BAB V
PENUTUP

A. Kesimpulan

Berdasarkan hasil pengembangan dan pembahasan yang telah dilakukan, dapat diberi kesimpulan bahwa:

1. Kualitas produk dinilai dari segi validitas, praktikalitas dan efektivitas. E-modul menunjukkan tingkat validitas yang tinggi mencapai skor rata-rata sebesar 83% dalam aspek materi, bahasa, dan media. Uji kepraktisan produk juga memperoleh skor rata-rata sebesar 83,83%. Sementara itu, keefektifan produk dikategorikan sangat efektif dengan skor rata-rata hasil angket siswa mencapai 84,6%.
2. Kemampuan *Disciplinary Core Ideas* siswa yang mempunyai kemampuan cepat (*faster leaner*) menggunakan pembelajaran mandiri (*self learner*) dengan rata-rata nilai 91% lebih tinggi dibandingkan pembelajaran biasa dengan pembelajaran tambahan (*regular teaching + tutorial*) rata-rata nilai 85% Sehingga kelompok kemampuan cepat (*faster leaner*) lebih cocok belajar menggunakan pembelajaran mandiri dibandingkan dengan pembelajaran tambahan + tutorial
3. Kemampuan *Disciplinary Core Ideas* siswa yang mempunyai kemampuan lambat (*slower learner*) menggunakan pembelajaran mandiri (*self learner*) rata-rata nilai 74% lebih rendah dibandingkan pembelajaran biasa ditambah pembelajaran tambahan (*regular teaching + tutorial*) dengan rata-rata nilai 89%. Sehingga kelompok kemampuan

lambat (*slower learner*) lebih cocok belajar menggunakan pembelajaran pembelajaran tambahan + tutorial dibandingkan dengan pembelajaran mandiri.

B. Saran

Peneliti memberikan beberapa saran terkait dengan penelitian ini yaitu:

1. *E*-modul dapat dikembangkan oleh guru dengan materi lainnya dalam pembelajaran fisika.
2. Peneliti selanjutnya diharapkan dapat mengoptimalkan waktu dengan efisien, sehingga proses pembelajaran dapat berjalan dengan lancar dan mendapatkan hasil yang lebih memuaskan, tanpa terganggunya durasi pembelajaran.

DAFTAR PUSTAKA

Agustini, S., Amin, B. D., & Yani, A. (2021). Pengembangan E -Modul Interaktif berbasis Problem Solving pada Pembelajaran Fisika. *Universitas Negeri Makassar*, 1–4.

Aini, K., Rosidi, I., Muharrami, L. K., Hidayati, Y., & Wulandari, A. Y. R. (2023). Uji Kelayakan Media Pembelajaran Videoscribe Berbasis Animation Drawing Menggunakan Model Addie Pada Materi Pencemaran Lingkungan. *Natural Science Education Research*, *6*(1), 112–121. https://doi.org/10.21107/nser.v6i1.11527

Ainurro'sydah, L. D. K., Ridlo, Z. R., & Ahmad, N. (2024). Pengembangan E-Modul Berbasis Problem Based Learning Terintegrasi Dengan Google Colaboratory Untuk Meningkatkan Kemampuan Berpikir Kritis Siswa. *EDUPROXIMA : Jurnal Ilmiah Pendidikan IPA*, *6*(4), 1270–1279. https://doi.org/10.29100/.v6i4.5439

Akbar, R., Siroj, R. A., Win Afgani, M., & Weriana. (2023). Experimental Reseacrch Dalam Metodologi Pendidikan. *Jurnal Ilmiah Wahana Pendidikan*, *9*(Vol 9 No 2 (2023): Jurnal Ilmiah Wahana Pendidikan), 465–474. https://jurnal.peneliti.net/index.php/JIWP/article/view/3165

Al-Busaidi, K. A., & Al-Shihi, H. (2012). Key factors to instructors' satisfaction of learning management systems in blended learning. *Journal of Computing in Higher Education*, *24*(1), 18–39. https://doi.org/10.1007/s12528-011-9051-x

Alhamuddin, Inten, D. N., Mulyani, D., & Erlangga, R. D. (2012). 21st Century Learning. *Handbook of Research on Serious Games as Educational, Business and Research Tools*, *658*(SoRes 2021), 782–799. https://doi.org/10.4018/978-1-4666-0149-9.ch040

Alnavis, N. B., Wirawan, R. R., Solihah, K. I., & Nugroho, V. H. (2024). Energi listrik berkelanjutan: Potensi dan tantangan penyediaan energi listrik di Indonesia. *Journal of Innovation Materials, Energy, and Sustainable Engineering*, *1*(2), 119–139. https://doi.org/10.61511/jimese.v1i2.2024.544

Alvia Quthrotun Nada, Taqwa, M. R., Supriana, E., & Suwasono, P. (2022). Development of an Android-Based Physics Interactive E-Module Equipped with Problems with Scaffolding in Applying the Concept of Light Waves. *International Journal of Education and Teaching Zone*, *1*(2), 159–178. https://doi.org/10.57092/ijetz.v1i2.43

Anggraeni, F. K. A., Prastowo, S. H. B., & Prihandono, T. (2022). Development of Integrated QR Code Module on Physics Learning Module to Increase Learning Interest and Knowing Students' Digital Literacy. *Jurnal Penelitian Pendidikan IPA*, *8*(5), 2203–2209. https://doi.org/10.29303/jppipa.v8i5.1874

Ashrafi, A., Zareravasan, A., Rabiee Savoji, S., & Amani, M. (2022). Exploring factors influencing students' continuance intention to use the learning management system (LMS): a multi-perspective framework. *Interactive Learning Environments*, *30*(8), 1475–1497. https://doi.org/10.1080/10494820.2020.1734028

Asrizal, Amran, A., Ananda, A., Festiyed, F., & Sumarmin, R. (2018). The development of integrated science instructional materials to improve students' digital literacy in scientific approach. *Jurnal Pendidikan IPA Indonesia*, *7*(4), 442–450. https://doi.org/10.15294/jpii.v7i4.13613

Astalini, Darmaji, D., Kurniawan, D. A., & Minarsih, M. (2022). Identification of HOTS Creative Thinking, Science Process Skills and Digital Literacy in Physics Subject. *Jurnal Penelitian Fisika Dan Aplikasinya (JPFA)*, *12*(1), 47–61. https://doi.org/10.26740/jpfa.v12n1.p47-61

Aswirna, P. (2018). Application Of Treatment Trait Interaction To Improve Learning Of Chemistry. *SHS Web of Conferences*, *42*, 00114. https://doi.org/10.1051/shsconf/20184200114

Aswirna, P., Aldila, E., Nurhasnah, N., & Fahmi, R. (2022). STEM-Based Global Warming E-Book in Sustainable Development Based on Gender View. *Indonesian Journal of Science and Mathematics Education*, *5*(2), 169–181. https://doi.org/10.24042/ijsme.v5i2.11247

Aswirna, P., Fahmi, R., Samad, D., & Tamala, N. (2022). *Pengembangan E-Modul Fisika Berbasis Model Trait Treatment Interaction Terhadap Keterampilan Berpikir Kritis*. *8*(1), 39–49.

Aswirna, P., & Harahap, K. (2020). The Android-Based Learning Media Using the Trait Treatment Interaction Model as Implementation of Industrial Era 4.0. *Journal of Physics: Conference Series*, *1594*(1), 0–9. https://doi.org/10.1088/1742-6596/1594/1/012024

Aswirna, P., Wardani, T., Asrar, A., Fahmi, R., & Fahmi, D. M. (2024). Designing a Thermochemistry E-Module Based on the Trait Treatment Interaction Educational Model for Madrasah Aliyah Students. *JTK (Jurnal Tadris Kimiya)*, *9*(1), 102–113. https://doi.org/10.15575/jtk.v9i1.30924

Augustone, N., & Pamungkas, P. (2020). Potensi Perencanaan Aliran Air Bendungan Sei Gong Sebagai Sumber Energi Terbarukan Melalui Pltmh. *Journal of Civil Engineering and Planning*, *1*(1), 1–6. https://doi.org/10.37253/jcep.v1i1.714

Berliner, D. C., & Cahen, L. S. (1972). Trait-Treatment Interactions and Learning1. *ETS Research Bulletin Series*, *1972*(1). https://doi.org/10.1002/j.2333-8504.1972.tb00448.x

Berliner, D. C., & Cahen, L. s. (2016). Trait-Treatment Interaction and Learning. *American Educational Research Association*, *1*(1973), 58–94.

Darma Putra, B., Sasmita Dahlan, S., Besar Pelatihan Pertanian Batangkaluku, B., Gowa, K., Selatan, S., Pengkajian Teknologi Pertanian, B., & Sulawesi Selatan, P. (2022). Pengembangan Pelatihan Pertanian Berbasis Model ADDIE. *Jurnal Eboni*, *4*(1), 32–40. https://ejournals.umma.ac.id/index.php/eboni/index.

Daryanto, D. (2013a). *Menyusun modul bahan ajar untuk persiapan guru dalam mengajar*. (pp. 9–23). Gava Media.

Daryanto, D. (2013b). *Menyusun modul bahan ajar untuk persiapan guru dalam mengajar*. Gava Media.

Dash, S. (2019). Google classroom as a learning management system to teach biochemistry in a medical school. *Biochemistry and Molecular Biology Education*, *47*(4), 404–407. https://doi.org/10.1002/bmb.21246

Daud, A., Linda, R., Harfal, Z., Nabila, O., Suryani, A., & Tahirah, Z. (2024). *Multimodal Text-Powered Interactive E-Module for Enhancing English Structure Learning*. *6*(1), 1–20.

Delita, F., Berutu, N., & Nofrion. (2022). *Online Learning : The Effects Of Using E-Modules On Self-Efficacy , Motivation And Learning Outcomes*. *2957*(October), 0–3.

Dewi, C. A., Awaliyah, N., Fitriana, N., Darmayani, S., Nasrullah, Setiawan, J., & Irwanto, I. (2022). Using Android-Based E-Module to Improve Students' Digital Literacy on Chemical Bonding. *International Journal of Interactive Mobile Technologies*, *16*(22), 191–208. https://doi.org/10.3991/ijim.v16i22.34151

Dini, A., Rahmatan, H., Muhibbudin, Nurmaliah, C., & Safrida. (2023). Application of the E-module combined with the Guided Inquiry Learning Model to Increase Student Motivation and Learning Outcomes on the Structure and Function of Plant Tissues. *Jurnal Penelitian Pendidikan IPA*, *9*(6), 4768–4776. https://doi.org/10.29303/jppipa.v9i6.3857

Distrik, I. W., Ertikanto, C., Purwati, Y. S., Saregar, A., & Ab Rahman, N. F. (2024). Digital Problem-Based Worksheet With 3D Pageflip: an Effort To Address Conceptual Understanding Problems and Enhance Digital Literacy Skills. *Jurnal Pendidikan IPA Indonesia*, *13*(1), 116–127. https://doi.org/10.15294/jpii.v13i1.48604

Eugara, A. F., & Efendi, R. (2023). Evektivitas Penggunaan E-module Sebagai Media Pembelajaran Untuk Meningkatkan Hasil Belajar Siswa The

Effectiveness of Using E-modules as Learning Media to Improve Student Learning Outcomes. *Jurnal Pendidikan*, *32*(1), 19–32.

Ewar, H. A., Nasar, A., & Ika, Y. E. (2023). Pengembangan Alat Peraga Pembangkit Listrik Tenaga Panas Bumi (Pltp) Sebagai Media Pembelajaran Fisika Pada Materi Sumber Energi Terbarukan. *OPTIKA: Jurnal Pendidikan Fisika*, *7*(1), 128–139. https://doi.org/10.37478/optika.v7i1.2777

Fahmi, A. N., Yusuf, M., & Muchtarom, M. (2021). Integration of Technology in Learning Activities: E-Module on Islamic Religious Education Learning for Vocational High School Students. *Journal of Education Technology*, *5*(2), 282–290. https://doi.org/10.23887/jet.v5i2.35313

Fahrurrozi, Hasanah, U., & Dewi, R. S. (2019). Integrated Learning Design Based on Google Classroom to Improve Student Digital Literacy. *2019 5th International Conference on Education and Technology, ICET 2019*, 108–111. https://doi.org/10.1109/ICET48172.2019.8987219

Fitriani, Y. (2020). Analisa Pemanfaatan Learning Management System (Lms) Sebagai Media Pembelajaran Online Selama Pandemi Covid-19. *Journal of Information System, Informatics and Computing*, *4*(2), 1. https://doi.org/10.52362/jisicom.v4i2.312

Fitriyani, F., & Teguh Nugroho, A. (2022). Literasi Digital Di Era Pembelajaran Abad 21. *Literasi Jurnal Pengabdian Masyarakat Dan Inovasi*, *2*(1), 307–314. https://doi.org/10.58466/literasi.v2i1.1416

Goldberg, L. R. (2025). Student Personality Characteristics And Optimal College Learning Conditions : An Extensive Search For Trait-By-Treatment Interaction Effects. *Journal Storage*, *1*(2), 153–210.

Haluk Sivrikaya, M. (2020). An Analysis on Digital Literacy Level of Faculty of Sports Science Students. *Asian Journal of Education and Training*, *6*(2), 117–121. https://doi.org/10.20448/journal.522.2020.62.117.121

Herawati, N., & Sudagung, A. D. (2020). Persepsi Masyarakat dan Potensi Public Acceptance Terkait Wacana Pembangunan PLTN di Kabupaten Bengkayang. *Jurnal Pengembangan Energi Nuklir*, *22*(2), 111. https://doi.org/10.17146/jpen.2020.22.2.6125

Irawan, O. W., Pratama, L. S., & Insani, C. (2021). Analisis Termodinamika Siklus Pembangkit Listrik Tenaga Uap Kapasitas 1500 kW. *JTM-ITI (Jurnal Teknik Mesin ITI)*, *5*(3), 109. https://doi.org/10.31543/jtm.v5i3.579

Irmawati, I., Baktiar, M., & Hutapea, B. (2023). Pemanfaatan E-Modul Bahan Ajar Berbasis Aplikasi Canva pada Prodi Pendidikan Matematika dalam Proses Pembelajaran Jarak Jauh. *Jurnal Pendidikan Sains Dan Komputer*, *3*(01), 145–

152. https://doi.org/10.47709/jpsk.v3i01.2738

Ismail, M. N. K., Supeno, S., & Rusdianto, R. (2024). Development of Web-Based Modules to Improve Digital Literacy and Learning Outcomes in Science Learning. *Jurnal Paedagogy*, *11*(3), 451. https://doi.org/10.33394/jp.v11i3.11133

Kasim, N. N. M., & Khalid, F. (2016). Choosing the right learning management system (LMS) for the higher education institution context: A systematic review. *International Journal of Emerging Technologies in Learning*, *11*(6), 55–61. https://doi.org/10.3991/ijet.v11i06.5644

Khan, N., Sarwar, A., Chen, T. B., & Khan, S. (2022). Connecting digital literacy in higher education to the 21st century workforce Nasreen Khan Abdullah Sarwar Tan Booi Chen Recommended citation : Connecting digital literacy in higher education to the 21st century workforce. *Knowledge Management & E-Learning*, *14*(1), 46–61.

Kraleva, R., Sabani, M., & Kralev, V. (2019). An analysis of some learning management systems. *International Journal on Advanced Science, Engineering and Information Technology*, *9*(4), 1190–1198. https://doi.org/10.18517/ijaseit.9.4.9437

Kurniati, R. D., Andra, D., & Distrik, I. W. (2020). E-module development based on PBL integrated STEM assisted by social media to improve critical thinking skill : A preliminary study. *Journal of Physics: Conference Seriesonference*. https://doi.org/10.1088/1742-6596/1796/1/012077

Kurniawan, C., & Kuswandi, D. (2021). *Pengembangan E-Modul sebagai Media Literasi Digital pada Pembelajaran Abad 21. Lamongan: Academia Publication.*

Lee, J. (2013). Development of an adaptive learning system based on Task-Trait-Treatment interaction theory. *International Journal of Software Engineering and Its Applications*, *7*(2), 49–66.

Lovenia, T., Budi, G. S., & Hartanto, T. J. (2023). Pengembangan E-modul Berbasis Learning Management System (LMS) dengan Moodle pada Materi Listrik Dinamis di Kelas IX SMP. *Bahana Pendidikan: Jurnal Pendidikan Sains*, *4*(2), 61–65. https://doi.org/10.37304/bpjps.v4i2.7693

Maolida, A. S., Maolida, A. S., Purwianingsih, W., & Rahman, T. (2024). *SSI-Integrated PjBL Model in Biodiversity Topics : Is it Effective for Increasing Students ' Digital Literacy ? 10*(2), 196–209.

Mufidah, A., Indana, S., & Arifin, I. S. Z. (2023). E-Module Based on Blended Learning Type Flipped Classroom on Climate Change Materials to Train

Students' Digital Literacy Ability. *International Journal of Current Educational Research, 2*(1), 1–16. https://doi.org/10.53621/ijocer.v2i1.204

Murdani, E. (2020). Hakikat Fisika Dan Keterampilan Proses Sains. *Jurnal Filsafat Indonesia*, *3*(3), 72–80. https://doi.org/10.23887/jfi.v3i3.22195

Nazifah, N., & Asrizal, A. (2022). Development of STEM Integrated Physics E-Modules to Improve 21st Century Skills of Students. *Jurnal Penelitian Pendidikan IPA*, *8*(4), 2078–2084. https://doi.org/10.29303/jppipa.v8i4.1820

Ndibalema, P. (2025). Digital literacy gaps in promoting 21st century skills among students in higher education institutions in Sub-Saharan Africa: a systematic review. *Cogent Education*, *12*(1). https://doi.org/10.1080/2331186X.2025.2452085

Nisa, W. L., Ismet, & Andriani, N. (2020). Development of E-Modules Based on Multi-representations in Solid-State Physics Introductory Subject. *Berkala Ilmiah Pendidikan Fisika*, *8*(2), 73–81. https://doi.org/10.20527/bipf.v8i2.7690

Nurhusna. (2020). Google Classroomsebagai Media Pembelajaran padaMata Kuliah Teks Bahasa Indonesia. *Prosiding Seminar Daring Nasional: Pengembangan Kurikulum Merdeka Belajar*, 52–57. https://ejournal.unib.ac.id/index.php/semiba/issue/view/956/Tersediadi:https://ejournal.unib.ac.id/index.php/semiba/issue/view/956/

Oguguo, B. C. E., Nannim, F. A., Agah, J. J., Ugwuanyi, C. S., Ene, C. U., & Nzeadibe, A. C. (2021). Effect of learning management system on Student's performance in educational measurement and evaluation. *Education and Information Technologies*, *26*(2), 1471–1483. https://doi.org/10.1007/s10639-020-10318-w

Palupi, D. N., Sundari, S., Syahtaria, M. I., & Sianipar, L. (2024). Analisis Dampak Lingkungan dan Keekonomian Pembangkit Listrik Tenaga Co-firing Biomassa dan Baru bara sebagai Upaya Bauran Energi Terbarukan. *El-Mal: Jurnal Kajian Ekonomi & Bisnis Islam*, *5*(3), 1627–1635. https://doi.org/10.47467/elmal.v5i3.781

Parinduri, L., & Parinduri, T. (2020). Konversi Biomassa Sebagai Sumber Energi Terbarukan. *Journal of Electrical Technology*, *5*(2), 88–92. https://www.dosenpendidikan.

Pool, C. R. (1997). A New Digital Literacy A Conversation with Paul Gilster. *Educational Leadership*, *55*(3), 6–11. http://namodemello.com.br/pdf/tendencias/tecnolnocurric.pdf

Pratama, F. A. K. ., Wahyuni, S., & Putra, P. D. A. (2022). Development of

Application-based Interactive Science E-Modules PocketBook to Improve the Digital Literacy and Creative Thinking of Middle School Students. *Jurnal Paedagogy*, *9*(1), 2022. https://e-journal.undikma.ac.id/index.php/pedagogy/index

Pratiwi, M. K., & Indana, S. (2022). Pengembangan E-Modul Berbasis QR-Code untuk Melatihkankemampuan Literasi Digital Siswa pada Materi Perubahan lingkungan. *Berkala Ilmiah Pendidikan Biologi (BioEdu)*, *11*(2), 457–468. https://doi.org/10.26740/bioedu.v11n2.p457-468

Pribowo, M. A., Hadiati, E., & Sufian, M. (2024). *Pengembangan E-Modul Pendidikan Agama Islam Interaktif Berbasis Flipbook untuk Meningkatkan Pembelajaran di Sekolah Menengah Pertama*. *6*(82), 1163–1177.

Purwaningsih, S., Falah, H. S., & Pujaningsih, F. B. (2025). *The Use of E-Modules to Improve Critical Thinking Skills of Physics Education Students*. *11*(1), 257–264. https://doi.org/10.29303/jppipa.v11i1.9553

Putra, A. G. P., Bektiarso, S., & Handayani, R. D. (2021). Pengaruh Model Problem Based Learning (Pbl) Terhadap Hasil Belajar Dan Keterampilan Proses Sains Dalam Pembelajaran Fisika Di SMA (Kelas X SMA Negeri 3 Jember). *Jurnal Pembelajaran Fisika*, *10*(1), 36. https://doi.org/10.19184/jpf.v10i1.19687

Putri, Amel Dwi Cahya, Nasbey, H., & Budi, E. (2024). *Rancangan Modul Digital Berbasis Stem-Project Based Learning Pada Materi Energi Terbarukan*. *XII*, 95–100. https://doi.org/10.21009/03.1201.pf14

Putri, F. I. (2021). Perbandingan Hasil Belajar Siswi Kelas VII C Dan VII D terhadap Mata Pelajaran IPA Fisika. *Ilmu Kependidikan*, *10*(1), 38–47. https://doi.org/10.33506/jq.v

Qoidah, N. N., Zain, M. S., Adha, A. F., & Sanyang, B. (2023). Comparison Of Gambia And Indonesia On Digital Literacy Ans Learning Outcomes. *EduFisika: Jurnal Pendidikan Fisika*, *8*(2), 164–173. https://doi.org/10.59052/edufisika.v8i2.26533

Qurnia Sari, A., Sukestiyarno, Y., & Agoestanto, A. (2017). Batasan Prasyarat Uji Normalitas dan Uji Homogenitas pada Model Regresi Linear. *Unnes Journal of Mathematics*, *6*(2), 168–177. http://journal.unnes.ac.id/sju/index.php/ujm

Rizal, R., Rusdiana, D., Setiawan, W., & Siahaan, P. (2021). Development of a problem-based learning management system-supported smartphone (PBLMS3) application using the ADDIE model to improve digital literacy. *International Journal of Learning, Teaching and Educational Research*, *20*(11), 115–131. https://doi.org/10.26803/ijlter.20.11.7

Rizal, R., Rusdiana, D., Setiawan, W., & Siahaan, P. (2022). Learning Management

System Supported Smartphone (LMS3): Online Learning Application In Physics For School Course To Enhance Digital Literacy Of Pre-Service Physics Teachers. *Technology and Science Education*, *12*(1), 191–203.

Sanova, A., Bakar, A., Afrida, A., Kurniawan, D. A., & Aldila, F. T. (2022). Digital Literacy on the Use of E-Module Towards Students' Self-Directed Learning on Learning Process and Outcomes Evaluation Cources. *JPI (Jurnal Pendidikan Indonesia)*, *11*(1), 154–164. https://doi.org/10.23887/jpi-undiksha.v11i1.36509

Santiago, B. J., Ramírez, J. M. O., Rodríguez-Reséndiz, J., Dector, A., García, R. G., González-Durán, J. E. E., & Sánchez, F. F. (2020). Learning management system-based evaluation to determine academic efficiency performance. *Sustainability (Switzerland)*, *12*(10), 1–17. https://doi.org/10.3390/su12104256

Shihab, M. Q. (2005). Tafsir Al Misbah Vol 7. *Jakarta : Lentera Hati*, 568.

Sidiq, R., Najuah, & Suhendro, P. (2021). Utilization of Interactive E-Modules in Formation of Students's Independent Characters in the Era of Pandemic. *International Journal of Educational Research & Social Science*, *2*(6), 1651–1657. https://ijersc.org

Sugihartini, N., & Yudiana, K. (2018). Addie Sebagai Model Pengembangan Media Instruksional Edukatif (Mie) Mata Kuliah Kurikulum Dan Pengajaran. *Jurnal Pendidikan Teknologi Dan Kejuruan*, *15*(2), 277–286. https://doi.org/10.23887/jptk-undiksha.v15i2.14892

Sulistyorini, L., & Anistyasari, Y. (2020). Studi Literatur Analisis Kelebihan dan Kekurangan LMS Terhadap Pembelajaran Berbasis Proyek pada Mata Pelajaran Pemrograman Web di SMK. *IT-Edu: Jurnal Information Technology and Education*, *5*(01), 171–181.

Supuwiningsih, N. N. (2024). *E-Modul Multimedia Pembelajaran untuk Self Directed Learning*.

Suwarna, I. P., & Zulfiani, Z. (2024). Development of WIV-S Physics e-Learning to Improve Inquiry Abilities and Digital Literacy of Prospective Science Teacher Students. *International Journal of Information and Education Technology*, *14*(9), 1291–1298. https://doi.org/10.18178/ijiet.2024.14.9.2159

Syalsabilla, A., & Samsul Arif. (2023). Pengembangan Modul Ajar Kurikulum Merdeka Matematika Smkn Winongan. *Jurnal Pembelajaran Dan Pengembangan Matematika*, *3*(2), 180–191. https://doi.org/10.36733/pemantik.v3i2.7064

Triyanti, M., & Sulistiyono, S. (2023). Pengembangan Modul Ipa Berbasis Project

Based Learning (Pjbl) Untuk Meningkatkan Pengetahuan Faktual Dan Konseptual Siswa Smp Kelas Viii. *Jurnal Perspektif Pendidikan*, *17*(2), 270–280. https://doi.org/10.31540/jpp.v17i2.2624

Utaminingsih, E. S., Puspita, M. A., Ihsandi, A., Intania, B. Y., Prasetya, A. T., & Ellianawat. (2023). A Systematic Literature Review : The Role of Character-Based Digital Literacy in 21 ST Century Learning in Elementary Schools. *Jurnal Penelitian Pendidikan IPA*, *9*(10), 829–840. https://doi.org/10.29303/jppipa.v9i10.4858

Vesta, F. J. (2006). Trait-Treatment Interactions, Cognitive Processes, and Research on Communication Media. *Academy of Management Review*, *31*(2), 386–408.

Wahyuni, S., Wulandari, E. U. P., Rusdianto, Fadilah, R. E., & Yusmar, F. (2022). Pengembangan Mobile Learning Module Berbasis Android Untuk Meningkatkan Literasi Digital Siswa Smp. *LENSA (Lentera Sains): Jurnal Pendidikan IPA*, *12*(2), 125–134. https://doi.org/10.24929/lensa.v12i2.266

Wahyuningtyas, E. P., & Ellianawati. (2023). Analysis of The Suitability of Eleventh Grade Physics Textbooks with the Independent Curriculum. *UPEJ Unnes Physics Education Journal*, *2*(12), 1–24.

Weaver, D., Spratt, C., & Nair, C. S. (2008). Academic and student use of a learning management system: Implications for quality. *Australasian Journal of Educational Technology*, *24*(1), 30–41. https://doi.org/10.14742/ajet.1228

Wijaya, J. E., & Vidianti, A. (2020). The Effectiveness of Using Interactive Electronic Modules on Student Learning Outcomes in Education Innovation Course. *Advances in Social Science, Education and Humanities Research*, *422*(Icope 2019), 86–89. https://doi.org/10.2991/assehr.k.200323.096

Yulkifli, Yohandri, Y., & Azis, H. (2022). Development of physics e-module based on integrated project-based learning model with Ethno-STEM approach on smartphones for senior high school students. *Momentum: Physics Education Journal*, *6*(1), 93–103. https://doi.org/10.21067/mpej.v6i1.6316

Yusmar, F., Putra, P. D. A., Ahmad, N., & Astuti, S. R. D. (2024). Development of Flipbook-Based E-Module Integrated with External Features to Facilitate Student Self-Learning. *Hasil Penelitian Dan Kajian Kepustakaan Di Bidang Pendidikan, Pengajaran Dan Pembelajaran*, *10*(3), 988–1000.