



Digital Module-Based Hybrid Collaborative Learning in Tennis Learning within the MBKM Framework

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Received: November 25, 2025

Revised: February 25, 2026

Accepted: March 25, 2026

Published: March 31, 2026

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DOI: [10.29303/jppipa.v12i3.13592](https://doi.org/10.29303/jppipa.v12i3.13592)

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Abstract: This study aims to develop and evaluate a digital module for hybrid collaborative learning in a Lawn Tennis course within the Merdeka Belajar Kampus Merdeka (MBKM) framework. The study employed a Research and Development (R&D) design using the ADDIE model, involving 64 students from two universities selected through purposive sampling. Data were collected using expert validation sheets, observation checklists, student response questionnaires, and learning outcome tests. Data analysis combined descriptive statistics and normalized gain (N-gain) analysis, supported by comparative analysis of pre-test and post-test results to measure learning improvement. The validation results indicated that the module achieved feasibility scores above 85% across all aspects, categorized as highly feasible. The implementation showed high engagement (85–95%). The N-gain score of 0.56 (moderate category) indicates a meaningful improvement in cognitive learning outcomes, with an average score of 78 and 75% mastery. Technical performance also improved, with an average score of 80%. These findings highlight that the module effectively improves both theoretical understanding and technical skills while supporting collaborative learning within the MBKM framework.

Keywords: Collaborative Learning; Digital Module; Hybrid Learning; Lawn Tennis; MBKM; Sports Educatio

Introduction

The rapid development of digital technology has created significant opportunities for innovation in higher education. Within the framework of the Merdeka Belajar Kampus Merdeka (MBKM) policy, universities are encouraged to implement flexible, collaborative, and student-centered learning models that are aligned with 21st-century competencies. Hybrid learning, which combines online and face-to-face instruction, has been widely recognized as an effective approach to enhance student engagement and academic performance (Hendrowati et al., 2025). Furthermore, in the context of Industry 5.0, the integration of digital technology into

learning processes plays a crucial role in improving accessibility, interaction, and learning effectiveness (Tahu, 2025).

One of the strategic approaches to support MBKM implementation is the development of digital learning modules integrated within hybrid collaborative learning environments. Digital modules provide flexible access to learning materials, support independent learning, and enable cross-institutional collaboration. Previous studies have highlighted the importance of web-based systems and digital learning tools in supporting MBKM programs and modern curriculum implementation (Alhayat & J., 2024; Setiani et al., 2024).

How to Cite:

Raibowo, S., Risdianto, E., Rizky, O. B., Hiskya, H. J., Destriani, & Fudin, M. S. (2026). Digital Module-Based Hybrid Collaborative Learning in Tennis Learning within the MBKM Framework. *Jurnal Penelitian Pendidikan IPA*, 12(3), 298-304. <https://doi.org/10.29303/jppipa.v12i3.13592>

In the context of physical education, particularly in tennis courses, the integration of digital modules within hybrid learning environments is highly relevant. Tennis learning involves a combination of cognitive understanding, technical skills, and physical performance, which often requires intensive practice and direct supervision. However, practical constraints such as limited court availability, time restrictions, and instructor availability often hinder optimal learning outcomes. Hybrid learning models have been explored to address these challenges, showing improvements in flexibility and student motivation (Dapat, 2024)

Several studies have also developed digital and blended learning modules for tennis education. These include modules integrating instructional videos and online resources to support skill acquisition and improve technical competence (Damrah et al., 2024; Raibowo et al., 2022). While these studies demonstrate the effectiveness of digital learning in sports education, they are generally limited to single-institution settings and focus primarily on instructional media development without integrating collaborative learning across institutions.

Despite the growing body of research on digital modules and hybrid learning, significant gaps remain. First, previous studies tend to emphasize general sports learning or isolated instructional contexts, with limited focus on tennis as a complex skill-based subject that requires the integration of cognitive and motor domains. Second, most studies have not explicitly examined the integration of digital modules within hybrid collaborative learning environments under the MBKM framework. Third, prior research predominantly employs descriptive approaches, with limited use of analytical methods to measure learning improvement, such as N-gain analysis.

Therefore, this study aims to address these gaps by developing and evaluating a digital module for tennis learning within a hybrid collaborative environment across universities under the MBKM program. This study not only focuses on product development but also applies a more comprehensive analytical approach to measure learning effectiveness, thereby providing both theoretical contributions and practical implications for the implementation of hybrid learning in higher education.

Method

This research uses the Research and Development (R&D) method with the ADDIE development model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. This model was chosen because it is suitable for developing digital learning tools that require a systematic process,

expert validation, and field testing before being widely implemented in hybrid learning within the MBKM context. The ADDIE model has also been widely used in educational media development research because it provides structured stages in producing a usable product for the classroom (McKenney & Reeves, 2020).

This study involved 64 undergraduate students enrolled in the Lawn Tennis course from two partner universities participating in the MBKM program. The participants were selected using purposive sampling, considering their active involvement in hybrid learning activities.

The analysis phase was conducted by identifying the learning needs for Tennis through curriculum studies, observation of the learning process, interviews with lecturers, analysis of student readiness, and mapping of digital infrastructure available at partner universities. The design phase then structured the module, including learning objectives, basic tennis technique content, synchronous and asynchronous activities, individual and collaborative assessment rubrics, and a plan for integrating the module into the *Learning Management System* (LMS).

During the development phase, the modules are developed in various media formats such as text, technical illustrations, demonstration videos, worksheets, and interactive quizzes. The resulting product was then validated by content experts, media experts, and pedagogical experts using a 1–5 Likert scale-based instrument that assessed content accuracy, instructional aspects, media appearance, and ease of use, as is commonly done in digital learning device development research (Reeves, 2015). Expert validation was conducted to ensure the module had content suitability and pedagogical effectiveness before being used in field trials, which aligns with the formative evaluation approach in the learning design process (Spatioti et al., 2022). Next, the module was implemented with students from two partner universities within the MBKM scheme through hybrid learning that combines field practice, synchronous sessions like video conferences, and asynchronous activities via an LMS. This hybrid learning model allows for learning flexibility while also increasing student engagement through structured digital interaction (Zhang et al., 2024). The evaluation was conducted formatively and summatively to assess the module's feasibility, the effectiveness of learning implementation, the improvement in student learning outcomes, and the quality of collaboration between universities, which served as the basis for improvements before the module was used more widely.

The research instruments used in the development of this digital module consist of expert validation sheets, observation sheets, student response questionnaires, and learning outcome tests. To ensure the quality of the instruments, validity and reliability testing were conducted. Content validity was established through expert judgment involving three experts in sports education, instructional design, and educational technology. Each expert evaluated the instruments based on relevance, clarity, and representativeness of the measured constructs. The reliability of the student response questionnaire was tested using Cronbach's Alpha coefficient, resulting in a value of $\alpha = 0.87$, which indicates high reliability. This suggests that the instrument has strong internal consistency and is suitable for data collection in this study. The validity process ensures that the instrument accurately measures the intended constructs, while reliability testing confirms the consistency of the measurement results.

Expert validation sheets are used to assess the module's feasibility from the aspects of material substance, instructional design, media appearance, and ease of use. This instrument uses a 1-5 Likert scale, which is commonly used in learning device development research to assess the quality and feasibility of the product before field implementation. The student response questionnaire was used to measure perceptions of material clarity, the quality of the hybrid learning experience, and the module's support for collaboration within the MBKM scheme, following the application of digital system usage evaluation in higher education, which utilizes questionnaires as the main instrument to assess satisfaction and effectiveness in using learning media (Solihin et al., 2024).

Meanwhile, observation sheets are used to assess the implementation of learning in both the classroom and online sessions, while learning outcome tests are used to assess students' competency achievement in terms of both tennis technique and theoretical understanding.

Data analysis in this study was conducted using descriptive statistical analysis and normalized gain (N-gain). Descriptive statistics were used to analyze the feasibility of the digital module, the implementation process, and student responses by calculating mean scores and percentages. To measure the improvement in student learning outcomes, N-gain analysis was applied to pre-test and post-test scores. The N-gain values were categorized into low, moderate, and high levels to determine the effectiveness of the learning intervention. In addition, a comparative analysis of pre-test and post-test results was conducted to examine the extent of learning improvement after the implementation of the digital module.

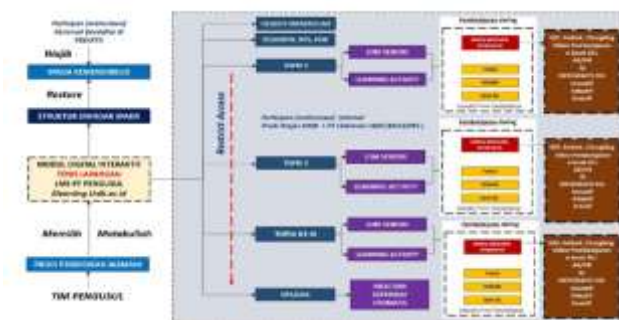


Figure 1. Development Design of The Tennis Course in The Learning Management System

Data analysis in this study was conducted using a combination of descriptive statistical analysis and normalized gain (N-gain) to provide a comprehensive evaluation of the developed digital module. Descriptive statistics were used to analyze the feasibility of the module, the implementation process, and student responses by calculating mean scores and percentages. This approach is commonly applied in educational research, particularly in development studies, to systematically describe product quality and learning implementation outcomes (Rashid et al., 2019; Schoonenboom & Johnson, 2017)

To examine the effectiveness of the learning intervention, N-gain analysis was applied to pre-test and post-test scores. The N-gain method is widely used to measure the extent of improvement in students' understanding before and after instructional treatment, particularly in science and educational research contexts (Meltzer, 2002). The resulting N-gain values were then categorized into low, moderate, and high levels to determine the effectiveness of the digital module in improving student learning outcomes.

Furthermore, a comparative analysis of pre-test and post-test results was conducted to identify the magnitude of learning improvement after the implementation of the digital module. This analysis allows for a clearer interpretation of how the intervention influences student performance, particularly in both cognitive understanding and technical skill acquisition. Such an approach is essential in hybrid learning research, where multiple learning modes are integrated and require comprehensive evaluation (Ansari et al., 2023; Hrastinski, 2019).

The integration of descriptive analysis and N-gain provides stronger analytical rigor compared to purely descriptive approaches, as it not only describes learning outcomes but also quantifies the level of improvement achieved by students. This combined approach enhances the validity of the findings and supports a more robust interpretation of the effectiveness of hybrid collaborative learning within the MBKM framework.

The data analysis technique in this study was conducted using a descriptive quantitative approach, which is suitable for development research because it aims to directly describe the level of product feasibility and the effectiveness of its implementation without hypothesis testing (Sakyi et al., 2020). Data from expert validation, observations, and questionnaires were analyzed by calculating average scores, achievement percentages, and classifying eligibility categories to determine the quality of the digital module before and after implementation. This type of analysis is widely used in the development of digital learning systems because it can objectively present user responses and learning performance (S. Supriyono, 2022). Additionally, student learning outcomes were analyzed based on individual and class completion percentages, following the learning outcome evaluation approach for sports education, which assesses improvements in motor skill performance and cognitive achievement (Blegur et al., 2023). The results of this analysis were then interpreted as the basis for revising and improving the module to make it suitable for wider implementation in hybrid learning within the MBKM program. The assessment score conversion was performed using the categorization intervals as shown in Table 1.

Table 1. Instrument Assesment Score Conversion

Percentage (%)	Eligibility Category
85 - 100	Very Eligible
69 - 84	Eligible
53 - 68	Moderate
37 - 52	Less Eligible
< 36	Not Eligible

Result and Discussion

The feasibility of the developed digital module was evaluated through expert validation involving material, media, and pedagogical experts. The results showed that the module achieved an average feasibility score of above 85% across all assessed aspects, which falls into the “very eligible” category. This indicates that the module meets the required standards in terms of content accuracy, instructional design, media quality, and ease of use.

The implementation of the digital module in hybrid learning demonstrated a high level of student participation. The percentage of student engagement ranged from 85% to 95% across synchronous and asynchronous learning activities. Students actively participated in face-to-face practice sessions, online discussions, and LMS-based assignments, indicating that the hybrid learning approach was effectively implemented.

Student responses toward the use of the digital module were generally positive. Most students reported that the module was easy to use, supported their understanding of tennis techniques, and facilitated collaborative learning activities. These findings indicate that the digital module contributes positively to the overall learning experience in a hybrid learning environment.

The results of the learning outcomes analysis showed an improvement in students’ cognitive achievement after the implementation of the digital module. The average pre-test score was 60, while the post-test score increased to 78. This improvement indicates that the learning intervention had a positive impact on students’ understanding of the material.

To further examine the level of learning improvement, N-gain analysis was conducted based on pre-test and post-test scores. The results showed that the N-gain score was 0.56, which falls into the moderate category. This indicates that the digital module contributed to a meaningful improvement in students’ learning outcomes.

Table 2. N-gain Analysis of Student Learning Outcomes

Component	Pre-test	Post-test	N-gain	Category
Cognitive	60	78	0.56	Moderate

In addition to cognitive improvement, students’ technical performance in tennis also showed positive results. The average score for technical skills reached 80, indicating that the digital module not only supports theoretical understanding but also enhances practical skill development.

The findings of this study indicate that the developed digital module is feasible and effective in supporting hybrid collaborative learning in tennis within the MBKM framework. The high feasibility score obtained from expert validation suggests that the module meets essential instructional and technological standards. This supports the view that well-designed digital learning resources play a crucial role in enhancing the quality of learning, particularly when they are developed through systematic instructional design processes (Alammary, 2019; Khalil & Elkhider, 2016).

The high level of student engagement observed during the implementation reflects the effectiveness of hybrid learning in facilitating active participation. The combination of synchronous and asynchronous learning activities allows students to interact, practice, and reflect more flexibly. This finding is consistent with recent studies indicating that hybrid learning environments can improve student engagement and participation by providing diverse learning pathways and reducing

limitations of time and space (Bidarra et al., 2025; Martin et al., 2024).

The positive responses from students further reinforce the usability and practicality of the digital module. Students' perceptions of ease of use and usefulness suggest that the module successfully supports both independent and collaborative learning processes. This aligns with the Technology Acceptance Model, which emphasizes that perceived usefulness and ease of use significantly influence the adoption of digital learning technologies (Boulton et al., 2019).

In terms of learning outcomes, the moderate N-gain score (0.56) indicates that the digital module contributes to a meaningful improvement in students' understanding, although it has not yet reached a high level of effectiveness. This suggests that while the module is beneficial, further refinement is needed to maximize learning gains. Similar findings have been reported in previous studies, where digital and hybrid learning interventions often result in moderate improvements due to variations in student readiness, learning environments, and instructional design quality (Serwornoo et al., 2024; Vo et al., 2017).

The improvement in both cognitive and technical performance highlights the importance of integrating theoretical and practical components in sports education. Tennis learning requires not only conceptual understanding but also the development of motor skills, which can be effectively supported through multimedia-based instruction and guided practice. The use of video demonstrations and structured activities in the module likely contributed to this dual improvement, as multimedia learning has been shown to enhance both knowledge acquisition and skill performance (Dwiyogo & Rodriguez, 2020).

Despite these positive findings, the moderate level of improvement suggests that the implementation of the module can be further optimized. Factors such as the level of student interaction, feedback mechanisms, and the intensity of practice sessions may influence learning outcomes. Therefore, future development should focus on enhancing interactivity, providing more adaptive feedback, and integrating advanced technologies to better support individualized learning in hybrid environments.

Overall, this study contributes to the growing body of research on digital and hybrid learning by providing empirical evidence from a specific context, namely tennis learning within the MBKM framework. While previous studies have largely focused on general subjects, this research highlights the application of hybrid collaborative learning in sports education, offering both theoretical and practical implications for higher education institutions.

Conclusion

This study concludes that the developed digital module for hybrid collaborative learning in tennis within the Merdeka Belajar Kampus Merdeka (MBKM) framework is valid, practical, and moderately effective. The high feasibility scores indicate that the module meets instructional and technical standards, while its implementation demonstrates the ability to support active student engagement in both synchronous and asynchronous learning environments.

The findings also show that the module contributes to improving students' learning outcomes, as indicated by the moderate N-gain value. This suggests that the integration of digital modules in hybrid learning can enhance both cognitive understanding and technical skill development in sports education, particularly in tennis learning, which requires the integration of theory and practice.

From a practical perspective, this study provides an applicable model for implementing hybrid collaborative learning across universities within the MBKM program. The use of structured digital modules can support learning flexibility, facilitate collaboration, and improve learning effectiveness in higher education. However, the level of improvement achieved remains in the moderate category, indicating the need for further refinement. Future research is recommended to incorporate more interactive features, adaptive feedback mechanisms, and advanced digital technologies to optimize learning outcomes. In addition, broader implementation across different contexts and subjects is needed to strengthen the generalizability of the findings.

Overall, while the novelty of this study is positioned at a moderate level due to the widespread use of the ADDIE model and hybrid learning approaches, its contribution lies in the specific application within tennis learning and the integration of collaborative hybrid learning in the MBKM context.

Acknowledgments

In this research, I would like to express my deepest gratitude to my beloved family, who have always provided unwavering support, love, and encouragement. Thank you to my fellow lecturers from Musamus University, Sriwijaya University, STKIP PGRI Trenggalek for the success of this collaboration and the incredible inspiration.

Author Contributions

Septian Raibowo is the lead author of this study, responsible for all writing processes. Eko Risdianto interpreted the data analysis from the statistician. Oddie Barnanda Rizky and Hendra Jondry Hiskya contributed to the interpretation and drawing of conclusions. Destriani and Muhammad Soleh Fudin refined the data analysis.

Funding

This research was supported by the Ministry of Higher Education, Science and Technology the 2024 digital learning development and implementation scheme in higher education.

Conflicts of Interest

The content of this article does not create a conflict of interest.

References

- Alammary, A. (2019). Blended learning models for introductory programming courses: A systematic review. *PLOS ONE*, 14(9), e0221765. <https://doi.org/10.1371/journal.pone.0221765>
- Alhayat, A., & J., R. C. (2024). Designing Learning Assessment with STEAM-Based Projects in Implementing of the Kurikulum Merdeka. *Jurnal Penelitian Pendidikan IPA*, 10(11), 9141-9157. <https://doi.org/10.29303/jppipa.v10i11.7266>
- Ansari, B. I., Junaidi, J., Maulina, S., Herman, H., Kamaruddin, I., Rahman, A., & Saputra, N. (2023). Blended-Learning Training and Evaluation: A Qualitative Study. *Journal of Intercultural Communication*, 155-164. <https://doi.org/10.36923/jicc.v23i4.201>
- Bidarra, J., Rocio, V., Sousa, N., & Coutinho-Rodrigues, J. (2025). Problems and prospects of hybrid learning in higher education. *Open Learning: The Journal of Open, Distance and e-Learning*, 40(3), 304-323. <https://doi.org/10.1080/02680513.2024.2404036>
- Blegur, J., Yustiana, Y. R., Taufik, A., Ilham, M., & Hardiansyah, S. (2023). Integrating analytical thinking skills into physical education to improve student learning outcomes. *Jurnal Keolahragaan*, 11(2), 180-190. <https://doi.org/10.21831/jk.v11i2.61176>
- Boulton, C. A., Hughes, E., Kent, C., Smith, J. R., & Williams, H. T. P. (2019). Student engagement and wellbeing over time at a higher education institution. *PLOS ONE*, 14(11), e0225770. <https://doi.org/10.1371/journal.pone.0225770>
- Damrah, D., Rasyid, W., Komaini, A., Pitnawati, P., Universitas Negeri Padang, Department of Sports Education, Faculty of Sports Science, Indonesia, & Komaini, A. (2024). Digital-Based E-module in Tennis Learning for Undergraduate Students in Sports Education. *Sport Mont Journal*, 22(1), 43-51. <https://doi.org/10.26773/smj.240207>
- Dapat, R. (2024). The Impact of Online Video and Tennis Sports App on Teaching and Learning Tennis Toward Digital Curriculum Design for Tennis Coaches. *International Journal of Education and Humanities*, 15(1), 228-239. <https://doi.org/10.54097/37be3c29>
- Dwiyogo, W. D., & Rodriguez, E. I. S. (2020). Blended Development Learning of Soccer Courses for Education in Physical Health and Recreation Students: *Proceedings of the 1st International Scientific Meeting on Public Health and Sports (ISMOPHS 2019)*. The 1st International Scientific Meeting on Public Health and Sports (ISMOPHS 2019). <https://doi.org/10.2991/ahsr.k.201203.002>
- Hendrowati, T. Y., Badrun, M., Siswoyo, & Istiani, A. (2025). The Impact of Hybrid Learning on Student Engagement and Academic Performance in Post-Pandemic Science Education. *Jurnal Penelitian Pendidikan IPA*, 11(4), 154-165. <https://doi.org/10.29303/jppipa.v11i4.10701>
- Hrastinski, S. (2019). What Do We Mean by Blended Learning? *TechTrends*, 63(5), 564-569. <https://doi.org/10.1007/s11528-019-00375-5>
- Khalil, M. K., & Elkhider, I. A. (2016). Applying learning theories and instructional design models for effective instruction. *Advances in Physiology Education*, 40(2), 147-156. <https://doi.org/10.1152/advan.00138.2015>
- Martin, F., Kumar, S., Ritzhaupt, A., & Polly, D. (2024). Bichronous Online Learning: Perspectives, Best Practices, Benefits, and Challenges from Award-Winning Online Instructors. *Online Learning*, 28(2). <https://doi.org/10.24059/olj.v28i2.3945>
- McKenney, S., & Reeves, T. C. (2020). Educational design research: Portraying, conducting, and enhancing productive scholarship. *Medical Education*, 55(1), 82-92. <https://doi.org/10.1111/medu.14280>
- Meltzer, D. E. (2002). The relationship between mathematics preparation and conceptual learning gains in physics: A possible "hidden variable" in diagnostic pretest scores. *American Journal of Physics*, 70(12), 1259-1268. <https://doi.org/10.1119/1.1514215>
- Raibowo, S., Fathoni, A. F., & Adi, S. (2022). Feasibility of audio-visual teaching materials to support tennis learning. *Jurnal Keolahragaan*, 10(2), 217-226. <https://doi.org/10.21831/jk.v10i2.48830>
- Rashid, Y., Rashid, A., Warraich, M. A., Sabir, S. S., & Waseem, A. (2019). Case Study Method: A Step-by-Step Guide for Business Researchers. *International Journal of Qualitative Methods*, 18, 1-13. <https://doi.org/10.1177/1609406919862424>
- Reeves, T. C. (2015). Educational design research: Signs of progress. *Australasian Journal of Educational Technology*, 31(5), 613-620. <https://doi.org/10.14742/ajet.2902>
- S. Supriyono. (2022). RESEARCH AND DEVELOPMENT: MODEL BORG & GALL (BAHAN AJAR REVISI). <https://doi.org/10.13140/RG.2.2.10113.94566>

- Sakyi, K. A., Musona, D., & Mweshi, G. (2020). Research Methods and Methodology. *Advances in Social Sciences Research Journal*, 7(3), Article 3. <https://doi.org/10.14738/assrj.73.7993>
- Schoonenboom, J., & Johnson, R. B. (2017). How to Construct a Mixed Methods Research Design. *KZfSS Kölner Zeitschrift Für Soziologie Und Sozialpsychologie*, 69(S2), 107-131. <https://doi.org/10.1007/s11577-017-0454-1>
- Serwornoo, M. Y. W., Danso, S., Azanu, B., Semarco, S. K. M., & Aidoo, E. A. K. (2024). Use of Digital Platforms Among University Students: A Systematic Literature Review. *Qeios*, 6(7), SQKGT5.2. <https://doi.org/10.32388/SQKGT5.2>
- Setiani, H., Ruhiat, Y., & Hendrayana, A. (2024). Assessment of the Success of the Independent Campus Independent Learning Program Through a Web-Based Integration System at the Participating University. *Jurnal Penelitian Pendidikan IPA*, 10(12), 10169-10177. <https://doi.org/10.29303/jppipa.v10i12.9335>
- Solihin, H. H., Nurangraeni, A. S., Pitoyo, D., Paramartha, V., Yuliaty, F., & Kosasih. (2024). Evaluation of User Experience E-Learning Website of Sangga Buana University Using the User Experience Questionnaire (UEQ) Method. *2024 18th International Conference on Telecommunication Systems, Services, and Applications (TSSA)*, 1-4. <https://doi.org/10.1109/TSSA63730.2024.10864367>
- Spatioti, A. G., Kazanidis, I., & Pange, J. (2022). A Comparative Study of the ADDIE Instructional Design Model in Distance Education. *Information*, 13(9), 1-20. <https://doi.org/10.3390/info13090402>
- Tahu, G. P. (2025). Implementation of Digital Technology in Industry 5.0 Era. *Jurnal Penelitian Pendidikan IPA*, 11(5), 557-562. <https://doi.org/10.29303/jppipa.v11i5.11191>
- Vo, H. M., Zhu, C., & Diep, N. A. (2017). The effect of blended learning on student performance at course-level in higher education: A meta-analysis. *Studies in Educational Evaluation*, 53, 17-28. <https://doi.org/10.1016/j.stueduc.2017.01.002>
- Zhang, Y., Beh, W. F., & Zhang, C. (2024). A Systematic Review of Blended Learning Strategies and Outcomes in Music Education. *Harmonia: Journal of Arts Research and Education*, 24(2), 247-262. <https://doi.org/10.15294/harmonia.v24i2.18523>