teaching and Learning) terhadap kemampuan kolaborasi dan hasil belajar siswa SMA pada pembelajaran biologi. *PENDIPA Journal of Science Education, 9*(2), 283–289. https://doi.org/10.33369/pendipa.9.2.283-289

Telaumbanua, Y., Harefa, A. R., & Lase, N. K. (2022). Efektivitas model pembelajaran contextual teaching and learning (CTL) pada pembelajaran biologi siswa XI MIPA SMA Negeri 1 Tuhemberua tahun pembelajaran 2021/2022. *Formosa Journal of Applied Sciences, 1*(5), 849–878. https://doi.org/10.55927/fjas.v1i5.1646

Ulfah, U., Arifudin, O., & Kartika, I. (2021). Pengaruh aspek kognitif, afektif, dan psikomotor terhadap hasil belajar peserta didik. *Jurnal Al-Amar: Ekonomi Syariah, Perbankan Syariah, Agama Islam, Manajemen dan Pendidikan, 2*(1), 1-9. https://ojs-steialamar.org/index.php/JAA/article/view/88

Zulfania, A., Syahrozi, S., & Rahmawan, S. (2025). Analisis efektivitas implementasi model pembelajaran contextual teaching & learning (CTL) mata pelajaran kimia jenjang SMA/MA dengan studi literature review. *Konfigurasi: Jurnal Pendidikan Kimia dan Terapan, 9*(2), 1-9. http://doi.org/10.24014/konfigurasi.v9i2.37164