

## DAFTAR PUSTAKA

- Agustini, A. A., & Tarigan, A. K. (2023). Pengembangan Human Capital di Dunia Pendidikan. *Jurnal Pelita Nusantara*, 266-270.
- Alseelawi, N. S., Adnan, E. K., Hazim, H. T., Rikabi, H. T., & Nasser, K. W. (2020). Design and Implementation of an E-learning Platform Using N-Tier Architecture. *International Journal of Interactive Mobile Technologies*, 171-185.
- ARDUINO. (2018, Februari 5). *What is Arduino*. Diambil kembali dari Arduino: <https://www.arduino.cc/en/Guide/Introduction>
- Arifin, M. Z., & Setiawan, A. (2020). Strategi Belajar Dan Mengajar Guru Pada Abad 21. *Indonesia Journal of Instructional Technology*, 27-46.
- Arsyad, A. (2011). *Media Pembelajaran*. Jakarta: PT. Raja Grafindo Persada.
- Austerlitz, H. (2003). *Data Acquisition Techniques Using PCs*. California: Academic Press.
- Avokali, G. (2012). 2 - Plastic materials: polyvinyl chloride (PVC). *Toxicity of Building Materials*, 23-53.
- Badhiye, S. S., Chatur, D. P., & Wakode, B. V. (2011). Data Logger System: A Survey. *International Journal of Computer Technology and Electronics Engineering*, 24-26.
- Bahari, F., Diah Ayu Kusuma Wardhani, L. P., Febrianti, N. A., & Nuraini, L. (2023). Rancang Bangun Media Pembelajaran Berbasis Website Google Sites Pada Materi Astronomi. *Edukasi: Jurnal Pendidikan*, 53-67.
- Bakri, F., Permana, H., Wulandari, S., & Mulyati, D. (2020). STUDENT WORKSHEET WITH AR VIDEOS: PHYSICS LEARNING MEDIA IN LABORATORY FOR SENIOR HIGH SCHOOL STUDENTS. *Journal of Technology and Science Education*, 231-240.
- Banzi, M., & Shiloh, M. (2009). *Make: Getting Started with Arduino 3rd Edition*. Maker Media, Inc.
- Berman. (2021). Education, Low Cost and Portable Laboratory Kit for Teaching and Learning of Air Conditioning Process in Vocational. *Journal of Technical Education and Training*, 135-145.
- Branch. (2009). *Instructional Design: The ADDIE Approach*. New York: Springer
- Branch. (2009). *Instructional Design-The ADDIE Approach*. New York: Springer.

- Cahyadi, R. A. (2019). Pengembangan Bahan Ajar Berbasis ADDIE Model. *Halaqa : Islamic Education Journal*, 35-44.
- Chala, A. A. (2019). Practice and Challenges Facing Practical Work Implementation in Natural Science Subjects at Secondary Schools. *Journal of Education and Practice*, 1-17.
- Chang, K.-E., Zhang, J., Huang, Y.-S., Lu, T.-C., & Sung, Y.-T. (2020). Applying augmented reality in physical education on motor skills learning. *Interactive Learning Environment*, 685-697.
- Cutnel, J. D., & W. Johnson, K. (2012). *Physics*. Danvers: John Willey & Sons.
- Cutnell, J. D., & Johnson, K. W. (2017). *Physics 9e*. Chicago: John Willey.
- Darmaji, Kurniawan, D. A., Astalini, Lumbanturoan, A., & Samosie, S. C. (2019). Mobile Learning in Higher Education for The Industrial Revolution 4.0: Perception and Response of Physics Practicum. *IJIM*, 5-20.
- Dewi, F., & Handayani, S. L. (2021). Pengembangan Media Pembelajaran Video Animasi En-Alter Source Berbasis Aplikasi Powton Pada Materi Sumber Energi Alternatif Sekolah Dasar. *Jurnal Basicedu*, 253-264.
- Djamarah, S. B., & Zain, A. (2006). *Strategi Belajar Mengajar*. Jakarta: Rineka Cipta.
- Fadli, A., & Irwanto. (2020). The Effect of Local Wisdom-Based ELSII Learning Model on the Problem Solving and Communication Skills of Pre-Service Islamic Teacher. *International Journal of Instruction*, 731-746.
- Farhan, Wahyuni, Herlina, & Akhyar. (2021). Transition of Learning Physics Technology Using Virtual Practicum to High School Physics Teacher in Aceh Barat District. *The 10th National Physics Seminar (SNF 2021)* (hal. 1-7). Jakarta: IOP Publishing.
- Gharaei, Z., & Ketabi, S. (2024). Language Learning Needs Analysis at Different Stages of the Undergraduate Course of Consecutive Interpreting. *Journal of Language Horizons*, 63-85.
- Gültekina, S. B., & Altun, T. (2022). Investigating the Impact of Activities Based on Scientific Process Skills on 4th Grade Student's Problem Solving Skill. *International Electronic Journal of Elementary Education*, 491-500.
- Halim, F. A., Muda, W. H., Zakaria, N., & Hanifah, N. (2020). The Potential of Using Augmented Reality (AR) Technology as Learning Material in TVET. *Journal of Technical Education and Training*, 120-124.
- Higde, E., & Aktamis, H. (2022). The effects of STEM activities on students' STEM career interests, motivation, science process skills, science achievement and views. *Thinking Skills and Creativity*.

- Hofstein, A., & Lunetta, V. N. (2004). The Laboratory in Science Education : Foundation for the Twenty-First Century. *Science Education*, 28-54.
- Ibadillah, A. F., & Alfita, R. (2017). *Mikrokontroler dan Aplikasinya*. Malang: Media Nusantara Creative.
- Ibrahim, D. (2006). *Microcontroller Based Applied Digital Control*. Cyprus: John Wiley & Sons.
- Jonnalagadda, R., Singh, P., Gogineni, A., Reddy, R. R., & Reddy, H. B. (2022). Developing, Implementing and Evaluating Training for Online Graduate Teaching Assistans Based on ADDIE Model. *Asian Journal of Education and Social Studies*, 1-10.
- Kadir, A. (2016). *Simulasi Arduino*. Jakarta: PT ELEX MEDIA KOMPUTINDO KOMPAS GRAMEDIA.
- Kadir, A. (2017). *Pemograman Arduino dan Processing*. Jakarta: PT.Elex Media Komputindo.
- Kadir, A. (2017). *Pemograman Arduino dan Processing*. Jakarta: PT Elex Media Komputindo.
- Kandari, A. M., & Qattan, M. M. (2020). E-Task-Based Learning Approach to Enhancing 21st-Century Learning Outcomes. *International Journal of Instruction*, 551-565.
- KEMENDIKBUD. (2011). *Pedoman Pembuatan Alat Peraga Fisika Untuk Sma*. Jakarta.
- Kemendikbud. (2024, Maret 1). *Kajian Akademik Kurikulum Merdeka*. Diambil kembali dari Kurikulum Merdeka: [https://kurikulum.kemdikbud.go.id/file/1711503412\\_manage\\_file.pdf](https://kurikulum.kemdikbud.go.id/file/1711503412_manage_file.pdf)
- Kementrian Kebudayaan Riset dan Teknologi. (2024, 21 04). *Kurikulum Merdeka*. Diambil kembali dari <https://kurikulum.kemdikbud.go.id/>
- Kilag, O. K., Tamayo, J. M., Eleno, J. I., & Jalin, A. R. (2024). Enhancing Science Education in the Twenty-First Century: Advancements and Applications of Laboratory Learning. *International Journal of Qualitative Research for Innovation, Sustainability, and Excellence (IJQRIFE)*, 45 - 51.
- Lee, Y.-F., Altschuld, J. W., Tseng, P.-K., & Hung, H. S. (2023). Assessing Study Skill Needs for Information Technology and Assessing Study Skill Needs for Information Technology and Vocational Universities. *Heliyon*, 9(10), 1-12. doi:<https://doi.org/10.1016/j.heliyon.2023.e20915>
- Li, C. L., & Abidin, M. J. (2024). Instructional Design of Classroom Instructional Skills Based on the ADDIE Model. *Technium Social Science Journal*, 167-178.

- Liu, G., & Fang, N. (2021). The effects of enhanced hands-on experimentation on correcting student misconception about work and energy in engineering mechanics. *Research in Science & Technological Education*, 1-20.
- Mahmudi, M. R., Amril, & Alena, S. (2023). Pengembangan Media Pembelajaran Berbantu Video Animasi Mata Pelajaran IPA Kelas V SDN 53/VI Pasar Masurai II Kabupaten Merangin. *Inovative : Journal of Social Science Research*, 32-64.
- Mashuri, S. (2019). *Media Pembelajaran Matematika*. Yogyakarta: Deepublish.
- Nana. (2010). *Dasar - Dasar Proses Pembelajaran*. Bandung: Sinar Baru.
- Nesje, K., & Lejonberg, E. (2022). Tools for the school-based mentoring of pre-service teachers: A scoping review. *Teaching and Teacher Education*.
- Nurfadhillah. (2021). *Media Pembelajaran, Pengertian Media Pembelajaran, Landasan, Fungsi, Manfaat, Jenis-Jenis Media Pembelajaran, dan Cara Penggunaan Kedudukan Media Pembelajaran*. CV Jejak.
- OMEGA a Dwyer Omega Brand. (2024, 28 April). *Data Loggers*. Diambil kembali dari How does a data logger work?: <https://www.omega.com/en-us/resources/data-loggers>
- Panuluh, A. H., Atmajati, E. D., & Kristanto, Y. D. (2020). Physics education students' perception on the use of motion detector in linear motion practicum. *Journal of Physics : Conference Series* (hal. 1-5). Yogyakarta: IOP Publishing.
- Permana, H., & Iswanto. (2018). Development of Thermal Radiation Experiments Kit Based on Data Logger for Physics Learning Media. *IOP CONFERENCE SERIES : Materials Science and Engineering* (hal. 1-7). IOP PUBLISHING.
- Permana, H., & Iswanto, B. H. (2018). Development of Thermal Radiation Experiments Kit Based on Data Logger for Physics Learning Media. *IOP Conference Series: Materials Science and Engineering*, 1-8.
- Permana, H., & Mulyati, D. (2017). Data Logger for Physics Laboratory: To Support Interpretation and Analysis Activities. *SRU INTERNATIONAL CONFERENCE*, 295-302.
- Prameswari, D. F., & Hasanudin, C. (2023). Penggunaan Media Pembelajaran Infografis untuk Meningkatkan Minat Belajar Siswa. *Prosiding Seminar Nasional Daring* (hal. 1577-1586). Bojonegoro: IKIP PGRI Bojonegoro.
- Pramudya, C. T., Islami, N., Azizahwati, & Rahmad, M. (2020). Development of Static and Kinetic Friction Coefficient Experiment Device Based on Arduino Uno. *Journal of Physics: Conference Series, Volume 1655*,

*Universitas Riau International Conference on Science and Environment 2020 (URICSE-2020) 11-13 September 2020, Pekanbaru, Riau, Indonesia, (hal. 1-5). Pekanbaru.*

- Purnama, S. (2013). METODE PENELITIAN DAN PENGEMBANGAN (Pengenalannya untuk Mengembangkan Produk Pembelajaran Bahasa Arab). *LITERASI*, 19-32.
- Purwaningsih, E. (2020). Improving the Problem-Solving Skill Through the Development of Teaching Material with STEM-PjBl (Science, Technology, Engineering, and Mathematics- Project Based Learning) model integrated TPACK (Technological Pedagogical Content Knowledge). *The 2nd International Conference on Research and Learning of Physics*.
- Rahayu, R., Iskandar, S., & Abidin, Y. (2022). Inovasi Pembelajaran Abad 21 Dan Penerapannya Di Indonesia. *Jurnal Basic Edu*, 101-104.
- Rapti, S., & Sapounidis, T. (2024). "Critical thinking, Communication, Collaboration, Creativity in kindergarten with Educational Robotics": A scoping review (2012–2023). *Computer and Education*, 210. doi:/doi.org/10.1016/j.compedu.2023.104968
- Rini, E. F., & Aldila, F. T. (2023). Practicum Activity : Analysis of Science Proses Skill and Student Critical Thinking Skills. *Integrated Science Education Journal*, 54-61.
- Sadiman, A. S., Rahardjo, R., Haryono, A., & Rahardjito. (2012). *Media Pendidikan: Pengertian, Pengembangan, dan Pemanfaatannya*. Jakarta: Rajawali.
- Sadraey, M. H. (2017). *Microcontroller*. Mohammad H. Sadraey: Springer Nature Switzerland AG.
- Safari, Susilo, B., & Rustana. (2022). Blackbody Radiation Experimental Apparatus (Arabeta) to Support Physics Learning for Senior High School Students. *Journal of Physics: Conference Series*.
- Saputra. (2022). Real-time data acquisition of dynamic moving. *Journal of Physics: Conference* (hal. 1-7). Jakarta: IOP Publishing.
- Sejati, A. E., Ihsan, N., Sugiarto, A., Anasi, P. T., Hariyadi, E., Nasruddin, & Kasmiati, S. (2022). The Effect of Practicum Methods on Geographic Information System Learning Outcomes and Students' Activeness in Senior High School. *International Conference on Sciences, Mathematics, and Education (ICoSMEd 2022)*, 1-11.
- Sembey, R., Hoda, R., & Grundy, J. (2024). Emerging technologies in higher education assessment and feedback practices: A systematic literature review. *The Journal of System and Software*, 1-17.

- Sormin, E. (2023). Use of Practicum Learning Methods in Improving Learning Outcomes. *International Journal of Social Science And Human Research*, 183-190.
- Sosa, Y. (2023). *Tribology & Lubrication Technology*, 54-57.
- Spatioti, A. G., Kazanidis, I., & Pange, J. (2022). A Comparative Study of the ADDIE Instructional Design Model in Distance Education. *Artificial Intelligence and Games Science in Education*, 402-422.
- Subroto, D. E., Supriandi, Wirawan, R., & Rukmana, A. Y. (2023). Implementasi Teknologi dalam Pembelajaran di Era Digital: Tantangan dan Peluang bagi Dunia Pendidikan di Indonesia. *Jurnal Pendidikan West Science*, 473-480.
- Sugiarto, T., Ambiyar, Wakhinudin, Purwanto, W., & Saputra, H. D. (2023). Efektivitas Penggunaan Media Pembelajaran Berbasis Teknologi Informasi dan Komunikasi Terhadap Hasil Belajar : Metaanalisis. *Edukasi: Jurnal Pendidikan* , 128-142.
- Sugiyono. (2019). *METODE PENELITIAN KUANTITATIF, KUALITATIF DAN R&D*. BANDUNG: ALFABETA.
- Sulayman, A. A., Araromi, D. O., Ayodele, O. E., Araromi, H. O., & Osuolale, F. N. (2024). Arduino microcontroller based real-time monitoring of haemodialysis process for patients with kidney disease. *e-Prime - Advances in Electrical Engineering, Electronics and Energy*, 7. doi:<https://doi.org/10.1016/j.prime.2023.100403>
- Sumardi, L., Rihman, A., & Wahyudiati, D. (2020). Does the Teaching and Learning Process in Primary Schools Correspond to the Characteristics of the 21st Century Learning? *International Journal Of Instruction*, 357-370.
- Sunaryo, Bakri, F., Abriansyah, & Mulyati, D. (2019). Mini photovoltaic system project: Physics laboratory activities through a technology-rich learning environment. *Journal of Physics: Conference Series*.
- Suryanti, S., Sutaji, D., Nusantara, T., & Subanji. (2023). Online Learning Quality Measurement Application for Higher Education: Development and Analysis Using ISO 9126. *KnE Social Science*, 94-107.
- Susanto, P. C., Arini, D. U., Yuntina, L., Soehaditama, J. P., & Nuraeni, N. (2024). Konsep Penelitian Kuantitatif: Populasi, Sampel, dan Analisis Data (Sebuah Tinjauan Pustaka). *Jurnal Ilmu Multidisiplin*, 1-12.
- TEAM, A. (2021, December 9th ). *One board to rule them all: History of the Arduino UNO*. Diambil kembali dari Arduino: One board to rule them all: History of the Arduino UNO
- Tynitag. (2024, April 28). *Gemini Data Logger*. Diambil kembali dari What are Data Loggers / Data Acquisition?:

[https://www.gemindataloggers.com/info/what\\_is\\_a\\_data\\_logger#:~:text=Data%20loggers%20are%20electronic%20devices,%2C%20voltage%2C%20pulses%20or%20counts.](https://www.gemindataloggers.com/info/what_is_a_data_logger#:~:text=Data%20loggers%20are%20electronic%20devices,%2C%20voltage%2C%20pulses%20or%20counts.)

- Utrujah, F., Hartono, & Wahyuni, S. (2024). Analysis of Science Process Skills to Application of Module Practicum Ethno-STEM for Senior High School . *Physics Communication*, 56-59.
- Valma, A. D., Margi, K., & Nalanda, D. (2022). Augmented Reality for Studying Hands on the Human Body for Elementary School Students. *Computer Science*, 237-244.
- Wibawa, A., Ashrianto, P. D., & Pambudi, S. T. (2021). Implementation of ADDIE Model in Improving the Ability of Lecturers to Write Scientific Articles in Accredited Journals. *Business, Management and Social Sciences*, 124-133.
- Wicaksono, K. A., Handayanto, A., & Happy, N. (2020). Pengembangan E-Modul Matematika Berbasis Pendekatan Kontekstual Berbantu Media Powerpoint untuk Meningkatkan Pemahaman Konsep Matematika Siswa pada Materi Program Linear. *Imajiner: Jurnal Matematika dan Pendidikan Matematika*, 461-466.
- Xu, Z., Zdravkovic, A., Moreno, M., & Woodruff, E. (2022). Understanding optimal problem-solving in a digital game: The interplay of learner attributes and learning behavior. *Computers and Education Open*, 3. doi:<https://doi.org/10.1016/j.caeo.2022.100117>
- Yadav, D., & Singh, A. K. (2004). *Microcontroller Features and Application*. New Delhi: New Age International Limited.
- Yu, J., & Jee, Y. (2020). the, Analysis of Online Classes in Physical Education during the COVID-19 Pandemic. *Education Science*, 1-14.