The Effectiveness Of Problem-Based E-Posters On The Learning Outcomes Of Students In Class Vii SMP Muhammadiyah Al-Kautasar Pk Kartasura On Ecological Study

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Abstract

Implementing e-poster media can improve learning outcomes. E-poster media is defined as a poster created using a computer graphics program in a digital format. Problem-Based Learning (PBL) is one learning model based on the constructivist paradigm that focuses on the student's learning process. The integration of e-posters with PBL has the potential to offer challenges that motivate students to actively seek solutions, thereby enhancing their engagement and learning outcomes. This study aims to ascertain the efficacy of problem-based e-poster learning media in influencing student learning outcomes. The research method is descriptive quantitative, employing a pre-test and post-test design with a control or comparison group. The research sample was obtained through purposive sampling, with a total of 120 seventh-grade students from SMP Muhamadiyah Al-Kautsar PK Kartasura participating in the study. The data collection instrument employed a cognitive learning outcome test comprising 20 multiple-choice questions and observation sheets to assess affective and psychomotor domains. The findings indicated that problem-based e-poster media can enhance students' cognitive learning outcomes effectively, with an n-gain value of 0.3791, categorizing it as moderate. Furthermore, the results indicated that 61% of students demonstrated an excellent category in affective learning outcomes, while 67% of students exhibited a good category in psychomotor scores.

Keywords: learning media, e-poster, problem-based learning, learning outcomes

1. Introduction

Learning today is student-centered and focused on the development of 21st- century skills, including critical thinking, creativity, communication, and collaboration. The integration of digital technology within the learning process is on the rise, fostering personalization and adaptive learning methodologies to cater to student's diverse needs and learning styles. This paradigm shift in education signifies a concerted effort to adapt to contemporary developments and societal needs in the digital era (Hikmah, 2024).

The efficacy of the learning process is a pivotal factor in attaining success in education. In the contemporary educational landscape, educators are compelled to develop learning methodologies that align with the prevailing educational requirements (Astuti et al., 2024). The digital era has introduced numerous challenges to the educational sector, necessitating adaptation to ensure its resilience and efficacy. These challenges encompass the cultivation of creative thinking skills, adaptable problem- solving, collaboration, and innovation that are pertinent to the 21st century (Pernantah et al., 2020). To address these

challenges, it is imperative to establish conducive learning environments and learning processes.

Effective learning is characterized by its capacity to foster creativity, critical thinking, analytical skills, and the ability to comprehend and apply material (Widyanto et al., 2020). The learning process encompasses the acquisition of cognitive, psychomotor, and affective competencies, as well as mastery of learning concepts and the development of various skills (Aryani et al., 2022). A learning process that is carried out effectively is one in which learning occurs optimally (Nurfadillah, 2021). Effective learning considers the individual needs of students and creates an environment that supports the growth of learning motivation and uses interactive and engaging media. The integration of advances in information and communication technology with online learning media has emerged as a pivotal support mechanism for the seamless facilitation of the learning process (Murtiyasa et al., 2021). As Intaha et al. (2020) note, educators have a wide array of learning media at their disposal, including posters and videos, to name a few.

Poster media is a type of visual media that can be developed. These posters serve the purpose of conveying messages to the viewer through the use of visual elements, whether in the form of images or text. The creation of posters can be performed in a digital manner using specialized applications or manually through the process of hand-drawing (Anggraheni et al., 2021). E-posters are created or drawn by hand and digitally scanned or photographed to create a digital format (Murtiyasa et al., 2021). Visual media such as e-posters can help learners understand ecological concepts more easily because the information is presented visually and interactively. E-posters allow learners to explore further with multimedia elements such as images, videos, and relevant text, making learning more contextual and enjoyable. This meets the needs of the digital generation who are more interested in technology-based media (Syahputra et al., 2024).

The utilization of e-posters in educational settings has been demonstrated to enhance the presentation of material, rendering it more engaging, informative, and readily comprehensible to students. This is consistent with research (Hadi, 2023) where e-posters can improve student learning outcomes. Research by Pujiningsih (2024) indicates that visually appealing poster media is more likely to be remembered by students over extended periods. The utilization of posters as a medium within learning models is a significant component of contemporary educational practices. The 21st- century learning model, as outlined by Indarta et al. (2022), places significant emphasis on technology, particularly the Internet, to facilitate the learning process. This model fosters active and independent learning, which is essential for developing 4C skills: critical thinking, communication, collaboration, and creativity. One of the learning models that can be employed in conjunction with e-posters is Problem-Based Learning (PBL).

PBL is a form of learning based on the paradigm of constructivism, which focuses on the learning process of students (student-centered learning). PBL focuses on presenting students with a problem (real or simulated) and then asking them to find a solution

through a series of investigative research based on theories, concepts, and principles learned from various sciences. The educator becomes a facilitator and guide (Mayasari et al., 2022). In the implementation of PBL, learning media are needed to facilitate students to learn. The media can be in the form of poster media. To facilitate the use in learning, poster media can be made into e-posters. The e-poster media used can be presented in the form of images that illustrate the problem. The problem is the initial presentation in learning in the PBL model. The problem presented through poster media provides a challenge that motivates students to actively seek solutions (Murtalib et al., 2023). In line with research (Djonomiarjo, 2020), PBL learning is more effective in improving student learning outcomes in cognitive, affective, and psychomotor aspects. The PBL learning model will be more effective if applied to appropriate learning, especially science subjects on ecological material.

Science learning will be more meaningful when it is designed to provide opportunities for students to find facts, build concepts, and explore new values (Hariyatmi et al., 2023). Junior high school ecology material is characterized by its relevance and contextualized content, so it is possible to use it as material for creating problem-based posters. Topics in the ecology chapter, such as interactions between ecosystem components, energy flows, food chains, food webs, biogeochemical cycles, and the impact of human activities on the environment, provide great opportunities to address issues relevant to students' everyday lives. This pedagogical approach has been shown to enhance students' comprehension of the significance of preserving ecological balance and its role in ensuring environmental sustainability.

The concept of ecology discusses the interaction between living things and their environment, including the issue of environmental pollution. A good understanding of this material is important so that students have awareness in protecting the environment and are able to develop critical thinking skills (Ridwan et al., 2023). A common challenge in the learning process of ecology is the low ability of students to connect theory with reality. A survey administered by the OECD as part of the Program for International Student Assessment (PISA) in 2023 revealed that Indonesian students demonstrated proficiency in mathematics, reading, and science, ranking 68th out of 81 countries. However, their science score experienced a 13-point decline to 383, from a previous 396, despite the RPJNM's target science score being 402 (Nasution, 2024). This phenomenon can be attributed to the utilization of media and learning models that often lack interactivity and engagement. Consequently, there is a necessity for innovation in the domain of learning media. One potential avenue for such innovation is the integration of technology in the form of PBL-based e-posters.

Based on the results of observations at SMP Muhammadiyah AL-Kautsar PK Kartasura conducted by the researcher interviews with science teachers at SMP Muhammadiyah AL-Kautsar PK Kartasura, this school is a digital school where students use laptops for daily learning. However, the implementation of learning using e-poster media has not yet been realized, and e-modules are the sole form of learning utilized. Ecology learning is still

taught with a less interesting model using only book media. Students are not used to being involved in problem solving or developing ideas independently. In addition, learning habits that focus on memorization cause knowledge to be easily forgotten, so that learning has not fully become a place to foster critical thinking skills. To support more effective 21st-century learning, educational media, and learning models must be developed that can engage students more actively, encourage creativity, and cultivate innovation.

The aforementioned problems have prompted researchers to embark on a study titled "The Efzfectiveness of Problem-Based E-posters on Student Learning Outcomes in Class VII SMP MUhammadiyah Al-Kautsar PK Kartasura on Ecological Material." This study aims to examine the effectiveness of employing Problem-Based Learning (PBL)- based electronic posters in enhancing student learning outcomes in ecological material. The utilization of electronic posters is expected to enhance student engagement in the learning process and facilitate a more profound comprehension of ecological concepts.

2. Material and Method

This is a descriptive quantitative research that employs a pre-test and post-test design with a control or comparison group. This study was conducted in Class VII SMP Muhamadiyah Al-Kautsar PK Kartasura during the 2024/2025 academic year. The study population comprised all seventh-grade students, encompassing four classes, with a total of 120 students. The participants were selected through a purposive sampling technique, with class VII D designated as the experimental class that would utilize learning media in the form of problem-based e-posters, and class VII B selected as the control class that would employ e-module learning media. The data collection was facilitated by an instrument in the form of a test comprising 20 multiple-choice inquiries. The collected data were then subjected to analysis using the n-gain test, a statistical method designed to assess the effectiveness of educational interventions. This analysis was conducted to determine whether problem-based e-poster learning media, utilized in the experimental class, was more effective than the e-module learning media, employed in the control class.

The first research procedure is to conduct observations in class and interviews with teachers to determine solutions to problems in learning at school. The second is to create learning media in the form of e-posters to help learning. The third is data collection by conducting a pre-test. The fourth is learning with students working on questions in groups based on e-posters. The fourth is collecting post-test value data. The media used during learning is an electronic poster made using the canva application.

Table 1. Research Design

Group	Pre-test	Treatment	Post-test
Experiment	A1	X	A2
Control	B1		B2

Description:

A1 : Pre-test of the experimental group

B1 : Pre-test of the control group

X   : Treatment using problem-based e-poster media

A2 : Post-test of the experimental group

B2 : Post-test of the control group

To evaluate the students' posttest and pretest scores, researchers use the gain normality test. The gain normality test is used to determine the effectiveness of the treatment administered. The formula used to calculate the results of the Meltzer Gain Normality Test is as follows:

$$N - again = \frac{Pster\ test\ score - Pre\ test\ score}{Ideal\ score - Pre\ test\ score}$$

Table 2. N-Gain Assessment Criteria

g-factor	Assessment Criteria
g > 0.70	High
$0.30 \leq g \leq 0.69$	Medium
g < 0.30	Low

Source: Setyowati et al. (2023)

The psychomotor and affective abilities obtained from the assessment sheet are subsequently converted into a percentage of ability using the following formula:

$$\frac{\sum p}{\sum q} \times 100\%$$

Description:

$\sum p$: The raw score (number of sub-skills performed)

$\sum q$: Ideal maximum score for each sub-skill

Table 3. Categorization scale

Score Range	Category of Ability
81–100	Excellent
61–80	Good
41–60	Average
20–40	Less
< 20	Poor

Source: Arifki et al. (2023)

3. Results and Discussion

3.1.Results

E-poster

E-posters are made or drawn by hand and scanned or photographed digitally to create a digital format (Murtiyasa et al., 2021). Visual media such as e-posters can help students understand ecological concepts more easily because the information is presented visually and interactively. On the posters used in this study, there are problems from the ecological material that will be solved by students and used for learning. The following is the poster used.

Figure 1. E-poster forest fires

Figure 2. E-poster population explosio

Figure 3. E-poster rice field ecosystem

Cognitive learning outcomes

Cognitive learning outcomes are defined as knowledge competencies that are assessed through written exams, oral exams, and assignments (Ramadani et al., 2024). The value of these cognitive learning outcomes in this study was assessed using pretest and post-test assessments calculated by the N-Gain Test. The N- Gain data from the experimental and control classes' research results after the pretest and posttest is presented in the following table:

Table 4. N-Gain Score Test Calculation Result

Class	Average	Minimum	Maximum	Category
Experiment	0,3791	-0,8	1,00	Medium
Control	0,1896	-0,5	0,63	Low

The experimental class is classified within the medium category, with a value of 0.3791, while the control class is classified within the low category, with a value of 0.1896. The calculation of the n-gain value shows results that indicate an outcome falling within the "good" category when the value is greater than 0.3. Consequently, the utilization of problem-based e-posters is deemed effective for students when N-gain results exceed 0.3.

Affective learning outcomes

Affective learning outcomes are assessments that emphasize feelings, such as interests and attitudes (Ulfah et al., 2021). The value of affective learning outcomes in this study was assessed using a questionnaire with three indicators: confidence, responsibility, and discipline. The results of this indicator assessment are illustrated in the accompanying diagram:
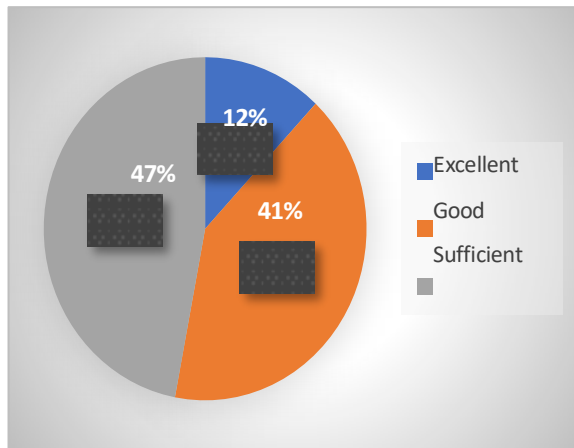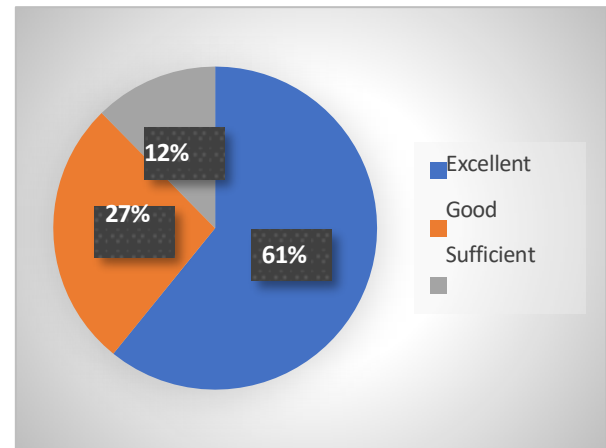
Figure 4. Diagram of Control Affective Score

Figure 5. Diagram of Experimental

Affective Score

As illustrated in Figure 1, the control class received an affective score of 12% of students excellent, 41% good, and 47% sufficient. Figure 2 demonstrates that the experimental class received an affective score of 61% of students excellent, 27% good, and 12% sufficient. The control class is included in the sufficient category, while the experimental class is included in the excellent category.

Psychomotor learning outcomes

Psychomotor learning outcomes refer to the skills and abilities that students acquire after learning (Veronika et al., 2022). The value of psychomotor learning outcomes in this study was assessed using a questionnaire with three indicators: presentation, active questioning, and cooperation. The results of the indicator assessment are illustrated in the accompanying diagram:
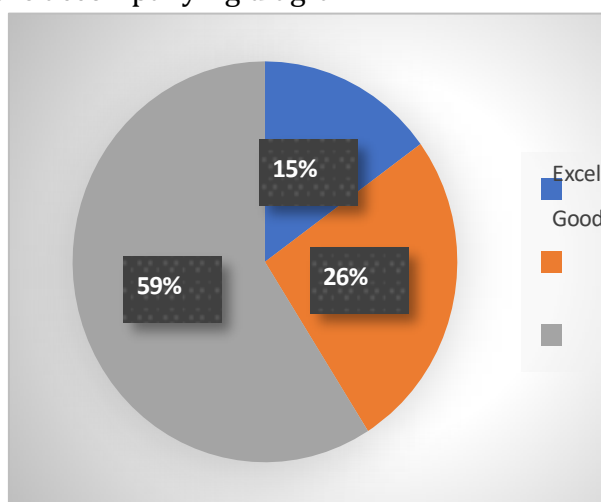

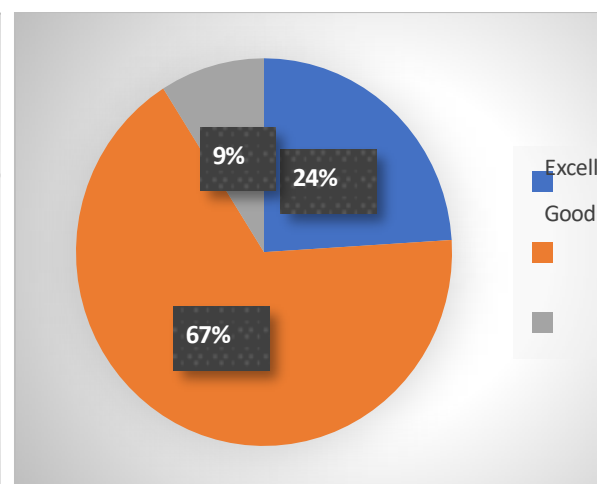**Figure 6.** Diagram of Control Psychomotor Scores

Figure 7. Diagram of Experimental Psychomotor Scores

As illustrated in Figure 3, the control class obtained a psychomotor score of 15% of students being excellent, 26% being good, and 59% being sufficient. Similarly, Figure 2 demonstrates that the experimental class obtained a score of 24% of students being excellent, 67% being good, and 9% being sufficient. The control class is in the moderate category, and the experimental class is in the good category.

3.2. Discussion

According to Tables 2, 3, and 4, higher biomass consistently improves adsorption efficiency for certain heavy metals but has different patterns in each wastewater type. In domestic and sand mining wastewater, the adsorption efficiency for arsenic increases significantly with higher *Lemna* biomass. Earlier research (Rai & Nongtri, 2024) demonstrates the affinity of *Lemna* species for arsenic due to its root structure and surface interactions. In batik textile wastewater, arsenic removal reaches its highest efficiency due to the unique ionic composition of the wastewater (Zakaria et al., 2023).

The efficacy of problem-based e-posters in enhancing learning outcomes is well-documented. These posters offer an ecologically-based medium, presented visually and interactively, that has been found to facilitate the comprehension of ecological concepts among students (Syahputra et al., 2024). This pedagogical approach aligns with the preferences of the digital generation, who exhibit a predilection for technology-based media. The incorporation of multimedia elements, such as images and pertinent text, enables students to delve deeper, thereby rendering the learning process more contextual and engaging. Moreover, the implementation of the Problem-Based Learning (PBL) model enables active student involvement in problem-solving, thus enhancing the contextual relevance and meaningfulness of the learning experience.

The findings of the study indicated that the control class demonstrated an N-gain of 0.1896, falling within the less category, while the experimental class exhibited an N- gain of 0.3791, categorizing it as moderate. These outcomes suggest that e-poster media has the potential to enhance student learning outcomes. This enhancement in student learning outcomes can be attributed to the visual and multimedia elements inherent in e-posters, which facilitate comprehension of complex concepts. Furthermore, the integration of the PBL model enhances student engagement in the learning process, aligning with the findings of Harahap et al. (2023). Their research suggests that one method to cultivate creative thinking, analysis, and problem-solving skills is to experiment with novel approaches, such as the implementation of e-posters as a medium for learning.

The findings indicated significant disparities in the affective learning outcomes between the control class and the experimental class. The control class exhibited a 47% rate of students falling within the sufficient category, while the experimental class demonstrated a 61% rate of students within the excellent category. Affective assessment is evaluated based on three distinct aspects: confidence, responsibility, and discipline. Confidence is evident in students' articulation of their thoughts with their peers,

responsibility is demonstrated during group discussions, where accuracy and focus are paramount in problem-solving using e-poster media, and discipline is exhibited in adhering to assignment deadlines. According to the findings of research conducted by Muzammil et al. (2023), the utilization of e-poster learning media has been identified as a highly effective strategy for enhancing student motivation and engagement. This approach has been found to facilitate a more profound comprehension of the subject matter, thereby contributing to the development of students' affective abilities.

The findings further demonstrated that there were discrepancies in psychomotor learning outcomes, with the control class exhibiting a 59% sufficient rate and the experimental class demonstrating a 67% good rate. Psychomotor assessment is evaluated based on three criteria: effective presentation, active inquiry, and cooperation. Problem-based e-posters encompass problems that students are tasked with solving, followed by presentations. The presentations that ensued from this discussion have been shown to enhance students' presentation skills, the effectiveness of their questioning during peer presentations, and their cooperation in responding to questions from their peers (Diana, 2023). This finding aligns with the research that has demonstrated the efficacy of presentation assessment in identifying and enhancing aspects of students' psychomotor abilities.

The findings indicate that the experimental class students' affective and psychomotor scores, which were attained through the utilization of problem-based e- poster media in their learning process, surpassed those of the control class, which did not employ such problem-based e-poster media. The efficacy of e-posters in enhancing affective and psychomotor learning outcomes is well-supported by empirical evidence. The interactive and engaging nature of e-posters fosters a deeper exploration by students, thereby motivating them to actively seek solutions to the presented problems. This finding aligns with the research by Murtalib et al. (2023), which demonstrates that problems presented through poster media can effectively stimulate critical and creative thinking in students.

This study builds upon the findings of prior research, particularly that of Hadi (2023), which demonstrated the efficacy of e-posters in enhancing student learning outcomes, particularly in the comprehension of complex and abstract concepts. The results of this study substantiate the positive impact of visual media, such as e-posters, in presenting information in a manner that is both engaging and readily comprehensible for students. This finding is consistent with the results of research conducted by Djonomiarjo (2020), which demonstrated that problem-based learning (PBL) models are more effective in improving student learning outcomes. PBL involves active student engagement in solving contextual problems relevant to everyday life, thereby fostering the development of critical, analytical, and creative thinking skills necessary for problem- solving.

The efficacy of problem-based E-Poster media in enhancing student learning outcomes has been empirically substantiated. The integration of engaging and structured problems within the poster has been identified as a pivotal factor in this effectiveness. This

assertion is further substantiated by the findings of research conducted by Suswanti (2021), which demonstrated that the PBL model significantly improved student learning outcomes across the cognitive, affective, and psychomotor domains. These findings collectively reinforce the argument that the integration of e-posters with the PBL model fosters a more engaging, interactive, and meaningful learning environment for students, thereby encouraging active involvement in the learning process and leading to enhanced overall learning outcomes.

Conclusion

The findings of this study demonstrate that the implementation of problem-based e-posters has yielded positive outcomes in enhancing student learning outcomes in class VII SMP Muhammadyah PK Kartasura. The analysis revealed that the cognitive aspects exhibited an n-gain value of 0.3791 within the medium category, indicating a substantial improvement in student performance. Furthermore, the affective learning outcomes indicated that 61% of students attained the very good category, while 67% of students achieved the good category in terms of psychomotor scores. The findings of this study substantiate the efficacy of problem-based e-posters in enhancing student learning outcomes.

References

Anggraheni, Y. N., & Saifuddin, M. F. (2021). Students' perception of learning media poster material structure and function of plants for class VIII SMP. *Journal of Biology Education Research (JBER), 2*(2), 68–73. https://doi.org/10.55215/jber.v2i2.4458

Arifki, M. M. M. F. N., Prasetyo, D., & Prastya, F. R. (2023). Analisis kemampuan psikomotorik mahasiswa melalui kegiatan magang industri di CV. Duta Cipta Electrindo (Samsung Service Center Madiun). *Jupiter (Jurnal Pendidikan Teknik Elektro), 8*(1), 1–10. https://doi.org/10.25273/jupiter.v8i1.16055

Aryani, I., & Nugroho, P. A. (2022). Analisis penggunaan media pembelajaran Schoology pada mata kuliah praktikum biologi lingkungan terhadap hasil belajar mahasiswa di era pandemi Covid-19. *Jurnal IPA & Pembelajaran IPA, 6*(2), 145–155. https://doi.org/10.24815/jipi.v6i2.25053

Astuti, R., & Najuba, N. (2024). Penggunaan model pembelajaran contextual teaching and learning (CTL) untuk meningkatkan hasil belajar dan keaktifan siswa. *Prima Magistra: Jurnal Ilmiah Kependidikan, 5*(1), 1–7. https://doi.org/10.37478/jpm.v5i1.3141

Djonomiarjo, T. (2020). Pengaruh model problem based learning terhadap hasil belajar. *Aksara: Jurnal Ilmu Pendidikan Nonformal, 5*(1), 39–46. https://doi.org/10.37905/aksara.5.1.39-46.2019

Hadi, S. (2023). Pemanfaatan pembuatan poster pada aplikasi digital sebagai media pembelajaran. *Prosiding Seminar Nasional*, 573–590.

Hariyatmi, & Tisniasari, H. S. (2023). PBL-based science learning on living things interaction in junior high school. *International Conference on Biology Education, Natural Science, and Technology, 1*(1), 587–598.

Hikmah, A. E. N. (2024). Literature review: Perkembangan sistem pendidikan di era zaman dahulu dan zaman sekarang. *Journal of Community Education, 4*(1), 63–71.

Indarta, Y., Jalinus, N., Samala, A. D., Riyanda, A. R., & Adi, N. H. (2022). Relevansi kurikulum Merdeka Belajar dengan model pembelajaran abad ke-21 dalam perkembangan era Society 5.0. *Edukatif: Jurnal Ilmu Pendidikan, 4*(2), 3011–3024.

Maulana Intaha, A., Munajat, Y., & Mulyana, S. (2020). The effect of poster and video learning media on the mastery of pencak silat skills. *Jurnal Pendidikan Jasmani, 20*(2), 145–153.

Mayasari, A., Arifudin, O., Juliawati, E., & Sabili, S. (2022). Implementasi model problem based learning (PBL) dalam meningkatkan keaktifan pembelajaran. *Jurnal Tahsinia, 3*(2), 167–175. https://doi.org/10.57171/jt.v3i2.335

Murtalib, M., & Mikrayanti, M. (2023). Implementasi model problem based learning berbantuan poster matematika dalam menyelesaikan masalah kaidah pencacahan. *JagoMIPA: Jurnal Pendidikan Matematika dan IPA, 3*(2), 63–74. https://doi.org/10.53299/jagomipa.v3i2.329

Murtiyasa, B., Aulida, A. N., & Abdullah, M. A. A. (2021). Analisis efektivitas Brainly sebagai platform e-learning untuk meningkatkan minat belajar siswa SMA. *PYTHAGORAS: Jurnal Pendidikan Matematika, 16*(2), 141–150. https://doi.org/10.21831/pythagoras.v16i2.44875

Nasution, A. A. (2024). Mengkaji keunggulan kurikulum IPA Finlandia untuk meningkatkan pendidikan sains di Indonesia. *Nizhamiyah, 14*(1), 1–10. https://doi.org/10.30821/niz.v14i1.3551

Nurfadillah, S. (2021). *Media pembelajaran: Pengertian, landasan, fungsi, dan manfaat.* Universitas Muhammadiyah Tangerang.

Pernantah, P. S., & Hardian, M. (2020). Peningkatan kompetensi pedagogik guru melalui pelatihan perangkat pembelajaran abad ke-21 berbasis Merdeka Belajar. *Jurnal Pengabdian Masyarakat, 2*, 432–439.

Pujiningsih, Y. (2024). Analisis penggunaan poster sebagai media pembelajaran IPS dalam meningkatkan hasil belajar siswa. *Jurnal Teknologi Pendidikan dan Pembelajaran, 2*(1), 165–168.

Ridwan Yusuf, I., & Salsabila, S. (2023). Pengaruh model problem based learning terhadap kemampuan berpikir kritis pada materi ekologi. *Diklabio: Jurnal Pendidikan dan Pembelajaran Biologi, 7*(1), 49–55. https://doi.org/10.33369/diklabio.7.1.49-55

Setyowati, B. E., Indriyani, S., Dewi, N. R., & Teaching, C. R. (2023). Peningkatan keterampilan literasi sains menerapkan problem based learning berbasis culturally responsive teaching. *Proceeding Seminar Nasional IPA XIII*, 218–230.

Syahputra, G., & Edwards, A. J. (2024). Transforming history teaching: Using Adobe Photoshop e-posters to teach the Battle of November 10, 1945. *Journal of Educational Technology and Learning Creativity, 2*(1), 29–40. https://doi.org/10.37251/jetlc.v2i1.980

Ulfah, & Arifudin, O. (2021). Pengaruh aspek kognitif, afektif, dan psikomotor terhadap hasil belajar peserta didik. *Jurnal Al-Amar (JAA), 2*(1), 1–9.

Veronika Sitepu, S., Sijabat, O. P., Naibaho, T., & Simanjuntak, R. M. (2022). Evaluasi psikomotorik dalam pembelajaran matematika berbasis hybrid learning. *Journal of Educational Learning and Innovation (ELIa), 2*(2), 251–267. https://doi.org/10.46229/elia.v2i2.487

Widyanto, I. P., & Wahyuni, E. T. (2020). Implementasi perencanaan pembelajaran. *Satya Sastraharing, 4*(2), 16–35.