



The Effectiveness of Moodle-Based E-Learning Media to Improve Students' Inductive Thinking Skill in an Integrated Science Project Course

Arie Rusmiyati✉, Putut Marwoto, Bambang Subali, Ani Rusilowati

DOI: <http://dx.doi.org/10.15294/usej.v13i1.13349>

Universitas Negeri Semarang, Indonesia

Article Info

Submitted 2024-09-05

Revised 2024-10-11

Accepted 2024-12-21

Keywords

E-learning; Moodle; Independent Flow; Inductive

Abstract

Improvements in teaching are required as technology advances, The Science and Technology Project distinguishes itself by including explanations of scientific phenomena, data collecting and evaluation. This requires structured thinking, ranging from simple to complicated. Moodle-based e learning with the MERDEKA flow is a tool that can assist students improve their inductive thinking skills. The MERDEKA flow is divided into stages that starting with oneself, concept exploration, collaborative space, contextual demonstration, development of understanding, and the connection between materials and practical action. The objective of this research is to determine the effectiveness of the product to improve students' inductive thinking skills. This research uses R&D Method and students of vocational school that consisted of 72 students served as the research subjects. Data collecting methods include questionnaires and tests, with data analysis techniques such as feasibility test analysis, effectiveness tests, and student feedback on e-learning. The e-learning validation results indicated 92.45% feasibility. The media's effectiveness was evaluated using N-Gain, and the result was 0.83, which is considered very high. After using e-learning, 98% of students rated it as very good. Moodle-based e-learning using the MERDEKA pathway can increase inductive thinking skills and is suited for science education.

How to Cite

Rusmiyati, A., Marwoto, P., & Subali, B., Rusilowati, A. (2024). The Effectiveness of Moodle-Based E-Learning Media to Improve Students' Inductive Thinking Skill in an Integrated Science Project Course. *Unnes Science Education Journal*, 13(2), 189-195.

✉ Correspondence Author:

E-mail: arie2rusmiyati@students.unnes.ac.id

INTRODUCTION

Technological developments in the era of globalization ensure that every activity is carried out effectively, efficiently, and on time. Internet usage has become an activity that cannot be separated from all areas, including education (Wiguna & Tristaningrat, 2022). Students can use the internet for independent learning and to enhance the delivery of learning (Hermansyah et al., 2022). Because they may research requirements on their own, students who use e-learning are more motivated to study (Sun et al., 2022).

The MERDEKA Curriculum, which is applied today and incorporates project-based learning features in line with the Pancasila student profile, is flexible and focuses on core subjects (Soliman, 2014). Each subject has a Competency Achievement of Learning Goal Flow that meets these (Jafarudin et al., 2023). The Science and Technology Project subject includes parts that correspond to three competencies: describing phenomena scientifically, designing and evaluating scientific investigations, and transferring data and evidence scientifically (Antari et al., 2023).

Based on initial observations, students at SMK N 1 Batang seem to be bored with scientific learning so far. The school's infrastructure consists of a projector, computer, and internet network. Students' inductive thinking skills in learning are not yet obvious, and they prefer to think practically. Hayes and Heit (2018) believe that students' inductive thinking skills can be tested using the following indicators: 1) By recognizing information, students can collect information data in the form of concepts, images, or issues; (Rijal & Sere, 2017) 2) Data analysis involves sorting data sequences and organizing them into patterns, classifications, and basic units of description (Supriadi et al., 2023). Students process the information data that has been obtained to organize it, and they will be instructed to think about finding answers to the challenges offered; 3) Concluding is the essence of inductive thinking among students (Nurlinda & Nirfayanti, 2022). Information and solutions to problems discovered will be summarized in a general-specific order. Students find new items that are related to previously acquired information.

There are various variants in the application of E-learning in learning, with the main concept being that the usage of electronic media can be accessed by students flexibly (Prastiyono et al., 2021). E-learning, such as Moodle, makes use of information technology and computers together with intranets and the internet (Aida, 2023).

Moodle has characteristics that allow for highly flexible interaction. Teachers can objectively observe students' activities without meeting face to face (Guillen-Gamez et al., 2017). Moodle features include discussion on topics, quizzes, and assignments. Moodle has the advantage of being free to download and modify by anybody, making it a solution for learning effective and efficiency (Issa et al., 2014). Moodle offers learning services in which teachers can submit teaching materials, instructional videos, PowerPoint presentations, discussion forums, and quizzes based on special journal material (Murnie, 2020). A similar study found that test scores increased from 42 to 86.35 at the posttest. This demonstrates that students are driven to learn (Soraya et al., 2020).

According to Basuki (2015), his research on Moodle-based e-learning reveals that learning, resources, appearance, and programming are all extremely good, with an 87.6% rating. Thus, based on the findings of the field implementation test, it was determined that e-learning based on the Natural Sciences (IPA) learning model was appropriate for use by Kotagede I State Elementary School students as a source of learning both individually and in groups (Basuki, 2015). Moodle's adaptive E-learning method is built on a personalized approach that automatically adjusts educational content according to the student's knowledge and learning style (Shchedrina et al., 2021). Several studies have found that e-learning Moodle can improve student motivation and learning outcomes. Based on this, it is essential to have E-learning to help students evaluate available information systematically and develop solutions, particularly for challenges that lack straightforward answers. For example, in tackling environmental problems, students can analyze the effects of pollution and propose solutions grounded in evidence. (Misrom et al., 2020). Students had an enjoyable session and were motivated (more interested, and fascinated) through the inductive learning session, and improved their critical thinking skills (Arjunaidi & Azid, 2022).

Moodle with the MERDEKA flow is a perfect media for creating E-learning (Mufliva et al., 2023). Moodle has the advantage of allowing students to interact at any time and from anywhere while also collecting assignments, discussions, quizzes, and learning materials. So that students can be active, creative, and independent (Samsudin & Ni Nyoman Utami, 2019). It becomes more complete to strengthen inductive thinking skills by including the MERDEKA flow as stated in the curriculum into each session, which includes starting with the self, concept ex-

ploration, collaborative space, contextual demonstration, connections between resources, and real action (Hamdani, 2023). The aim of this research is to analyze the feasibility and effectiveness of e-learning and determine student responses after implementing Moodle-based e-learning with the MERDEKA pathway. The benefit of using e-learning is to improve students' inductive thinking abilities.

METHOD

E-learning was utilized in this research, and data was gathered from pre-test and post-test results. The study phase was conducted for phase E students at SMK N 1 Batang class X, AKL 1 and 2. The variables observed were the effectiveness of implementing e-learning. Data collection methods include pretest and posttest to determine the inductive thinking abilities of students who will be tested using N-Gain (Coletta et al., 2007).

Table 1. Table of Inductive Thinking Indicators Used on Moodle

Steps	Description	Indicators
Start from Self	Students recognize their initial understanding and connect it to personal experiences or everyday problems	1. Answer reflective questions. 2. Identify relevant issues.
Concept Exploration	Students study the core material through various learning resources, such as videos, modules, or online activities	1. Analyze learning materials to identify patterns or key concept 2. Record key points.
Collaboration Space	Students exchange ideas, discuss, and critique conclusions in a collaborative learning environment	1. Contribute to discussions. 2. Provide feedback or suggestions.
Contextual Demonstration	Students apply the knowledge they have gained in practical situations or context-based simulations	1. Perform tasks, experiments, or simulations 2. Record the results of the application in report format.
Elaborating Understanding	Students expand their understanding by solving case studies, completing in-depth exercises, or analyzing data	1. Answer questions requiring in-depth analysis. 2. Create presentations to explain findings.
Connecting Concepts	Students integrate new concepts with previous material or connect them to other fields of study	1. Show the relationship between the current topic and previously learned concepts. 2. Identify relevance to other disciplines.
Real-World Action	Students use the knowledge and conclusions they have gained to solve real-world problems through practical projects.	1. Design solution-based projects to address real-world challenges. 2. Document project outcomes in digital format.

Test Effectiveness with N-Gain

According to Hake normalized gain (N-Gain) (Hake, 2002) is expressed in the form of the equation below:

$$<g> = \frac{\% \text{ post test} - \% \text{ pretest}}{100 - \% \text{ pretest}}$$

Note: The Ideal Score is the highest score that can be obtained.

For the categorization of the magnitude of N-gain score improvement, please refer to the normalized gain criteria in Table 2. The effective-

ness of the intervention can be assessed using the criteria provided in Table 3.

Table 2. The Normalized Gain Criteria

N-Gain Value	Interpretation
$70 \leq g \leq 100$	High
$30 \leq g < 70$	Medium
$0 < g < 30$	Low
$g = 0$	There is no increase
$-100 \leq g < 0$	There is a decrease

Table 3. Criteria for Determining the Level of Effectiveness

Percentage (%)	Interpretation
< 40	Not effective
40-45	Less effective
56 – 75	Moderately Effective
>76	Effective

RESULT AND DISCUSSION

This IPAS project employed a Moodle-based e-learning platform with the MERDEKA learning path to investigate the effectiveness of e-learning in enhancing students' inductive reasoning skills when studying matter and its changes. The study utilized a pre-test and post-test design to assess the impact of the intervention. N-gain analysis was employed to measure the improvement in students' inductive reasoning abilities before and after the implementation of the Moodle-based e-learning with the MERDEKA learning path. The results of this analysis are presented in Table 4.

Table 4. Pretest and Posttest Scores for Students in the Experimental Class

Class	Pretest Mean	Posttest Mean	<g>	Category
Experiment	50.46	90.39	0.83	High
Control	51.30	71.3	0.41	Medium

The effectiveness of e-learning was evaluated using the N-Gain score, as presented in Table 4. The average pretest score was 50.46, and the posttest score was 91.39. The calculated N-gain value of 0.83 indicates a high level of learning gain according to Hake (1999). This high N-gain value suggests that Moodle-based e-learning with the MERDEKA learning path is effective in enhancing students' inductive reasoning skills in the topic of matter and its changes (Pramesty & Hardini, 2023). The use of Moodle encourages students to think critically, generate new ideas, and remain focused and active throughout the learning process (Sumarwati et al., 2020). The implementation of the MERDEKA learning path contributes to a more systematic and holistic learning experience, making learning more effective and allowing students to think, collaborate, and engage in more meaningful learning (Jamaludin et al., 2023).

The Moodle-based e-learning incorporated the MERDEKA learning path, which comprised several stages (Zulfi & Khairat, 2023). The process began with the "Mulai dari Diri" phase, where students were prompted with thought-provoking questions to stimulate their thinking (Fitri, 2022).

This was followed by the "Eksplorasi Konsep" phase, allowing students to independently explore the subject matter (Lisnawati, 2023). Subsequent stages included collaborative learning, contextual demonstrations, and elaboration of understanding. The learning path culminated in the "Aksi Nyata" phase, where students applied their knowledge by designing and implementing a real-world project. The e-learning flow menu is illustrated in Figure 1. This comprehensive approach, as demonstrated by Hayati et al. (2023), significantly enhanced students' collaborative skills.

**Figure 1.** Visual Representation of the LMS Menu

User Response

The response test findings revealed that the average percentage of e-learning effectiveness in the user-friendliness aspect was 97.8% and in the efficiency aspect was 98.6%, resulting in an overall average of 98% and a very good category for increasing inductive thinking skills. Students say learning becomes more engaging, diverse, and intriguing (Hayati et al., 2023).

Science & Technology Project learning in the MERDEKA curriculum attempts to help students understand phenomena, explore data, and conduct evaluations. Moodle-based e-learning using the MERDEKA flow can boost students' knowledge by starting with simple things, observing, and confirming with real action, so increasing creative and inductive thinking skills (Awaliyah & Tiarina, 2023). Moodle-based e-learning can also help students think inductively, starting with literacy and progressing from specific to ge-

neral concepts, allowing students to draw conclusions based on the outcomes of observations or experiments (Sara et al., 2020).

The usage of learning media can assist teachers in conveying knowledge to students. Moodle-based e-learning learning media with the MERDEKA flow is a media that provides space for students to be creative in learning, beginning with questions that trigger everyday phenomena, providing problems that lead students to design scientific investigations, so that motivation arises to create products that can solve the problems presented (Thongsonkleeb et al., 2022). Moodle is an e-learning platform that assists students in learning by allowing them to communicate with teachers and classmates, as well as complete assignments independently or with teacher guidance (Kim et al., 2019). The flow described can assist students strengthen their inductive thinking skills while learning. (Agustini et al., 2021) Moodle is an e-learning platform that assists students in learning by allowing them to communicate with teachers and peers, as well as complete work independently or with teacher direction (Chang et al., 2022). Moodle provides advantages in terms of simple operation processes and ease of access (Muhammad et al., 2020).

Based on the results of the media suitability validation analysis, the efficacy of the media with N-Gain, and student responses, it is possible to conclude that the Moodle-based e-learning media with the MERDEKA flow is feasible and efficient for educational application (Anggraini, 2018). Learning using Moodle allows students to learn independently and creatively based on their creative ability. This learning enables teachers to deliver material both online and offline. The MERDEKA flow, as described in the MERDEKA curriculum leads students to think from simple to complex. (Wulandari & Widiyatmoko, 2023).

CONCLUSION

In the metaverse era, as technology advances, education must adapt to new developments. Creative and inventive learning will outperform manual learning using simple media and approaches. Learning is centered on the needs of the students, according to the child-oriented educational philosophy. As a result, teachers must meticulously plan their lessons. The research findings indicate that the development of Moodle-based e-learning with an MERDEKA flow is appropriate for use in science and science education to increase students' inductive thinking skills. This is

demonstrated by the high levels of expert validation, which indicate that it is suitable for use. Student responses to the introduction of Moodle-based e-learning are strong. Students' learning motivation grows as they feel happier and more engaged in participating in learning.

REFERENCES

- Agustini, S., Amin, B. D., & Yani, A. (2021). *Pengembangan E-Modul Interaktif berbasis Problem Solving pada Pembelajaran Fisika*. Universitas Negeri Makassar.
- Aida, S. (2023). Impact of E-Learning Orientation, Moodle Usage, and Learning Planning on Learning Outcomes in On-Demand Lectures. *Education Sciences*, 13(10). <https://doi.org/10.3390/educsci13101005>
- Anggraini, A. (2018). Keefektifan Pembelajaran Elektronik (E-Learning) sebagai pengganti Perkuliahan Konvensional untuk Meningkatkan Kemampuan analitis Mahasiswa. *Jurnal Sosial Humaniora*, 9(2). <https://doi.org/10.30997/jsh.v9i2.1101>
- Antari, P. L., Widiana, I. W., & Wibawa, I. M. C. (2023). Modul Elektronik Berbasis Project Based Learning Pembelajaran IPAS untuk Meningkatkan Hasil Belajar Siswa Sekolah Dasar. *Jurnal Imiah Pendidikan Dan Pembelajaran*, 7(2). <https://doi.org/10.23887/jipp.v7i2.60236>
- Arjunaidi, A. J., & Azid, N. (2022). The Implementation of an Inductive Model on Science Students' Critical Thinking Skills during Online Learning. *International Journal of Information and Education Technology*, 12(9). <https://doi.org/10.18178/ijiet.2022.12.9.1694>
- Awaliyah, S., & Tiarina, Y. (2023). An Analysis of English Teachers' Difficulties and Strategies in Implementing Merdeka Curriculum on the Seventh Grade at SMPN 1 Panyabungan Selatan. *Journal of English Language Teaching*, 12(2).
- Basuki, ginanjar dwi. (2015). pengembangan e-learning berbasis moodle pembelajaran ilmu pengetahuan alam (ipa) bagi siswa kelas Vsd negeri kotagede. *Uny*, 151(3).
- Chang, Y. C., Li, J. W., & Huang, D. Y. (2022). A Personalized Learning Service Compatible with Moodle E-Learning Management System. *Applied Sciences (Switzerland)*, 12(7). <https://doi.org/10.3390/app12073562>
- Coletta, V. P., Philips, J. A., & Steinert, J. J. (2007). Interpreting force concept inventory scores: Normalized gain and SAT scores. *Physical Review Special Topics - Physics Education Research*, 3(1). <https://doi.org/10.1103/PhysRevSTPER.3.010106>
- Fitri, J. (2022). Meningkatkan Motivasi Belajar Siswa Pada Mata Pelajaran IPA Integrasi Litnum Dengan Alur Merdeka Di SMP Negeri 1 Seunagan Kabupaten Nagan Raya. *Ability: Journal of Education and Social Analysis*, 3(1).

- Guillen-Gamez, F. D., Bravo-Agapito, J., & Garcia-Magarino, I. (2017). Students' perception of the importance of facial authentication software in moodle tools. *International Journal of Engineering Education*, 33(1).
- Hake, R. R. (2002). Relationship of individual student normalized learning gains in mechanics with gender, high-school physics, and pretest scores on Mathematics and Spatial Visualization. *Physics Education Research Conference*, 8(August 2002), 1–14. https://scholar.google.com/citations?view_op=view_citation&hl=en&user=10EI2q8AAAAJ&citation_for_view=10EI2q8AAAAJ:IjCSPb-OGc4C
- Hamdani, M. I. I. (2023). Studi Analisis Implementasi Kurikulum Merdeka pada Mata Pelajaran sejarah di SMA Baitul Arqom Balung Kabupaten Jember. *SANDHYAKALA Jurnal Pendidikan Sejarah, Sosial Dan Budaya*, 4(1). <https://doi.org/10.31537/sandhyakala.v4i1.987>
- Hayati, U., Saifuddin, K., & Arafah, K. (2023). Meningkatkan Keterampilan Kolaborasi melalui Model Pembelajaran Project Based Learning dengan Alur Merdeka di SMA Negeri 1 Soppeng. *Jurnal Pemikiran Dan*, 5(2).
- Hermansyah, H., Nurhairunnisah, N., & Dwi Lestari, I. (2022). Analysis of Prospective Teacher's Learning Independence Based on Gender Through the Utilization of Moodle-Based E-Learning. *Jurnal Pendidikan Fisika Dan Teknologi*, 8(1). <https://doi.org/10.29303/jpft.v8i1.3698>
- Issa, G., Hussain, S. M., & Al-Bahadili, H. (2014). Competition-based learning: A model for the integration of competitions with project-based learning using open source LMS. *International Journal of Information and Communication Technology Education*, 10(1). <https://doi.org/10.4018/ijicte.2014010101>
- Jafarudin, A. Y., Roshayanti, F., & Siswanto, J. (2023). Penerapan PJBL Berbasis Steam dalam Implementasi Pembelajaran IPAS Siswa Kelas X SMK PGRI 2 Taman. *Jurnal Inovasi Pembelajaran Di Sekolah*, 4(2). <https://doi.org/10.51874/jips.v4i2.140>
- Jamaludin, U., Pribadi, R. A., Zahara, G., Sultan, U., & Abstract, A. T. (2023). Pengembangan Media Pembelajaran Berbasis Alur Merdeka. *Jurnal Ilmiah Wahana Pendidikan*, Juli, 9(14).
- Kim, E., Park, H., & Jang, J. U. (2019). Development of a class model for improving creative collaboration based on the online learning system (Moodle) in Korea. *Journal of Open Innovation: Technology, Market, and Complexity*, 5(3). <https://doi.org/10.3390/joitmc5030067>
- Lisnawati, L. (2023). Implementasi Kurikulum Merdeka Belajar Melalui Muatan Lokal Seni Musik Pada Program Pendidikan Kesetaraan di PKBM Al Kahfi Kota Serang. *Jurnal Pendidikan UNIGA*, 17(1). <https://doi.org/10.52434/jpu.v17i1.2680>
- Misrom, N. S., Abdurrahman, M. S., Abdullah, A. H., Osman, S., Hamzah, M. H., & Fauzan, A. (2020). Enhancing students' higher-order thinking skills (HOTS) through an inductive reasoning strategy using geogebra. *International Journal of Emerging Technologies in Learning*, 15(3). <https://doi.org/10.3991/ijet.v15i03.9839>
- Mufliva, R., Fitriani, A. D., & Iriawan, S. B. (2023). Pengembangan LKPD berbasis Alur "MERDEKA" sebagai penguatan Literasi Numerasi dalam Implementasi Pembelajaran Berdiferensiasi di Sekolah Dasar. *Dwija Cendekia: Jurnal Riset Pedagogik*, 7(3). <https://doi.org/10.20961/jdc.v7i3.79571>
- Muhammad, H., R. Eka Murtinugraha, & Sittati Musalamah. (2020). Pengembangan Media Pembelajaran E-Learning Berbasis Moodle Pada Mata Kuliah Metodologi Penelitian. *Jurnal PenSil*, 9(1). <https://doi.org/10.21009/jpensil.v9i1.13453>
- Murnie. (2020). Optimalisasi pembelajaran Daring di Sekolah Dasar: Sebagai Respon dari New Normal di Era Covid 19. *Equity In Education Journal*, 2(2). <https://doi.org/10.37304/eej.v2i2.1852>
- Nurlinda, N., & Nirfayanti, N. (2022). Penerapan Model pembelajaran Berpikir Induktif terhadap Hasil Belajar Matematika Siswa SMP. *Pedagogy: Jurnal Pendidikan Matematika*, 7(1). <https://doi.org/10.30605/pedagogy.v7i1.1804>
- Pramesty, F. A., & Hardini, H. T. (2023). Pengembangan E-LKPD Berbantuan Software iSpring Suite 10 pada Materi Siklus Akuntansi Perusahaan Dagang di SMKN 2 Buduran Sidoarjo. *Jurnal Basicedu*, 7(3). <https://doi.org/10.31004/basicedu.v7i3.5870>
- Prastiyono, H., Utaya, S., Sumarmi, S., Astina, I. K., Amin, S., & Aliman, M. (2021). Development of E-Learning, Mobile Apps, Character Building, and Outdoor Study (EMCO Learning Model) to Improve Geography Outcomes in the 21st Century. *International Journal of Interactive Mobile Technologies*, 15(7). <https://doi.org/10.3991/ijim.v15i07.21553>
- Rijal, M., & Sere, I. (2017). SARANA BERFIKIR ILMIAH. *Biosel: Biology Science and Education*, 6(2). <https://doi.org/10.33477/bs.v6i2.170>
- Samsudin, M., & Ni Nyoman Utami, J. (2019). Pengembangan Pembelajaran E-learning Dengan Moodle (Modulator Object-Oriented Dynamic Learning Environment). *Jurnal Sistem Dan Informatika (JSI)*, 14(1). <https://doi.org/10.30864/jsi.v14i1.210>
- Sara, K., Witi, F. L., & Mude, A. (2020). Implementasi E-Learning Berbasis Moodle di Masa Pandemi Covid 19. *Journal Of Administration and Educational Management (ALIGNMENT)*, 3(2). <https://doi.org/10.31539/alignment.v3i2.1813>
- Shchedrina, E., Valiev, I., Sabirova, F., & Babaskin, D. (2021). Providing Adaptivity in Moodle LMS Courses. *International Journal of Emerging Technologies in Learning*, 16(2). <https://doi.org/10.3991/ijet.v16i02.18813>
- Soliman, N. A. (2014). Using E-Learning to Devel-

- op EFL Students' Language Skills and Activate Their Independent Learning. *Creative Education*, 05(10). <https://doi.org/10.4236/ce.2014.510088>
- Soraya, S., Suherma, L., & Zawitri, S. (2020). Pemanfaatan E-Learning berbasis Moodle dalam Meningkatkan Motivasi dan Hasil Belajar. *Eksos*, 16(1). <https://doi.org/10.31573/eksos.v16i1.89>
- Sumarwati, S., Fitriyani, H., Setiaji, F. M. A., Amiruddin, M. H., & Jalil, S. A. (2020). Developing mathematics learning media based on elearning using moodle on geometry subject to improve students' higher order thinking skills. *International Journal of Interactive Mobile Technologies*, 14(4). <https://doi.org/10.3991/IJIM.V14I04.12731>
- Sun, X., Zhang, X., & Lei, L. (2022). The Effects of Online Role-play Teaching Practice on Learners' Availability for Resources. *International Journal of Emerging Technologies in Learning*, 17(5). <https://doi.org/10.3991/ijet.v17i05.30575>
- Supriadi, A., Suprijono, A., Imron, A., & Marzuqi, M. I. (2023). Pengaruh Penggunaan Model Pembelajaran Berpikir Induktif (Thinking Inductively) Terhadap Kemampuan Berpikir Kritis Peserta Didik Pada Pembelajaran IPS. *Jurnal Dialektika Pendidikan IPS*, 3(3). <https://doi.org/10.26740/penips.v3i3.56197>
- Thongsonkleeb, K., Daengsubha, S., & Boonsieng, N. (2022). Students' Opinions on Online Learning Management during the COVID-19 Situation. *ICBIR 2022 - 2022 7th International Conference on Business and Industrial Research, Proceedings*. <https://doi.org/10.1109/ICBIR54589.2022.9786516>
- Wiguna, I. K. W., & Tristaningrat, M. A. N. (2022). Langkah Mempercepat Perkembangan Kurikulum Merdeka Belajar. *Edukasi: Jurnal Pendidikan Dasar*, 3(1). <https://doi.org/10.55115/edukasi.v3i1.2296>
- Wulandari, A. S., & Widiyatmoko, A. (2023). Penerapan Alur Merdeka Belajar dalam Meningkatkan Kemampuan Berpikir Kreatif dan Hasil Belajar Peserta Didik. *Seminar Nasional IPA XIII*.
- Zulfi, T., & Khairat, A. (2023). Implementation of Independent Learning Curriculum in the Learning of Islamic Religious Education at SMAN 3 Batusangkar. *EDUMALSYS Journal of Research in Education Management*, 1(1). <https://doi.org/10.58578/edumalsys.v1i1.1083>