

DAFTAR PUSTAKA

- A. K, P., M, M., Rajamanickam, S., Sivarethinamohan, S., Gaddam, M. K. R., Velusamy, P., R, G., Ravindiran, G., Gurugubelli, T. R., & Muniasamy, S. K. (2023). Impact of climate change and anthropogenic activities on aquatic ecosystem – A review. *Environmental Research*, 238, 117233. <https://doi.org/https://doi.org/10.1016/j.envres.2023.117233>
- Adam, N., Rahman, M. H., & Yusuf, D. S. A. (2023). *Analisis Respon Guru Dan Peserta didik Terhadap Pengembangan Bahan Ajar Fisika Berbasis Model POE2WE Berbantuan Google Site*. 21(3), 579–591.
- Ainiyyah, Z. F., & Saraswati, U. (2023). Pengaruh Model Discovery Learning Terhadap Kemampuan Berpikir Kritis Peserta didik Pada Materi Manusia dan Sejarah Kelas X IPS di MA Al Asror Tahun Pelajaran 2022/2023. *HISTORIA PEDAGOGIA Jurnal Penelitian Dan Inovasi Pendidikan Sejarah*, 12(1), 34–43. <https://doi.org/https://doi.org/10.15294/hisped.v12i1.65118>
- Akbar, F. H., & Ulya, H. (2021). Prodi Pendidikan Matematika, Universitas Muria Kudus, Kudus, Indonesia. *Didaktika: Jurnal Kependidikan*, 15(1), 75–90. <https://doi.org/https://doi.org/10.30863/didaktika.v15i1.1523>
- Al Idrus, S. W., Alamudi, F. Z., & Sofia, B. (2025). Pengaruh model pembelajaran POE2WE terhadap kemapuan berpikir kritis peserta didik kelas xi SMAN 8 Mataram. *Jurnal Pendidikan Dan Dakwah*, 5(6), 933–944. <https://doi.org/doi.org/10.58578>
- Anggraeni, P., Kurniawan, D., Mansyur, M. Z., & Yulianto, E. (2024). *Pengaruh model pembelajaran POE2WE (Prediction , Observation , Explanation , Elaboration , Write , and Evaluation) terhadap kemampuan koneksi matematis peserta didik*. 10(1), 28–32. <https://doi.org/10.37058/jp3m.v10i1.9404>
- Anwar, M. (2025). Kerangka Konseptual Pembelajaran Mendalam (Deep Learning) dan Implementasinya dalam Pendidikan di Indonesia. *Tafhim Al-'ilmi: Jurnal Pendidikan Dan Pemikiran Islam*, 17(1), 69–96.
- Aprilia, F., & Sulistyaningsih, D. (2020). *The Effectiveness of Video-Based POE2WE Model on Magnetic Induction Materials in the COVID 19 Pandemic*. 8(2), 186–193.
- Ardimiati, N. C., Syahril, & Syarif, A. (2026). Implementing a Deep Learning Pedagogical Approach to Improve Conceptual Understanding and Critical Thinking in Grade 5 IPAS Ecosystem Learning: A Classroom Action Research Study. *Journal of Inovation and Research in Primary Education*, 5(1), 1364–1371. <https://doi.org/10.56916/jirpe.v5i1.3027>
- Arianto, F., Sumarno, A., Setyaedhi, H. S., Shofiana, F. R., & Hanif, M. (2026). *Deep Digital Learning (DDL) Model Effect on Higher Education Critical*

Thinking and Problem-Solving Skills : A Quasi-Experimental Study. 13(1), 39–50.

- Arizona, K., Rokhmat, J., Ramdani, A., Gunawan, & Sukarso, A. (2025). Examining Global Trends in 21st Century Skills: A Systematic Literature Review And Bibliometric Analysis. *Proceeding Of The 3rd International Conference On Islamic Education And Science Development (ICONSIDE)*, May, 585–610. <https://doi.org/https://proceeding.uinmataram.ac.id/index.php/iconside>
- Arviani, F. P., Wahyudin, D., & Dewi, L. (2023). *The Effectiveness of Problem Based Learning Model in Improving Students ' Higher Order Thinking Skills*. 12(4), 627–635. <https://doi.org/https://doi.org/10.23887/jpiundiksha.v12i4.65606> The
- Asún, S., Chivite, M. T., & Romero, M. R. (2020). Perceptions of Professional Competences in Physical Education Teacher Education (PETE). In *Sustainability* (Vol. 12, Issue 9, p. 3812). <https://doi.org/10.3390/su12093812>
- Azis, S. R., Fatmawati, B., & Asri, I. H. (2024). Improving Science Process Skills through the Discovery Learning model. *Reflection Journal*, 4(2 SE-Articles), 97–104. <https://doi.org/10.36312/rj.v4i2.2652>
- Azmi, I., Sabda, D., & Sabrun, S. (2025). Profil Berpikir Kritis Peserta didik SMP pada Mata Pelajaran IPA. *Journal of Classroom Action Resea*, 7(1). <https://doi.org/https://doi.org/10.29303/jcar.v7i1.10570>
- Bahtiar, Maimun, & Anggraini, B. L. (2022). Pengaruh Model Discovery Learning Melalui Kegiatan Praktikum IPA Terpadu Terhadap Kemampuan Berpikir Kritis Peserta didik. *Jurnal Pendidikan MIPA*, 12(2008), 134–142. <https://doi.org/https://doi.org/10.37630/jpm.v12i2.564>
- Bariyyah, K. (2021). Problem solving skills : essential skills challenges for the 21st century graduates. *Jurnal EDUCATIO (Jurnal Pendidikan Indonesia)*, 7(1), 71–80. <https://doi.org/https://doi.org/10.29210/120212843>
- Baydere, F. K. (2021). Effects of a context-based approach with prediction–observation–explanation on conceptual understanding of the states of matter, heat and temperature. *Chemistry Education Research and Practice*, 22(3), 640–652. <https://doi.org/10.1039/D0RP00348D>
- Benitez-Polo, Z., & Velasco, L. A. (2020). Effects of suspended mineral coal dust on the energetic physiology of the Caribbean scallop *Argopecten nucleus* (Born, 1778). *Environmental Pollution*, 260, 114000. <https://doi.org/https://doi.org/10.1016/j.envpol.2020.114000>
- Bila, S. S., Fitriani, A. D., & Buhori, A. (2024). Pengaruh Model Experiential Learning pada Hasil Belajar IPA Peserta didik Kelas V,. *Pedadidaktika: Jurnal Ilmiah Pendidikan Guru Sekolah Dasar*, 11(3), 503–512. <https://doi.org/http://ejournal.upi.edu/index.php/pedadidaktika/index>

- Blown, T. G. K. B. E. J. (2024). Ausubel ' s meaningful learning re-visited. *Current Psychology*, April 2023, 4579–4598. <https://doi.org/https://doi.org/10.1007/s12144-023-04440-4> Ausubel's
- Budhiarti, Y., Mytra, P., & Slow, L. (2025). The Role of Deep Learning in Elementary Education : Pedagogical Insights from a Literature Study. *Jurnal Pedagogi Dan Inovasi Pendidikan*, 1(2), 42–51.
- Corlett, R. T., Primack, R. B., Devictor, V., Maas, B., Goswami, V. R., Bates, A. E., Koh, L. P., Regan, T. J., Loyola, R., Pakeman, R. J., Cumming, G. S., Pidgeon, A., Johns, D., & Roth, R. (2020). Impacts of the coronavirus pandemic on biodiversity conservation. *Biological Conservation*, 246, 108571. <https://doi.org/https://doi.org/10.1016/j.biocon.2020.108571>
- Delita, D., Rasyid, A., & Sugandi, M. K. (2022). Penerapan Model Pembelajaran Predict Observe Explain (POE) Terhadap Keterampilan Berpikir Kritis Peserta didik SMA pada Konsep Sistem Pencernaan Manusia. *Mirabilis: Journal of Biology Education*, 1(1), 48–57. <https://doi.org/https://ejournal.papanda.org/index.php/jm>
- Dewey, J. (1933). *How We Think: A Restatement of the Relation of Reflective Thinking to the Educative Process*. D.C. Heath and Company.
- Díaz, S., Settele, J., Brondizio, E. S., Ngo, H. T., Guèze, M., Agard, J., Zayas, C. N. (Eds.). (2019). *Summary for policymakers of the global assessment report on biodiversity and ecosystem services*. IPBES Secretariat. <https://doi.org/10.5281/zenodo.3553458>
- Duffy, T. M., & Jonassen, D. H. (1996). *Constructivism and the technology of instruction: A conversation*. Lawrence Erlbaum Associates
- Ennis, R. (2011). Critical Thinking: Reflection and Perspective Part I. *Inquiry: Critical Thinking Across the Disciplines*, 26(1), 4–18.
- Fajriyah, R. L., & Jatmiko, B. (2021). Penerapan Model POE2WE Berbasis Virtual Learning pada Materi Listrik Arus Bolak Balik (AC) untuk Melatihkan High Order Thinking Skills (HOTS) Peserta Didik SMA. *PENDIPA Journal of Science Education*, 5(1 SE-Articles), 102–107. <https://doi.org/10.33369/pendipa.5.1.102-107>
- Fiorella, L. (2023). Making Sense of Generative Learning. In *Educational Psychology Review* (Vol. 35, Issue 2). Springer US. <https://doi.org/10.1007/s10648-023-09769-7>
- Fitriyah, I. J., Affriyenni, Y., & Hamimi, E. (2021). Efektifitas Model Pembelajaran Inkuiri Terbimbing untuk Meningkatkan Kemampuan Bepikir Kritis Mahasiswa. *Biormatika: Jurnal Ilmiah Fakultas Keguruan Dan Ilmu Pendidikan*, 7(2), 122–129. <https://doi.org/https://doi.org/10.35569/biormatika.v7i2.1017>

- Fullan, M., Quinn, J., & Mceachen, J. (2018). *Praise for Deep Learning : Engage the World Change the World*. SAGE Publications.
- Gurning, P. H., Hasratuddin, Puryati, & Siregar, S. (2025). Kemampuan pemecahan masalah dan berpikir kritis peserta didik melalui problem based learning di sdn 106232 penggalangan. *Pendas : Jurnal Ilmiah Pendidikan Dasar*, 10(September).
- Gushmanida, G., Mustadi, A., Nugroho, I. A., Kusumo, G., & Mapandi, R. D. (2025). *Digital Literacy : Thinking Critically About Language Skills in the Digital Age*. 6(1), 87–96.
- Handayani, M. S., Warrohmah, M., & Mahmudah, U. (2025). Bibliometric analysis of deep learning research trends as a pedagogical approach to science learning in elementary schools (2021–2025). *Jurnal Penelitian Ilmu Pendidikan*, 18(2), 223–234. <https://doi.org/10.21831/jpip.v18i2.94621>
- Haqi, Z., & Sundari, P. D. (2024). The Effect of Discovery Learning on Student Learning Outcomes : Elasticity and Static Fluid Contexts. *Jurnal Penelitian Pendidikan IPA*, 10(3), 1237–1246. <https://doi.org/10.29303/jppipa.v10i3.6033>
- Haryanti, A. S., Hidayat, S., Juansah, D. E., & Parwis, F. Y. (2024). The effect of the POE2WE model and students' critical thinking on the ability to write argumentations. *International Journal of Advanced and Applied Sciences*, 11(6), 237–244. <https://doi.org/10.21833/ijaas.2024.06.025>
- Haryanti, A. S., & Parwis, F. Y. (2025). Implementation of the POE2WE Learning Model to Improve Critical Thinking and Report Writing Skills. *IJORER : International Journal of Recent Educational Research*, 6(6), 1868–1881. <https://doi.org/10.46245/ijorer.v6i6.1016>
- Hendratma Gunawan, K. D., Liliarsari, L., Kaniawati, I., & Riandi, R. (2025). Status of Prospective Science Teachers' Critical and Creative Thinking Skills in Energy and Its Integration Topics. *Jurnal Pendidikan Fisika*, 12(3), 152–162. <https://doi.org/10.26618/jpf.v12i3.11521>
- Hidayah, N., Idrus, A. Al, & Purwoko, A. A. (2025). *Validity of Ethnoscience-Integrated Problem Based Learning Student Worksheet to Train Science Literacy and Creative Thinking*. 11(8), 576–584. <https://doi.org/10.29303/jppipa.v11i8.9904>
- Huinker, D., & Laughlin, C. (1996). Talk your way into writing. *The Writing Teacher*, 10(1), 12–19
- Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). (2019). *Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. IPBES Secretariat. <https://doi.org/10.5281/zenodo.3831673>

- Istianah. (2015). Upaya Pelestarian Lingkungan Hidup Dalam Perspektif Hadis. *Riwayah*, 1(2), 249–270.
- Jayadi, A., Putri, D. H., & Johan, H. (2020). Identifikasi Pembekalam Keterampilan Abad 21 Pada Aspek Keterampilan Pemecahan Masalah Peserta didik SMA Kota Bengkulu Dalam Pelajaran Fisika. *Jurnal Kumparan Fisika*, 3(1 April SE-Articles), 25–32. <https://doi.org/10.33369/jkf.3.1.25-32>
- John Hattie, J., & Donoghue, G. (2022). *Learning strategies: A synthesis and conceptual model*. *npj Science of Learning*, 7, 13. <https://doi.org/10.1038/s41539-022-00129-2>
- Kalsum, U., Saddia, A., Rais, W., Barat, U. S., & Sains, L. (2022). Pengaruh Model Pembelajaran *Prediction, Observation, Explanation, Elaboration, Write, Evaluation* (POE2WE) terhadap Kemampuan Literasi Sains <https://doi.org/10.31605/phy.v5i1.2302>
- Kementerian Pendidikan Dasar dan Menengah Republik Indonesia. (2025). *Pembelajaran mendalam Menuju Pendidikan Bermutu Untuk Semua*. Pusat Kurikulum dan Pembelajaran Badan Standar, Kurikulum, dan Asesmen Pendidikan Kementerian Pendidikan Dasar dan Menengah Republik Indonesia.
- Khairunnisa, A., Aniswita, Imamuddin, M., & Rahmat, T. (2024). Pengaruh Model Pembelajaran Predict, Observ, Explaining, Elaboration, Write And Evaluation Terhadap Pemahaman Konsep Matematika Di Kelas XI IPS SMAN 1 X Koto. *J-CEKI: Jurnal Cendekia Ilmiah*, 3(5), 3059–3067. <https://doi.org/https://doi.org/10.56799/jceki.v3i5.4463>
- Komarudin, Rani, O. M., & Netriwati. (2022). Analisis kemampuan pemecahan masalah dan penalaran matematis: Dampak model pembelajaran prediction, observation, ekplanation, elaboration, write, and evaluation. *Jurnal Pendidikan Sains Dan Matematika*, 10(2), 120.
- Kong, S. C., & Hou, C. (2025). Predictive capability of foundational concepts tests for problem-solving using machine learning concepts: Evaluating project-based learning courses in artificial intelligence literacy education. *Computers and Education: Artificial Intelligence*, 9, 100503. <https://doi.org/https://doi.org/10.1016/j.caeai.2025.100503>
- Krisna, M., Pradita, A., Suartama, I. K., Bimbingan, P., & Ganesha, U. P. (2024). *The Effect of Problem Based Animated Learning Video on Science Content*. 8(3), 462–471.
- Kurniati, E., Tinenti, Y. R., & Komisia, F. (2024). Jurnal Pendidikan MIPA. *Jurnal Pendidikan MIPA*, 14(1), 108–113. <https://doi.org/https://doi.org/10.37630/jpm.v14i1.1480>
- Laelawati, M., & Sulistyaningsih, D. (2021). *Analisis Model Blended POE2WE terhadap Keterampilan Proses Sains Peserta didik Melalui Penggunaan*

- Laboratorium Virtual Pada Materi Dualisme Gelombang Partikel*. 12(1), 83–89. <https://doi.org/10.26877/jp2f.v12i1.7162>
- Latifah, F., Rakhmawan, A., Ari Wahyuni, E., Ahied, M., Kunci, K., berpikir kritis, K., Poe, M., & Simulations, P. (2023). Pengaruh model pembelajaran Poe2we berbantuan Phet Simulations Pada Materi Cahaya Dan Alat Optik Terhadap Keterampilan Berpikir Kritis. *Jurnal Natural Science Educational Research*, 6(3), 2654–4210.
- Le Heron, E., Allen, W., Le Heron, R., Logie, M. J., Glavovic, B., Greenaway, A., Hikuroa, D., Davies, K. K., & Blackett, P. (2021). What does success look like? An indicative rubric to assess and guide the performance of marine participatory processes. *Ecology and Society*, 26(1). <https://doi.org/10.5751/ES-12211-260129>
- Lisdayanti, Hakim, A., & Sridana, N. (2025). *Validasi LKPD IPA Berbasis CBL Terintegrasi Kearifan Lokal untuk Meningkatkan Kemampuan Berpikir Kreatif dan Pemecahan Masalah 1*. 4(2), 2193–2201.
- Made, N., Mulyanti, B., & Gading, I. K. (2023). *Dampak Penerapan Model Pembelajaran Inkuiri Terbimbing terhadap Hasil Belajar IPA dan Kemampuan Berpikir Kritis Peserta didik*. 6, 109–119.
- Maker, C. J., Zimmerman, R., Bahar, A. K., & In-Albon, C. (2021). The influence of real engagement in active problem solving on deep learning: An important component of exceptional talent in the 21st century context. *Australasian Journal of Gifted Education*, 30(2), 40–63. <https://doi.org/10.21505/ajge.2021.0014>
- Maker, F. (2025). *Pengembangan E-Modul Fisika Berbasis Creative Problem Solving Berbantuan Flipbook Maker di SMAN 1 Siberut Utara*. 5, 182–196.
- Maknun, D. (2017). *Ekologi: Populasi, Komunitas, Ekosistem Mewujudkan Kampus Hijau, Asri Islami dan Ilmiah*. (A. Zaeni, Ed.) (1st ed.). Cirebon: Nurjati Press
- Malik, A., Muntahaa Karmini, S., Agustina, R. D., & Nugraha, A. R. (2022). Comparison of the Poe2We Model’S Effectiveness With the 5M Scientific Approach To Problem-Solving Ability in Simple Harmonic Motion. *Edusains*, 14(2), 126–136. <https://doi.org/10.15408/es.v14i2.28589>
- Mansyur, Yuda, V., Firandhi, O., Arianti, I., & Bahar. (2025). Mental Acts Developed in Deep Learning : A Literature Review. *Jurnal Pedagogi Dan Inovasi Pendidikan*, 1(2), 52–61.
- Mariano-dolesh, M. L., Collantes, L. M., Ibanez, E. D., & Pentang, T. J. (2022). Mindset and Levels of Conceptual Understanding in the Problem-Solving of Preservice Mathematics Teachers in an Online Learning Environment. *International Journal of Learning, Teaching and Educational Research*, 21(6), 18–33. <https://doi.org/10.26803/ijlter.21.6.2>

- Marindo, F. A., Dinata, M. N., & Allo, M. . M. (2024). Pendekatan pembelajaran ipa berbasis inkuiri untuk pengembangan keterampilan berpikir kritis peserta didik smpn 2 bajawa. *Jurnal Citra Magang Dan Persekolahan (JCMP)*, 2, 531–539.
<https://jurnalilmiahcitrabakti.ac.id/jil/index.php/jcmp/index%0AVolume>
- Marta, R. A., Noviyanti, M., & Terbuka, U. (2024). *Pengembangan Lembar Kerja Peserta Didik Berbasis Problem Based Learning pada Mata Pelajaran Matematika di Kelas V Sekolah Dasar*. 5(4), 5137–5145.
- Maryani, Y., & Permana, I. (2021). Critical Thinking Skills of Junior High School Students in Science Learning. *SCIENTIAE EDUCATIA: JURNAL PENDIDIKAN SAINS*, 10(1), 20–28.
<https://doi.org/http://dx.doi.org/10.24235/sc.educatia.v10i1.8034>
 SCIENTIAE
- Masyhurah, D., & Nor, M. (2026). *The Implementation of the POE2WE Learning Model Assisted by PhET Simulation to Improve Conceptual Understanding of Grade XI Students at SMAN 1 Bukit Batu*. 5(2), 1–14.
<https://journal.amorfati.id/index.php/jipsi>
- Mende, S., Proske, A., & Narciss, S. (2023). *Generative preparation tasks in digital collaborative learning : actor and partner e cts of constructive preparation activities on deep comprehension*.
- Mubarok, I., Nana, N., & Sulistyaningsih. (2020). *Analisis penerapan model pembelajaran POE2WE berbasis hand on activity terhadap kemampuan berpikir kritis peserta didik*. 5(2003). <https://doi.org/https://online-journal.unja.ac.id/EDP/article/view/10804/11660>
- Mulia, E., Zakir, S., Rinjani, C., & Annisa, S. (2021). Kajian Konseptual Hasil Belajar Peserta didik dalam Berbagai Aspek dan Faktor yang Mempengaruhinya Pendahuluan Pendidikan mempunyai peranan penting dalam menentukan masa depan bangsa . Pendidikan yang berkualitas dapat ditempuh melalui Sekolah Dasar , Sekolah Men. *Dirāsāt: Jurnal Manajemen Dan Pendidikan Islam*, 7(2), 137–156.
- Muliana, M., Fonna, M., & Nufus, H. (2024). Pengaruh Penerapan Problem Based Learning (PBL) terhadap Keterampilan Abad 21. *Ar-Riyadhiyyat: Jurnal Pendidikan Matematika*, 5(1), 22–30.
- Nana, N., Sajidan, S., Akhyar, M., & Rochsantiningih, D. (2014). The development of Predict, Observe, Explain, Elaborate, Write, and Evaluate (POE2WE) learning model in physics learning at senior secondary school. *Journal of Education and Practice*, 5(19), 56–65.
- Nana, N., & Surahman, E. (2019). Pengembangan Inovasi Pembelajaran Digital Menggunakan Model Blended POE2WE di Era Revolusi Industri 4.0. *Prosiding SNFA (Seminar Nasional Fisika Dan Aplikasinya)*, 4, 82.
<https://doi.org/10.20961/prosidingsnfa.v4i0.35915>

- Nelfani, F., Syahril, & Irianti, M. (2025). Penerapan model pembelajaran POE2WE untuk meningkatkan hasil belajar kognitif peserta didik kelas VIII pada materi cahaya dan alat optik. *Silampari Jurnal Pendidikan Ilmu Fisika*, 7(1), 89–99. <https://doi.org/https://doi.org/10.62112/sjpif.v7i1.260>
- Ningsih, S. W., & Noer, A. M. (2025). Pengembangan LKPD Model Predict, Observation, Explanation, Elaboration, Write, dan Evaluation (POE2WE) pada Materi Sifat Koligatif Larutan (The Development of LKPD Predict, Observation, Explanation, Elaboration, Write, and Evaluation (POE2WE) on Colligative Properties of Solutions Materials). *1*, 51–59.
- Nu'man, M. (2020). Eksplorasi berpikir kreatif melalui discovery learning Bruner. *Humanika: Kajian Ilmiah Mata Kuliah Umum*, 20(1), 13–30. <https://doi.org/10.21831/hum.v20i1.29265.13-30>
- Nur Maclasari & Lusiana. (2025). Efektivitas deep learning dalam pembelajaran: Sebuah kajian systematic literature review (SLR). *Education and Development*, 13(2), 298–305. <https://doi.org/10.37081/ed.v13i2.7006>
- Nuraeni, I., Djumhana, N., & Saputri, A. E. (2020). Penerapan Model Predict Observe Explain (POE) untuk Meningkatkan Keterampilan Proses Sains Peserta didik Kelas V Sekolah Dasar. *Jurnal Pendidikan Guru Sekolah Dasar*, 5(22), 41–52. <http://ejournal.upi.edu/index.php/jpgsd/index>
- Nurdiana, A., Zulianti, H., Ciciria, D., Fitria, N., & Kirana, A. R. (2024). Practical Applications of Deep Learning in Mathematics to Enhance Student Engagement and Conceptual Mastery. *Jurnal Teori Dan Aplikasi Matematika*, 8(4), 1361–1373. <https://doi.org/10.31764/jtam.v8i4.33102>
- Nurdiansah, I., Islami, F. H., & Nana, N. (2020). Penerapan Model POE2WE terhadap Pemahaman Konsep Fisika Materi Gelombang Berjalan dan Gelombang Stasioner. *EduFisika: Jurnal Pendidikan Fisika*, 5(2012), 16–22.
- Nurhalipa, A., Srigustini, A., Afriza, E. F., & Siliwangi, U. (2025). Penerapan model Pembelajaran prediction, observation, explanation, elaboration, write, and evaluation (POE2WE) meningkatkan kemampuan berpikir kritis peserta didik. *Jurnal Ilmiah Kajian Multidisipliner*, 9(6), 262–274.
- Nuryanti, L., Zubaidah, S., & Diantoro, M. (2020). Analisis Kemampuan Berpikir Kritis Peserta didik SMP. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, 3(2), 155–158. <http://journal.um.ac.id/index.php/jptpp/article/view/10490>
- Oktania, S., & Futra, D. (2024). Pengembangan E-LKPD Berbasis POE2WE Menggunakan Liveworksheet pada Materi Termokimia. 7(Pinatih 2020).
- Panadero, E. (2023). A review of self-regulated learning: Six models and four directions for research. *Frontiers in Psychology*, 14, Article 1225301. <https://doi.org/10.3389/fpsyg.2023.1225301>
- Panggabean, D. D., Naibaho, G. D. M., & Simangunsong, I. T. (2023). Improving

- Students' Concept with POE2WE Learning Model Assisted by PhET Android Simulation. *Jurnal Penelitian Pendidikan IPA*, 9(5), 2619–2624. <https://doi.org/10.29303/jppipa.v9i5.2892>
- Pitaloka, N. A., Inayah, N., Huda, M. N., & Setyawati, M. (2024). *Fostering Critical Thinking Skills and Scientific Epistemological Beliefs through Flipbook-Assisted POE2WE*. 7(2), 325–336. <https://doi.org/10.24014/jnsi.v7i2.32666>
- Prasetyo, P. T., & Haryanto, E. N. (2024). Penerapan Model Pembelajaran Problem Based Learning Berbasis Socio- Scientific Issue untuk Meningkatkan Kemampuan Berpikir Kritis Peserta didik Kelas VIID Materi Ekologi. *Seminar Nasional Pendidikan Dan Penelitian Tindakan Kelas*, 1293, 1293–1300.
- Pujani, N. M. (2022). The Effectiveness of the Inquiry Learning Model on Basic Science Learning Materials on Problem Solving and Critical Thinking Skills. *Jurnal Pendidikan Dan Pengajaran*, 55(1), 173–181. <https://doi.org/http://dx.doi.org/10.23887/jpp.v55i1.37155> The
- Purnama, E. M. (2024). Pengaruh Penerapan Kontekstual Terhadap Hasil Belajar IPA : Konsep Perubahan Wujud Benda Kelas IV SDIT Insan Madani Jakarta. *Journal on Education*, 07(01), 509–513. <https://doi.org/https://doi.org/10.31004/joe.v7i1.6385>
- Rahayu, A., Nana, Agustian, D., Hernawati, D., & Badriah, L. (2026). Identifikasi Keterampilan Berpikir kritis dan Pemecahan Masalah Peserta Didik pada Pembelajaran IPA. *Jurnal Pendidikan Dan Pembelajaran IPA Indonesia*, 16(1), 69–78. <https://doi.org/https://doi.org/10.23887/jppii.v16i1.107394>
- Rahayu, D., & Muttaqien, M. (2023). Pengaruh Model Pembelajaran Discovery Learning Berbantu Educandy Terhadap Hasil Belajar Peserta didik. *Jurnal Edukasi*, 1, 234–246. <https://doi.org/https://doi.org/10.60132/edu.v1i2.149>
- Rahman, M. H., Hamid, F., & Isra, H. H. (2024). Implementation of POE2WE Model-Based Teaching Materials Assisted by Google Sites to Improve Students' Critical Thinking Skills Corresponding Author : *Navigation Physic: Journal of Physics Education*, 7(2).
- Rahmawati, D. (2023). Pengembangan E-LKPD virus berbasis problem based learning untuk melatih keterampilan berpikir kritis peserta didik kelas X. *Bioedu: Berkala Ilmiah Pendidikan Biologi*, 250–259. <https://ejournal.unesa.ac.id/index.php/bioedu>
- Rahmawati, I., Setiani, A., & Lukman, H. S. (2022). Eksperimentasi Model Pembelajaran POE dengan Pendekatan Metaphorical Thinking terhadap Kemampuan Berpikir Tingkat Tinggi Peserta didik. *PRISMA*, 11(2), 320–328. <https://doi.org/10.35194/jp.v11i2.2342>
- Ratnawati, Yansaputra, G., & Anjarini, T. (2021). Penerapan Model Discovery

- Learning untuk Meningkatkan Kemampuan Berpikir Kritis. *Jurnal Pendidikan Dasar*, 4(2), 74–78.
https://jurnal.umpwr.ac.id/jpd/article/view/3644?utm_
- Ridho, M. A. (2024). *PhET Simulation Worksheet for Momentum and Impulse Learning Using the POE2WE Model*. 10(2).
- Rikmasari, R., Sundari, K., & Nuraini, H. (2022). Model Pembelajaran Predict Observe Explain (POE) Terhadap Hasil Belajar IPA Peserta didik Sekolah Dasar. *Jurnal Cakrawala Pendas*, 8(4), 1634–1645.
<https://doi.org/http://dx.doi.org/10.31949/jcp.v8i2.3187> p-ISSN:
- Rochmah, N., & Alifiani. (2026). Deep Learning Pedagogy dalam Perspektif Konstruktivisme: Systematic Literature Review terhadap Pemahaman Konseptual. *Mandalika Mathematics and Education Journal*, 8, 71–84.
<https://doi.org/http://dx.doi.org/10.29303/jm.v8i1.11332>
- Roelle, J., Froese, L., Krebs, R., Obergassel, N., & Waldeyer, J. (2022). Sequence matters! Retrieval practice before generative learning is more effective than the reverse order. *Learning and Instruction*, 80, 101634.
<https://doi.org/https://doi.org/10.1016/j.learninstruc.2022.101634>
- Ruffin, M. A., Tudor, R. N., & Beier, M. E. (2024). *behavioral sciences Prompting Strategy Use and Beyond : Examining the Relationships between Elaboration , Quantity , and Diversity of Learning Strategies on Performance*.
- Rusdiana, A., Sulhan, M., Zaenal, I., & Ahmad, A. U. (2020). *Penerapan Model POE2WE Berbasis Blended Learning Google Classroom Pada Pembelajaran Masa WFH Pandemic Covid-19*. 1–10.
- Rustam, Priyanto, Wini, L. O., & Saputra, A. B. (2024). Mendesain Modul Ajar Bahasa Indonesia Menggunakan Model Poe2We Untuk Meningkatkan Keterampilan Berpikir Kritis (Critical Thinking) Berbasis Project Based Learning (PjBL). *Alfabeta: Jurnal Bahasa, Sastra, Dan Pembelajarannya*, 7(2), 98–108.
<http://ejurnal.budiutomomalang.ac.id/index.php/alfabeta%0AMendesain>
- Safitri, R. D., Suwarma, D. M., & Muyassaroh, I. (2024). Pendekatan Konstruktivisme Terhadap Peningkatan Hasil Belajar Peserta didik SD. *Jurnal Review Pendidikan Dasar: Jurnal Kajian Pendidikan Dan Hasil Penelitian*, 10(03). <https://doi.org/https://doi.org/10.26740/jrpd.v10n3.p238-247>
- Salimah, Gunawan, A., Soeryana, A., Shibab, F., & Wahyudin, A. (2023). Konsep Pengetahuan dan Pemahaman Tentang Hasil Evaluasi Belajar. *Jurnal Review Dan Pengajaran*, 6(4), 4516–4522.
<http://journal.universitaspahlawan.ac.id/index.php/jrpp>
- Samosir, H. (2010). Pengembangan model POEW dalam pembelajaran fisika. Universitas Negeri Medan

- Sayangan, Y. V., Una, L. M. W., & Beku, V. Y. (2024). Jurnal Pendidikan MIPA. *Jurnal Pendidikan MIPA*, 14(September), 757–766. <https://doi.org/https://doi.org/10.37630/jpm.v14i3.1829>
- Sihite, M. S., Asri, Z., Ali, S. C., Yasthophi, A., & Kurniawati, Y. (2026). *The Effectiveness of Predict-Observe-Explain (POE) Model in Enhancing Students ' Critical Thinking Skills on Colloid Topic*. 10(1), 92–99.
- Siregar, H. T. (2024). Faktor-Faktor yang Mempengaruhi Hasil Belajar dalam Pembelajaran PAI. *Jurnal Ilmu Tarbiyah Dan Keguruan*, 2(2), 215–226. <https://ejournal.edutechjaya.com/index.php/jitk%0AFaktor-Faktor>
- Slamet Hariyadi, Dede Sopiandy, N. R. (2025). Analisis Faktor Ynag Mempengaruhi Hasil Belajar PPKn Peserta didik Kelas VI SD Negeri 2 Sabilambo. *Jurnal Ilmiah PGSD FKIP Universitas Mandiri*, 11 Nomor 0, 1–23.
- Solichah, M., Istiq, N., & Purwoko, B. (2025). Profil Kemampuan Berpikir Kritis dalam Pembelajaran IPA di Sekolah Dasar pada Era Digital Profile of Critical Thinking Ability in Science Learning in Elementary Schools in the Digital Era. *Variabel*, 8(1), 9–19. <https://jurnalilmiahcitrabakti.ac.id/jil/index.php/jcmp/index%0AVolume>
- Srirahmawati, A., Deviana, T., & Wardani, S. K. (2023). Peningkatan Keterampilan Abad 21 (6C) Peserta didik kelas IV Sekolah dasar Melalui Model Project Based Learning Pada Kurikulum Merdeka. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, 08(01).
- Studi, P., Fisika, P., & Siliwangi, U. (2023). *Pengaruh E-LKS berbasis Model POE2WE terhadap Hasil Belajar Peserta didik pada Materi Gerak Lurus*. 14(2), 209–221. <https://doi.org/10.26877/jp2f.v14i2>.
- Sudarmono, M. A. (2025). *Deep Learning Approach in Improving Critical Thinking Skills of Elementary School Students*. 11(8), 60–70. <https://doi.org/10.29303/jppipa.v11i8.11708>
- Sugiyono. (2022). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Alfabeta.
- Sumarno, Gimin, & Noviana, E. (2023). The Comparison Analysis of Teacher ' s Learning Effectiveness in Realizing Entrepreneurship Skills of Students. *International Journal of Intruction*, 16(2), 679–702. <https://doi.org/https://doi.org/10.29333/iji.2023.16236a>
- Supiyati, H., Hidayati, Y., Rosidi, I., Yuniasti, A., & Wulandari, R. (2019). Analisis Kemampuan Pemecahan Masalah Peserta didik Menggunakan Model Guided Inquiry dengan Pendekatan Keterampilan Proses Sains pada materi Pencemaran Lingkungan. *Natural Science Education Reseach*, 2018, 59–67.
- Suriansyah, A., & Purwanti, R. (2024). *Meningkatkan Motivasi Belajar dan Keterampilan Memecahkan Masalah Peserta didik Menggunakan Model INSIDE dan Media Hologram Pada Muatan IPAS Kelas V di SDN Murung*

Raya 4 Banjarmasin. 3(4), 954–963.

- Susilawati, S., & Supriyatno, T. (2023). *Problem-Based Learning model in improving critical thinking ability of elementary school students*. 3(1), 638–647. <https://doi.org/10.25082/AMLER.2023.01.013>
- Sutrisna, I. G., Sudiatmika, A. A. I. A. ., & Suja, I. W. (2023). Pengaruh Model Discovery Learning dan gaya Belajar. *Jurnal Pendidikan Dan Pembelajaran IPA Indonesia*, 13(2), 45–56. <https://doi.org/https://doi.org/10.23887/jppii.v13i2>
- Suwartiningsih, S. (2021). Penerapan Pembelajaran Berdiferensiasi untuk Meningkatkan Hasil Belajar Peserta didik pada Mata Pelajaran IPA Pokok Bahasan Tanah dan Keberlangsungan Kehidupan di Kelas IXb Semester Genap SMPN 4 Monta Tahun Pelajaran 2020/2021. *Jurnal Pendidikan Dan Pembelajaran Indonesia (JPPI)*, 1(2), 80–94. <https://doi.org/10.53299/jppi.v1i2.39>
- Syiarah, H., Purwaningsih, S., & Pathoni, H. (2022). *Jurnal Pendidikan MIPA*. 12, 379–387.
- Ulfa, S. M., Nugroho, K. A., & Aldila, F. T. (2024). *Is a Global Warming E-Book Based on Problem-Based Learning Assisted by PhET Interactive Simulation Effective in Enhancing Students ' Communication Skills ?* 8(4), 743–752.
- Ulumiyah, D., & Pratama, M. A. (2025). Literasi sains peserta didik sekolah dasar melalui pendekatan pembelajaran mendalam (Deep learning). *Pendas: Jurnal Ilmiah Pendidikan Dasar*, 10(04), 258–269.
- Wibowo, G., Gunawan, D., & Mardiana, D. (2025). Implementasi Pendekatan Pembelajaran Mendalam (Deep Learning) dalam Meningkatkan Pemahaman Konsep Peserta didik di Sekolah Dasar. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, 10(3).
- White, R., & Gustone, R. (1992). *Probing understanding*. Falmer Press
- Yasmine Adhitri, Lo Caterina, & Teza Serli Diovani. (2024). Analisis Faktor-Faktor Yang Mempengaruhi Hasil Belajar Peserta didik Pada Pembelajaran Daring Masa Pandemi Covid-19 Di Sman 7 Padang. *Ekasakti Educational Scientific Journal, Volume 1*,(2), 147–154. <https://doi.org/10.60034/eesj>
- Zahra, P., Gresinta, E., & Pratiwi, R. H. (2021). Pengaruh Kecerdasan Intrapersonal Terhadap Kemampuan Pemecahan Masalah pada Mata Pelajaran Biologi. *EduBiologia: Biological Science and Education Journal*. <https://api.semanticscholar.org/CorpusID:23402092>
- Zidan, Z., Maftuhah, Yusti, D., Rahmat, A., Riandi, & Kusnadi. (2023). *Learning strategies on ecosystem concepts and environmental change: A pedagogical study analysis. Assimilation: Indonesian Journal of Biology Education*, 6(2), 141–152. <https://doi.org/10.17509/aijbe.v6i2.59777>