

## DAFTAR PUSTAKA

- Abbie, H., & Timothy, D. (2016). *The Essentials of Instructional Design*. Routledge.
- Achor, E. E., Ellah, B. O., Omega, J. O., Sains, P., & Benue, U. N. (2022). *Miskonsepsi dan Konsep Sulit sebagai Penentu Siswa Keterlibatan dan Retensi Akademik dalam Fisika*. 34(1), 42–52.  
<https://doi.org/10.23917/varidika.v1i1.17660>
- Adnan, Mulbar, U., Sugiarti, & Bahri, A. (2020). Assessing Scientific Literacy Skills of Indonesian Students: Problem of Biology Teaching in Junior High School in South Sulawesi. *International Journal of Instruction*, 14(3), 847–860.
- Akpinar, E. (2006). *Computer Assisted Instruction in Constructing of Abstract Concepts in Science Teaching: The Unit Electricity in Our Life*. Dokuz Eylül University.
- Amin, M., Muslim, S., & Wirasti, M. K. (2020). *Modul Pembelajaran Hypercontent Pengenalan Perangkat Jaringan Komputer Untuk Mahasiswa Asal Daerah 3t Di Stkip Surya*. 9, 228–242.
- Aptyka, H., Fiedler, D., & Großschedl, J. (2022). Effects of Situated Learning and Clarification of Misconceptions on Contextual Reasoning About Natural selection. *Evolution: Education and Outreach*, 15(5), 1–21.  
<https://doi.org/10.1186/s12052-022-00163-5>
- Archila, P. A., Restrepo, S., Mejía, A. T. de, & Molina, J. (2023). STEM and Non-STEM Misconception.pdf. *Science & Education*.
- Arslan, H. O., Cigdemoglu, C., & Moseley, C. (2012). A Three-Tier Diagnostic Test to Assess Pre-Service Teachers' Misconceptions about Global Warming, Greenhouse Effect, Ozone Layer Depletion, and Acid Rain. *International Journal of Science Education*, 34(11), 1667–1686.  
<https://doi.org/10.1080/09500693.2012.680618>
- Arthur-nyarko, E. (2020). *Digitizing distance learning materials : Measuring students ' readiness and intended challenges*.  
<https://doi.org/10.1007/s10639-019-10060-y>
- Awidi, I. T., & Paynter, M. (2018). The impact of a flipped classroom approach on student learning experience. *Computers & Education*, 128, 269–283.  
<https://doi.org/10.1016/j.compedu.2018.09.013>
- Azis, D., Desfandi, M., Abdi, A. W., & Gadeng, A. N. (2023). *The Identification Misconception in Geography Learning During Covid-19 Pandemic Using Three-Tier Diagnostic Test*. 16(4), 87–100.

- Badan Standar Kurikulum dan Asesmen. (2022). *Capaian Pembelajaran Mata Pelajaran Biologi Fase E – Fase F*. Kementerian Pendidikan, Kebudayaan, Riset, Dan Teknologi Republik Indonesia.
- Barke, H.-D., Hazari, A., & Yitbarek, S. (2009). *Misconceptions in Chemistry, Addressing Perceptions in Chemical Education*. Springer.  
<https://doi.org/DOI.10.1007/978-3-540-70989-3>
- Bernacki, M. L., Greene, J. A., Crompton, H., Hall, P., & Hill, C. (2019). Mobile Technology, Learning, and Achievement: Advances in Understanding and Measuring the Role of Mobile Technology in Education. *Contemporary Educational Psychology*, 101827.  
<https://doi.org/10.1016/j.cedpsych.2019.101827>
- Bhakti, Y. B., & Astuti, I. A. . (2018). *The Influence Process of Science Skill and Motivation Learning with Creativity Learn*. 12(1), 30–35.  
<https://doi.org/10.11591/edulearn.v12i1.6912>
- Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). . *Taxonomy of educational objectives: The classification of educational goals. Handbook I: Cognitive domain*. David McKay Company Inc.
- Borg, W.R & Gall, J. P. (2007). *Education Research, an introduction*. Longman Inc.
- Boyras, S. (2021). *Connectivism : A Literature Review for the New Pathway of Pandemic Driven Education*. 6(3).
- Bradbury, B. L., Tahini, I. H., & Dadykin, A. K. (2018). *Fundamentals of New Effective System to Accelerate Language Acquisition Using Visual Approach*. 8(11), 768–772. <https://doi.org/10.18178/ijiet.2018.8.11.1137>
- Branch, R. M. (2009). *Instructional Design: The ADDIE Approach*. Springer Science&Business Media, LLC. [https://doi.org/10.1007/978-3-319-19650-3\\_2438](https://doi.org/10.1007/978-3-319-19650-3_2438)
- Buitrago-Flórez, F., Danies, G., Restrepo, S., & Hernández, C. (2021). Fostering 21st Century Competences Through Computational Thinking and Active Learning: A Mixed Method Study. *International Journal of Instruction*, 14(3), 737–754. <https://doi.org/10.29333/iji.2021.14343a>
- Busyairi, A., Makhrus, M., & Verawati, N. N. S. P. (2022). *The Effect of Cognitive Conflict Strategy on Improving Understanding of Students ' Physics Concepts Reviewing from Cognitive Style*. 7(2c), 980–986.  
<https://doi.org/https://doi.org/10.29303/jipp.v7i2c.583>
- Casper, A. M. A., & Balgopal, M. M. (2018). Conceptual Change in Natural Resource Management Students' Ecological Literacy\*. *Environmental Education Research*, 24(8), 1159–1176.

<https://doi.org/10.1080/13504622.2017.1350830>

Celik, C., Guven, G., & Cakir, N. K. (2020). *Integration of mobile augmented reality (MAR) applications into biology laboratory : Anatomic structure of the heart*. 28(1063519), 1–11.

Champagne, A. B., Klopfer, L. E., & Gunstone, R. F. (1982). Cognitive Research and the Design of Science Instruction. *Educational Psychologist*, 17(1), 31–53. <https://doi.org/10.1080/00461528209529242>

Chen, C., Sonnert, G., Sadler, P. M., Sasselov, D., & Fredericks, C. (2019). The Impact of Student Misconceptions on Student Persistence in a MOOC. *Journal of Research in Science Teaching*, 57, 879–910. <https://doi.org/10.1002/tea.21616>

Chen, C., Sonnert, G., Sadler, P. M., & Sunbury, S. (2020). *The Impact of High School Life Science Teachers ' Subject Matter Knowledge and Knowledge of Student Misconceptions on Students ' Learning*. 19(ar9), 1–16. <https://doi.org/10.1187/cbe.19-08-0164>

Christensen, D., & Lombardi, D. (2020). Understanding Biological Evolution Through Computational Thinking a K-12 Learning Progression Dana. *Science and Education*, 29, 1035–1077.

Chrzanowski, M. M., Grajkowski, W., Żuchowski, S., Spalik, K., & Ostrowska, B. E. (2018). Vernacular Misconceptions in Teaching Science – Types and Causes. *Journal of Turkish Science Education*, 15(4), 29–54. <https://doi.org/10.12973/tused.10244a>

Čok, V., Vlah, D., & Vukašinović, N. (2022). *Storyboards as an Engineering Tool for Extraction of Functional Requirements*. 2273–2282. <https://doi.org/10.1017/pds.2022.230>

Corbett, F., & Spinello, E. (2020). *Connectivism and leadership harnessing a learning theory for the digital age to redefine leadership in the twenty-first century.pdf*. <https://doi.org/https://doi.org/10.1016/j.heliyon.2020.e03250>  
Received

Cruickshank, D. R., Jenkins, D. B., & Metcalf, K. K. (2006). *The Act of Teaching* (4th ed.). McGraw-Hill.

Dauer, J., & Dauer, J. (2016). A framework for understanding the characteristics of complexity in biology. *International Journal of STEM Education*. <https://doi.org/10.1186/s40594-016-0047-y>

Demirci, T., & Munir, O. (2021). The Effectiveness of Concept Teaching Using Concept Maps on Academic Achievement and Elimination of Misconceptions: Protein Synthesis Case. *Science Education International*, 32(4), 390–399. <https://doi.org/https://doi.org/10.33828/sei.v32.i4.15>

- Dewi, M. R. (2022). Kelebihan dan Kekurangan Project-based Learning untuk Penguatan Profil Pelajara Pancasila Kurikulum Merdeka. *Inovasi Kurikulum*, 19, 213–226.
- Dewi, N. P., Martini, & Purnomo, A. R. (2021). Analisis Miskonsepsi Peserta Didik Pada Materi Sistem Pernapasan Manusia. *Pensa E-Jurnal : Pendidikan Sains*, 9(3), 422–428.
- Dias, L. (2022). *Teaching and Learning with Mobile Devices in the 21st Century Digital World : Benefits and Challenges*. 8385(June), 26–34.
- Dick, W., Carey, L., & Carey, J. O. (2014). *The Systematic Design of Instruction* (Vol. 8). Pearson.
- Doğan, B., & Ay, T. (2013). *Biyolojinin Toplum Bilim Ve Teknoloji Açısından Önemi*, in *Biyolojide Özel Konular* (3rd edn). Pegem Akademi.
- Dwiwarna, & Rahadian, R. B. (2018). The Most Considered Type of Student Characteristics by Primary School Teacher. *International Journal on Integrating Technology in Education*, 7(3), 29–42. <https://doi.org/10.5121/ijite.2018.7303>
- Engeness, I. (2021). Developing Teachers' Digital Identity: Towards The Pedagogic Design Principles of Digital Environments to Enhance Students' Learning in The 21st Century. *European Journal of Teacher Education*, 44(1), 96–114. <https://doi.org/10.1080/02619768.2020.1849129>
- Erbas, C., & Demirer, V. (2019). *The effects of augmented reality on students' academic achievement and motivation in a biology course* †. 4244, 1–9. <https://doi.org/10.1111/jcal.12350>
- Ferliyati, L., Kurniati, T. H., & Suryanda, A. (2014). Penggunaan Multimedia Interaktif Berbasis Inkuiri dalam Meminimalisasi Miskonsepsi Siswa pada Materi Bioteknologi. *Biosfer: Jurnal Pendidikan Biologi*, 7(1), 17–25.
- Fitriah, L. (2017). *Diagnosis Miskonsepsi Siswa Pada Materi Kalor Dengan Menggunakan Three-Tier Essay Dan Open – Ended Test*. 5(2), 168–181.
- Fleuchaus, E., Kloos, H., Kiefer, A. W., & Silva, P. L. (2020). Complexity in Science Learning: Measuring the Underlying Dynamics of Persistent Mistakes. *Journal of Experimental Education*, 88(3), 448–469. <https://doi.org/10.1080/00220973.2019.1660603>
- Gal, H. (2019). When The Use of Cognitive Conflict is Ineffective—Problematic Learning Situations in Geometry. *Educational Studies in Mathematics*, 102, 239–256. <https://doi.org/10.1007/s10649-019-09904-8>
- Gall, M. D., Gall, J. P., & Borg, W. R. (2003). Educational Research: An Introduction. In *Qualitative Voices in Educational Research* (7th ed.). Pearson Education, Inc. <https://doi.org/10.4324/9781003008064-1>

- Gao, Y., Zhai, X., Andersson, B., Zeng, P., & Xin, T. (2020). Developing a Learning Progression of Buoyancy to Model Conceptual Change: A Latent Class and Rule Space Model Analysis. *Research in Science Education*, 50(4), 1369–1388. <https://doi.org/10.1007/s11165-018-9736-5>
- Gentile, J. R., & Lalley, J. P. (2003). *Standards and Mastery Learning*. Corwin Press.
- Gerlach, V. S., & Ely, D. P. (1980). Teaching & Media: A Systematic Approach. In *Retrieved, August* (Vol. 2). Pearson Education.
- Ginja, T. ., & Chen, X. (2020). Teacher Educators ' Perspectives and Experiences towards Differentiated Instruction. *International Journal of Instruction*, 13(4), 781–798.
- Gold-veerkamp, C. (2022). *Analysing a Systematic Literature Review Combined with an Undergraduate Survey on Misconceptions about Software Engineering*. March.
- Gouvea, J. (2023). *Processing misconceptions : dynamic systems perspectives on thinking and learning*. August, 1–12. <https://doi.org/10.3389/feduc.2023.1215361>
- Gustafson, K. L., & Branch, R. M. (2002). *Survei of Instructional Development Models*. Eric Clearinghouse on Information & Technology Syracuse University.
- Güveli, H., Baki, A., & Güveli, E. (2022). The Impact of the Cognitive Conflict Approach on the Elimination of the Misconception in Square Root Numbers. *The Asian Institute of Research Education Quarterly Reviews*, 5(2). <https://doi.org/10.31014/aior.1993.05.04.604>
- Hadiprayitno, G., Muhlis, & Kusmiyati. (2019). Problems in Learning Biology for Senior High Schools in Lombok Island. *IOP Conf.Series: Journal of Physics*. <https://doi.org/10.1088/1742-6596/1241/1/012054>
- Haka, N. B., Rohman, R. N., Hamid, A., & Masya, H. (2022). Cognitive Conflict-Based Conceptual Change Model on Concept Mastery & Student Self-regulation. *Jurnal Pendidikan MIPA*, 23(1), 100–110.
- Hake, R. R. (1998). *Interactive-engagement versus traditional methods : A six-thousand-student survey of mechanics test data for introductory physics courses* *Interactive-engagement versus traditional methods : A six-thousand-student survey of mechanics test data for introduc.* 64(1998). <https://doi.org/10.1119/1.18809>
- Hala, Y., Syahdan, U. A., Pagarra, H., & Saenab, S. (2018). Identification of Misconceptions on Cell Concepts among Biology Teachers by Using CRI Method. *Journal of Physics: Conference Series*, 1028(1), 1–7. <https://doi.org/10.1088/1742-6596/1028/1/012025>

- Halim, A., Mahzum, E., Yacob, M., Irwandi, I., & Halim, L. (2021). The Impact of Narrative Feedback, E-Learning Modules and Realistic Video and the Reduction of Misconception. *Education Sciences*, 11(158), 1–14. <https://doi.org/10.3390/educsci11040158>
- Halim, A. S., Finkenstaedt-quinn, S. A., & Olsen, L. J. (2018). *Identifying and Remediating Student Misconceptions in Introductory Biology via Writing-to-Learn Assignments and Peer Review*. 1–12. <https://doi.org/10.1187/cbe.17-10-0212>
- Hanafri, M. I., Gustomi, L. F., Susanti, H., Stmik, D., Sarana, B., Stmik, M., & Sarana, B. (2018). *Pengembangan Iklan Layanan Masyarakat Berbasis Animasi 2D Pada BPJS Ketenagakerjaan*. 8(1). <https://doi.org/10.38101/sisfotek.v8i1.177>
- Hefzallah, I. M. (2004). *The New Educational Technologies And Learning* (2nd ed.). Charles C Thomas Pub Ltd.
- Hewson, P. W., & Mariana, M. G. (1988). An appropriate conception of teaching science: A view from studies of science learning. *Science Education*, 72(5), 597–614. <https://doi.org/10.1002/sce.3730720506>
- Hinchliffe, L. J. (2018). *Predictable Information Literacy Misconceptions of First-Year College Students Predictable Information Literacy Misconceptions of First-Year College Students*. 12(1), 4–18. <https://doi.org/https://doi.org/10.15760/comminfolit.2018.12.1.2> This
- Huang, R., Spector, J. M., & Yang, J. (2019). *Educational Technology A Primer for the 21st Century*. Springer Nature Singapore Pte Ltd. <https://doi.org/10.4324/9781315854816-16>
- Hughes, S., Lyddy, F., & Lambe, S. (2013). Misconceptions about Psychological Science: A review. *Psychology Learning and Teaching*, 12(1), 20–31. <https://doi.org/10.2304/plat.2013.12.1.20>
- Ibrahim, M. (2000). *Pembelajaran Kooperatif*. University Press.
- Ichsan, I. ., Sigit, D. ., Miarsyah, M., Ali, A., Arif.W.P, & Prayitno, T. . (n.d.). *HOTS-AEP: Higher Order Thinking Skills from Elementary to Master Students in Environmental Learning*. 8(4), 935–942. <https://doi.org/10.12973/eu-jer.8.4.935>
- Iii, J. H. (2020). perceptions : a synthesis of research published between 2015. *Educational Technology Research and Development*, 68(3), 853–876. <https://doi.org/10.1007/s11423-019-09700-4>
- Ilahi, T. D. ., Mufit, F., Hidayati, & Afrizon, R. (2021). *Desain dan Validitas Multimedia Interaktif Berbasis Konflik Kognitif pada Materi Vektor untuk Kelas X SMA / MA*. 12(2), 182–195. <https://doi.org/10.26877/jp2f.v12i2.9324>

- Ilyas, M., & Syarif, H. (2023). The Use of English Language Learning Videos Designed Through Canva App : Students ' Perceptions. *IJIM*, 17(08), 100–112. <https://doi.org/10.3991/ijim.v17i08.39215>
- Imbar, K., Ariani, D., Widyaningrum, R., & Syahyani, R. (2021). *Ragam Storyboard Untuk Produksi Media Pembelajaran*. 04(01), 108–120. <https://doi.org/10.21009/JPI.041.14>
- Januszewski, A., & Molenda. (2008). *Educational Technology: A Definition with Complementary*. Lawrence Erlbaum Associates.
- Johan, R. C., Rullyana, G., & Ardiansah, A. (2022). Hyper content e-module in information behavior course with the assistant of screencast. *Journal of Education and Learning (EduLearn)*, 16(2), 210–218. <https://doi.org/10.11591/edulearn.v16i2.20339>
- Joyce, B., Weil, M., & Calhoun, E. (2011). *Models of Teaching* (8th ed.). Pearson.
- Jumadi, J., Sukarelawan, M. I., & Kuswanto, H. (2023). *An investigation of item bias in the four-tier diagnostic test using Rasch model*. 12(2), 622–629. <https://doi.org/10.11591/ijere.v12i2.22845>
- Kang, Y. Y., Wang, M. J. J., & Lin, R. (2009). Usability evaluation of E-books. *Displays*, 30(2), 49–52. <https://doi.org/10.1016/j.displa.2008.12.002>
- Kapici, H. O., Akcay, H., & Jong, T. de. (2019). *Using Hands-On and Virtual Laboratories Alone or Together—Which.pdf* (pp. 231–250).
- Karlimah, K., Hamdu, G., Pratiwi, V., Herdiansah, H., & Kurniawan, D. (2021). *The development of motion comic storyboard based on digital literacy and elementary school mathematics ability in the new normal era during covid-19 pandemic* *The development of motion comic storyboard based on digital literacy and elementary school mathem.* <https://doi.org/10.1088/1742-6596/1987/1/012026>
- Karpudewan, M., Roth, W., & Chandrakesan, K. (2015). Remediating misconception on climate change among secondary school students in Malaysia. *Environmental Education Research*, March 2015, 37–41. <https://doi.org/10.1080/13504622.2014.891004>
- Kilbane, C. R., & Milman, N. B. (2014). *Teaching Models Designing Instruction for 21ST Century Learners*. Pearson Education Inc.
- Kilic, D., & Saglam, N. (2004). The effect of the concept maps on achievement and retention of learning in biology education. *Hacettepe University Journal of Education*, 27, 155– 164.
- Kim, H. K., & Kim, H. A. (2022). Analysis of Student Responses to Constructed Response Items in the Science Assessment of Educational Achievement in South Korea. *International Journal of Science and Mathematics Education*,

20, 901–919. <https://doi.org/10.1007/s10763-021-10198-7>

- Kim, Y., Lee, Y., Lee, H., & Lim, S. (2022). Aligment of Concepts of Meiosis Among Curriculum, Texbook , Clasroom Teacing and Assesment in Uper Secondary School in Republic of Korea. *Journal of Baltic Science Education*, 21(2), 232–244.  
<https://doi.org/https://doi.org/10.33225/jbse/22.21.232>
- Kirbulut, Z. D., & Geban, O. (2014). Using three-tier diagnostic test to assess students' misconceptions of states of matter. *Eurasia Journal of Mathematics, Science and Technology Education*, 10(5), 509–521.  
<https://doi.org/10.12973/eurasia.2014.1128a>
- Kloos, H., Baker, H., & Waltzer, T. (2019). A Mind with a Mind of Its Own: How Complexity Theory Can Inform Early Science Pedagogy. *Educational Psychology Review*, 31, 735–752. <https://doi.org/10.1007/s10648-019-09472-6>
- Koć-Januchta, M. M., Schönborn, K. J., Roehrig, C., Chaudhri, V. K., Tibell, L. A. E., & Heller, H. C. (2022). “Connecting Concepts Helps Put Main Ideas Together”: Cognitive Load and Usability in Learning Biology with an AI-Enriched Textbook. *International Journal of Educational Technology in Higher Education*, 19(11). <https://doi.org/10.1186/s41239-021-00317-3>
- Kumandas, B., Ateskan, A., & Lane, J. (2018). Misconceptions in biology: a meta-synthesis study of research, 2000–2014. *Journal of Biological Education ISSN:*, 53(4), 350–364.
- Kusmaryono, I., Aminudin, M., & Kartinah. (2022). *The Role Of Equilibration In The Formation Of Cognitive Structures*. 11(2), 311–324.  
<https://doi.org/Journal of Mathematics Ed>  
<https://doi.org/10.22460/infinity.v11i2.p311-324>
- Kusumah, F. H. (2017). Diagnosis Miskonsepsi Siswa pada Materi Kalor dengan Menggunakan Three-Tier Essay dan Open–Ended Test Items. *Berkala Ilmiah Pendidikan Fisika*, 5(2), 168. <https://doi.org/10.20527/bipf.v5i2.3007>
- Kusumatuty, A. J., & Murwaningsih, T. (2018). *The Implementation of Problem Based Learning ( PBL ) Based E-Book to Improve The Learning Outcome of Vocational High School ( VHS ) Students*. 103–110.  
<https://doi.org/10.24331/ijere.454794>
- Kutluay, Y. (2005). *Diagnosis of eleventh grade students' misconceptions about geometric optic by a three-tier test*. Middle East Technical University.
- Lagoudakis, N., Vlachos, F., Christidou, V., Vavougiios, D., & Batsila, M. (2023). The Role of Hemispheric Preference in Student Misconceptions in Biology. *European Journal of Educational Research*, 12(2), 739–747.  
<https://doi.org/https://doi.org/10.12973/eu- jer.12.2.739> Introduction



- Larkin, D. (2012). Misconceptions about “misconceptions”: Preservice secondary science teachers’ views on the value and role of student ideas. *Science Education*, 96(5), 927–959. <https://doi.org/10.1002/sce.21022>
- Lee, G.-H., & Kwon, J.-S. (2003). Toward An Understanding and Use of Cognitive Conflict in Science Instruction (I) : Definition and Model. *Journal of The Korean Association For Science Education*, 23(4), 360–374.
- Lee, G., & Kwon, J. (2001). What Do We Know About Students’ Cognitive Conflict In Science Classroom: A Theoretical Model Of Cognitive Conflict Process. *Proceedings of the Annual Meeting of the Association for the Education of Teachers in Science (Costa Mesa, CA, January 18-21, 2001)*.
- Lee, G., Kwon, J., Park, S., Kim, J., Kwon, H., & Park, H. (2003). *Development of an Instrument for Measuring Cognitive Conflict in Secondary-Level Science Classes*. 40(6), 585–603. <https://doi.org/10.1002/tea.10099>
- Lee, J.-K., Aini, R. Q., Sya’bandari, Y., Rusmana, A. N., Ha, M., & Shin, S. (2021). Biological Conceptualization of Race The Unintended Consequence of Korean College Students’ Learning of Biology. *Science & Education*, 30, 293–316. <https://doi.org/10.1007/s11191-020-00178-8>
- Lee, W. W., & Owens, D. L. (2004). *Multimedia Based Instructional Design*. Pfeiffer An Imprint of Wiley.
- Lestari, P., Ristanto, R. H., & Miarsyah, M. (2019). Metacognitive and Conceptual Understanding of Pteridophytes: Development and Validity Testing of an integrated Assessment Tool. *Indonesian Journal of Biology Education*, 2(1), 15–24. <https://doi.org/10.31002/ijobe.v2i1.1225>
- Li, X., Li, Y., & Wang, W. (2023). Long-Lasting Conceptual Change in Science Education. *Science & Education*, 123–168. <https://doi.org/10.1007/s11191-021-00288-x>
- Liaw, H., Yu, Y. R., Chou, C. C., & Chiu, M. H. (2021). Relationships between Facial Expressions, Prior Knowledge, and Multiple Representations: a Case of Conceptual Change for Kinematics Instruction. *Journal of Science Education and Technology*, 30, 227–238. <https://doi.org/10.1007/s10956-020-09863-3>
- Lim, B. C., Liu, L. W., & Choo, C. (2020). *Investigating the Effects of Interactive E-Book towards Academic Achievement*. <https://doi.org/10.24191/ajue.v16i3.10272>
- Limon, M. (2001). On the Cognitive Conflict as an Instructional Strategy for Conceptual Change a Critical Appraisal. *Learning and Instruction*, 11(4–5), 357–380. [https://doi.org/10.1016/S0959-4752\(00\)00037-2](https://doi.org/10.1016/S0959-4752(00)00037-2)
- Liu, G., & Fang, N. (2022). The effects of enhanced hands-on experimentation on correcting student misconceptions about work and energy in. *Research in*

*Science & Technological Education*, 00(00), 1–20.  
<https://doi.org/10.1080/02635143.2021.1909555>

- Ma'rifatullah, R., Umamah, N., Marjono, Sumardi, & Surya, R. A. (2021). Development of e-modules based on science technology society integrated life based learning in history learning. *IOP Conference Series: Earth and Environmental Science*, 747(1). <https://doi.org/10.1088/1755-1315/747/1/012064>
- Madu, B. C., & Orji, E. (2015). Effects of Cognitive Conflict Instructional Strategy on Students' Conceptual Change in Temperature and Heat. *SAGE Open*, 5(3), 1–9. <https://doi.org/10.1177/2158244015594662>
- Mason, L., & Zaccoletti, S. (2021). Inhibition and Conceptual Learning in Science: a Review of Studies. *Educational Psychology Review*, 33, 181–212. <https://doi.org/10.1007/s10648-020-09529-x>
- Miarso, Yusufhadi. (2004). *Menyamai Benih Teknologi Pendidikan* (1st ed.). Kencana.
- Moore, K. D. (2005). *Effective Instructional Strategies From Theory to Practice*. Sage Publications.
- Morrison, G. R., Ross, S. M., Kalman, H. K., & Kemp, J. E. (2013). *Designing Effective Instruction* (7th ed., Vol. 7). John Wiley & Sons, Inc.
- Mufit, F., Festiyed, Fauzan, A., & Lufri. (2023). *The Effect of Cognitive Conflict-Based Learning ( CCBL ) Model on Remediation of Misconceptions*. 20(1), 26–49. <https://doi.org/10.36681/tused.2023.003>
- Mulyadi, Syahrul, R., Atmazaki, & Agustina. (2020). The Development Of E-Modules Based on Adobe Flash For Indonesian Subjects At IAIN Bukittinggi Bukittinggi. *IOP Conf. Series: Journal of Physics: Conf. Series* 1471. <https://doi.org/10.1088/1742-6596/1471/1/012002>
- Mulyanto, H., Gunarhadi, & Indriayu, M. (2018). *The Effect of Problem Based Learning Model on Student Mathematics Learning Outcomes Viewed from Critical Thinking Skills*. 2013, 37–45.
- Munson, B. H. (1994). Ecological misconceptions. *Journal of Environmental Education*, 25(4), 30–34. <https://doi.org/10.1080/00958964.1994.9941962>
- Murdani, E., & Sumarli, S. (2022). *Identification of Students Misconceptions in School and College on Kinematics*. *Bicess 2018*, 75–82. <https://doi.org/10.5220/0009016800002297>
- Nelson-Ebimie, D. ., Adolphus, T., Omeodu, D. M., & Naade, N. B. (2023). *Identification of Biology Students' Misconceptions in Genetics Among Secondary School Students in Nembe Local Government Area in Bayelsa State*. 26(1), 11–19.

- Nenciovici, L., Brault Foisy, L. M., Allaire-Duquette, G., Potvin, P., Riopel, M., & Masson, S. (2018). Neural Correlates Associated With Novices Correcting Errors in Electricity and Mechanics. *Mind, Brain, and Education*, 12(3), 120–139. <https://doi.org/10.1111/mbe.12183>
- Ningrum, L. S., Drastisianti, A., Setiowati, H., & Pratiwi, R. (2022). *The Effectiveness of Cognitive Conflict-Based Chemistry Learning in Reducing Students' Misconceptions of Acid-Base Materials*. 8(4), 2131–2135. <https://doi.org/10.29303/jppipa.v8i4.2092>
- Nurhidayah, L., & Solihat, R. (2020). *Identifikasi miskonsepsi siswa SMA pada topik ekosistem ( Identification of senior high school students' misconception regarding to the ecosystem topic )*. 3(1), 12–17. <https://doi.org/10.17509/ajjbe.v3i1.23303>
- Oh, H. Y., & Lederman, N. G. (2018). Using an Explicit NOS Flow Map in Instruction of Nature of Science Based on the Science of Philosophy. *Journal of Turkish Science Education*, 15(3), 64–90. <https://doi.org/10.12973/tused.10238a>
- Okumuş, M. G., & Guveli, E. (2023). Elimination of Misconceptions about Percentages with the Cognitive Conflict Approach. *Journal of Computer and Educational Research*, 11(21). <https://doi.org/10.18009/jcer.1223434>
- Oliver, M., & Troemel, V. (2022). *Self-Explaining Photosynthesis to Achieve Conceptual Change : An Analysis of Explanation Content*. 21(7), 410–448. <https://doi.org/https://doi.org/10.26803/ijlter.21.7.22>
- Ozdemir, E. (2022). *Animated Concept Cartoons as a Starter for Cognitive Conflict in Online Science Learning : A Case of Circular Motion*. 5(March). <https://doi.org/10.17509/jsl.v5i2.41191>
- Parwati, N. N., & Suharta, I. G. P. (2020). Effectiveness of the Implementation of Cognitive Conflict Strategy Assisted by e-Service Learning to Reduce Students' Mathematical Misconceptions. *Http://Www.i-Jet.Org*, 102–119. <https://doi.org/https://doi.org/10.3991/ijet.v15i11.11802>
- Patil, S. J., Chavan, R. L., & Khandagale, V. S. (2019). Identification of Misconceptions in Science: Tools , Techniques & Skills for Teachers. *Aarhat Multidisciplinary International Education Research Journal (AMIERJ)*, 8(2), 466–472.
- Peters, M., Guitert-catasús, M., Romero, M., & Peters, M. (2021). Student learning ecologies in online higher education : a model to support connected learning across contexts Student learning ecologies in online higher education : a model to support connected learning across contexts. *Higher Education Research & Development*, 0(0), 1–17. <https://doi.org/10.1080/07294360.2021.2014408>

- Pickett, S. B., Nielson, C., Marshall, H., Tanner, K. D., & Coley, J. D. (2022). *Effects of Reading Interventions on Student Understanding of and Misconceptions about Antibiotic Resistance*. 23(1).  
<https://doi.org/https://doi.org/10.1128/jmbe.00220-21>
- Pribadi, B.A. (2023). *Penelitian dan Pengembangan Program Pembelajaran* (1st ed.). Erlangga.
- Pribadi, Benny A. (2009). *Model Desain Sistem Pembelajaran*. Dian Rakyat.
- Prinz, A., Golke, S., & Wittwer, J. (2021). Counteracting Detrimental Effects of Misconceptions on Learning and Metacomprehension Accuracy: The Utility of Refutation Texts and Think Sheets. In *Instructional Science* (Vol. 49).  
<https://doi.org/10.1007/s11251-021-09535-8>
- Putu, N., Devi, L., Sudarma, I. K., Bimbingan, P., & Ganesha, U. P. (2023). *Improving Student Balinese Language Learning Outcomes through Interactive Animated Video Based on a Contextual Method*. 7(2), 351–360.  
<https://doi.org/10.23887/jet.v7i2.64151>
- Qian, Y., Hambruch, S., Yadav, A., Gretter, S., & Li, Y. (2019). Teachers' Perceptions of Student Misconceptions in Introductory Programming. *Journal of Educational Computing Research*, 1800.  
<https://doi.org/10.1177/0735633119845413>
- Rachmawati, T. N., & Supardi, Z. A. I. (2021). *Analisis Model Conceptual Change dengan Strategi Konflik Kognitif untuk Mengurangi Miskonsepsi Fisika dengan Metoda Library Research*. 5(2), 133–142.  
<https://doi.org/10.33369/pendipa.5.2.133-142>
- Radović, S., Radojičić, M., Veljković, K., & Marić, M. (2020). *Examining the effects of Geogebra applets on mathematics learning using interactive mathematics textbook learning using interactive mathematics textbook*. 4820.  
<https://doi.org/10.1080/10494820.2018.1512001>
- Raharjo, D., Ramli, M., & Rinanto, Y. (2018). Misconception Protist in High School Biology Textbooks. *International Conference on Mathematics and Science Education*, 3, 85–90.  
<http://science.conference.upi.edu/proceeding/index.php/ICMScE/issue/view/3%7CICMScE2018>
- Rahmat, I., & Chanunan, S. (2018). Open Inquiry in Facilitating Metacognitive Skills on High School Biology Learning: An Inquiry on Low and High Academic Ability. *International Journal of Instruction*, 11(4), 593–606.  
<https://doi.org/10.12973/iji.2018.11437a>
- Reigeluth, C. M. (1983). *Instructional Design Theories and Models*. Lawrence Erlbaum Associates.
- Reiser, R. A., & Dempsey, J. V. (2018). *Trends and Issues in Instructional Design*

and Technology (R. A. Reiser & J. V Dempsey (eds.); 4th ed.). Pearson Education, Inc.

Resbiantoro, G., Setiani, R., & Dwikoranto. (2022). A Review of Misconception in Physics: The Diagnosis, Causes, and Remediation. *Journal of Turkish Science Education*, 19(2), 403–427. <https://doi.org/10.36681/tused.2022.128>

Richey, R. (1986). *The Theoretical and Conceptual Bases of Instructional Design*. Nichols Publishing Company.

Riduwan, & Akdon. (2007). *Rumus dan Data dalam Aplikasi Statistika*. Alfabeta.

Rolahnoviza, G. (2017). *Analisis Miskonsepsi Siswa Pada Mata Pelajaran Ipa Di Smpn 4 Penukal Utara Kabupaten Penukal Abab Lematang Ilir Pendopo*. UIN Raden Fatah Palembang.

Rothwell, W., Benscoter, B., King, M., & King, S. B. (2016). *Mastering the Instructional Design Process* (5th ed., Vol. 5). Pfeiffer.

Rothwell, W. J., & Kazanas, H. C. (1998). *Mastering the Instructional Design Process: A Systematic Approach* (2nd ed., Vol. 2). Pfeiffer. <https://doi.org/10.1002/9781119176589>

Santosos, T. N. ., Siswandari, & Sawiji, H. (2018). *The Effectiveness of eBook versus Printed Books in the Rural Schools in Indonesia at the Modern Learning Era*. 77–84. <https://doi.org/10.24331/ijere.453512>

Sebatana, M. J., & Dudu, W. T. (2022). Reality or Mirage: Enhancing 21st-Century Skills Through Problem-Based Learning While Teaching Particulate Nature of Matter. *International Journal of Science and Mathematics Education*, 20(5), 963–980. <https://doi.org/10.1007/s10763-021-10206-w>

Seel, N. M., Lehmannn, T., Blumschein, P., & Podolskiy, O. A. (2017). *Instructional Design for Learning*. Sense Publishers. [https://doi.org/10.1007/978-1-4419-1428-6\\_888](https://doi.org/10.1007/978-1-4419-1428-6_888)

Seels, B. B., & Richey, R. C. (1994). *Teknologi Pembelajaran Definisi dan Kawasanya, terjemahan Yusufhadi Miarso et,al., (Yusuf adi Miarso, D. . Prawiradilaga, & R. Rahardjo (eds.)). Universitas Negeri Jakarta*.

Semiawan, C. R. (2007). *Landasan Pembelajaran Dalam Perkembangan Manusia* (Yufiarti (ed.); 1st ed.). Pusat Pengembangan Kemampuan Manusia.

Septiana, D., Zulfiani, Z., & Noor, M. F. (2015). Identifikasi Miskonsepsi Siswa Pada Konsep Archaeobacteria Dan Eubacteria Menggunakan Two-Tier Multiple Choice. *Edusains*, 6(2), 191–200. <https://doi.org/10.15408/es.v6i2.1151>

Septiana, R., Yulianti, E., & Nurcahyo, H. (2023). Development of Multiple Intelligence Based Interactive Ebook to Improve Critical Thinking Ability

and Cognitive Learning Outcomes on an Excretory System. *Journal of Research in Science Education*, 9(6), 4265–4272.  
<https://doi.org/10.29303/jppipa.v9i6.3286>

Setyaningrum, V & Sopandi, W. (2021). Probing 8 th Grade Students ' Conception about Heat and Temperature Using Three-Tier Test : A Case Study. *Jurnal Pendidikan Fisika Indonesia*, 17(December), 115–125.  
<https://doi.org/10.15294/jpfi.v17i2.25272>

Sheffield, R., Blackley, S., & Moro, P. (2018). A Professional Learning Model Supporting Teachers to Integrate. *Issues in Educational Research*, 28(2), 487–510. <https://doi.org/https://doi.org/10.2991/assehr.k.220129.063>

Siemens, G. (2005). *Connectivism : A Learning Theory for the Digital Age*. 1–9.  
[https://doi.org/http://www.itdl.org/Journal/Jan\\_05/article01.htm](https://doi.org/http://www.itdl.org/Journal/Jan_05/article01.htm)

Silber-Varod, V., Eshet-Alkalai, Y., & Geri, N. (2019). Tracing Research Trends of 21st-Century Learning Skills. *British Journal of Educational Technology*, 50(6), 3099–3118. <https://doi.org/10.1111/bjet.12753>

Smaldino, S. E., Russell, J. d, Heinich, R., & Molenda, M. (2005). *Introductory Technology and Media for Learning* (Eight). Pearson.

Soeharto, Csapo, B., Sarimanah, E., Dewi, F. I., & Sabri, T. (2019). A Review Of Students ' Common Misconceptions In Science And Their Diagnostic Assessment Tools. *Jurnal Pendidikan IPA Indonesia*, 8(2), 247–266.  
<https://doi.org/10.15294/jpii.v8i2.18649>

Soeharto, Csapó, B., Sarimanah, E., Dewi, F. I., & Sabri, T. (2019). A review of students' common misconceptions in science and their diagnostic assessment tools. *Jurnal Pendidikan IPA Indonesia*, 8(2), 247–266.  
<https://doi.org/10.15294/jpii.v8i2.18649>

Soeharto, S., & Csapo, B. (2021). *Evaluating Item Difficulty Patterns for Assessing Student Misconceptions in Science Across Physics , Chemistry , and Biology concepts*. 7(September).  
<https://doi.org/10.1016/j.heliyon.2021.e08352>

Soeharto, Soeharto. (2021). Development of A Diagnostic Assessment Test to Evaluate Science Misconceptions in Terms of School Grades: A Rasch Measurement Approach. *Journal of Turkish Science Education*, 18(3), 351–370. <https://doi.org/10.36681/tused.2021.78>

Soeharto, Soeharto, & Csapo, B. (2022). Exploring Indonesian student misconceptions in science concepts. *Heliyon*, 8(September).  
<https://doi.org/10.1016/j.heliyon.2022.e10720>

Suparman, M. A. (2012). *Desain Instruksional*. Erlangga.

Suryanda, A., Rosariyantika, W., Komala, R., & Azrai, E. P. (2023). *The Urgency*

*of Digital-Based Audio-Visual Learning Media in Natural Science Subjects in Schools*. 7(1), 118–122. <https://doi.org/10.22236/jbes/7110589>

Susanti, R. (2018a). Misconception of biology education student of teacher training and education of Sriwijaya University to the concept of photosynthesis and respiration. *Journal of Physics: Conference Series*, 1022(1). <https://doi.org/10.1088/1742-6596/1022/1/012056>

Susanti, R. (2018b). Misconception of biology education student of teacher training and education of Sriwijaya University to the concept of photosynthesis and respiration Misconception of biology education student of teacher training and education of Sriwijaya University to t. *Journal of Physics: Conference Series PAPER*.

Tampubolon, H., Hanim, H., & Bahri, H. (2022). *Development Of Interactive E - Books For Production Unit Courses By Implementing A Hybrid Learning System*. 2433–2440.

Tessmer, M. (2005). *Planning And Conducting Formative Ev*. Routledge Taylor & Francis Group.

Theobald, M., & Brod, G. (2021). Tackling Scientific Misconceptions: The Element of Surprise. *Child Development*, 92(5), 2128–2141. <https://doi.org/10.1111/cdev.13582>

Tilaar, H. A. . (2014). *Pedagogik Teoritis untuk Indonesia*. PT Kompas Media Utama.

Traboco, L., Pandian, H., Nikiphorou, E., & Gupta, L. (2022). Designing Infographics : Visual Representations for Enhancing Education , Communication , and Scientific Research. *J Korean Med Sci*, 37(27), 1–7. <https://doi.org/10.3346/jkms.2022.37.e214>

Trianto. (2007). *Model-model Pembelajaran Inovatif Berorientasi Konstruktivistik* (1st ed.). Prestasi Pustaka.

Trinidad, J. E. (2019). Understanding student-centred learning in higher education : students ' and teachers ' perceptions , challenges , and cognitive gaps. *Journal of Further and Higher Education*, 00(00), 1–11. <https://doi.org/10.1080/0309877X.2019.1636214>

Ugwuanyi, C. S., Orji, E. I., & Ezema, M. J. (2023). *Evaluating the Instructional Efficacies of Conceptual Change Models on Students ' Conceptual Change Achievement and Self-Efficacy in Particulate Nature Matter in Physics*. March, 1–29. <https://doi.org/10.1177/21582440231153851>

Vaniček, J., Dobiáš, V., & Šimandl, V. (2023). *Understanding loops : What are the misconceptions of lower- secondary pupils ?* 00(00). <https://doi.org/10.15388/infedu.2023.20>

- Vaughn, A. R., Brown, R. D., & Johnson, M. L. (2020). Understanding Conceptual Change and Science Learning through Educational Neuroscience. *Mind, Brain, and Education*, 14(2), 82–93. <https://doi.org/10.1111/mbe.12237>
- Voskoglou, M. G. (2022). *Connectivism vs Traditional Theories of Learning*. 10(4), 257–261. <https://doi.org/10.12691/education-10-4-15>
- Vosniadou, S. (2019). The Development of Students' Understanding of Science. *Frontiers in Education*, 4(32), 1–6. <https://doi.org/10.3389/feduc.2019.00032>
- Widiyatmoko, A., & Shimizu, K. (2019). *Literature Review of Factors Contributing to Students' Misconceptions in Light and Optical Instruments*. December 2018.
- Wijaya, T. T., Cao, Y., Weinhandl, R., & Tamur, M. (2022). A meta-analysis of the effects of E-books on students' mathematics achievement. *Heliyon*, 8(December 2021), e09432. <https://doi.org/10.1016/j.heliyon.2022.e09432>
- Wojdon, J. (2016). *E-teaching History*. Cambridge Scholars Publishing. <https://doi.org/10.1515/phw-2016-7419>
- Woolfolk, A. (2007). *Educational Psychology* (Tenth Edit). Pearson Education Inc.
- Wulandari, R., Widodo, A., & Rochintaniawati, D. (2020). Penggunaan Aplikasi Augmented Reality Untuk Memfasilitasi Penguasaan Konsep Dan Keterampilan Berpikir Kreatif Peserta Didik. *Jurnal Pendidikan Biologi*, 11, 59–69.
- Yunanda, I., Susilo, H., & Ghofur, A. (2019). Misconceptions identification on biodiversity and protist using multiple choice open reason (mcor). *Biosfer*, 12(2), 170–181. <https://doi.org/10.21009/biosferjpb.v12n2.170-181>
- Yunita, Y., Juandi, D., Diana, N., Sukma, Y., Mariyam, M., Kaniawati, I., & Sriyati, S. (2021). *Project Based Learning ( PjBL ) Learning Model in Science Learning : Literature Review Project Based Learning ( PjBL ) Learning Model in Science Learning : Literature Review*. <https://doi.org/10.1088/1742-6596/2019/1/012043>
- Zulfia, F. A., Susilo, H., & Listyorini, D. (2019). Virus-bacteria diagnostic test (vbd-test) in identifying biology teacher's misconception. *Jurnal Pendidikan Biologi*, 12(2), 144–156. <https://doi.org/10.21009/biosferjpb.v12n2.144-156>