

**PENGEMBANGAN MODEL PEMBELAJARAN PROYEK  
BERBASIS RISET DIDUKUNG *SELF-REGULATED LEARNING*  
(PjBR-SRL) UNTUK MENINGKATKAN KETERAMPILAN RISET**

**DISERTASI**

**Diajukan sebagai persyaratan untuk memperoleh gelar Doktor  
Di Bidang Pendidikan Ilmu Pengetahuan Alam**



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UNIVERSITAS PENDIDIKAN INDONESIA**

**2024**

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# **DEVELOPMENT OF PROJECT-BASED RESEARCH LEARNING MODEL SUPPORTED BY SELF-REGULATED LEARNING (PjBR-SRL) TO ENHANCE RESEARCH SKILLS**

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## **ABSTRACT**

Developing research skills at the senior high school level is vital in facing the increasingly complex demands of secondary education. This implication is reinforced by international conventions and the transformation of the Merdeka curriculum in Indonesia, emphasizing the integration of research skills. The reality in the field shows that project learning activities have the potential to develop research skills. However, misconceptions often lead to an emphasis on the product rather than the process itself. Therefore, this study introduces the Project-Based Research Learning Model with Self-Regulated Learning Support (PjBR-SRL) as a solution to improve research skills. The learning model was developed using the ADDIE cycle development model. After going through comprehensive testing, evaluation, and improvement stages, a learning model was produced, which was then implemented on 74 grade XI students in three different schools. The implementation results showed that all stages of the learning model and its tools functioned well, positively impacting students' skills. The PjBR-SRL model consists of five syntaxes, including 1) research theme orientation, 2) concept exploration and design, 3) research activities, 4) data analysis and results, and 5) communication and reflection. During learning, students receive support by metacognitive questionnaires specifically designed to encourage students to engage in a comprehensive cycle of self-regulation, including analyzing tasks and setting goals (task interpretation), planning strategies, cognitive actions, monitoring and fixing up, and setting success criteria. Statistical test results show a significant difference in students' research skills. The results show that Self-Regulated Learning (SRL) assistance in the learning model helps students identify the steps and actions needed to complete research activities successfully. This study also discussed the prerequisite characteristics of teachers and students that support the implementation of PjBR-SRL.

*Keywords: research skills, SRL, Project-based learning, RSD framework, learning model*

**PENGEMBANGAN MODEL PEMBELAJARAN PROYEK BERBASIS RISET  
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MENINGKATKAN KETERAMPILAN RISET**

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**ABSTRAK**

Pengembangan keterampilan riset di tingkat SMA penting dalam menghadapi tuntutan pendidikan menengah yang semakin kompleks. Implikasi ini diperkuat oleh konvensi internasional dan transformasi kurikulum Merdeka di Indonesia yang menekankan integrasi keterampilan riset. Kenyataan di lapangan menunjukkan kegiatan pembelajaran proyek yang sejatinya berpotensi untuk mengembangkan keterampilan riset, namun seringkali terdapat miskonsepsi yang menyebabkan penekanan terhadap produk akhir daripada proses itu sendiri. Oleh karena itu, penelitian ini memperkenalkan Model Pembelajaran Proyek Berbasis Riset dengan Dukungan *Self-Regulated Learning* (PjBR-SRL) sebagai solusi untuk meningkatkan keterampilan riset. Pengembangan model pembelajaran dilakukan dengan menggunakan model pengembangan siklus ADDIE. Setelah melalui tahapan ujicoba, evaluasi, dan perbaikan yang komprehensif, dihasilkan satu model pembelajaran yang kemudian dilaksanakan pada 74 siswa kelas XI di tiga sekolah berbeda. Hasil implementasi menunjukkan bahwa seluruh tahapan model pembelajaran dan perangkatnya berfungsi dengan baik, memberikan dampak positif terhadap peningkatan keterampilan siswa. Model PjBR-SRL terdiri dari lima sintaks meliputi 1) orientasi tema riset, 2) eksplorasi konsep dan perancangan, 3) kegiatan riset, 4) analisis data dan hasil, serta 5) komunikasi dan refleksi. Selama pembelajaran siswa memperoleh dukungan melalui penggunaan angket metakognitif yang dirancang secara khusus untuk mendorong siswa terlibat dalam siklus komprehensif pengaturan diri, meliputi menganalisis tugas dan menetapkan tujuan (*task interpretation*), menerapkan strategi (*planning strategy*), aksi kognitif (*cognitive actions*), pemantauan dan penyesuaian strategi (*monitoring and fix up*), serta penetapan kriteria sukses (*success criteria*). Hasil uji statistik menunjukkan terdapat perbedaan yang signifikan pada keterampilan riset siswa. Hasil menunjukkan bahwa bantuan *Self-Regulated Learning* (SRL) dalam model pembelajaran secara efektif membantu siswa mengidentifikasi langkah-langkah dan tindakan yang diperlukan untuk menyelesaikan kegiatan riset dengan sukses. Pada penelitian ini juga dibahas karakteristik prasyarat guru dan siswa yang mendukung keterlaksanaan PjBR-SRL.

Kata kunci: keterampilan riset, *self-regulated learning*, pembelajaran proyek, kerangka RSD, model pembelajaran

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## DAFTAR PUSTAKA

- A, V. S. (2020). The Role of Transformation in Biology Science and Education for Supporting Sustainable Development Goals. *Kongunadu Research Journal*. <https://doi.org/10.26524/krj.2020.27>
- Al-Balushi, S. M., & Al-Aamri, S. S. (2014). The effect of environmental science projects on students' environmental knowledge and science attitudes. *International Research in Geographical and Environmental Education*, 23(3), 213–227. <https://doi.org/10.1080/10382046.2014.927167>
- Alamrawy, R. G., Fadl, N., & Khaled, A. (2021). Psychiatric Morbidity and Dietary Habits During COVID-19 Pandemic: A Cross-Sectional Study Among Egyptian Youth (14–24 Years). *Middle East Current Psychiatry*. <https://doi.org/10.1186/s43045-021-00085-w>
- Alfieri, L., Brooks, P. J., Aldrich, N. J., & Tenenbaum, H. R. (2011). Does discovery-based instruction enhance learning? *Journal of Educational Psychology*, 103(1), 1–18. <https://doi.org/10.1037/a0021017>
- Alonazi, S. M. (2017). The Role of Teachers in Promoting Learner Autonomy in Secondary Schools in Saudi Arabia. *English Language Teaching*, 10(7), 183. <https://doi.org/10.5539/elt.v10n7p183>
- Amalia, R., Ismoyowati, D., & Mulyati, G. T. (2022). Nutritional Content in Snack Food: Consumer Perceptions and Behaviors. *Agroindustrial Journal*. <https://doi.org/10.22146/aij.v8i2.76731>
- Andriyani, R., Shimizu, K., & Widiyatmoko, A. (2019). The effectiveness of Project-based Learning on students' science process skills: a literature review. *Journal of Physics: Conference Series*, 1321(3), 032121. <https://doi.org/10.1088/1742-6596/1321/3/032121>
- Arce, M. E., Miguez, J. L., Granada, E., Miguez, C., & Cacabelos, A. (2013). Project based learning: Application to a research master subject of thermal engineering. *Journal of Technology and Science Education*, 3(3). <https://doi.org/10.3926/jotse.81>
- Aripin, I., Hidayat, T., Rustaman, N., & Riandi, R. (2021a). The Effectiveness of Science



- Learning Research Skills: A Meta-Analysis Study. *Scientiae Educatia*, 10(1), 40. <https://doi.org/10.24235/sc.educatia.v10i1.8486>
- Aripin, I., Hidayat, T., Rustaman, N. Y., & Riandi, R. (2021b). Prospective biology teachers' research skills. *Journal of Physics: Conference Series*, 1806(1), 012170. <https://doi.org/10.1088/1742-6596/1806/1/012170>
- Arizona, K., Abidin, Z., & Rumansyah, R. (2020). PEMBELAJARAN ONLINE BERBASIS PROYEK SALAH SATU SOLUSI KEGIATAN BELAJAR MENGAJAR DI TENGAH PANDEMI COVID-19. *Jurnal Ilmiah Profesi Pendidikan*, 5(1), 64–70. <https://doi.org/10.29303/jipp.v5i1.111>
- Bae, H., & Kwon, K. (2021). Developing metacognitive skills through class activities: what makes students use metacognitive skills? *Educational Studies*, 47(4), 456–471. <https://doi.org/10.1080/03055698.2019.1707068>
- Baloo, K., Pauli, R., & Worrell, M. (2018). Conceptions of Research Methods Learning Among Psychology Undergraduates: A Q Methodology Study. *Cognition and Instruction*, 36(4), 279–296. <https://doi.org/10.1080/07370008.2018.1494180>
- Bandaranaike, S. (2018). From research skill development to work skill development. *Journal of University Teaching and Learning Practice*, 15(4). <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85064042012&partnerID=40&md5=8763d2d1efc79b49be71e78b24eced57>
- Bauer, J. M., & Reisch, L. A. (2019). Behavioural insights and (un) healthy dietary choices: A review of current evidence. *Journal of Consumer Policy*. <https://doi.org/10.1007/s10603-018-9387-y>
- Bezeljak, P., Scheuch, M., & Torkar, G. (2020). Understanding of Sustainability and Education for Sustainable Development Among Pre-Service Biology Teachers. *Sustainability*. <https://doi.org/10.3390/su12176892>
- Biletska, H., Mironova, N., ЄФРЕМОВА, O., Barna, L. S., & Bloshchynskyi, I. (2021). The Future Biology Teachers Training for the Implementation of Sustainable Development Ideas in Ecological Education. *International Journal of Innovative Research and Scientific Studies*. <https://doi.org/10.53894/ijirss.v4i4.200>

- Bingham, T. J., Wirjapranata, J., & Bartley, A. (2017). Building resilience and resourcefulness: The evolution of an academic and information literacy strategy for first year social work students. *Information and Learning Science*, 118(7–8), 433–446. <https://doi.org/10.1108/ILS-05-2017-0046>
- Bink, A. B., & Corrigan, P. (2022). The impact of mental health information overload on community education programs to enhance mental health-care seeking. *Journal of Public Mental Health*, 21(2), 174–178. <https://doi.org/10.1108/JPMH-06-2021-0077>
- Bjornstad, P., Nehus, E., & Raalte, D. H. v. (2020). Bariatric Surgery and Kidney Disease Outcomes in Severely Obese Youth. *Seminars in Pediatric Surgery*. <https://doi.org/10.1016/j.sempedsurg.2020.150883>
- Blumenfeld, P. C., Soloway, E., Marx, R. W., Krajcik, J. S., Guzdial, M., & Palincsar, A. (1991). Motivating Project-Based Learning: Sustaining the Doing, Supporting the Learning. *Educational Psychologist*, 26(3–4), 369–398. <https://doi.org/10.1080/00461520.1991.9653139>
- Burkart, S., Parker, H., Weaver, R. G., Beets, M. W., Jones, A., Adams, E. L., Chaput, J., & Armstrong, B. (2021). Impact of The COVID-19 Pandemic on Elementary Schoolers' Physical Activity, Sleep, Screen Time and Diet: A Quasi-experimental Interrupted Time Series Study. *Pediatric Obesity*. <https://doi.org/10.1111/ijpo.12846>
- Butler, D. L., & Cartier, S. C. (2004). Promoting Effective Task Interpretation as an Important Work Habit: A Key to Successful Teaching and Learning. *Teachers College Record: The Voice of Scholarship in Education*, 106(9), 1729–1758. <https://doi.org/10.1111/j.1467-9620.2004.00403.x>
- Butler, D. L., & Cartier, S. C. (2005). Multiple Complementary Methods for Understanding Self-Regulated Learning as Situated in Context. *American Meeting of the American Educational Research Association*, 11–15. <https://ecps.educ.ubc.ca/files/2013/11/Butler-Cartier-2005-AERA-Paper-Final.pdf>
- Butler, D. L., Schnellert, L., & Perry, N. E. (2017). *Developing self-regulating learners*. Don Mills, ON: Pearson.

- Carbone, E. T., & Ware, S. (2017). Are college graduates ready for the 21st century? Community-engaged research can help. *Journal of Higher Education Outreach and Engagement*, 21(4), 173–208.
- Carrad, A., Louie, J. C. Y., Milosavljevic, M., Kelly, B., & Flood, V. M. (2015). Consumer Support for Healthy Food and Drink Vending Machines in Public Places. *Australian and New Zealand Journal of Public Health*. <https://doi.org/10.1111/1753-6405.12386>
- Chen, A. H., Rosli, S. A., & Hovis, J. K. (2020). A Survey on Daily Activity Inclination and Health Complaints Among Urban Youth in Malaysia. *Journal of Environmental and Public Health*. <https://doi.org/10.1155/2020/9793425>
- Cherian, C. G., Buta, E., Simon, P., Gueorguieva, R., & Krishnan-Sarin, S. (2021). Association of Vaping and Respiratory Health Among Youth in the Population Assessment of Tobacco and Health (PATH) Study Wave 3. *International Journal of Environmental Research and Public Health*. <https://doi.org/10.3390/ijerph18158208>
- Chisingui, A. V., & Costa, N. (2020). Teacher Education and Sustainable Development Goals: A Case Study With Future Biology Teachers in an Angolan Higher Education Institution. *Sustainability*. <https://doi.org/10.3390/su12083344>
- Chowdhury, N., Katsikas, S., & Gkioulos, V. (2022). Modeling effective cybersecurity training frameworks: A delphi method-based study. *Computers & Security*, 113, 102551. <https://doi.org/10.1016/j.cose.2021.102551>
- Chu, S. K. W., Reynolds, R. B., Tavares, N. J., Notari, M., & Lee, C. W. Y. (2017). *21st Century Skills Development Through Inquiry-Based Learning*. Springer Singapore. <https://doi.org/10.1007/978-981-10-2481-8>
- Cleary, T. J., Velardi, B., & Schnaidman, B. (2017). Effects of the Self-Regulation Empowerment Program (SREP) on middle school students' strategic skills, self-efficacy, and mathematics achievement. *Journal of School Psychology*, 64, 28–42. <https://doi.org/10.1016/j.jsp.2017.04.004>
- Costacou, T., Crandell, J., Kahkoska, A. R., Liese, A. D., Dabelea, D., Lawrence, J. M., Pettitt, D. J., Reynolds, K., Mayer-Davis, E. J., & Mottl, A. K. (2018). Dietary

Patterns Over Time and Microalbuminuria in Youth and Young Adults With Type 1 Diabetes: The SEARCH Nutrition Ancillary Study. *Diabetes Care*. <https://doi.org/10.2337/dc18-0319>

Daneshvar, M. (2023). *Breakfast Skipping as an Indicator of Unhealthy Lifestyle Among Adolescents: A Short Letter*. <https://doi.org/10.1101/2023.04.10.23288359>

Davidson, Z. E., & Palermo, C. (2015). Developing Research Competence in Undergraduate Students through Hands on Learning. *Journal of Biomedical Education*, 2015, 1–9. <https://doi.org/10.1155/2015/306380>

Dewi Anggelia, Ika Puspitasari, & Shokhibul Arifin. (2022). Penerapan Model Project-based Learning ditinjau dari Kurikulum Merdeka dalam Mengembangkan Kreativitas Belajar Pendidikan Agama Islam. *Jurnal Pendidikan Agama Islam Al-Thariqah*, 7(2), 398–408. [https://doi.org/10.25299/al-thariqah.2022.vol7\(2\).11377](https://doi.org/10.25299/al-thariqah.2022.vol7(2).11377)

Dias, M., & Brantley-Dias, L. (2017). Setting the Standard for Project Based Learning: A Proven Approach to Rigorous Classroom Instruction. *Interdisciplinary Journal of Problem-Based Learning*, 11(2). <https://doi.org/10.7771/1541-5015.1721>

Engelmann, K., Neuhaus, B. J., & Fischer, F. (2016). Fostering scientific reasoning in education – meta-analytic evidence from intervention studies. *Educational Research and Evaluation*, 22(5–6), 333–349. <https://doi.org/10.1080/13803611.2016.1240089>

Faff, R. W. (2016). Mapping “Pitching Research” Tasks into the RSD7 Framework: A Pedagogic Perspective. *SSRN Electronic Journal*, 1–55. <https://doi.org/10.2139/ssrn.2724451>

Feldon, D. F., Litson, K., Jeong, S., Blaney, J. M., Kang, J., Miller, C., Griffin, K., & Roksa, J. (2019). Postdocs’ lab engagement predicts trajectories of PhD students’ skill development. *Proceedings of the National Academy of Sciences*, 116(42), 20910–20916. <https://doi.org/10.1073/pnas.1912488116>

Finderup, J., Kristensen, A. F., Christensen, R., & Jespersen, B. (2018). A Triangulated Evaluation of a Youth Clinic for Patients With Kidney Disease. *Journal of Renal Care*. <https://doi.org/10.1111/jorc.12246>

- Fischer, F., Kollar, I., Ufer, S., Sodian, B., Hussmann, H., Pekrun, R., Neuhaus, B., Dorner, B., Pankofer, S., Fischer, M., Strijbos, J.-W., Heene, M., & Eberle, J. (2014). Scientific Reasoning and Argumentation: Advancing an Interdisciplinary Research Agenda in Education. *Frontline Learning Research*, 2, 28–45. <https://files.eric.ed.gov/fulltext/EJ1090940.pdf>
- Fitzsimons, G. M., Finkel, E. J., & vanDellen, M. R. (2015). Transactive goal dynamics. *Psychological Review*, 122(4), 648–673. <https://doi.org/10.1037/a0039654>
- Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive–developmental inquiry. *American Psychologist*, 34(10), 906–911. <https://doi.org/10.1037/0003-066X.34.10.906>
- Geisinger, K. F. (2016). 21st Century Skills: What Are They and How Do We Assess Them? *Applied Measurement in Education*, 29(4), 245–249. <https://doi.org/10.1080/08957347.2016.1209207>
- Geithner, C. A., & Pollastro, A. N. (2016). Doing peer review and receiving feedback: Impact on scientific literacy and writing skills. *Advances in Physiology Education*, 40(1), 38–46. <https://doi.org/10.1152/advan.00071.2015>
- Gorleku, P. N., Setorglo, J., Gorleku, O., Dzefi-Tetty, K., Edzie, E. K. M., Pierson, A. D., & Antwi, R. (2019). Effect of Eating Habits on Oral Health Among Junior High Students in the Cape Coast Metropolis. *International Journal of Innovative Research in Medical Science*. <https://doi.org/10.23958/ijirms/vol04-i12/798>
- Gormally, C., Sullivan, C. S., & Szeinbaum, N. (2016). Uncovering Barriers to Teaching Assistants (TAs) Implementing Inquiry Teaching: Inconsistent Facilitation Techniques, Student Resistance, and Reluctance to Share Control over Learning with Students. *Journal of Microbiology & Biology Education*, 17(2), 215–224. <https://doi.org/10.1128/jmbe.v17i2.1038>
- Guo, P., Saab, N., Post, L. S., & Admiraal, W. (2020). A review of project-based learning in higher education: Student outcomes and measures. *International Journal of Educational Research*, 102, 101586. <https://doi.org/10.1016/j.ijer.2020.101586>
- Guthrie, J. F., Mancino, L., & Lin, C.-T. J. (2015). Nudging Consumers Toward Better Food Choices: Policy Approaches to Changing Food Consumption Behaviors.

*Psychology and Marketing*. <https://doi.org/10.1002/mar.20795>

- Handrianto, C., & Rahman, M. A. (2019). PROJECT BASED LEARNING: A REVIEW OF LITERATURE ON ITS OUTCOMES AND IMPLEMENTATION ISSUES. *LET: Linguistics, Literature and English Teaching Journal*, 8(2), 110–129.
- Hartati, L., Marsono, M., & Yoto, Y. (2022). The effect of the project-based learning model on the soft skill of vocational school students. *Technium Social Sciences Journal*, 27, 180–193. <https://doi.org/10.47577/tssj.v27i1.5569>
- Hendriarto, P., Mursidi, A., Kalbuana, N., Aini, N., & Aslan, A. (2021). Understanding the Implications of Research Skills Development Framework for Indonesian Academic Outcomes Improvement. *Jurnal Iqra': Kajian Ilmu Pendidikan*, 6(2). <https://doi.org/10.25217/ji.v6i2.1405>
- Herwanti, K., Nugrohadi, S., . M., Baatarkhuu, K., Christo Petra Nugraha, S., & Novita, M. (2022). Importance of Data-based Planning in Kurikulum Merdeka Implementation. *KnE Social Sciences*. <https://doi.org/10.18502/kss.v7i19.12448>
- Higgins, R., Hogg, P., & Robinson, L. (2017). Constructive alignment of a research-informed teaching activity within an undergraduate diagnostic radiography curriculum: A reflection. *Radiography*, 23, S30–S36. <https://doi.org/10.1016/j.radi.2016.11.004>
- Hoa, N. T., Huy, D. T. N., & Van Trung, T. (2021). IMPLEMENTATION OF STUDENTS'S SCIENTIFIC RESEARCH POLICY AT UNIVERSAL EDUCATION INSTITUTIONS IN VIETNAM IN TODAY SITUATION AND SOLUTIONS. . *Review of International Geographical Education Online*.
- Hussein, B. (2021). Addressing Collaboration Challenges in Project-Based Learning: The Student's Perspective. *Education Sciences*, 11(8), 434. <https://doi.org/10.3390/educsci11080434>
- İlhan, I. (2014). A study on the efficacy of project-based learning approach on Social Studies Education: Conceptual achievement and academic motivation. *Educational Research and Reviews*, 9(15), 487–497. <https://doi.org/10.5897/ERR2014.1777>

- Illahi, P. C., Fitri, R., & Arsih, F. (2022). The Effect of Project Based Learning Model on Creative Thinking Ability in Biology Learning. *Journal of Digital Learning and Education*, 2(3), 171–177. <https://doi.org/10.52562/jdle.v2i3.441>
- Indarta, Y., Jalinus, N., Waskito, W., Samala, A. D., Riyanda, A. R., & Adi, N. H. (2022). Relevansi Kurikulum Merdeka Belajar dengan Model Pembelajaran Abad 21 dalam Perkembangan Era Society 5.0. *EDUKATIF : JURNAL ILMU PENDIDIKAN*, 4(2), 3011–3024. <https://doi.org/10.31004/edukatif.v4i2.2589>
- John Larmer, John Mergendoller, & Suzie Boss. (2015). *Setting the Standard for Project Based Learning*. ASCD.
- Kalkan, İ. (2019). The Impact of Nutrition Literacy on the Food Habits Among Young Adults in Turkey. *Nutrition Research and Practice*. <https://doi.org/10.4162/nrp.2019.13.4.352>
- Kallio, P., Pahkala, K., Heinonen, O. J., Tammelin, T., Hirvensalo, M., Telama, R., Juonala, M., Magnussen, C. G., Rovio, S., Helajärvi, H., Hutri-Kähönen, N., Viikari, J., & Raitakari, O. T. (2018). Physical Inactivity From Youth to Adulthood and Risk of Impaired Glucose Metabolism. *Medicine & Science in Sports & Exercise*. <https://doi.org/10.1249/mss.0000000000001555>
- KAMARUZAMAN, F. M., HAMID, R., RASUL, M. S., OMAR, M., & ZAID, M. F. A. M. (2023). VALIDITY AND RELIABILITY OF GS4IR INSTRUMENT FOR ENTRY-LEVEL CIVIL ENGINEERS USING RASCH MODEL. *Journal of Engineering Science and Technology*, 18(3), 1570–1580.
- Kavousi, S., Miller, P. A., & Alexander, P. A. (2020). Modeling metacognition in design thinking and design making. *International Journal of Technology and Design Education*, 30(4), 709–735. <https://doi.org/10.1007/s10798-019-09521-9>
- Kementerian Pendidikan dan Kebudayaan. (2013). *Model Pembelajaran Penemuan (Discovery Learning)*.
- Kim, K., Moss, C., Park, J. J., & Wekerle, C. (2022). Child Maltreatment and the Child Welfare System as Environmental Factors in the International Classification of Functioning. *Frontiers in Rehabilitation Sciences*. <https://doi.org/10.3389/fresc.2021.710629>

- Kokotsaki, D., Menzies, V., & Wiggins, A. (2016). Project-based learning: A review of the literature. *Improving Schools*, 19(3), 267–277. <https://doi.org/10.1177/1365480216659733>
- Kołota, A., & Głabska, D. (2022). Analysis of Association Between Adolescents' Food Habits and Body Mass Change in a Population-Based Sample: Diet and Activity of Youth During COVID-19 (DAY-19) Study. *International Journal of Environmental Research and Public Health*. <https://doi.org/10.3390/ijerph191811772>
- Kumalasari, D., Milama, B., & Bahriah, E. S. (2017). MODEL PEMBELAJARAN BERBASIS PROYEK TERHADAP KEMAMPUAN BERPIKIR KREATIF SISWA PADA MATERI KOLOID. *JRPK: Jurnal Riset Pendidikan Kimia*, 7(1), 22–29. <https://doi.org/10.21009/JRPK.071.04>
- Kunze, R., & Büssing, A. G. (2022). *Sustainable Agriculture as a Topic of Biology Education for Sustainable Development*. <https://doi.org/10.31219/osf.io/fj4gk>
- Kwietniewski, K. (2017). *Literature Review of Project Based Learning*. State University of New York College at Buffalo - Buffalo State College.
- Labov, J. B., Reid, A. H., & Yamamoto, K. R. (2010). Integrated Biology and Undergraduate Science Education: A New Biology Education for the Twenty-First Century? *CBE—Life Sciences Education*, 9(1), 10–16. <https://doi.org/10.1187/cbe.09-12-0092>
- Larson, N., Story, M., Eisenberg, M. E., & Neumark-Sztainer, D. (2016). Secular Trends in Meal and Snack Patterns Among Adolescents From 1999 to 2010. *Journal of the Academy of Nutrition and Dietetics*. <https://doi.org/10.1016/j.jand.2015.09.013>
- Lee, D., Huh, Y., & Reigeluth, C. M. (2015). Collaboration, intragroup conflict, and social skills in project-based learning. *Instructional Science*, 43(5), 561–590. <https://doi.org/10.1007/s11251-015-9348-7>
- Leksono, S. M., & Ekanara, B. (2019). Profil Kemampuan Berpikir Kritis Siswa Sma Melalui Pembelajaran Mini-Riset Berbasis Pendidikan Konservasi. *Prosiding Seminar Nasional Pendidikan FKIP*, 218–223.
- Lian, L., Sun, N., Zhang, L., Xu, G., Liu, J., Hu, J., Zhang, Z., Lou, J., Deng, H., Shen,



- Z., & Han, L. (2020). Fast Food Consumption Among Young Adolescents Aged 12–15 Years in 54 Low- And Middle-Income Countries. *Global Health Action*. <https://doi.org/10.1080/16549716.2020.1795438>
- Liu, Y., Pleasants, R. A., Croft, J. B., Wheaton, A. G., Heidari, K., Malarcher, A., Ohar, J. A., Kraft, M., Mannino, D. M., & Strange, C. (2015). Smoking Duration, Respiratory Symptoms, and COPD in Adults Aged  $\geq$ 45 Years With a Smoking History. *International Journal of Chronic Obstructive Pulmonary Disease*. <https://doi.org/10.2147/copd.s82259>
- Loes, C. N., & Pascarella, E. T. (2015). The Benefits of Good Teaching Extend Beyond Course Achievement. *Journal of the Scholarship of Teaching and Learning*, 1–13. <https://doi.org/10.14434/josotl.v15i2.13167>
- Lyzwinski, L. N., Naslund, J. A., Miller, C. J., & Eisenberg, M. J. (2022). Global Youth Vaping and Respiratory Health: Epidemiology, Interventions, and Policies. *NPJ Primary Care Respiratory Medicine*. <https://doi.org/10.1038/s41533-022-00277-9>
- Maddens, L., Depaepe, F., Janssen, R., Raes, A., & Elen, J. (2020). Evaluating the Leuven Research Skills Test for 11th and 12th Grade. *Journal of Psychoeducational Assessment*, 38(4), 445–459. <https://doi.org/10.1177/0734282918825040>
- Maddens, L., Depaepe, F., Janssen, R., Raes, A., & Elen, J. (2021). Research skills in upper secondary education and in first year of university. *Educational Studies*, 47(4), 491–507. <https://doi.org/10.1080/03055698.2020.1715204>
- Maddens, L., Depaepe, F., Raes, A., & Elen, J. (2022). Fostering students' motivation towards learning research skills: the role of autonomy, competence and relatedness support. *Instructional Science*. <https://doi.org/10.1007/s11251-022-09606-4>
- Maknun, D., Gloria, R. Y., & Muzakki, J. A. (2019). *MODEL KERJA LAB BERBASIS PROYEK UNTUK MENINGKATKAN KETERAMPILAN MENELITI DAN KESADARAN EKO-SPIRITUAL MAHASISWA SI PROGRAM STUDI PENDIDIKAN BIOLOGI DI WILAYAH III CIREBON*. IAIN Syekh Nurjati Cirebon.
- Mao, Y. (2023). Issues and Strategies in Inquiry-Based Learning Evaluation. *Open Journal of Social Sciences*, 11(04), 422–440. <https://doi.org/10.4236/jss.2023.114030>

- Masjudin, M., Muzaki, A., Abidin, Z., & Ariyanti, I. A. P. (2020). Analysis of student's statistical thinking ability in understanding the statistical data. *Journal of Physics: Conference Series*, 1521(3), 032063. <https://doi.org/10.1088/1742-6596/1521/3/032063>
- Mataniari, R., Willison, J., Hasibuan, M. H. E., Sulistiyo, U., & Dewi, F. (2020). Portraying students' critical thinking skills through research skill development (RSD) framework: A case of a biology course in an Indonesian University. *Journal of Turkish Science Education*, 17(2), 302–314. <https://doi.org/10.36681/tused.2020.28>
- Morgan, H. (2014). Maximizing Student Success with Differentiated Learning. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, 87(1), 34–38. <https://doi.org/10.1080/00098655.2013.832130>
- Muliardi, M. (2023). Mengembangkan kreativitas dan karakter bangsa melalui Kurikulum Merdeka di Madrasah. *Takuana: Jurnal Pendidikan, Sains, Dan Humaniora*, 2(1), 1–12. <https://doi.org/10.56113/takuana.v2i1.68>
- Muminah, I. H., Aripin, I., & Hikmawati, V. Y. (2022). Pelatihan Keterampilan Riset Dan Publikasi Ilmiah Pada Mahasiswa Fakultas Keguruan Dan Ilmu Pendidikan. *BERNAS: Jurnal Pengabdian Kepada Masyarakat*, 3(2), 227–234.
- Murtonen, M., Olkinuora, E., Tynjälä, P., & Lehtinen, E. (2008). “Do I need research skills in working life?”: University students' motivation and difficulties in quantitative methods courses. *Higher Education*, 56(5), 599–612. <https://doi.org/10.1007/s10734-008-9113-9>
- Nurlaelah, I., Widodo, A., Redjeki, S., & Rahman, T. (2022). *The Development of Researching Skills Test Instruments in the Authentic Research Program* (A. Samsudin, L. Hasanah, G. Yuliani, M. Iryanti, Y. F. Kasi, A. S. Shidiq, & L. Rusyati (eds.); Vol. 2468). American Institute of Physics Inc. <https://doi.org/10.1063/5.0102966>
- Omarchevska, Y., Lachner, A., Richter, J., & Scheiter, K. (2022). Do Video Modeling and Metacognitive Prompts Improve Self-Regulated Scientific Inquiry? *Educational Psychology Review*, 34(2), 1025–1061. <https://doi.org/10.1007/s10648-021-09652->

- Onanuga, P. A. (2020). Relative Effectiveness of Generative Learning Strategy on Students' Academic Achievement in Senior Secondary School Biology: Sustainable Development Perspective. *Annual Journal of Technical University of Varna Bulgaria*. <https://doi.org/10.29114/ajtuv.vol4.iss1.134>
- Opitz, A., Heene, M., & Fischer, F. (2017). Measuring scientific reasoning – a review of test instruments. *Educational Research and Evaluation*, 23(3–4), 78–101. <https://doi.org/10.1080/13803611.2017.1338586>
- Oshri, A., Liu, S., Huffman, L. G., & Koss, K. J. (2020). Firm Parenting and Youth Adjustment: Stress Reactivity and Dyadic Synchrony of Respiratory Sinus Arrhythmia. *Developmental Psychobiology*. <https://doi.org/10.1002/dev.22019>
- Pamungkas, Z. S., Aminah, N. S., & Nurosyid, F. (2018). Students Critical Thinking Skill in Solving Scientific Literacy using a Metacognitive Test Based on Scientific Literacy. *Jurnal Ilmiah Pendidikan Fisika Al-Biruni*, 7(2), 161–169. <https://doi.org/10.24042/jipfalbiruni.v7i2.2909>
- Pieper, M., Roelle, J., vom Hofe, R., Salle, A., & Berthold, K. (2021). Feedback in Reflective Journals Fosters Reflection Skills of Student Teachers. *Psychology Learning & Teaching*, 20(1), 107–127. <https://doi.org/10.1177/1475725720966190>
- Pols, C. F. J., Dekkers, P. J. J. M., & de Vries, M. J. (2021). What do they know? Investigating students' ability to analyse experimental data in secondary physics education. *International Journal of Science Education*, 43(2), 274–297. <https://doi.org/10.1080/09500693.2020.1865588>
- Pries, A. M., Ferguson, E., Sharma, N., Upadhyay, A., & Filteau, S. (2019). Exploratory Analysis of Nutritional Quality and Metrics of Snack Consumption Among Nepali Children During the Complementary Feeding Period. *Nutrients*. <https://doi.org/10.3390/nu11122962>
- Prieto-Flores, M.-E., Gomez-Barroso, D., Torrecilla, R. C., & Jiménez, A. M. (2021). Geographic Health Inequalities in Madrid City: Exploring Spatial Patterns of Respiratory Disease Mortality. *Human Geographies – Journal of Studies and Research in Human Geography*. <https://doi.org/10.5719/hgeo.2021.151.1>
- Qomariyah, N., Wirawan, R., M Angraini, L., Nova Anggarani, & 4Ni K. (2019).

Peningkatan Kompetensi Guru Dalam Pembelajaran Fisika Berbasis Metode Eksperimen. *WIDYABHAKTI Jurnal Ilmiah Populer*, 1(2), 93–99.

Rahayu, R., Rosita, R., Rahayuningsih, Y. S., Hernawan, A. H., & Prihantini, P. (2022). Implementasi Kurikulum Merdeka Belajar di Sekolah Penggerak. *Jurnal Basicedu*, 6(4), 6313–6319. <https://doi.org/10.31004/basicedu.v6i4.3237>

Rahman, S., Yasin, R. M., Salamuddin, N., & Surat, S. (2014). The Use of Metacognitive Strategies to Develop Research Skills among Postgraduate Students. *Asian Social Science*, 10(19). <https://doi.org/10.5539/ass.v10n19p271>

Rahtikawati, Y., & Rusmana, D. (2020). Developing The Indonesian Master Students Research Mindset With The Research Skill Development Framework. *PalArch's Journal of Archaeology of Egypt/Egyptology*, 17(7), 13111–13122. [https://etheses.uinsgd.ac.id/43316/1/Developing The Indonesian Master Students\\_Yayan Rahtikawati.pdf](https://etheses.uinsgd.ac.id/43316/1/Developing%20The%20Indonesian%20Master%20Students_Yayan%20Rahtikawati.pdf)

Roito, E., Solihat, R., & Wulan, A. R. (2019). Pencapaian Keterampilan Meneliti Abad Ke-21 Peserta Didik SMA pada Pembelajaran Ekosistem melalui Step-By-Step Model Experiment. *Assimilation: Indonesian Journal of Biology Education*, 2(1), 14–18. <https://doi.org/10.17509/aijbe.v2i1.15112>

Roksa, J., Trolan, T. L., Blaich, C., & Wise, K. (2017). Facilitating academic performance in college: understanding the role of clear and organized instruction. *Higher Education*, 74(2), 283–300. <https://doi.org/10.1007/s10734-016-0048-2>

Sagita, S., Rahmat, A., Priyandoko, D., & Sriyati, S. (2023). The Potency of Google Sites to Enhance Students Performance in Research Skills. *Pedagonal: Jurnal Ilmiah Pendidikan*, 7(2), 92–104. <https://doi.org/10.55215/pedagonal.v7i2.8843>

Salybekova, N., Issayev, G., Abdrassulova, Z., Bostanova, A., Dairabaev, R., & Erdenov, M. (2021). Pupils' research skills development through project-based learning in biology. *Cypriot Journal of Educational Sciences*, 16(3), 1106–1121. <https://doi.org/10.18844/CJES.V16I3.5829>

Santika, E. F. (2023). *Pemuda Bekerja Lulusan SMA Lebih Banyak Dibanding Tamatan Perguruan Tinggi*. Databoks. <https://databoks.katadata.co.id/datapublish/2023/01/19/pemuda-bekerja-lulusan->

sma-lebih-banyak-dibanding-tamatan-perguruan-tinggi

- Sari, D. P. (2018). *MEMBANGUN KETERAMPILAN RISET ABAD KE-21 SISWA MELALUI LEARNING MANAGEMENT SYSTEM BERBASIS EDMODO PADA PEMBELAJARAN PROYEK ....* <http://repository.upi.edu/id/eprint/44044>
- Sari, D. P., Wulan, A. R., & Solihat, R. (2019). *Developing 21st century student research skills through assessment matrix and edmodo in biology project* (Saprudin, A. G. Abdullah, Sutarno, R. R. Agustin, I. Permana, & A. B. D. Nandiyanto (eds.); Vol. 1157, Issue 2). Institute of Physics Publishing. <https://doi.org/10.1088/1742-6596/1157/2/022093>
- Seki, T., Takeuchi, M., & Kawakami, K. (2021). Eating and Drinking Habits and Its Association With Obesity in Japanese Healthy Adults: Retrospective Longitudinal Big Data Analysis Using a Health Check-Up Database. *British Journal of Nutrition*. <https://doi.org/10.1017/s0007114521000179>
- Shaban, K., Abdulwahed, M., & Younes, A. (2015). Problem-centric Process for Research-based Learning. *International Journal of Engineering Pedagogy (IJEP)*, 5(2), 24. <https://doi.org/10.3991/ijep.v5i2.4506>
- Shimizu, I., Matsuyama, Y., Duvivier, R., & van der Vleuten, C. (2021). Contextual attributes to promote positive social interdependence in problem-based learning: a focus group study. *BMC Medical Education*, 21(1), 222. <https://doi.org/10.1186/s12909-021-02667-y>
- Sijmkens, E., De Cock, M., & De Laet, T. (2023). Scaffolding students' use of metacognitive activities using discipline- and topic-specific reflective prompts. *Metacognition and Learning*. <https://doi.org/10.1007/s11409-023-09363-w>
- Sinensis, A. R., Firdaus, T., & Saulon, B. O. (2022). Build Students' Research Skills Through Collaborative Real-World Analysis-Based Learning. *Indonesian Review of Physics*, 5(2), 57–65. <https://doi.org/10.12928/irip.v5i2.6488>
- Skulmowski, A. (2023). Learners Emphasize Their Intrinsic Load if Asked About It First: Communicative Aspects of Cognitive Load Measurement. *Mind, Brain, and Education*, 17(3), 165–169. <https://doi.org/10.1111/mbe.12369>

- Solihat, R., Rustaman, N., Widodo, A., & Saefudin, S. (2015). Keterampilan Riset Mahasiswa Biologi dan Pendidikan Biologi; Analisis Berdasarkan Refleksi Personal. *Metode Didaktik*, 9(2), 16–24.
- Spante, M., Hashemi, S. S., Lundin, M., & Algers, A. (2018). Digital competence and digital literacy in higher education research: Systematic review of concept use. *Cogent Education*, 5(1), 1519143. <https://doi.org/10.1080/2331186X.2018.1519143>
- Stevens, E. R., Xu, S., Niaura, R., Cleland, C. M., Sherman, S. E., Mai, A., Karey, E., & Jiang, N. (2022). Youth E-Cigarette Use and Functionally Important Respiratory Symptoms: The Population Assessment of Tobacco and Health (PATH) Study Waves 3 and 4. *International Journal of Environmental Research and Public Health*. <https://doi.org/10.3390/ijerph192215324>
- Subekti, H., Setiawan, B., Yuhana, W. L., & Susilo, H. (2018). Analisis Keterampilan Riset Mahasiswa Calon Guru IPA di Universitas Negeri Surabaya: Studi Eksplorasi. *SEMINAR NASIONAL IPA IX “Evaluasi, Riset, Dan Publikasi Pembelajaran IPA,”* 164–175. [https://www.researchgate.net/publication/326539197\\_Analisis\\_Keterampilan\\_Riset\\_Mahasiswa\\_Calon\\_Guru\\_IPA\\_di\\_Universitas\\_Negeri\\_Surabaya\\_Studi\\_Eksplorasi](https://www.researchgate.net/publication/326539197_Analisis_Keterampilan_Riset_Mahasiswa_Calon_Guru_IPA_di_Universitas_Negeri_Surabaya_Studi_Eksplorasi)
- Sukarso, A. A., & Muslihatun, M. (2021). Mengembangkan Keterampilan Berpikir Kreatif, Sikap dan Kemampuan Bekerja Ilmiah Melalui Pembelajaran Praktikum Proyek Riset Otentik. *Jurnal Ilmiah Profesi Pendidikan*, 6(3), 467–475. <https://doi.org/10.29303/jipp.v6i3.268>
- Sulaiman, S. K., Tsiga-Ahmed, F. I., Faris, M., Musa, M. S., Akpan, U. A., Umar, A. M., Abubakar, S., Allaham, K. K., Alyammahi, T., Abduljalil, M. A., Javaid, S. F., & Khan, M. A. (2022). Nigerian Muslim’s Perceptions of Changes in Diet, Weight, and Health Status During Ramadan: A Nationwide Cross-Sectional Study. *International Journal of Environmental Research and Public Health*. <https://doi.org/10.3390/ijerph192114340>
- Tedjokoesoemo, P., Nilasari, P., & Sari, S. (2021). Addressing the Independent Learning Curriculum (Kurikulum Merdeka Belajar) as a Form of Positive Disruption to Empower the Community. *Proceedings of the 1st International Conference on Emerging Issues in Humanity Studies and Social Sciences*, 167–176. <https://doi.org/10.5220/0010749100003112>

- Titus, S. L., & Ballou, J. M. (2014). Ensuring PhD Development of Responsible Conduct of Research Behaviors: Who's Responsible? *Science and Engineering Ethics*, 20(1), 221–235. <https://doi.org/10.1007/s11948-013-9437-4>
- Torres, L. (2018). Research skills in the first-year biology practical - Are they there? *Journal of University Teaching and Learning Practice*, 15(4), 32–55. <https://doi.org/10.53761/1.15.4.3>
- Trilling, B., & Fadel, C. (2009). *21st Century Skills: Learning for Life in Our Times*. John Wiley & Sons.
- Tu, K. M., Li, X., & Cohen, J. R. (2019). The “Heart” of Depression During Early Adolescence. *Developmental Psychobiology*. <https://doi.org/10.1002/dev.21862>
- Uswatun Chasanah, A. R., Khoiri, N., & Nuroso, H. (2016). Efektivitas Model Project Based Learning terhadap Keterampilan Proses Sains dan Kemampuan Berpikir Kreatif Siswa pada Pokok Bahasan Kalor Kelas X SMAN 1 Wonosegoro Tahun Pelajaran 2014/2015. *Jurnal Penelitian Pembelajaran Fisika*, 7(1). <https://doi.org/10.26877/jp2f.v7i1.1149>
- Vieno, K., Rogers, K. A., & Campbell, N. (2022). Broadening the Definition of ‘Research Skills’ to Enhance Students’ Competence across Undergraduate and Master’s Programs. *Education Sciences*, 12(10), 642. <https://doi.org/10.3390/educsci12100642>
- Voráčová, J., Sigmund, E., Sigmundová, D., & Kalman, M. (2015). Changes in Eating Behaviours Among Czech Children and Adolescents From 2002 to 2014 (HBSC Study). *International Journal of Environmental Research and Public Health*. <https://doi.org/10.3390/ijerph121215028>
- Willison, J., & Buisman-Pijlman, F. (2016). PhD prepared: research skill development across the undergraduate years. *International Journal for Researcher Development*, 7(1), 63–83. <https://doi.org/10.1108/IJRD-07-2015-0018>
- Willison, J., & O’Regan, K. (2007). Commonly known, commonly not known, totally unknown: a framework for students becoming researchers. *Higher Education*

*Research & Development*, 26(4), 393–409.  
<https://doi.org/10.1080/07294360701658609>

Willison, J. W. (2012). When academics integrate research skill development in the curriculum. *Higher Education Research and Development*, 31(6), 905–919.  
<https://doi.org/10.1080/07294360.2012.658760>

Willison, J. W. (2018). Research skill development spanning higher education: Critiques, curricula and connections. *Journal of University Teaching and Learning Practice*, 15(4), 2–16. <https://doi.org/10.53761/1.15.4.1>

Wilmore, M., & Willison, J. (2016). Graduates' Attitudes to Research Skill Development in Undergraduate Media Education. *Asia Pacific Media Educator*, 26(1), 113–128.  
<https://doi.org/10.1177/1326365X16640348>

Wisker, G. (2018). Frameworks and freedoms: Supervising research learning and the undergraduate dissertation. *Journal of University Teaching and Learning Practice*, 15(4).  
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85064039207&partnerID=40&md5=3984c4d79398269485b7c70f9992323a>

Yuan, X., Yu, L., & Wu, H. (2021). Awareness of Sustainable Development Goals Among Students From a Chinese Senior High School. *Education Sciences*.  
<https://doi.org/10.3390/educsci11090458>

Yuliansyah, A., & Ayu, M. (2021). THE IMPLEMENTATION OF PROJECT-BASED ASSIGNMENT IN ONLINE LEARNING DURING COVID-19. *Journal of English Language Teaching and Learning*, 2(1), 32–38.  
<https://doi.org/10.33365/jeltl.v2i1.851>

Yurttaş Kumlu, G. D., & Şahin, F. (2022). Metacognitive Activities Performed by Pre-Service Science Teachers in Scientific Reasoning Skills Teaching with the POE Technique. *Science Insights Education Frontiers*, 13(1), 1789–1817.  
<https://doi.org/10.15354/sief.22.or066>

Zalewska, M., & Maciorkowska, E. (2017). Selected Nutritional Habits of Teenagers Associated With Overweight and Obesity. *Peerj*. <https://doi.org/10.7717/peerj.3681>