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The Effectiveness of Contextual-Approach Science E-Module Integrated with Local Wisdom on Pressure Topic to Improve Critical Thinking Skills

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Abstract

Integrating local wisdom into science materials is a crucial effort to create contextual learning and instill noble values and a sense of cultural appreciation. Each region requires education tailored to its unique characteristics for effective educational development, necessitating a contextual approach. Incorporating local wisdom values is an essential step in this process. This study aims to develop a contextual science e-module that integrates local wisdom to enhance students' critical thinking skills. The research employed a Research and Development (R&D) approach, specifically using the Sugiyono model. The results indicated that the e-module received a validation score of 97% from material experts, categorized as very valid, and 96% from media experts, also categorized as very valid. The practicality test assessment yielded a value of 98% and was rated as very practical, and student feedback resulted in a score of 98%, which was deemed very good. Additionally, the effectiveness of the e-module was evaluated through the N-Gain score for critical thinking skills, which averaged 0.83, placing it in the high category. The N-Gain value for students' critical thinking skills was 89.95%, classified as effective. Based on the validation, readability, practicality, and effectiveness assessments, the contextual-approach science e-module integrated with local wisdom is deemed feasible as a learning resource.

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INTRODUCTION

The Merdeka Curriculum is a learning approach designed to give students the freedom to develop their potential and creativity. The Pancasila Student Profile within the Merdeka Curriculum reflects the goals of national education. It intends to cultivate students to be devout in their faith, possess noble character, and shape healthy, knowledgeable, capable, creative, independent, engaged, democratic, and responsible citizens. The Pancasila Student Profile encompasses six dimensions: 1) belief in and reverence for God Almighty and possessing noble character, 2) independence, 3) collaboration, 4) critical thinking, and 5) creativity.

The Pancasila Student Profile aligns with the scientific attitudes emphasized in the Natural Sciences (IPA). A scientific attitude is essential when conducting experiments, encompassing traits like curiosity, the pursuit of reasons behind processes, critical, objective, open-minded, unbiased, skeptical, diligent, patient, humble, anti-authoritarian, creative, and honest thinking (Riswakhyuningsih, 2022). According to the Ministry of Education and Culture's guidelines, the Learning Achievements (*Capaian Pembelajaran*/CP) for junior high school science subjects should support student character development in line with the Pancasila Student Profile, particularly in fostering critical thinking skills.

Science learning involves critical thinking skills essential for solving problems and analyzing natural phenomena (Wulandari et al., 2023). Students are trained to identify assumptions, evaluate arguments, and make decisions based on logical and rational thinking. These critical thinking skills help students develop emotional intelligence, the courage to face challenges, and the capacity to make sound decisions (Rofi'ud et al., 2023). Additionally, science learning encourages creative thinking as students are prompted to recognize unconventional relationships between concepts, discover new solutions, and generate innovative ideas. These abilities enhance students' character by fostering independence, encouraging unconventional thinking, and equipping them to adapt to changes (Ramdani et al., 2020).

The Merdeka Curriculum emphasizes a student-centered learning process to enhance students' knowledge and shape their characters (Utari et al., 2023). According to this curriculum, science education aims to help students master scientific concepts and principles. Appropriate teaching materials, such as an e-module, are essential to foster critical thinking skills and improve character.

An e-module is structured electronic teaching materials, making it easily accessible anytime and anywhere, thus facilitating independent learning (Iman et al., 2023). The advantages of using e-modules include reducing paper usage and the ability to display animations and learning videos on a computer or laptop, which can engage students more effectively (Mutmainnah et al., 2021). Advances in technology also allow e-modules to be accessed via smartphones, making them highly accessible at any time and place (Zinnurain, 2021). For e-modules to be effective, they must be contextual, incorporating the surrounding environment to enhance students' understanding of the material. Integrating local wisdom into teaching materials is a way to ensure that science education is relevant and connected to students' environments.

Integrating local wisdom into science materials is crucial for creating contextual learning, instilling noble values, and fostering a sense of appreciation for regional culture (Rahmatih et al., 2020). This approach is also emphasized in the Regulation of the Minister of Education and Culture No. 81A of 2013, which addresses curriculum implementation. It states that education must align with the characteristics of each region to support educational development, necessitating a contextual approach (Nasir, 2013). Therefore, incorporating local wisdom values is an essential step in this process.

One effective approach to facilitate student learning is to use contextual science learning media by integrating local wisdom (Jufrida et al., 2019). Contextual learning media incorporating local wisdom is a form of culturally grounded education (Anzelina, 2023). Culture encompasses a complex and intricate set of elements, including knowledge, beliefs, arts, laws, morals, customs, and habits individuals develop within their societal roles.

Bima, located in the eastern part of NTB, is rich in cultural traditions and local wisdom, including the traditional game of bedi o,o, or

pletokan (Aksa & Nurhayati, 2020). This traditional game was widely popular before modern technology reached Bima and continued to be a favorite among children. The game of *bedi o,o* can be an engaging tool for teaching science concepts, leveraging local cultural elements to enhance learning.

Bedi o,o is a traditional game in which players use a tool made from small cylindrical bamboo to shoot projectiles (Nuriyah et al., 2021). The projectiles, or "bullets," are typically made from moistened paper. The bamboo for shooting is generally around 30 cm long with thick walls (Dian et al., 2021). A bamboo pusher, which has one end fashioned from bamboo roots or intentionally widened bamboo, is used to push the paper bullets. The length of the bamboo pusher that enters the hole is reduced by 2 cm from the end to prevent the paper wad from falling out during the push. A unique feature of this traditional game is that it can produce sound energy (Ali *et al.*, 2021).

Bedi o,o is one local wisdom that can be further investigated regarding its mechanism of use. A brief explanation of *bedi o,o* indicates fairly simple physics principles and can be used as examples in the learning process. Therefore, the authors are highly motivated to research the effectiveness of integrating local wisdom, particularly on the pressure materials, to improve students' critical thinking skills.

METHODS

The type of research employed is Research and Development (R&D) development research. R&D is a research method used to create specific products and assess their effectiveness (Sugiyono, S., & Lestari, 2021). The design utilized in this study follows the Sugiyono model, which comprises ten stages simplified to meet the researchers' needs. These stages are (1) Data collection and analysis; (2) Media design; (3) Initial product development; (4) Initial field trials; (5) Revision based on initial field trial results; (6) Main field trials; (7) Revision of the operational products; (8) Field implementation tests; (9) Final product refinement; (10) Dissemination and implementation.

The above explanation indicates that the R&D steps can be simplified and adapted based on the researchers' needs, available time, and originality. Due to limitations in time and resources, the research up to step 7 is often sufficient to test the validity and feasibility of the developed media. Steps 8 and 9, which involve large-scale field tests and revisions, are costly, and therefore, researchers, particularly those working on theses or dissertations, typically limit their work to step 7. Dissemination and implementation are achieved by publishing articles in a journal. The stages of Sugiyono's research procedure are illustrated in Figure 1.

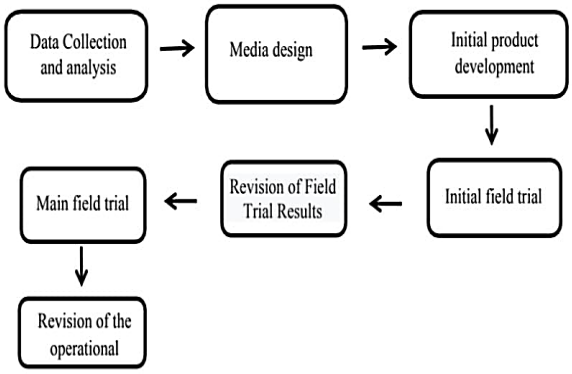

Figure 1. The Procedure of Development

The data searching and collection stages were conducted to identify the needs and describe the conditions of the science teaching and learning process at SMP Negeri 1 Lambitu, Bima Regency, West Nusa Tenggara Province. The findings revealed that educators commonly used only printed books and student worksheets as learning media.

During the planning stage, various types of information about learning multimedia that could address the identified problems were collected. Researchers gathered information from journals, books, and the Internet. The researchers proposed a solution to address the issues at SMP Negeri 1 Lambitu: creating a science e-module with a contextual approach that integrates local wisdom.

After completing the observations and planning, the next step is to design and develop a contextual science e-module using the Canva application that integrates local wisdom into the pressure material. The reference sources for the development of this e-module are drawn from materials that include Basic Competencies, Competency Standards, Competency Achievement

Indicators, and Learning Objectives in accordance with the Merdeka Curriculum.

In the initial field trial stage, the assessment focuses on whether the design of the science e-module, as a supporting teaching material for science learning, is rationally better and more effective than the previous learning media. This was done by seeking evaluations from experienced experts. The design validation included four aspects: content, presentation, graphics, and language feasibility.

The initial product revision stage was conducted after receiving assessments from experts. All input, criticism, suggestions, and recommendations from experts and experienced teachers were recorded and used to improve the design of the product being developed. Validation from these experts helped identify the product's weaknesses, which were then addressed by refining the design. The revised product is declared valid upon receiving positive feedback and is worthy of proceeding to the next stage: product testing.

After that, the finished product was tested in learning activities. This trial aimed to gather information about the developed e-module. The contextual science e-module, which integrates local wisdom into the pressure material, was tested in two ways: practicality tests and small group trials.

Product revisions were made based on the initial trial results. The field trial provided qualitative information about the program or product being developed. If weaknesses are identified during the product trial with students, additional evaluations may be necessary to address these issues. Product revisions were carried out to address any remaining weaknesses and refine the product before its final implementation.

RESULTS AND DISCUSSION

The Characteristics of the Developed E-Module

The contextual science e-module, which integrates local wisdom on pressure material, was created using the Canva application. This e-module was designed to meet students' needs as a learning resource for pressure-related topics. The e-module includes the following sections: (1) Cover; (2) Foreword; (3) Content and technical use of the e-module; (4) Characteristics of the e-module; (5) Pancasila Student Profile and its characteristics; (6) Core competencies and basic competencies; (7) Table of contents; (8) List of images; (9) Concept map; (10) Material content; (11) Summary; (12) Evaluation; (13) Bibliography. According to Laili et al. (2019), E-modules should be used to improve understanding of a material or subject. The illustration of the development is presented in Figure 2.

Figure 2. The E-Module Display

The contextual-approach science e-module integrated with local wisdom features lesson content interwoven with traditional community games, highlighting the connection between local wisdom and scientific principles. Unlike previous e-modules, which rarely link material to a contextual approach integrating local wisdom, this e-module offers a distinctive approach. The contextual approach in the e-module is illustrated through the phenomenon of waterfalls, which relates to the topic of liquid pressure. Additionally, the integration of local wisdom is showcased through the traditional game of bedi o,o, which connects to the topic of solid pressure.

This science e-module also includes videos designed to provide additional explanations related to the subject matter. These videos offer an alternative for students who may feel disengaged from reading, allowing them to switch to watching and listening. The incorporation of videos is intended to enhance student engagement and appeal.

Furthermore, the e-module aims to serve as a comprehensive learning guide, enabling students to study independently in line with 21st-century learning criteria. The videos are clickable, encouraging students to utilize technology as part of

their learning process. Designed as a supportive tool for education, this e-module aligns with recommendations from Suttrisno & Rofi'ah (2023), which suggested that a contextual approach integrating local wisdom can effectively support the achievement of learning objectives.

The Effectiveness of the Developed E-Module In Improving Students' Critical Thinking Skills

Based on the pretest and posttest results, there was a noticeable improvement before and after the treatment was administered. The average scores after using the e-science module increased significantly, indicating that the e-science module effectively enhanced students' critical thinking skills. The average percentage for each indicator of critical thinking skills is detailed in Table 1.

Table 1. The Pretest and Posttest Results on Each Indicator of Critical Thinking Skills

Indicator	Pretest Average	Category	Posttest Average	Category
Providing simple explanations	42	Low	90	Very High
Building basic skills	41	Low	93	Very High
Concluding	38	Low	89	Very High
Providing advanced explanations	27	Low	83	High
Strategies and tactics	27	Low	80	High

The increase in critical thinking skills is particularly evident from comparing the pretest and posttest results across several indicators, including providing simple explanations, building basic skills, drawing conclusions, making further explanations, and employing strategies and tactics. The indicator for providing straightforward explanations comprises three sub-indicators: focusing, analyzing, and asking and answering questions.

The science e-module, which utilizes a contextual learning approach integrating local wisdom, is closely related to the indicator of providing simple explanations. This approach simplifies learning materials for students by incorporating familiar contexts, such as the traditional game of bedi o,o and natural phenomena like waterfalls. According to Ketut et al. (2021), this contextual approach makes science concepts more concrete and relevant, helping students connect theory to real-life experiences, thereby making explanations simpler and easier to understand. Cristiana et al. (2021) also noted that contextual-based learning links educational materials to students' real lives, indirectly engaging them in solving their problems. Regarding the indicator of providing simple explanations, the percentage of students in the low category decreased from 42% before treatment to 10% after treatment. In comparison, those in the very high category increased from 0% to 90%. This represents a 48% improvement in critical thinking skills related to providing simple explanations due to the intervention.

In the indicator of basic skills building, the percentage of students in the low category decreased from 41% before treatment to 7% after treatment. In comparison, those in the very high category increased from 0% to 93%. This represents a 52% improvement in students' critical thinking skills related to basic skills building following the intervention. This improvement demonstrates that students have effectively developed their basic skills. The basic skills-building indicator consists of two sub-indicators: evaluating the credibility of sources and observing and analyzing the results of observations. In the e-science module, students engaged in practical activities, such as observing the phenomenon of waterfalls and participating in traditional bedi o,o games. Through these activities, students learned to describe observations in detail, discuss their findings, and express opinions, which stimulated critical thinking. Fauzan et al. (2022) found that group discussion methods effectively enhance students' critical thinking skills because they provide opportunities for social interaction, engagement, and positive member interactions, improving individual quality. Observations train students to focus on details and build basic skills by identifying key elements of a phenomenon, such as the impact of bamboo length and surface area on pressure in the bedi o,o game, and the effect of waterfall height on pressure. Agus (2019) also

highlighted that contextual methods effectively improve students' critical thinking and process skills.

In the previous assessment, 38% of students were categorized as having low critical thinking skills, while 89% were in the very high category following the intervention. This represents a 51% improvement in students' critical thinking skills after the treatment, demonstrating their enhanced ability to make sound conclusions. The indicator for making further explanations includes three sub-indicators: making and considering deductive results, making and considering inductive results, and making and evaluating decision values. The science e-module, developed using a contextual approach and integrating local wisdom, includes group discussion activities that train students to consider various viewpoints and refine their conclusions based on feedback from other groups. Research by Fauzan et al. (2022) indicated that group discussions effectively improve students' critical thinking skills. These discussions provide students with social space to express their ideas, encourage their involvement, and foster positive interactions among group members, thereby enhancing individual quality. During the activities, each group was tasked with creating a bedi o,o and a waterfall model and analyzing how the concept of pressure applies to these traditional games and the waterfall phenomenon. This practical analysis allowed students to understand how the concept of pressure is applied in everyday life. According to research by Muhartini et al. (2023), contextual-based learning helps students connect the knowledge they acquire with real-life situations. This approach aids in developing critical thinking skills, ultimately helping students better understand the concepts they are learning.

In the indicator for making further explanations, 27% of students were initially in the low category, but this increased to 83% in the high category following the intervention. This represents a 56% improvement in students' critical thinking skills, demonstrating that the e-module enhances critical thinking among students at SMP Negeri 1 Lambitu. The indicator for making further explanations comprises two sub-indicators: defining terms and identifying assumptions. The e-module, which uses a contextual approach and incorporates local wisdom through activities such as the bedi o,o game and the waterfall phenomenon, helps students better understand the relevant local context. According to Nia et al. (2022), teaching materials based on contextual modules effectively improve students' critical thinking skills and enhance their learning activities across cognitive, affective, and psychomotor aspects. This approach facilitates a deeper understanding of pressure concepts by relating them to familiar real-life contexts. Students can more effectively explain how pressure operates in these contexts by linking pressure concepts with practical examples like the bedi o o game and the waterfall phenomenon. Contextual-based learning helps students connect the knowledge they acquire with real-life situations (Muhartini et al., 2023), making it easier for them to provide detailed explanations based on their everyday experiences.

In the indicators for strategy and tactics, 27% of students were initially in the low category, but this increased to 80% in the high category following the intervention. This represents a 53% improvement in students' critical thinking skills, demonstrating that they are now better at developing effective strategies and tactics. The strategy and tactics indicators focus on deciding on appropriate actions. Using a contextual approach has encouraged the students to solve specific problems during experiments, such as understanding how the height of a waterfall affects pressure. Planning actions are closely linked to problem-solving skills, which are strongly connected to critical thinking skills. Implementing contextual-based learning can enhance these skills (Syeriduni, 2020). This approach allows students to refine their critical thinking abilities by identifying suitable solutions and deciding on appropriate actions.

The developed e-module was deemed very valid and subsequently implemented in the learning process for class VIII on pressure topic at SMP Negeri 1 Lambitu. This implementation phase aimed to test the effectiveness of the e-module in enhancing students' critical thinking skills by administering critical thinking ability test questions.

Students' critical thinking skills were assessed based on both their knowledge and competencies.

Table 2. The N-Gain Score Results

	N	Minimum	Maximum	N-Gain Mean	Category
N-Gain Score	20	39.55	89.95	0.83	High

Based on Table 2, the N-Gain score for students' critical thinking skills falls into the high category, with a mean value of 0.8347. The percentage of students achieving critical thinking skills in the effective category is 89.95%. This indicates that the contextual science module positively affects students' critical thinking skills. This conclusion is supported by the pretest and posttest results conducted in the experimental class over four meetings. The test comprised 10 essay questions on critical thinking skills related to pressure material. The assessment focused on five indicators: providing simple explanations, building basic skills, making further explanations, developing strategies and tactics, and drawing conclusions. These findings align with Malik's (2021) research, which showed increased critical thinking skills following a contextual approach module as a learning resource. Additionally, local wisdom-based learning has been shown to improve student learning outcomes (Sriyati et al., 2022). Njatrijani (2018) also emphasized that local wisdom is crucial in maintaining cultural sustainability.

CONCLUSION

The contextual science e-module, which integrates local wisdom, effectively enhances students' critical thinking skills. The results from applying the e-module indicate that it significantly impacts students' critical thinking, as evidenced by an N-gain value of 0.83, which falls into the high category.

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REFERENCES

Agus, I. (2019). Efektivitas guided discovery menggunakan pendekatan kontekstual ditinjau dari kemampuan berpikir kritis, prestasi, dan self-efficacy. *Jurnal Riset Pendidikan Matematika*, *6*(2), 120–132. https://doi.org/10.21831/jrpm.v6i2.14517

Aksa, A., & Nurhayati, N. (2020). Moderasi Beragama Berbasis Budaya Dan Kearifan Lokal Pada Masyarakat Donggo Di Bima (Tinjauan Sosio-Historis). *Harmoni*, *19*(2), 338–352. https://doi.org/10.32488/harmoni.v19i2.449

Ali, M., & Aqobah, Q. J. (2021). Permainan Tradisional Betawi untuk Mengembangkan Keterampilan Sosial. *Jpsd*, *6*(2), 151–161.

Annisa Novianti Taufik, Hilda Kristina, Brenda Fajri Gibran, Alfia Sabililah, Syahilda Septiani, Dzul Asfi Warraihanah, Lia Nurmalia, Syofiarni, S., & Oyok Tati Risalah. (2023). Pengembangan E-Book Kontekstual Berorientasi Kearifan Lokal Banten untuk Siswa SMP. *Jurnal Pendidikan Mipa*, *13*(4), 1095–1104. https://doi.org/10.37630/jpm.v13i4.1251

Anzelina, D. E. (2023). Potensi Kearifan Lokal Sumatera Selatan sebagai Basis Media Pembelajaran Kontekstual Biologi SMA. *Journal of Nusantara Education*, *2*(2), 53–63. https://doi.org/10.57176/jn.v2i2.51

Cristiana, D. I., Anjarini, T., & Purwoko, R. Y. (2021). Pengembangan Modul Pembelajaran Ipa Berbasis Kontekstual Materi Suhu Dan Kalor Di Sekolah Dasar. *SITTAH: Journal of Primary Education*, *2*(2), 145–160. https://doi.org/10.30762/sittah.v2i2.3400

Dian, Wijayanti, R., & Muntomimah, S. (2021). Pengaruh Kegiatan Bermain Bambu Pletokan Terhadap Kemampuan. *Jurnal Riset Pendidikan Dan Pembelajaran*, *1*(1), 20–27.

Iman, S. H., Yusuf, M., Abdjul, T., & Odja, A. H. (2023). *Pengembangan E-Modul Kearifan Lokal Berbantuan Aplikasi Flipping Book Pada Materi*

Getaran , Gelombang Dan Bunyi. *9*(November), 294–304.

Jufrida, J., Basuki, F. R., Xena, A., & Pasminingsih, P. (2019). Pengembangan Buku IPA Berbasis Kearifal Lokal Jambi pada Materi Tekanan serta Getaran dan Gelombang. *Indonesian Journal of Science and Mathematics Education*, *2*(3), 287–297. https://doi.org/10.24042/ijsme.v2i3.4353

Kemdikbud. (2022). *Buku panduan capaian hasil asesmen nasional untuk satuan pendidikan*.

Ketut, N., Muliastrini, E., Dwiarwati, K. A., Ganesha, U. P., & Ganesha, U. P. (2021). *Pengaruh Pendekatan Pembelajaran Kontekstual Berbantuan Media Visual Terhadap*. *4*(1).

Laili, I., Ganefri, & Usmeldi. (2019). Efektivitas pengembangan e-modul project based learning pada mata pelajaran instalasi motor listrik. *Jurnal Imiah Pendidikan Dan Pembelajaran*, *3*(3), 306–315. https://ejournal.undiksha.ac.id/index.php/JIPP/article/download/21840/13513

Malik, A. S. (2021). Pengembangan E-Modul Berbantuan Sigil Software Dan Analisis Kemampuan Berpikir Kritis Siswa. *Pasundan Journal of Mathematics Education : Jurnal Pendidikan Matematika*, *11*(Vol 11 No 1). https://doi.org/10.23969/pjme.v11i1.3731

Muhartini, Amril Mansur, & Abu Bakar. (2023). Pembelajaran Kontekstual dan Pembelajaran Problem Based Learning. *Lencana: Jurnal Inovasi Ilmu Pendidikan*, *1*(1), 66–77.

Mutmainnah, Aunurrahman, & Warneri. (2021). Efektivitas Penggunaan E-Modul Terhadap Hasil Belajar Kognitif Pada Materi Sistem Pencernaan Manusia di Madrasah Tsanawiyah. *Jurnal Basicedu*, *5*(3), 1625–1631.

Nasir, M. (2013). Pengembangan Kurikulum Muatan Lokal Dalam Konteks Pendidikan Islam Di Madrasah. *HUNAFA: Jurnal Studia Islamika*, *10*(1), 1–18. https://doi.org/10.24239/jsi.v10i1.12.1-18

Nia, N., Leksono, S. M., & Nestiadi, A. (2022). Pengembangan E-Modul Pelestarian Lingkungan Berbasis Problem Based Learning (PBL) Untuk Meningkatkan Kemampuan Berpikir Kritis Siswa SMP. *PENDIPA Journal of Science Education*, *6*(2), 415–421. https://doi.org/10.33369/pendipa.6.2.415-421

Njatrijani, R. (2018). Kearifan Lokal Dalam Perspektif Budaya Kota Semarang. *Gema Keadilan*, *5*(1), 16–31. https://doi.org/10.14710/gk.2018.3580

Nuriyah Ma'arif, N., & Mulyati, M. (2021). Meningkatkan Kemampuan Fisik Motorik Kasar Anak Melalui Permainan Tradisional Pletokan Pada Kelompok B Tkm Nu 169 Khubbul Wathon Cerme Gresik. *Atthiflah: Journal of Early Childhood Islamic Education*, *8*(2), 111–120. https://doi.org/10.54069/atthiflah.v8i2.155

Presdenta, K. A. G., & Wahjun, E. S. (2023). Integrasi Kurikulum Merdeka Pada Pembelajaran Pai dengan Pendekatan Kontekstual. *Berajah Jurnal*, *3*(1), 119–124.

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. https://doi.org/10.29303/jpm.v15i2.1663

Ramdani, A., & Artayasa, I. P. (2020). Keterampilan Berpikir Kreatif Mahasiswa dalam Pembelajaran IPA Menggunakan Model Inkuiri Terbuka. *Jurnal Pendidikan Sains Indonesia*, *8*(1), 1–9. https://doi.org/10.24815/jpsi.v8i1.15394

Riswakhyuningsih, T. (2022). Pengembangan Alur Tujuan Pembelajaran (ATP) Mata Pelajran Ilmu Pengetahuan Alam (IPA) Kelas VII SMP. *RISTEK : Jurnal Riset, Inovasi Dan Teknologi Kabupaten Batang*, *7*(1), 20–30. http://ojs.batangkab.go.id/index.php/ristek/article/view/123/225

Rofi'ud , Muamar, Farhan, D. (2023). *Pengaruh Pengelolaan Kelas dan Minat Belajar terhadap Kemampuan Berpikir Kritis Siswa Kelas V di SD Negeri Kalibuntu 02 ,*. *1*(3).

Rudiana, Y., Ruhimat, M., & Sundawa, D. (2022). Pengaruh Sikap Ekoliterasi dan Pembelajaran Berbasis Proyek Terhadap Kemampuan Berpikir Kreatif. *JIPSINDO (Jurnal Pendidikan Ilmu Pengetahuan Sosial Indonesia)*, *09*(02), 177–191.

Sriyati*, S., Marsenda, P. H., & Hidayat, T. (2022). Pemanfaatan Kearifan Lokal Orang Rimba di Jambi Melalui Pengembangan Bahan Ajar Untuk Meningkatkan Literasi Lingkungan Siswa. *Jurnal Pendidikan Sains Indonesia*, *10*(2), 266–278. https://doi.org/10.24815/jpsi.v10i2.23548

Sugiyono, S., & Lestari, P. (2021). *Metode penelitian kualitatif. Unisma Press.*

Supiadi, E., Sulistyo, L., Fitri Rahmani, S., Riztya, R., Gunawan, H., Kesejahteraan Sosial Bandung, P., Ir Juanda No, J. H., Coblong, K., Bandung, K., Barat, J., Islam Nahdlatul Ulama Jepara, U., Taman Siswa, J., Tahunan, K., & Jepara, K. (2023). Efektivitas Model Pembelajaran Terpadu dalam Meningkatkan Kemampuan Berpikir Kreatif dan Hasil Belajar Siswa di Sekolah. *Journal on Education*, *5*(3), 9494–9505. https://www.jonedu.org/index.php/joe/article/view/1764

Suttrisno, S., & Rofi'ah, F. Z. (2023). Integrasi Nilai-Nilai Kearifan Lokal Guna Mengoptimalkan Projek Penguatan Pelajar Pancasila Madrasah Ibtidaiyah Di Bojonegoro. *Pionir: Jurnal Pendidikan*, *12*(1), 54–76. https://doi.org/10.22373/pjp.v12i1.17480

Syahputra, F. I., & Muktiari, B. R. (2023). Pengembangan Modul Matematika pada Pembelajaran Problem Solving dengan Pendekatan Kontekstual untuk Meningkatkan Kemampuan Penalaran Matematis Siswa. *PRISMA, Prosiding Seminar Nasional Matematika*, *6*, 270–274. https://journal.unnes.ac.id/sju/index.php/prisma/

Syeriduni, E. (2020). Upaya Meningkatkan Kemampuan Berfikir Kritis Siswa melalui Penerapan Metode Diskusi dengan Pendekatan Contekstual Teaching and Learning pada Tema Indahnya Negeriku di Kelas IV SD Negeri 200217 Padangsidimpuan. *Jurnal ESTUPRO*, *5*(1), 12–24.

Utari, D., & Muadin, A. (2023). Peranan Pembelajaran Abad-21 Di Sekolah Dasar Dalam Mencapai Target Dan Tujuan Kurikulum Merdeka. *Jurnal Pendidikan Islam Al-Ilmi*, *6*(1), 116. https://doi.org/10.32529/al-ilmi.v6i1.2493

Wulandari, S. I., Pamelasari, S. D., & Hardianti, R. D. (2023). Penggunaan E-Modul Berbasis Etnosains Materi Zat dan Perubahannya dalam Usaha Meningkatkan Kemampuan Berpikir Kritis Siswa SMP. *Proceeding Seminar Nasional IPA XIII*, 103–113. https://proceeding.unnes.ac.id/index.php/snipa/article/view/2294

Zinnurain, Z. (2021). Pengembangan E-Modul Pembelajaran Interaktif Berbasis Flip pdf Corporate Edition Pada Mata Kuliah Manajemen Diklat. *Jurnal Inovasi Riset Akademik*, *1*(1), 132–139.