

The Use of Mobile Learning-Based Electronic Modules in the Learning Process

Badrus Sholeh^{1*}, Sholeh Hidayat², Ujang Jamaludin³

Doctoral Education, Universitas Sultan Ageng Tirtayasa

Corresponding Author: Badrus Sholeh: badrussholeh0068@gmail.com

ARTICLE INFO

Keywords: Electronic Modules, Mobile Learning, Higher Education

Received : 20, June

Revised : 12, July

Accepted: 22, August

©2026 Sholeh, Hidayat, Jamaludin (s): This is an open-access article distributed under the terms of the [Creative Commons Atribusi 4.0 Internasional](https://creativecommons.org/licenses/by/4.0/).



ABSTRACT

Learning strategies in educational institutions, particularly higher education, have changed as a result of technological improvements. Institutions of higher learning need to modify their teaching methods. Using technology, particularly mobile learning-based electronic modules, is one such adaptation. This study uses a literature survey on the application of mobile learning-based e-modules in higher education. Journal articles and conference proceedings make up the data sources. The results show that mobile learning-based e-modules strengthen students' digital literacy, increase their enthusiasm to learn, and improve their comprehension of the course material.

INTRODUCTION

The digital revolution is advancing education by leveraging information and communication technology to improve learning outcomes (Criollo-C et al., 2021). Innovations in technology have led to the creation of smart tools and multifunctional devices that have transformed society in the information age (Reddy et al., 2022). In 21st-century education, students are encouraged to use their abilities to deepen their understanding of the material without relying on the instructor (Izhar et al., 2023). The rapidly growing reliance on digital technology, as well as the need to carefully consider how individuals use digital technology, how they interact online, and their skills in performing tasks related to digitalization (Reddy et al., 2023). Digital skills are becoming increasingly relevant in every context, especially in the workplace (Akour & Alenezi, 2022). 21st-century learning requires students to use technology by developing essential digital skills.

Students use the many resources that digital technology provides, including formal learning settings in higher education coursework, to improve their learning (Alenezi, 2023). Higher education must adapt its educational practices to the rapidly evolving information and communication technologies that are spreading throughout society (Rukmana et al., 2024). Digital transformation has driven various innovations in the learning process by providing learning resources that are more varied, interactive, and easily accessible to students (Maharani et al., 2023). 21st-century learning emphasizes developing the knowledge and skills students need, such as creativity, critical thinking, and soft skills that enable them to exchange information, learn from others, and ultimately become active global citizens (Khlaisang et al., 2023). The advancement of digital technologies requires higher education to adjust learning practices through information and communication technology, the provision of varied learning resources that are easily accessible, varied, and interactive, so students are required to have digital literacy skills and 21st-century skills.

College graduates are expected to think creatively, critically, and systematically when solving problems. However, classroom instruction alone is not sufficient to develop these skills; therefore, technology is necessary to create learning experiences and practical skills that reflect real-world work situations. (Sophonhiranrak, 2021). Higher education institutions are embracing technology to improve instructional delivery (Goundar & Kumar, 2022). With electronic modules, learning can be done independently, without being limited by time or place. Modules commonly used in education are typically printed, large-page materials that are not very engaging, resulting in low student interest in using them (Nugraha et al., 2023).

The e-module is designed to stimulate students' interest in learning, motivation, and engagement, and enhance their understanding of the subject matter (Faridah & Afridiani, 2021). An e-module is an electronically packaged module that contains various interactive media; the e-module's learning materials are systematically organized to support the learning process (Amalya

& Lutfi, 2024). E-modules can be delivered in the form of mobile learning (Sholichin et al., 2022). Creating modules in a more efficient and engaging format can be one way to make students more interested in and eager to read the modules, since electronic modules are often equipped with various interactive features such as animations, videos, and images (Putra et al., 2022). Nowadays, practically all knowledge-related activities use mobile learning (Criollo-C, 2021).

Mobile learning provides a clear picture of how the teaching and learning process is being digitally transformed through the use of cutting-edge IT technologies and methods (Naveed et al., 2023). Many research initiatives on mobile learning have been conducted at colleges and universities over the years (Goundar & Kumar, 2022). Higher education institutions have a responsibility to guide students so they can succeed in the digital information age (Khan et al., 2022).

There have been several literature reviews on e-modules, such as the use of e-modules in ecology courses (Muliana & Arsal, 2022). The Use of E-Modules in Biology Education (Fatma et al., 2025). Nevertheless, research on the application of mobile learning-based e-modules in higher education is still lacking. The need for more flexible learning, the demands of the digital age for interactive learning, and the need for a methodical evaluation of the efficacy of mobile learning-based e-modules in higher education all contribute to the urgency of this research. As a result, it is critical to comprehend how mobile learning-based e-modules support the learning process in higher education. This study was conducted to determine the impact of using mobile-based e-modules in higher education.

LITERATURE REVIEW

A module is a teaching resource with characteristics that allow students to use it as an independent learning resource, as it is supported by learning activities and supplemented with assessment tools (Suhara et al., 2022). The module facilitates students' ability to set their own pace and provides them with the flexibility to understand the material according to their individual abilities (Mangasak et al., 2025). The flexibility of e-modules enables students to obtain learning materials without being restricted by time or place, making them usable anywhere and anytime (Mutmainnah et al., 2021). E-modules enhance accessibility compared with conventional printed modules, flexibility, and the ability to present material more interactively and engagingly through multimedia such as video, audio, and animation (faizah Fitria & Muthi, 2024). With advances in technology, mobile-based e-modules have become a learning solution that facilitates ubiquitous learning, Providing students with access to educational resources anytime and anywhere, particularly in hybrid and online learning environments (Arifin & Indrakusuma, 2025).

E-modules can be integrated with mobile learning (Sholichin et al., 2022). E-modules reduce the need for costly printing, can be accessed anywhere and at any time, and offer an efficient and sustainable solution (Sirwan et al., 2021). The

principle of learning modules remains in the mobile learning-based e-module application, for example, materials, learning objectives, summaries, glossaries, and evaluations, where the learning process using modules allows students to improve learning activities optimally and can help students learn independently at their own pace (Pradana et al., 2020).

Mobile learning helps expand knowledge of the latest information and communication technologies (Roslin & Salleh, 2021). Electronic modules can be supplemented with video content, images, quizzes, and discussion forums, enabling students to address gaps in their knowledge and overcome the high costs associated with conventional modules (Sirwan et al., 2021). M-learning is a new learning technology that enables students to engage in educational activities using mobile devices, thereby making it easier to access learning materials such as lectures, courses, assignments, quizzes, and exams (Almaiah, 2019). Mobile learning supports students' engagement with educational content within authentic learning environments (Orhani, 2023). Students can access resources via cellphones at any time and from any location thanks to mobile learning (Purmadi et al., 2022). Students are happy and excited to study because mobile learning is an innovative, participatory approach to learning (Yosiana et al., 2021).

METHODOLOGY

A review of the literature is used in this investigation. It is anticipated that the results of this study will shed light on the effects of utilizing electronic modules for mobile learning in higher education. The literature review process consists of several stages: 1) determining the topic; 2) establishing inclusion criteria; 3) searching for literature; 4) conducting analysis and synthesis (Turasih et al., 2024).

The first stage involved determining the topic, namely mobile learning-based e-modules at the higher education level. In the stage of establishing inclusion criteria, this study includes articles sourced from journal articles and research proceedings published between 2021 and 2024, discussing the development of e-modules based on *mobile learning* at the higher education level or equivalent, and sourced during the search process using the Google Scholar database, including open-access articles in both Indonesian and English. The literature search was conducted via Google Scholar and Semantic Scholar using the keywords "mobile learning-based e-modules." The final stage involves analysis and synthesis: after collecting and reading the articles, the articles are reviewed and analyzed based on the previous steps.

RESEARCH RESULT

The results obtained from the reviewed studies are summarized in Table 1

Table 1. Mobile-Based E-Modules in Higher Education Institutions

Author and Year	Article Title	Results
Puspaningtyas & Anugrahani. (2024)	Efectiveness of Interactive E-Module Based on Mobile Learning in Management Accounting Course : Profit Planning and Performance Evaluation	Interactive modules that use 3D flipbook applications enhance effectiveness and deepen students' mastery of the material to improve the quality of learning in management accounting courses.
Wahid. (2024)	Inovasi E-modul Interaktif Berbasis Mobile untuk optimalisasi Pembelajaran Mandiri dalam Metodologi Penelitian	The e-modules, as assessed by media experts and subject matter experts, have been deemed highly suitable and effective in enhancing understanding and promoting independent learning
Diana. (2023)	Students' Perceptions on Usability Principle and interface design of flipbook as M-Learning in higher education	Using flipbooks as an m-learning medium results in a "good" learning experience for students and is suitable for higher education.
Milanti et al. (2023)	Validasi E-modul Berbasis Mobile Learning dalam Pembelajaran Inovatif Pendidikan Kewarganegaraan	E-modules provide accessible, flexible, and interactive learning experiences that promote student engagement, foster critical thinking skills, and promote a more engaging learning experience .
Muqtada & Nurjanah. (2023)	Pengembangan E-Modul Android Berbasis Hybrid Learning Pada Mata Kuliah Teori Bilangan	The e-modules that have been developed enhance students' understanding through independent study; they also help students solve complex mathematical problems and increase their flexibility and engagement in learning.
Masing et al. (2023)	The development of local plants e-module based on mobile learning for the subjects of botany and plant morphology	Expert and student assessments confirmed that the developed e-module effectively supports self-paced, self-directed learning

Rahmadani et al.(2022)	Pengembangan Modul Elektronik Evaluasi Pendidikan Komputer Berbasis Android Di Perguruan Tinggi	Electronic modules facilitate self-directed learning; they can be developed and used as a learning resource for the Computer Education Evaluation course.
Dewi et al. (2022)	Using Android-Based E-Module to Improve Students' Digital Literacy on Chemical Bounding	Android-based e-modules strengthen students' digital literacy, especially their critical thinking and communication skills, and increase both comprehension and motivation for independent learning
Saidah. (2022)	Pengembangan E-Modul Berbasis Mobile Learning Untuk Mata Metode Penelitian	E-modules enhance students' research skills related to preparing research proposals, provide alternatives for independent learning, and make out-of-class learning more efficient and effective.
H et al. (2021)	Interactive E-module Development in Multimedia Learning	The products developed are validated, practical, and effective.

DISCUSSION

The use of *mobile learning*-based e-modules in higher education has been extensively studied. Research findings indicate that *mobile learning*-based e-modules facilitate understanding of the material and promote independent learning. Several studies have shown that the application of *mobile learning*-based e-modules facilitates understanding of the material and enhances independent learning through flexibility in their use (Diana, 2023; Masing & Sila, 2023; Milanti et al., 2023; Muqtada & Nurjanah, 2023; Rahmadani et al., 2022; Saidah, 2022; Wahid, 2024). The variety of engaging features makes learning more enjoyable. These findings provide further evidence of the effectiveness of e-modules in facilitating students' understanding of the subject matter; furthermore, one of the principles of e-modules is self-instruction, meaning that students can study the modules independently without the instructor's presence. Study by H et al., (2021) The electronic module developed can be used for self-directed learning; it is valid, practical, and effective for online learning, but has limitations in terms of students' commitment to learning, which the researcher does not monitor. To overcome these problems, various content can be added to increase students' seriousness in learning. Mobile learning will be effective if it is supported by self-regulated learning such as goal setting, monitoring, reflection, and self-evaluation, but without continuous support, independent learning behavior can decline (Kondo et al., 2012). Designers must create *mobile learning* based on

specific learning objectives and integrate it into the curriculum through technology-proficient educators, providing appropriate *scaffolding* and gradually reducing assistance (Palalas, 2020).

The use of interactive modules in management enhances effectiveness and deepens students' mastery of the material, improving the quality of learning; it is recommended that these modules be revised and adjusted, and that case studies and other interactive elements be included (Puspaningtyas & Anugrahani, 2024). E-modules can be developed by including case studies; these can be used to bridge the gap between the theoretical concepts students are learning and the real-world problems they face. The case studies presented in the e-modules relate to various everyday problems, making the knowledge students gain relevant and deeply meaningful to their learning experience (Amalia et al., 2025).

According to a study by Dewi et al (2022) Digital literacy has increased, and students' motivation for independent learning has improved after studying the e-modules. Hasanuddin et al (2023) that e-modules, as a form of mobile learning, increase motivation to learn. Material presented in a more dynamic digital format that combines text, images, audio, and video increases engagement and motivation to learn (Safroni et al., 2025). The e-module design was developed with student comfort in mind, and its engaging content encourages students to participate during learning and boosts their motivation to learn

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the discussion, mobile learning-based e-modules improve material understanding, increase learning flexibility and independence because they can be accessed anytime and anywhere, increase digital literacy, and increase learning motivation. The need for additional content that can increase students' seriousness in learning, lead to self-regulated learning, and provide support in the form of scaffolding and developing material content based on case studies.

ADVANCED RESEARCH

This study has limitations in the time span of the analyzed articles and the level of higher education analyzed, which give rise to variations in findings. Future research should expand the scope of the study and include objects beyond the higher education level.

REFERENCES

Akour, M., & Alenezi, M. (2022). Higher education future in the era of digital transformation. *Education Sciences*, 12(11), 784.

- Alenezi, M. (2023). Digital learning and digital institution in higher education. *Education Sciences*, 13(1), 88.
- Almaiah, M. A. (2019). Examination of factors influencing the use of mobile learning system: An empirical study. *Education and Information Technologies*, 24(1), 885–909. <https://doi.org/10.1007/s10639-018-9810-7>
- Amalia, R., Hamidah, A., & Aswan, D. M. (2025). Pengembangan E-Modul Berbasis Studi Kasus Pada Materi Sistem Saraf Kelas XI SMA. *Proceeding Seminar Nasional IPA*, 441–459.
- Amalya, R. C., & Lutfi, A. (2024). E-Modul Berbasis Mobile Learning untuk Meningkatkan Ketrampilan Berpikir Kritis pada Materi Keseimbangan Kimia. *JIIP-Jurnal Ilmiah Ilmu Pendidikan*, 7(10), 12244–12257.
- Arifin, M. O., & Indrakusuma, A. H. (2025). Pengembangan E-Modul Berbasis Mobile Dengan Menggunakan Canva Pada Mata Pelajaran Informatika Kelas X Semester Ganjil Di Smk Pgri 1 Tulungagung Tahun Pelajaran 2024/2025. *Sindoro: Cendikia Pendidikan*, 17(3), 31–40.
- Criollo-C, S. (2021). Mobile learning technologies for education: Benefits and pending issues. *Applied Sciences (Switzerland)*, 11(9). <https://doi.org/10.3390/app11094111>
- Criollo-C, S., Guerrero-Arias, A., Jaramillo-Alcázar, Á., & Luján-Mora, S. (2021). Mobile learning technologies for education: Benefits and pending issues. *Applied Sciences (Switzerland)*, 11(9). <https://doi.org/10.3390/app11094111>
- Dewi, C. A., Awaliyah, N., Fitriana, N., Darmayani, S., 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).
- Diana, N. (2023). *Students ' Perceptions On Usability Principle And Interface Design Of Flipbook As M-Learning In Higher Education*. 11(1), 293–300.
- faizah Fitria, G., & Muthi, I. (2024). Strategi Peningkatan Kemampuan Belajar Siswa Melalui Pemanfaatan Media Digital Interaktif Pada Penggunaan Aplikasi Pembelajaran Berbasis Smartphone. *Jurnal Ilmiah Multidisipin*, 2(8), 360–364.
- Faridah, A., & Afridiani, W. (2021). Meningkatkan hasil belajar mahasiswa melalui e-modul berbasis android. *Mimbar Ilmu*, 26(3), 476–482.

- Fatma, M. T., Selaras, G. H., Fadilah, M., Fajrina, S., & Rahmi, F. O. (2025). Tinjauan Literatur tentang Penggunaan E-Modul sebagai Media Pembelajaran Biologi. *JURNAL BIOSHELL*, 14(2), 269–278.
- Goundar, M. S., & Kumar, B. A. (2022). The use of mobile learning applications in higher education institutes. *Education and Information Technologies*, 27(1), 1213–1236. <https://doi.org/10.1007/s10639-021-10611-2>
- H, N., Hakim, A., & Wahid, M. S. (2021). Interactive E-Module Development in Multimedia Learning. *AL-ISHLAH: Jurnal Pendidikan*, 13(3), 2293–2300. <https://doi.org/10.35445/alishlah.v13i3.863>
- Hasanuddin, H., Fatirul, A. N., Walujo, D. A., & Fatkhurrohman, F. (2023). Pengembangan E-Modul Inventor 2023 Berbasis Android Sebagai Mobile Learning Mata Pelajaran Teknik Pemesinan Di SMK. *Jurnal JEETech*, 4(2), 94–102.
- Izhar, N. A., Ishak, N. A., & Baharudin, S. M. (2023). A bibliometric analysis of 21st century learning using scopus database. *International Journal of Learning, Teaching and Educational Research*, 22(3), 225–240.
- Kaniyah, Y., Purnamasari, I., & Siswanto, J. (2022). Pengembangan E-Modul pembelajaran IPA berbasis Problem Based Learning untuk meningkatkan kemampuan literasi sains peserta didik. *Jurnal Kualita Pendidikan*, 3(2), 101–108.
- Khan, N., Sarwar, A., Chen, T. B., & Khan, S. (2022). Connecting digital literacy in higher education to the 21st century workforce. *Knowledge Management & E-Learning*, 14(1), 46–61.
- Khlaisang, J., Huang, F., Koraneekij, P., & Teo, T. (2023). Using mobile technologies to teach 21st century learning skills: a study of teachers' acceptance in Thai secondary schools. *International journal of mobile learning and organisation*, 17(1-2), 254–279.
- Kondo, M., Ishikawa, Y., Smith, C., Sakamoto, K., Shimomura, H., & Wada, N. (2012). Mobile assisted language learning in university EFL courses in Japan: Developing attitudes and skills for self-regulated learning. *ReCALL*, 24(2), 169–187.
- Maharani, A., Sunaryo, S., & Astra, I. M. (2023). Development Of Electronic Module Based On Interactive Lecture Demonstrations With Microsoft Sway On Direct Current Electrical Circuit. *Joint Prosiding IPS dan Seminar Nasional Fisika*, 11.
- Mangasak, A., Ervianti, E., & Gasong, D. (2025). Pengembangan modul pembelajaran berbasis digital pada mata pelajaran informatika kelas VIII di

- SMP Kristen Kandora. *Jurnal Studi Guru dan Pembelajaran*, 8(3), 1565–1575.
- Masing, F. A., & Sila, V. U. R. (2023). The development of local plants e-module based on mobile learning for the subjects of botany and plant morphology. *Biosfer: Jurnal Pendidikan Biologi*, 16(1), 197–205.
- Masing, F. A., Ulia, V., Sila, R., & Education, B. (2023). *Biosfer : Jurnal Pendidikan Biologi*. 16(1), 197–205.
- Milanti, A. A., Lasambouw, C. M., & Maulana, M. Y. (2023). *Validasi E-Modul Berbasis Mobile Learning dalam Pembelajaran Inovatif Pendidikan Kewarganegaraan*. 4(4), 1543–1552.
- Muliana, G. H., & Aarsal, A. F. (2022). Analisis Kebutuhan Bahan Ajar Mahasiswa pada Mata Kuliah Ekologi Tumbuhan. *Jurnal Ilmiah Wahana Pendidikan*, 8(23), 434–441.
- Muqtada, M. R., & Nurjanah, A. (2023). *Pengembangan E-Modul Android Berbasis Hybrid Learning Pada Mata Kuliah Teori Bilangan*. 12(2), 100–112.
- Mutmainnah, Aunurrahman, & Warneri. (2021). Efektivitas Penggunaan E-Modul Terhadap Hasil Belajar Kognitif Pada Materi Sistem Pencernaan Manusia di Madrasah Tsanawiyah. *Jurnal Basicedu*, 5(3), 1625–1631.
- Naveed, Q. N., Choudhary, H., Ahmad, N., Alqahtani, J., & Qahmash, A. I. (2023). Mobile Learning in Higher Education: A Systematic Literature Review. *Sustainability (Switzerland)*, 15(18). <https://doi.org/10.3390/su151813566>
- Nugraha, S., Megawati, E., & Ikhwati, A. (2023). Pengembangan E-Modul Materi Teks Eksposisi Berbasis Flipbook Heyzine Untuk Siswa Kelas X SMA Fajrul Islam. *Hortatori: Jurnal Pendidikan Bahasa Dan Sastra Indonesia*, 7(2), 115–123.
- Orhani, S. (2023). Philosophy of e-learning vs m-learning. *Futurity Philosophy*, 2(4), 4–23.
- Palalas, A. (2020). The relationship between mobile learning and self-regulated learning: A systematic review. *Australasian Journal of Educational Technology*, 36(4), 151–172. <https://doi.org/10.14742/AJET.5650>
- Pradana, R. A., Sulton, S., & Husna, A. (2020). Pengembangan e-modul berbasis mobile learning seni budaya materi konsep budaya, seni, dan keindahan untuk siswa kelas X SMKN 1 Turen Malang. *Jurnal Inovasi Dan Teknologi Pembelajaran*, 6(2), 89–96.

- Purmadi, A., Muzakkir, M., & Astuti, E. R. P. (2022). Developing m-learning applications to support digital literacy of vocational high school students. *Jurnal Inovasi dan Teknologi Pembelajaran*, 9(3), 291–301.
- Puspaningtyas, M., & Anugrahani, I. S. (2024). *Effectiveness of Interactive E-Module Based on Mobile Learning in Management Accounting Course : Profit Planning and Performance Evaluation*. 2024, 69–79. <https://doi.org/10.18502/kss.v9i4.15059>
- Putra, Y. I., Ridoh, A., Caniago, R., & Satria, T. (2022). Pengembangan E-Modul Pembelajaran Flash Flipbook Berbasis Web Mobile Pada Mata Kuliah Sistem Basis Data. *Jurnal Muara Pendidikan*, 7(2), 191–197.
- Rahmadani, A. F., Suryani, K., Widyastuti, R., Putra, A., Gultom, N., & Sulastrri, R. (2022). *Pendidikan Komputer Berbasis Android Di Perguruan Tinggi*. c, 246–258. <https://doi.org/10.31571/edukasi.v20i2.4143>
- Reddy, P., Chaudhary, K., & Hussein, S. (2023). A digital literacy model to narrow the digital literacy skills gap. *Heliyon*, 9(4).
- Reddy, P., Sharma, B., & Chaudhary, K. (2022). Digital literacy: a review in the South Pacific. *Journal of Computing in Higher Education*, 34(1), 83–108.
- Roslin, N. B., & Salleh, N. M. (2021). Penggunaan M-Learning Sebagai bahan bantu pengajaran dalam kelas pendidikan khas. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 6(5), 53–63.
- Rukmana, M., Watung, F. A., Hasmiati, T. P. A., & Utami, A. R. P. (2024). Pengembangan E-Modul Pembelajaran Biologi Umum Berbasis Konstruktivisme. *Scholaria: Jurnal Pendidikan Dan Kebudayaan*, 14(2), 167–176.
- Safroni, S., Chandra, D. A., & Muslim, M. (2025). Pengembangan E-Modul Pada Mata Pelajaran Administrasi Sistem Jaringan DI SMK. *JUTECH: Journal Education and Technology*, 6(2), 516–526.
- Saidah, N. (2022). Pengembangan E-Modul Berbasis Mobile Learning Untuk Mata Kuliah Metode Penelitian. *Refleksi Edukatika: Jurnal Ilmiah Kependidikan*, 12(2), 126–133.
- Sholichin, M., Razak, A., Lufri, L., & Irdawati, I. (2022a). Validitas dan Praktikalitas E-Modul Berbasis Mobile Learning Berbantuan 3D Page Flip Professional Pada Materi Ekologi dan Perubahan Lingkungan di Kelas X SMA. *Jurnal Penelitian Pendidikan IPA*, 8(6), 3034–3043.
- Sholichin, M., Razak, A., Lufri, L., & Irdawati, I. (2022b). Validity and Practicality

- of 3D Page Flip Professional Assisted Mobile Learning-Based E-Module on Ecology Material and Environmental Change. *Jurnal Penelitian Pendidikan IPA*, 8(6), 3034–3043.
- Sirwan, Kamal, & Nurkhamid. (2021). Developing E-module based on mobile learning as a preparation media. *Journal of Physics: Conference Series*, 1833(1). <https://doi.org/10.1088/1742-6596/1833/1/012049>
- Sophonhiranrak, S. (2021). Features, barriers, and influencing factors of mobile learning in higher education: A systematic review. *Heliyon*, 7(4), e06696. <https://doi.org/10.1016/j.heliyon.2021.e06696>
- Suhara, Y. I., Siska, N. D., Fadilah, A. F., & Supriyadi, M. A. (2022). Analisis Perbandingan Modul Elektronik dengan Modul Cetak pada Pembelajaran IPS untuk Melihat Indikator Karakter Peduli Lingkungan. *Journal of Basic Education Research*, 3(3), 69–75.
- Turasih, T., Surkanti, H. K., & Riandi, R. (2024). Field trips (outdoor learning) untuk melatih berpikir kritis dan peduli lingkungan pada materi perubahan lingkungan: Literature review. *Jurnal Pendidikan Matematika Dan Sains*, 12(1), 22–35.
- Wahid, Abdul, M. (2024). *Inovasi E-Modul Interaktif Berbasis Mobile Untuk Optimalisasi Pembelajaran Mandiri Dalam Metodologi Penelitian*. 1741–1758.
- Yosiana, Y., Djuandi, D., & Hasanah, A. (2021). Mobile learning and its effectiveness in mathematics. *Journal of Physics: Conference Series*, 1806(1), 12081.