3 (1), 2024, 31-40
Pedagogy Review
https://imrecsjournal.com/journals/index.php/pedrev

A Systematic Literature Review of Development Models for Local Wisdom-Integrated Science Learning in Nusa Tenggara, Indonesia

Syarful Annam[1,*], Amalia Syuzita[2], Rosi Pratiwi[2], & Yusuf Sarkingobir[3]
[1]Department of Primary Teacher Education, STKIP Taman Siswa, Indonesia
[2]Master's Program in Science Education, University of Mataram, Indonesia
[3]Department of Enviromental Education, Shehu Shagari University of Education Sokoto, Nigeria

Abstract: This study explores trends in the design and implementation of research and development (R&D) models tailored for science education rooted in local wisdom within the Nusa Tenggara region (NTB and NTT), Indonesia. Utilizing a Systematic Literature Review (SLR) methodology, the research synthesizes findings from 20 pertinent articles published between 2017 and 2023, adhering to specific inclusion and exclusion criteria. Selected studies are indexed in SINTA (levels 1–6) and focus on ethnoscience, local wisdom, and R&D models, while studies outside primary and secondary school science education or predating 2017 were excluded. The review identifies ADDIE (Analyze, Design, Develop, Implement, Evaluate) and 4D (Define, Design, Develop, Disseminate) as the most frequently employed development models, each representing 40% of the analyzed studies. Their popularity stems from their structured processes and adaptability to tight development timelines. Less commonly used models, such as Borg & Gall and Dick & Carey, feature in only 10% of cases, likely due to their complexity and resource demands. Most studies focus on producing contextually relevant teaching materials, such as ethnoscience-based modules, interactive tools, and multimedia resources that incorporate elements of local wisdom. The integration of local cultural knowledge into science learning enhances students' understanding of abstract scientific concepts, cultivates critical thinking, and strengthens cultural appreciation. These findings emphasize the value of culturally responsive approaches in designing science education materials that connect traditional wisdom with contemporary scientific perspectives. In summary, the ADDIE and 4D models are pivotal in fostering culturally relevant science education in Nusa Tenggara. Their practical and systematic frameworks enable the effective integration of regional culture into science curricula, supporting the creation of impactful and contextually aligned educational practices.

Keywords: science learning, local wisdom, ethnoscience, ADDIE model, 4D model, Nusa Tenggara, systematic literature review.

▪ INTRODUCTION

The study of Natural Sciences revolves around exploring phenomena through systematic processes, collectively known as scientific methods. Science education focuses on immersing students in direct experiences to develop skills that enable them to scientifically explore and understand their natural surroundings (Dinatha & Arimbawa, 2018). Local culture and science are deeply interconnected, shaping daily life and human experiences. Communities rich in cultural heritage possess knowledge preserved through generations via customs, rituals, and beliefs that inform their worldview. However, not all of this knowledge aligns with the analytical nature of scientific methods (Ardan, 2019). As such, educational approaches must strive to harmonize local and modern scientific knowledge to foster a comprehensive understanding of the world (Laksana & Widiastika, 2017).

Syarful Annam
Email: syarfulannam16@gmail.com

Received: 30 November 2024
Accepted: 07 January 2025
Published: 10 January 2025

Despite its importance, science education often struggles with low popularity among students. The abstract nature of scientific concepts can be confusing, diminishing students' interest and engagement. To address this, educational materials must connect meaningfully to students' lived experiences and environments. Integrating local wisdom into science curricula offers a compelling solution by grounding learning in familiar contexts, making it more engaging and relatable (Dinatha & Arimbawa, 2018). Local wisdom encompasses cultural values and knowledge shaped by a community's geographical and historical context. Though rooted in specific traditions, these insights often carry universal relevance (Ardan, 2019). Incorporating local wisdom into education creates a culturally attuned learning environment that resonates with students. Local wisdom can form a society with characteristics that are typical of a region so that it can be distinguished from communities from other regions (Rahmatih et al, 2020)

Embedding local wisdom into science education bridges the gap between traditional and modern knowledge systems. This approach nurtures an appreciation for regional culture, which is increasingly threatened by modern influences. Research indicates that integrating local wisdom preserves cultural heritage while enhancing the relevance of educational content (Sar'iyyah et al., 2018). Moreover, it provides students with tangible, real-world examples to better grasp complex scientific concepts (Ardan, 2019). By combining the natural environment and cultural practices into teaching strategies, educators can craft valuable, contextually rich learning experiences. Learning based on local wisdom is expected to create a learning environment and design learning experiences that combine the habits of the surrounding community or culture as part of the learning process. Learning with local wisdom includes the use of various forms of its manifestation in community habits both around the place of residence and around the school environment. Learning based on local wisdom is an effort to realize learning that utilizes the surrounding nature as a learning medium in the contextual learning process as well as the elaboration of examples of concepts or principles in a subject and the context of applying principles or procedures in a subject (Uslan & Abdullah, 2022).

The integration of local wisdom into science education has gained traction in recent years, yet the specific frameworks for designing and implementing such curricula remain underexplored. While many studies highlight the importance of local knowledge in shaping students' scientific understanding, fewer investigations focus on structured development models to achieve this integration. A key research gap lies in evaluating the effectiveness of various development models for embedding local wisdom into science education in Nusa Tenggara.

The ADDIE and 4D models are among the most widely used frameworks in education, valued for their structured and adaptable approaches. However, their application in local wisdom-based science curricula, particularly in Nusa Tenggara, remains insufficiently examined. Comparisons with other models, such as Borg & Gall and Dick & Carey, are also lacking. Addressing these gaps is crucial for optimizing science education that reflects the unique cultural contexts of the Nusa Tenggara region.

Research Questions

This study seeks to address the identified gaps by examining the use of development models in local wisdom-based science education through the following research questions:

1. What are the most commonly used development models for integrating local wisdom into science education in Nusa Tenggara (NTB and NTT)?
2. How do models such as ADDIE, 4D, Borg & Gall, and Dick & Carey compare in their effectiveness for incorporating local wisdom into science curricula?
3. What are the advantages and challenges of using each development model in the context of Nusa Tenggara's local wisdom?
4. How does the integration of local wisdom influence students' understanding of scientific concepts and engagement with science education?

By addressing these questions, this study aims to provide a detailed analysis of the prevalent development models, offering recommendations for improving the integration of local wisdom into science education in the Nusa Tenggara region.

▪ METHOD

Methods

This study adopts a Systematic Literature Review (SLR) approach, defined as a structured process of identifying, evaluating, and synthesizing all relevant research evidence to address a specific research question or topic (Kitchenham, 2009). The SLR method's structured nature facilitates a thorough review and synthesis of existing studies. By adhering to a clearly outlined procedure, the research ensures that its findings are systematic, reproducible, and based on a solid methodological foundation.

Data Sources and Article Selection

Articles included in this study were selected based on carefully defined inclusion and exclusion criteria to guarantee relevance and quality as shown in Table 1. The search for relevant studies was conducted using electronic databases, ensuring access to peer-reviewed, high-quality publications. Keywords, including "local wisdom," "ethnoscience," "science education," and "Nusa Tenggara," were applied in different combinations to locate pertinent research. Articles meeting the inclusion criteria underwent detailed review and analysis, focusing on extracting data about the development models used in local wisdom-oriented science education.

Table 1. Inclusion and exclusion criteria

Inclusion criteria	1. Articles searched for published in 2017-2023 2. Articles indexed in SINTA 1-6 3. Research topics: ethnoscience, local wisdom, Nusa Tenggara (NTB and NTT) 4. The method of the articles searched for is the Research and Development (R&D) method
Exclusion criteria	1. Literature related to science learning in elementary and secondary schools 2. Literature from 2015-2023 publications

Data Analysis

The selected articles were analyzed through a combination of qualitative and quantitative descriptive methods. Qualitative analysis identified patterns and trends in the application of development models and evaluated how local wisdom was integrated into science education frameworks. Quantitative analysis calculated the frequency of specific development models, presenting results through percentages and visual aids, such as charts and diagrams.

Ethical Considerations

The study adhered to ethical standards throughout the review process. All referenced materials were properly cited, and no proprietary or unpublished data were included without authorization. By using predefined criteria and involving multiple reviewers, the researchers minimized bias in article selection and analysis.

▪ RESULT AND DISCUSSION

Based on the analysis conducted according to the inclusion and exclusion criteria, 20 articles were obtained that were eligible for analysis regarding the study of the application of science learning model design in local wisdom-based learning development research in Nusa Tenggara (west and east). The results of the article review that have been conducted can be seen in table 2.

Table 2. Results of analysis of local wisdom articles of nusa tenggara

No	Author	Title	City	Model
1	Kristina Novita Ule , Yohanes Nong Bunga , Yohanes Bare	*Pengembangan Modul Pembelajaran Biologi Berbasis Jelajah Alam Sekitar (JAS) Materi Ekosistem Taman Nasional Kelimutu (TNK) SMA Kelas X.*	Ende (NTT)	4D
2	Dek Ngurah Laba Laksana dan I Gede Widiastika	*Pengembangan Multimedia Pembelajaran Tematik Sekolah Dasar Berbasis Budaya Lokal Masyarakat Flores*	Flores (NTT)	ADDIE
3	Nurfidianty Annafi, Sry Agustina	*Pengembangan Model Pembelajaran Project Based Learning (PBL) Berbasis Kearifan Lokal Untuk Mempersiapkan Calon Pendidik Yang Berbudaya*	Bima (NTB)	Dick & Carey
4	Atabikrifki, M. Agus Martawijaya, Jasruddin	*Pengembangan Buku Siswa Fisika Berbasis Kearifan Lokal (Maja Labo Dahu) Di Man 1 Kota Bima*	Bima (NTB)	4D
5	Andam Surianty Ardan	*Pengembanagan Perangkat Pembelajaran Biologi Berbasis Kearifan Lokal Timor Untuk Meningkatkan Pengetahuan Lingkungan Pada Topik Keanekaragaman Hayati Kelas X Sma*	Pulau Timor (NTT)	3D (mengadopsi dari model 4D)
6	Anak Agung Ayu Trisna Handayani, Yayuk Andayani, Yunita Arian Sani Anwar	*Pengembangan LKPD IPA SMP Berbasis Etnosains Terintegrasi Culturally Responsive Transformative Teaching (CRTT)*	Lombok (NTB)	4D
7	Rabiatul Adawiyah, Yayuk Andayani, Lalu	*Pengembangan Modul Kimia Etnosains Terintegrasi Model Culturally Responsive*	Lombok (NTB)	ADDIE

No	Author	Title	City	Model
	Rudyat Telly Savalas	*Transformative Teaching (CRTT)*		
8	Nining Sar'iyyah, Adi Neneng Abdullah, Chatarina Novianti	*Model ADDIE Berbasis Kearifan Lokal Ende-Lio Untuk Meningkatkan Kualitas Perkuliahan Desain Pembelajaran Ipa Pada Mahasiswa Pgsd Uniflor*	Flores (NTT)	ADDIE
9	Ngurah Mahendra Dinatha	*Pengembangan Lembar Kerja Siswa P4 Interaktif Mata Pelajaran IPA Terpadu Untuk Siswa SMP Berbasis Budaya Lokal Masyarakat Ngada Flores*	Flores (NTT)	ADDIE
10	Muhammad Shohibul Ihsan, dan Muhammad Zainul Pahmi	*Pengembangan Modul IPA Interaktif Berbasis Etnosains Untuk Meningkatkan Kemampuan Berpikir Kritis Siswa*	Lombok Timur (NTB)	ADDIE
11	Muhammad Irwansyah	*Pengembangan LKS Biologi Berbasis Pendidikan Abad 21 Terintegrasi Kearifan Lokal Mbojo Pada Siswa SMA*	Bima Mbojo (NTB)	4D
12	Nova Kurnia , dan Rizki Nugrahani	*Pengembangan Perangkat Proyek Keamanan Pangan Berbasis Etnosains Lombok*	Lombok (NTB)	Aadaptasi dari Walter Dick dan Lou Carey
13	Eris Nurhayati , Yayuk Andayani, Aliefman Hakim	*Pengembangan E-Modul Kimia Berbasis STEM Dengan Pendekatan Etnosains*	Lombok Barat (NTB)	3D (Modifikasi model 4D)
14	Agnes Rofina D. Lidi, Sri Sulystyaningsih N.D.Tiring, M.A.Yohanita Nirmalasari	*Pengembangan Unit Kegiatan Belajar Mandiri (UKBM) Kimia Berbasis Kearifan Lokal Daerah Kabupaten Sikka Melalui Model Discovery Learning Pada Materi Asam Basa Kelas XI SMA Negeri 1 Maumere*	Sikka (NTT)	Borg and Gall (Modifikasi)
15	Isabel Coryunitha Panis, Maria Ursula Jawa Mukin, Yosefa Lama Uran	*Pengembangan Modul Pembelajaran Fisika Berbasis Kearifan Lokal Pada Alat Musik Tradisional Untuk Meningkatan Pemahaman Konsep*	NTT	Borg and Gall (Modifikasi)
16	Ngurah Mahendra Dinatha, Maria Yuliana Kua	*Pengembangan Modul Praktikum Digital Berbasis Nature Of Science (NOS) Untuk Meningkatkan Higher Order Thinking Skill (HOTS)*	Ngada (NTT)	ADDIE
17	Imelda Uma Riwu, Dek Ngurah Laba Laksana,	*Pengembangan Bahan Ajar Elektronik Bermuatan Multimedia Pada Tema Peduli Terhadap Makhluk Hidup Untuk*	Ngada (NTT)	ADDIE

No	Author	Title	City	Model
	Konstantinus Dua Dhiu	*Siswa Sekolah Dasar Kelas IV Di Kabupaten Ngada*		
18	Maria Angelina Seso, Dek Ngurah Laba Laksana, Konstatinus Dua	*Pengembangan Bahan Ajar Elektronik Bermuatan Multimedia Untuk Siswa Sekolah Dasar Kelas IV Di Kabupaten Ngada*	Ngada (NTT)	ADDIE
19	Wahyuni Purnami, Fransiska Jaiman Madu, Wigbertus Gaut Utama	*Pengembangan Modul Pendidikan Lingkungan Hidup Di Sekolah Dasar*	Manggarai (NTB)	3D (Modifikasi model 4D)
20	Aska Muta Yuliani, Muhammad Irham	Development Of Sumbawa Local Wisdom-Based Mathematics Module	Sumbawa (NTB)	4D

The article is reviewed to see the most frequently used development models in research. Based on table 1 above, there are several development models used in research including 4D, ADDIE, Borg and Gall, and Dick and Carey. The results of the review are presented in the form of a diagram which can be seen in diagram 1.

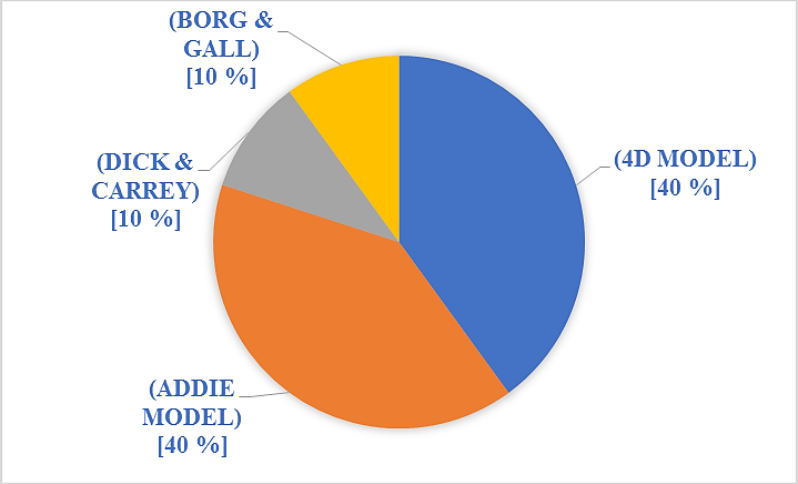

Figure 1. Percentage of development models in science learning in Nusa Tenggara

Based on figure 1, the most frequently used development models are ADDIE and 4D with a percentage of 40% each, while the Dick & Carey and Borg & Gall models are each 10%. The Borg & Gall model is rarely used because this model requires a relatively long time, because the procedure is relatively complex and requires quite large financial resources (Maydiantoro, 2021). ADDIE and 4D model is most frequently used because it has systematic stages and is the most effective in developing current products (Priyantini et al, 2021). The ADDIE Development Model consists of 5 stages, namely Analyze, Design, Develop, Implementation and Evaluation. While the 4D model has the stages Define, Design, Develop and Disseminate. The advantage of the 4D model is that it does not require a relatively long time, because the stages are relatively not too complex (Maydiantoro, 2021).

The study reviewed 20 articles selected through strict inclusion and exclusion criteria, focusing on the use of science learning design models in local wisdom-based education across West and East Nusa Tenggara. The analysis identified four main development models: ADDIE, 4D, Borg & Gall, and Dick & Carey. Table 2 in the original manuscript summarizes the results.

The ADDIE and 4D models emerged as the most frequently employed, each representing 40% of the studies. Their popularity stems from their structured, systematic frameworks, which are adaptable and efficient for educational product development. In contrast, the Borg & Gall and Dick & Carey models, appearing in only 10% of studies each, are less favored due to their complexity, high resource demands, and longer implementation timelines. This finding aligns with Maydiantoro (2021), who highlighted the resource-intensive nature of the Borg & Gall model, given its iterative and comprehensive design.

Trends in Model Application and Role of Local Wisdom

The dominance of the ADDIE and 4D models highlights their strengths in local wisdom-based learning. ADDIE's five phases Analyze, Design, Develop, Implement, and Evaluate offer a clear, adaptable framework for creating culturally relevant learning materials. Similarly, the 4D model (Define, Design, Develop, Disseminate) provides a streamlined yet robust process for developing high-quality educational tools.

These models have been effectively applied to create diverse teaching resources, such as ethnoscience modules, culturally responsive strategies, and multimedia tools integrating local wisdom. By connecting abstract scientific concepts to students' cultural and environmental contexts, these approaches enhance comprehension and engagement.

Local wisdom-based education bridges students' cultural heritage with modern science, enriching both comprehension and critical thinking. The reviewed studies illustrate how integrating indigenous practices, local biodiversity, and traditional ecological knowledge into curricula makes science relatable and engaging. Such approaches foster cultural appreciation and contextualize scientific principles, providing students with a richer educational experience.

While ADDIE and 4D are preferred for their simplicity and efficiency, Borg & Gall and Dick & Carey offer comprehensive frameworks better suited to large-scale projects. For instance, Borg & Gall involves extensive planning, validation, and implementation, making it ideal for ambitious initiatives but less practical for limited resources or time. Similarly, Dick & Carey's systematic design approach is effective but requires significant expertise and funding. For resource-constrained settings like Nusa Tenggara, the practicality of ADDIE and 4D stands out, though adapting the other models could unlock their potential for local wisdom-based projects.

Challenges and Future Research Directions

The findings underscore the importance of structured development models in embedding local wisdom into science education. Training educators in models like ADDIE and 4D is crucial for creating culturally relevant, scientifically robust materials. Policymakers should allocate resources to support teacher training, research, and the production of culturally responsive educational tools. This approach aligns with goals like sustainable development and preserving cultural heritage, empowering students to address local challenges while celebrating their cultural roots.

Despite its promise, local wisdom-based education faces challenges, including a lack of standardized integration guidelines and resource limitations. Comprehensive frameworks are needed to guide educators, while funding and expertise remain barriers to widespread adoption. Future research should focus on scalable, adaptable models and explore digital tools like virtual reality for immersive, culturally rich learning experiences. Collaborative efforts involving educators, researchers, and communities will be key to preserving and integrating local wisdom into education respectfully and effectively.

▪ CONCLUSION

This study systematically examined the use of development models in local wisdom-based science education in Nusa Tenggara, Indonesia. The findings emphasize the widespread adoption of the ADDIE and 4D models, valued for their structured, efficient methodologies. These models have proven effective for designing culturally relevant learning resources, such as modules, books, and multimedia tools, that seamlessly integrate local wisdom into science curricula. By bridging traditional knowledge with scientific concepts, these approaches not only enhance students' understanding of abstract ideas but also foster an appreciation for their cultural heritage.

Although the ADDIE and 4D models dominate in practice, the study highlights the distinct benefits of other frameworks, such as Borg & Gall and Dick & Carey. These models offer comprehensive and iterative processes, making them suitable for large-scale or specialized projects. However, their lower adoption is attributed to the complexity, extended timelines, and significant resource requirements they entail. This suggests that selecting a development model should be context-sensitive, factoring in available resources, time constraints, and specific educational goals.

Integrating local wisdom into science education holds profound educational and cultural implications. It creates a contextually relevant teaching approach that enhances scientific literacy while safeguarding and promoting indigenous knowledge. In regions like Nusa Tenggara, where local wisdom is deeply intertwined with community identity, aligning science education with cultural contexts can produce more engaging and impactful learning experiences. This integration not only enriches students' educational journeys but also supports the preservation of intangible cultural heritage.

However, this promising approach faces several challenges. Key barriers include the lack of standardized guidelines for embedding local wisdom into curricula, limited resources for creating culturally relevant materials, and insufficient teacher training in applying development models. Addressing these issues requires a concerted effort among educators, policymakers, and researchers. Investment in teacher professional development and funding for research and educational material production is crucial to facilitate broader adoption.

▪ REFERENCES

Adawiyah, R., Andayani, Y., & Savalas, L. R. T. (2022). *Pengembangan modul kimia etnosains terintegrasi model culturally responsive transformative teaching (CRTT).* Journal of Classroom Action Research, 4(4).

Annafi, N., & Agustina, S. (2018). *Pengembangan model pembelajaran Project Based Learning (PBL) Berbasis kearifan lokal untuk mempersiapkan calon pendidik yang berbudaya.* Quantum: Jurnal Inovasi Pendidikan Sains, 9(1), 1-10.

Atabikrifki, A., Martawijaya, M. A., & Malago, J. D. *Pengembangan buku siswa fisika berbasis kearifan lokal (Maja Labo Dahu) di Man 1 Kota Bima.* Jurnal Sains Dan Pendidikan Fisika, 14(3), 319169.

Ardan, A. S. (2015). *Pengembangan perangkat pembelajaran biologi berbasis kearifan lokal timor untuk meningkatkan pengetahuan lingkungan pada topik keanekaragaman hayati kelas X SMA.* Media Sains: Jurnal Matematika & Ilmu Pengetahuan Alam, 19, 33-39.

Dinatha, N. M., & Arimbawa, P. (2018). *Pengembangan lembar kerja siswa p4 interaktif mata pelajaran ipa terpadu untuk siswa smp berbasis budaya lokal masyarakat ngada flores.* Journal of education technology, 2(4), 186-191.

Dinatha, N. M., & Kua, M. Y. (2019). *Pengembangan modul praktikum digital berbasis nature of science (NOS) untuk meningkatkan higher order thinking skill (HOTS).* Journal of Education Technology, 3(4), 293-300.

Handayani, A. A. A. T., Andayani, Y., & Anwar, Y. A. S. (2022). *Pengembangan LKPD IPA SMP berbasis etnosains terintegrasi culturally responsive transformative teaching (CRTT).* Journal of Classroom Action Research, 4(4).

Ihsan, M. S., & Pahmi, M. Z. (2022). Development of etnoscience based interactive science module to improve student's critical thinking ability. Jurnal Inovasi Pendidikan dan Sains, 3(3), 83-88.

Irwansyah, M., Ferawati, F., & Suryani, E. (2019). *Pengembangan LKS biologi berbasis pendidikan abad 21 terintegrasi kearifan lokal mbojo pada siswa SMA.* Jurnal Biotek, 7(2), 11-121.

Kitchenham, B. (2009). 'Systematic literature reviews in software engineering-A systematic literature review', Information and Software Technology. Elsevier B.V., 51(1), pp. 7–15. doi: 10.1016/j.infsof.2008.09.009.

Kurnia, N., & Nugrahani, R. (2022). *Pengembangan perangkat proyek keamanan pangan berbasis etnosains lombok.* Jurnal Inovasi Pendidikan Kimia, 16(2), 104-110.

Laksana, D. N. L. (2017). *Pengembangan multimedia pembelajaran tematik sekolah dasar berbasis budaya lokal masyarakat Flores.* Jurnal Pendidikan Dasar Nusantara, 2(2).

Lidi, A. R., Tiring, S. S. D., & Nirmalasari, M. Y. (2020). *Pengembangan unit kegiatan belajar mandiri (UKBM) kimia berbasis kearifan lokal daerah kabupaten sikka melalui model discovery learning pada materi asam basa kelas XI SMA Negeri 1 Maumere.* SPIN Jurnal Pendidikan Kimia, 1(1).

Maydiantoro, A. (2021). *Model-model penelitian pengembangan* (research and development). Jurnal pengembangan profesi pendidik indonesia (JPPPI), 1(2), 29-35.

Nurhayati, E., Andayani, Y., & Hakim, A. (2021). *Pengembangan E-Modul kimia berbasis STEM dengan pendekatan etnosains.* Chemistry Education Practice, 4(2), 106-112.

Panis, I. C., Mukin, M. U. J., & Uran, Y. L. (2023). *Pengembangan modul pembelajaran fisika berbasis kearifan lokal pada alat musik tradisional untuk meningkatan pemahaman konsep.* JKTP: Jurnal Kajian Teknologi Pendidikan, 6(1), 050-059.

Purnami, W., Madu, F. J., & Utama, W. G. (2017). *Pengembangan modul pendidikan lingkungan hidup di sekolah dasar.* Jurnal Pendidikan dan Kebudayaan Missio, 9(2), 174-180.

Rahmatih, A. N., Maulyda, M. A., & Syazali, M. (2020). *Refleksi nilai kearifan lokal (local wisdom) dalam pembelajaran sains sekolah dasar: Literature review*. Jurnal Pijar MIPA, 15(2), 151–156.

Riwu, I. U., Laksana, D. N. L., & Dhiu, K. D. (2018). *Pengembangan bahan ajar elektronik bermuatan multimedia pada tema peduli terhadap makhluk hidup untuk siswa sekolah dasar kelas IV di Kabupaten Ngada.* Journal of Education Technology, 2(2), 56-64.

Sar'iyyah, N., Abdullah, A. N., & Novianti, C. (2018). *Model ADDIE berbasis kearifan lokal ende-lio untuk meningkatkan kualitas perkuliahan desain pembelajaran IPA.* Journal of Elementary School (JOES), 1(2), 175-181.

Seso, M. A., Laksana, D. N. L., & Dua, K. (2018). *Pengembangan bahan ajar elektronik bermuatan multimedia untuk siswa sekolah dasar kelas Iv Di Kabupaten Ngada.* Journal of Education Technology, 2(4), 177-185.

Ule, K. N., Bunga, Y. N., & Bare, Y. (2021). *Pengembangan modul pembelajaran biologi berbasis jelajah alam sekitar (JAS) materi ekosistem taman nasional kelimutu (TNK) SMA Kelas X.* Diklabio: Jurnal Pendidikan dan Pembelajaran Biologi, 147-156.

Uslan & Abdullah, N. 2022. *Pembelajaran ipa berasaskan pengetahuan tempatan tanaman faloak (Sterculia quadrifida R.Br) sebagai Solusi pembelajaran IPA di Sekolah Dasar.* Jurnal Pendidikan Dasar Flobamorata, 3(2): 331-337.