

Science Education and Application Journal (SEAJ)
Program Studi Pendidikan IPA
Universitas Islam Lamongan
http://jurnalpendidikan.unisla.ac.id/index.php/SEAJ

September, 2026. Vol. 8, No. 2,
p-ISSN: 2656-6672
e-ISSN: 2656-8365
pp. 141-149

The Practicality of the Biolove Pocket Book as a Learning Medium for the Circulatory System Based on the Integration of Biology, Local Wisdom, and Values Science Education Students at IAIN Parepare

[1]Novia Anugra, [2]Musma Rukmana
[1]Tadris of Natural Science, Faculty of Tarbiyah, State Islamic Institute (IAIN) Parepare, 8 Amal Bakti Street, Parepare City, South Sulawesi, Indonesia
[2]Biology Education Study Program, Faculty of Education, Manado State University, Puncak Tonsaru Street, South Tondano District, Minahasa Regency, North Sulawesi, Indonesia
Email Correspondence: noviaanugra@iainpare.ac.id

Article Info
Article History
Received: August 10th, 2026
Revised: September 12th, 2026
Accepted: September 22nd, 2026
Published: September 30th, 2026
Keywords
Biolove Pocket Book, Practicality, Circulatory System, Local Wisdom, Value-Oriented Learning, Science Education, Higher Education

Abstract
The circulatory (cardiovascular) system is considered a complex topic in undergraduate biology education, as students often harbor misconceptions and struggle to grasp the interconnected physiological mechanisms involved; consequently, there is a need for learning media that are concise, contextual, innovative, and portable, while also fostering active student engagement. This study aimed to analyze the practicality of the "Biolove Pocket Book," a printed learning resource integrating biological content, local wisdom, and value-oriented learning, based on student perceptions of its use for the circulatory system topic within the Natural Science Education (Tadris IPA) program at IAIN Parepare. A quantitative descriptive approach utilizing a survey method was employed. Data were gathered via a student response questionnaire administered to 21 students in the Natural Science Education program at IAIN Parepare after they had used the material directly during their coursework. The instrument comprised 15 Likert-scale statements covering four dimensions: (1) motivation and comfort, (2) limitations and shortcomings, (3) engagement and interaction, and (4) achievement of learning objectives. Data were analyzed using percentage calculations and practicality level categorization. The results revealed an average student response rate of 85.78%, placing the resource in the "highly practical" category. The dimension regarding the achievement of learning objectives scored the highest (87.86%), followed by motivation and comfort (86.90%), engagement and interaction (86.19%), and limitations and shortcomings (80.95%). As the data were derived from student perceptions, the findings reflect the practicality of the Biolove Pocket Book from the students' perspective rather than serving as direct evidence of the medium's effectiveness in improving learning outcomes. Given that the study was limited to 21 students from a single program, the findings are not intended for broad generalization to other higher education contexts. This study provides empirical evidence regarding the practicality of printed learning materials based on local wisdom integrating biology content, local wisdom, and value-oriented learning to teach complex biological topics in Indonesian higher education.

Citations: Anugra, N. & Rukmana, M. (2026). The Practicality of the Biolove Pocket Book as a Learning Medium for the Circulatory System Based on the Integration of Biology, Local Wisdom, and Values Science Education Students at IAIN Parepare. Science Education and Application Journal (SEAJ), 8(2), 141-149.

INTRODUCTION

Teaching the circulatory system at the university level presents a significant challenge due to the abstract nature of the topic and the multitude of interconnected physiological concepts

involved (Tono et al., 2021). This situation is consistent with international findings showing that misconceptions regarding cardiovascular physiology persist, even among medical students (Bordes et al., 2026) as well as prospective biology teachers, as reflected in the systematic errors in the circulatory system concept diagrams they created (Köse Ozay,2024). Learning strategies that build understanding incrementally through guided questioning or the interconnection of concepts have proven effective in correcting such misconceptions (Lena et al., 2024). Consequently, the need for learning media that are informative, practical, and portable and capable of fostering active student engagement has become increasingly urgent.

Learning media are a crucial component of the teaching-learning process, as their selection determines the depth of students' understanding of the material. Digital transformation has accelerated the adoption of various technology-based learning platforms in higher education institutions (Alenezi, 2023). A survey of university students in the Middle East reveals a preference for reading course materials in print rather than electronic format, due to fewer visual distractions and less eye strain (Deva et al., 2023). On the other hand, mobile learning technology has also been consistently shown to enhance student engagement and learning outcomes (Anuyahong et al., 2023). As corroborated by a meta-analytic review demonstrating the positive cognitive impact of mobile-based learning on university students (Bazhenova et al., 2022). These findings confirm that portability and ease of access, whether in print or digital media, are factors that consistently influence learning motivation.

The pocket book is a form of print media widely developed as a supplementary teaching resource due to its portability, readability, and ability to present material in a concise yet structured manner. Research indicates that a mind-map-based biology pocket book covering the topic of viruses received very high practicality scores based on feedback from both students and teachers (Jirana, J., Firdaus, F., Damayanti, M., & Dahliana, 2024). Meanwhile, Qoiriyah & Setyawati 2022) reported a similar positive response regarding the development of a mind-mapping-based pocketbook for the reproductive system topic. Another study demonstrated that an e-pocketbook on bacteria effectively improved learning outcomes as well as students' motivation and curiosity. (Nugraheni & Marianti, 2022), Meanwhile, gamification elements in e-books have been shown to enhance learners' academic achievement and motivation during the learning process (Chen, 2023). However, the effectiveness of print media does not always depend on such interactive elements; an experimental study involving business students demonstrated that print modules designed based on learning outcomes significantly improved student performance compared to a control group (Inarda, 2023), emphasizing that the quality of the media's structural design is a primary determining factor, regardless of whether a print or digital format is used.

In the context of the circulatory system topic, Safitri & Amintarti 2021) specifically developed a digital booklet that received a student response score of 4.58 out of 5 (categorized as "very good"), while other research found that the Grade XI biology textbook covering this material did not fully align with curriculum competency requirements, thereby underscoring the importance of variety and innovation in learning media for this topic (Nisa & Maesaroh, 2022). Furthermore, other studies indicate that digitally developed e-pocket books have been proven to improve learning outcomes and serve as an engaging alternative medium for learners in the digital revolution era (Saphira, 2023). This reinforces the argument that the pocketbook format—whether in print or electronic form holds great potential for adaptation to complex and abstract biological topics, such as the circulatory system.

Practicality is a dimension of instructional media quality that determines whether the media can truly be used optimally in a real-world setting. Media that is valid in terms of content but lacks practicality will not yield a tangible impact on learning (Riduwan, 2016), defining practicality through user perceptions of ease of use, time efficiency, and media appeal in actual

learning situations. This definition aligns with a systematic review of self-directed learning assessment practices in health professions education, which confirms that user response instruments are key indicators of a learning medium's acceptability (Taylor et al., 2023). The reliability of such instruments requires a rigorous validation process, as demonstrated by the development and validation of scientific literacy instruments for the junior and senior high school levels, ensuring that practical evaluations from the students' perspective yield authentic and relevant data that reflect actual learning experiences. (Zhang et al., 2023).

The "Biolove" Pocket Book is a print-based learning resource developed locally by lecturers from the Science Education Study Program at IAIN Parepare to support instruction on the circulatory system. The name "Biolove" is an acronym for Biology, Local Wisdom, and Love, reflecting the philosophy behind the resource's development: integrating biological concepts with local wisdom and values of love for science and the Creator. This approach aligns with meta-analysis findings indicating that learning media based on local wisdom significantly enhance student engagement and learning outcomes in Indonesia (Yusuf, 2023). Exploring indigenous science as both learning content and context is also considered relevant for supporting education for sustainable development (Zidny et al., 2021). Meanwhile, narrative-based programs grounded in context, such as pop-up stories, have proven effective in fostering environmental awareness among elementary school students. (Mohamed et al., 2024) It emphasizes that educational media integrating local values and contextual narratives possess a unique pedagogical appeal. The Biolove Pocket Book aims not only to provide a scientific understanding of the circulatory system but also to encourage students to view biology as part of the magnificence of God's creation, a subject to be studied with a sense of gratitude, love, and responsibility, in alignment with the integrative academic vision that characterizes Islamic higher education.

Although the "Pocket Book Biolove" has been used in lectures, a formal evaluation of its practicality from the students' perspective has not yet been systematically conducted. Addressing this gap is crucial, as data regarding practicality serves as the basis for decision-making regarding revisions and further media development. Systematic instructional design principles such as the ADDIE model have proven relevant as a framework for developing both distance and face-to-face learning media (Spatioti & Kazanidis, 2022). Meanwhile, research on students' problem-solving abilities in PBL-based learning further underscores the importance of well-designed media in supporting learning outcomes (Meliyanti et al., 2024). Gamification elements in STEM domains (Listanto et al., 2025), a QR code-based physics module capable of enhancing learning interest and digital literacy (Kusuma et al., 2022), the development of interactive e-modules (Nurhikmah et al., 2021), as well as an open interoperability framework that bridges print and digital materials (Perisic et al., 2023) It outlines various future development directions for learning media that are relevant to refining the Biolove e-Pocket Book. Meanwhile, a recent meta-analysis comparing electronic books and printed books in language learning concludes that both can yield equivalent learning outcomes, provided they are designed systematically and in alignment with user needs (Listanto et al., 2025). This study aims to address this gap by systematically analyzing the practicality of the Biolove e-Pocket Book using a validated Likert-scale student response questionnaire, thereby providing an empirical basis for media developers and biology educators to enhance the quality of higher education instruction.

METHODS

This study employs a quantitative descriptive approach using a survey method. This approach was selected because the study aims to describe and quantify the level of practicality of the Biolove e-Pocket Book based on the perceptions of students who used it directly in their learning (Sugiyono, 2017). The survey was conducted at the end of the learning unit on the

circulatory system, after all participants had used the Biolove e-Pocket Book during at least four class sessions.

The research subjects consisted of 21 students enrolled in the Biology Education Study Program at IAIN Parepare, South Sulawesi, during the even semester of the 2024/2025 academic year. A total sampling technique was employed, meaning that all students within the specific study group who had used the "Biolove" e-Pocket Book were included as participants. All participants provided written informed consent before data collection.

The research instrument consisted of a student response questionnaire containing 15 positive statements covering four dimensions of practicality: (1) motivation and comfort (4 items), (2) limitations and shortcomings (3 items), (3) engagement and interaction (4 items), and (4) achievement of learning objectives (4 items). Each item was scored using a five-point Likert scale: Strongly Agree (5), Agree (4), Undecided (3), Disagree (2), and Strongly Disagree (1). The instrument was validated by two expert validators (one subject matter expert and one instructional media expert), resulting in a "feasible" rating prior to field implementation.

Data analysis was conducted by calculating the percentage of response scores using the following formula:

$$P\,(\%) = (\text{Total Score Obtained} / \text{Maximum Possible Score}) \times 100\%$$

The percentage results were categorized based on practicality criteria: 80%–100% = very strong; 60%–80% = strong; 40%–60% = moderately strong; 20%–40% = weak; and 0%–20% = very weak. Analysis was conducted both by dimension and overall to obtain a comprehensive overview of the media's practicality (Riduwan, 2016).

RESULTS AND DISCUSSION

Based on the analysis of response questionnaires administered to 21 students, data summarizing the practicality of the Biolove Pocket Book were obtained, as presented in Table 1.

Table 1. Recapitulation of the Practicality of the Biolove Pocket Book Based on Student Responses (n = 21)

Assessment Dimension	Items	Max Score	Score Obtained	Ideal Score	P (%)	Category
Motivation and Comfort	4	20	365	420	86.90%	Very Strong
Limitations and Shortcomings	3	15	255	315	80.95%	Very Strong
Engagement and Interaction	4	20	362	420	86.19%	Very Strong
Achievement of Learning Objectives	4	20	369	420	87.86%	Very Strong
Average / Total	**15**	**75**	**1,351**	**1,575**	**85.78%**	**Very Strong**

Source: Primary research data

The analysis results in Table 1 show an average student response percentage of 85.78%, which falls into the "very strong" category based on the criteria (Riduwan, 2016). In greater detail, the results can be broken down into four assessment categories: the learning objective achievement dimension received the highest score (87.86%), followed by motivation and comfort (86.90%), engagement and interaction (86.19%), and limitations and shortcomings (80.95%). Overall, these findings indicate that students found the Biolove Pocket Book easy to use,

engaging, and supportive of their learning process. These results are consistent with findings (Jirana, J., Firdaus, F., Damayanti, M., & Dahliana, 2024) which report on the practicality of a mind map-based biology pocketbook on the topic of viruses with equally high response scores from students and teachers, as well as research (Qoiriyah & Setyawati, 2022) ...which received a similarly positive response regarding the reproductive system pocketbook. This consistency of results across various biological topics is likely attributable to the characteristics of the pocketbook format itself, specifically, the concise, portable, and systematic presentation of material, which consistently meets students' needs for accessible learning resources, regardless of the specific topic being covered. This consistency is further corroborated by international meta-analyses, which conclude that both print and electronic books can yield equivalent learning outcomes when systematically designed to meet user needs (Listanto et al., 2025), as well as a literature review on physics e-pocketbooks, which confirms that pocketbook-based media consistently enhance student engagement and learning outcomes across various learning contexts (Saphira, 2023).

The motivation and convenience dimension achieved a score of 86.90%. Based on responses regarding the items in this dimension, students felt that the Biolove Pocket Book made the learning process feel lighter, more flexible, and less burdensome. Its compact and portable format allowed students to study in various settings without relying on digital devices. These findings align with survey results indicating that students tend to find reading printed materials more comfortable than electronic ones, due to fewer visual distractions and reduced eye strain (Deva et al., 2023). These findings indicate that portability and ease of access are motivational factors that remain consistent across media types.

The dimension regarding limitations and shortcomings received a score of 80.95%; while still classified as highly practical, this was the lowest score among the four dimensions. Some students noted that the *Biolove Pocket Book* had limitations regarding the depth of explanation, particularly concerning the mechanisms of the cardiac cycle and hemodynamic regulation, which are physiologically complex. This limitation is a logical consequence of the pocket book format, which prioritizes concise presentation; it also represents a specific area for revision, for instance, by incorporating step-by-step flowcharts or additional illustrations that simplify cardiac cycle mechanisms without compromising the book's overall conciseness. Although the pocket book includes QR codes linking to supplementary digital material, the content was deemed insufficiently detailed to fully address these limitations. Moving forward, the QR-linked supplementary material could be enhanced by including short animations of the cardiac cycle, simple interactive simulations, or more visual, step-by-step explanations, thereby deepening student understanding without sacrificing the portability of the printed version. Research indicates that print media supplemented with QR codes can boost students' learning interest and digital literacy without compromising the portability of the print format. (Putri, 2021), resulting in interconnected print-digital learning (Listanto et al., 2025). Therefore, interconnected print-digital learning (Perisic et al., 2023) has the potential to serve as a direction for the further development of the Pocket Book Biolove.

The engagement and interaction dimension achieved a score of 86.19%, indicating that the Biolove Pocket Book effectively fosters active student engagement in the learning process. Students reported that the medium encouraged them to seek additional information, ask more in-depth questions during lectures, and discuss learned concepts with their peers. The mechanisms driving this engagement can be attributed to several design features of the Biolove Pocket Book: concise material presentation that avoids cognitive overload; contextual content integrating local wisdom familiar to the students; an eye-catching visual design; and guiding questions that prompt students to think more deeply about the subject matter. These findings align with research demonstrating that bacteria-themed e-pocket books effectively enhance

student motivation and curiosity (Nugraheni & Marianti, 2022). This pattern of active engagement also aligns with experimental studies showing that gamification elements in e-books can enhance learners' learning interactions (Chen, 2023), as well as findings that mobile-based learning technology consistently enhances student engagement in higher education (Anuyahong et al., 2023), emphasizing that the factors triggering engagement span across media formats, provided they are designed in a structured manner.

The dimension regarding the achievement of learning objectives received the highest score (87.86%), indicating that students perceived tangible benefits from the Biolove Pocket Book in mastering the material and preparing for assessments. It should be noted that these findings measure student perceptions rather than direct mastery or objective assessment performance; therefore, the results should be interpreted with appropriate perspective. Students perceived the logical organization of the material, ranging from cardiac anatomy and systemic and pulmonary circulation to blood components and functions, as facilitating the systematic construction of concept maps. This aligns with principles of systematic instructional design, which assert that a structured, step-by-step organization of content contributes significantly to the achievement of learning objectives (Spatioti & Kazanidis, 2022). Similar results were also reported for the digital booklet on the circulatory system, with student response scores classified as excellent (Safitri & Amintarti, 2021), confirming that a concise and systematic media format contributes positively to the achievement of learning objectives. It highlights learning strategies that build conceptual connections incrementally regarding the circulatory system, as well as the importance of well-designed media in supporting students' problem-solving skills (Meliyanti et al., 2024), further reinforcing the argument that the structure of material presentation is key to successfully achieving learning objectives.

Overall, the study's findings indicate that the Biolove Pocket Book is considered highly practical by participating university students as a learning resource for the circulatory system in a higher education context. The term "valid learning resource" should be used with caution in this context, as the study primarily evaluated practicality based on student perceptions rather than content validity or the resource's effectiveness regarding learning outcomes. These findings are also relevant to the issue of misconceptions regarding the circulatory system, which are frequently reported among medical students (Bordes et al., 2026) as well as prospective biology teachers (Kadirhanoğulları & Köse, 2024). ...as a practical and easily accessible medium, it has the potential to serve as a supporting tool in addressing the issue, even though this study does not directly measure changes in conceptual understanding. This study addresses the research gap outlined in the introduction—namely, the lack of a systematic evaluation regarding the practicality of the *Biolove Pocket Book* from the students' perspective—while also offering a novel contribution in the form of empirical evidence on the practicality of a locally-based printed learning medium that integrates biology content, local wisdom, and value-oriented learning for the circulatory system topic. A review of the literature on pocket-book-based media—whether digital or printed—further confirms that both consistently enhance student engagement and learning outcomes, while also serving as alternative media adaptable to various learning contexts (Saphira, 2023). The relevance of print media grounded in local wisdom, such as the Pocket Book Biolove, is further reinforced by findings that learning media based on local wisdom significantly enhance student engagement and learning outcomes in Indonesia (Yusuf, 2023), consistent with evidence that integrating local wisdom into science media enhances cultural literacy and critical thinking (Basari et al., 2025) as well as the relevance of indigenous science as a context for sustainable learning (Zidny et al., 2021). The reliability of the response instrument used in this study also aligns with self-assessment practices recommended in higher education (Taylor et al., 2023) as well as instrument validation procedures that ensure measurement reliability in science education research (Zhang et al., 2023). These findings confirm the value of

systematically designed local print media, mirroring the institutional transformation of higher education, which requires balancing digital innovation with proven print media (Alenezi, 2023). This confirms that the Biolove pocketbook can function effectively as a supplementary learning tool in higher education even in an era dominated by digital media, as evidenced by the effectiveness of learning-outcome-based printed modules among business students (Inarda, 2023).

CONCLUSION

Based on an analysis of responses from 21 students in the Science Education (Tadris IPA) program at IAIN Parepare, it can be concluded that the Biolove Pocket Book is perceived as highly practical as a learning medium for the circulatory system topic. This is evidenced by an average student response rate of 85.78%, placing it in the "highly practical" category. All four dimensions of practicality evaluated motivation and comfort (86.90%), limitations and shortcomings (80.95%), engagement and interaction (86.19%), and achievement of learning objectives (87.86%) fell within the highly practical category.

These findings indicate that systematically designed, locally-based print media have the potential to serve effectively as supplementary learning aids in higher education, even in an era dominated by digital media. The Biolove Pocket Book proved capable of supporting learning motivation, fostering active student engagement, and facilitating the achievement of learning objectives regarding the circulatory system, according to the participating students.

This study has several limitations that should be considered when interpreting the findings. First, the relatively small sample size (21 students) and the study's scope limited to a single program at one institution restrict the generalizability of the findings to the broader higher education context. Second, the data are derived from students' perceptions of the medium's practicality rather than direct measurements of learning outcomes; therefore, they cannot be used to empirically conclude the Biolove Pocket Book's effectiveness in improving actual learning achievement. Consequently, future research should involve larger and more diverse samples across different learning contexts or institutions and incorporate additional outcome measures such as pre- and post-use concept mastery tests—to gain a more comprehensive understanding of the Biolove Pocket Book's impact on learning the circulatory system in higher education.

REFERENCES

Alenezi, M. (2023). Education Sciences Digital Learning and Digital Institution in Higher Education.

Anuyahong, B., Pucharoen, N., & Coast, G. (2023). Emerging Technologies in Learning. 18(18), 50–63.

Basari, A., Wahyudi, E., Salimi, M., Hidayah, R., & Surya, A. (2025). Local wisdom-based science e-module to improve cultural literacy and critical thinking skills of elementary school students. 3(3), 387–395. https://doi.org/10.62672/joease.

Bazhenova, E. D., Shuzhebayeva, A. I., Kuntuganova, S. M., Bazhenova, M. D., & Murygina, S. I. (n.d.). The Impact of Mobile Learning on Undergraduate Students ' Cognitive Learning Outcomes : A Meta-Analytic Review. 42–53.

Bordes, S. J., Manyevitch, R., Huntley, J. D., Li, Y., & Murray, I. V. J. (2026). Medical student misconceptions in cardiovascular physiology. November 2020, 241–249. https://doi.org/10.1152/advan.00220.2020

Chen, C. (2023). The study on the effects of gamified interactive e-books on students ' learning achievements and motivation in a Chinese character learning flipped classroom. August, 1–14. https://doi.org/10.3389/fpsyg.2023.1236297

Deva, A., Raghavan, D., & Arulappan, J. (2023). Heliyon Preferences for printed books versus E-books among university students in a Middle Eastern country. Heliyon, 9(6), e16776. https://doi.org/10.1016/j.heliyon.2023.e16776

Inarda, A. (2023). Promoting outcomes-based instructional materials: Testing the effectiveness of print modules for business students. 12(3), 1257–1268. https://doi.org/https://doi.org/10.12973/eu-jer.12.3.1257

Jirana, J., Firdaus, F., Damayanti, M., & Dahliana, D. (2024). Pengembangan media pembelajaran buku saku berbasis mind map pada pelajaran biologi materi virus. SAINTIFIK: Jurnal Matematika, Sains, Dan Pembelajarannya, 10, 107–114. https://doi.org/https://doi.org/10.31605/saintifik.v10i1.495

Kadirhanoğulları, K., & Köse, Ö. (2024). Biology teacher candidates' drawings about circulatory system. Science Insights Education Frontiers. 23(2), 3779–3797. https://doi.org/https://doi.org/10.15354/sief.24.or621

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

Lena, R., Silaban, S., Siadari, S. M., Lastri, M., & Butar, E. F. B. (2024). Building Creativity And Imagination In Early Childhood Through Picture Story Books. 3(1), 33–44.

Listanto, V., Arlinwibowo, J., Permatasari, A. D., Iftitah, K. N., & Mukhamad, E. O. (2025). Which is Better : E-Book or Printed Book ? A Meta- Analysis of Educational Materials in Language Learning. 26(3).

Meliyanti, A., Wilujeng, I., & Kuswanto, H. (2024). Profile of Problem-Solving Ability for High School Students : Context of Using PBL-Based Physics Learning Media on Global Warming. 10(11), 8996–9002. https://doi.org/10.29303/jppipa.v10i11.6007

Mohamed, D. A., Margeni, A., & Ali, H. (2024). E ff ectiveness of a Pop-Up Story-Based Program for Developing Environmental Awareness and Sustainability Concepts among First-Grade Elementary Students.

Nisa, R., & Maesaroh. (2022). Analisis Buku Ajar Biologi SMA Kelas XI Materi Sistem Peredaran Darah dan Sistem Endokrin. 7(1), 61–67.

Nugraheni, E. A., & Marianti, A. (2022). The Bacteria Material E-Pocket Book to Improve Learning Outcomes and Motivation and Curiosity of Class X Students. 11(2), 212–219.

Nurhikmah, H., Hakim, A., & Wahid, M. S. (2021). Interactive E-Module Development in Multimedia Learning. 13(3).

Perisic, A., Perisic, I., Lazic, M., & Perisic, B. (2023). Heliyon: The foundation for future education, teaching, training, learning, and performing infrastructure - The open interoperability conceptual framework approach. Heliyon, 9(6), e16836. https://doi.org/10.1016/j.heliyon.2023.e16836

Putri, R. K. (2021). Analisis Kebutuhan Pengembangan Petunjuk Praktikum Fisiologi Tumbuhan untuk Pembelajaran Jarak Jauh. Prosiding Seminar Nasional, FITK UIN Jakarta 2021, 19–26.

Qoiriyah, M., & Setyawati, H. (2022). Pengembangan Buku Saku Berbasis Mind Mapping Sebagai Bahan Ajar Biologi pada Materi Sistem Reproduksi untuk Siswa Kelas XI. 10(2), 101–109.

Riduwan. (2016). Skala Pengukuran Variabel Penelitian. Alfabeta.

Safitri, A., & Amintarti, S. (2021). Pengembangan Bahan Ajar Konsep Sistem Peredaran Darah Manusia Biologi SMA Dalam Bentuk Booklet Digital. 3(2).

Saphira, H. V. (2023). The emerging of digital revolution : A literature review study of mobile and Android-based e-pocket book in physics learning. 3(1), 718–726. https://doi.org/10.25082/AMLER.2023.01.020

Spatioti, A. G., & Kazanidis, I. (2022). A Comparative Study of the ADDIE Instructional Design Model in Distance Education. 1–20.

Sugiyono. (2017). Metode Penelitian Kuantitatif, Kualitatif dan R&D. Alfabet.

Taylor, T. A. H., Kemp, K., Mi, M., Lerchenfeldt, S., Taylor, T. A. H., Kemp, K., Mi, M., Lerchenfeldt, S., & Taylor, T. A. H. (2023). Self-directed learning assessment practices in undergraduate health professions education : a systematic review professions education : a systematic review ABSTRACT. Medical Education Online, 28(1). https://doi.org/10.1080/10872981.2023.2189553

Tono, L., Universidade, C., & Campinas, E. De. (2021). Cardiac Cycle Puzzle : Development and Analysis of Students ' Perception of an Online Digital Version for Teaching Cardiac Physiology State-of-the-Art. https://doi.org/10.5753/jis.2021.1879

Yusuf, F. A. (2023). International Journal of Educational Methodology Meta-Analysis : The Influence of Local Wisdom-Based Learning Media on the Character of Students in Indonesia. 9(1).

Zhang, L., Liu, X., & Feng, H. (2023). Development and validation of an instrument for assessing scientific literacy from junior to senior high school. Disciplinary and Interdisciplinary Science Education Research. https://doi.org/10.1186/s43031-023-00093-2

Zidny, R., Solfarina, S., Sari, R., Aisyah, S., & Eilks, I. (2021). Education Sciences: Exploring Indigenous Science to Identify Contents and Contexts for Science Learning in Order to Promote Education for Sustainable Development