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## Practicality and Effectiveness of the Edupark Fisika Batang Tabik Waterpark Enrichment Book in Improving Students' Physics Conceptual Understanding at SMAN 1 Sarolangun, Jambi Province

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### ABSTRACT

Batang Tabik Waterpark in Lima Puluh Kota Regency, West Sumatra, is an educational tourism destination with great potential as a source for contextual physics learning. However, this potential has not been optimally utilized in the learning process. Many students still have difficulty understanding and relating physics concepts to phenomena found in the Waterpark's attractions. As a solution, an enrichment book based on Problem-Based Learning was developed, presenting contextual problems related to physics phenomena at the Waterpark to help students better understand concepts in a real context. The book was validated by experts before testing its practicality and effectiveness in learning. This study aims to produce an enrichment book, Edupark Physics Batang Tabik Waterpark, based on PBL that meets practical and effective criteria. The quantitative research method used a one-group pretest-posttest design, with purposive sampling of class XI-2 from the XI Fase F population at SMAN 1 Sarolangun, as this class applies the Problem-Based Learning model. Instruments included questionnaires for practicality testing and multiple-choice C2 level tests to measure conceptual understanding. Data were analyzed using percentage and paired sample t-test. The results showed that the enrichment book is highly practical (average score 92.58%) and effectively improves students' physics concept understanding significantly ( $p < 0.001$ ).

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## 1. INTRODUCTION

Physics instruction in schools plays a pivotal role in enhancing national intellectual capacity by fostering students' understanding of natural phenomena through relevant scientific concepts (Dani et al., 2019). However, many students often perceive physics as a difficult and unappealing subject due to the abstract nature of its concepts and its limited connection to real-life contexts (Puspitasari et al., 2022). One of the main factors contributing to students' low motivation and limited conceptual understanding is the lack of contextual and environment-based learning materials (Fitri & Mufit, 2022).

This issue is further compounded by students' inability to connect theoretical knowledge with practical applications, which hinders the development of a deeper understanding of physics concepts (Hermanto et al., 2023; Nurul, 2022; Adawiyah et al., 2021; Ulumiyah et al., 2021). This perspective is also supported by findings from interviews conducted in a study by Hajratun et al. (2022), which revealed that many high school teachers reported that their students struggled to understand physics and required a stronger grasp of conceptual knowledge. These findings indicate that enhancing students' conceptual understanding is a fundamental need in the physics learning process.

In line with this need, Kinanti and Rifai (2023) developed an enrichment book based on the Problem-Based Learning (PBL) model integrated with the Physics Edupark at Batang Tabik Waterpark. The book is designed to connect physics concepts with direct experiences at water-based recreational attractions through contextual problem-solving, observation activities, and conceptual reflection based on real phenomena such as water slides, swimming pools, and tipping buckets. The development process followed several stages, including Edupark finding, direct observation, analysis of student, teacher, and curriculum characteristics, preliminary design using the concept fitting technique, self-assessment, and expert recommendation. These stages are part of the preliminary research phase within the Plomp development model, which encompasses needs analysis, direct observation, mapping of student and teacher characteristics, and expert validation.

Validation results showed that the material feasibility aspect scored 93.4%, the graphical aspect 94.2%, and the enrichment book's content relevance 93.1% each of which was classified as "very valid." These results indicate that the book possesses high content quality, strong relevance, and significant potential for application in physics learning. However, the book has not yet been tested further in classroom settings, leaving its practicality and effectiveness unverified. At SMAN 1 Sarolangun, physics instruction has already been implemented using a Problem-Based Learning (PBL) approach, making this enrichment book relevant for use in that school context. Therefore, this study was conducted as a follow-up to examine the practicality and effectiveness of the Batang Tabik Waterpark Edupark Physics Enrichment Book in supporting contextual physics learning.

Based on observations conducted at SMAN 1 Sarolangun, Jambi Province, 27.22% of students were found to have low levels of conceptual understanding in physics, 60.61% fell into the moderate category, and only 12.12% achieved high conceptual understanding. This low level of comprehension was evident in students' difficulties in breaking down problems, demonstrating concepts, categorizing information, formulating and drawing conclusions, as well as comparing and explaining physical phenomena they encountered—skills aligned with the indicators of conceptual understanding outlined by Radiusman (2020). This condition highlights an urgent need to bridge the gap between theoretical knowledge and real-world phenomena in physics learning.

The low level of conceptual understanding in physics observed in the field can be attributed to several interrelated factors. A lack of learning interest causes students to become passive and reluctant to explore concepts in depth. The tendency to memorize formulas without understanding their meaning and application reflects weak cognitive processes that should ideally be developed through meaningful comprehension. In fact, effective physics learning requires attention to two essential aspects: the learning process and its outcomes where students are expected not only to recall information but also to develop a deep understanding of concepts (Quality et al., 2019). This is consistent with the view that physics is not merely a subject of memorization, but one that demands profound conceptual understanding, as it involves the study of natural phenomena that are expressed through mathematical representations (Liza, 2021; Maulidina & Bhakti, 2020).

The lack of experimental activities in physics learning has made it difficult for students to relate theoretical concepts to real-life applications (Riwanto et al., 2019). This condition indicates that physics instruction has not yet provided students with a comprehensive and meaningful learning experience. Therefore, it is necessary to develop contextual teaching materials that can bring real-world situations into the classroom, enabling students to better understand physics concepts in everyday life. To address

this issue, it is essential to develop innovative instructional approaches that integrate physics concepts with local contextual elements (Trisma, Hamdi, & Sari, 2020).

Physics learning becomes more effective when students' everyday environments are utilized as learning resources, creating a connection between theoretical concepts and real-world phenomena (Darmadi, 2021). The Edupark approach, which leverages educational tourism sites such as science-themed parks, enables students to understand physics concepts through direct observation and experiential learning (Hidayat et al., 2022; Sari et al., 2020).

One relevant approach is Edupark-based learning integrated with Contextual Teaching and Learning (CTL), which utilizes the surrounding environment as a learning resource (Amelia et al., 2024). For instance, at Batang Tabik Waterpark, students can analyze parabolic motion on water slides to study Newton's laws or explore the buoyant force in swimming pools (Yunita & Rifai, 2020). This approach not only bridges the gap between theory and practice but also aligns with national educational standards, making learning more engaging and meaningful (Sadraini & Rifai, 2019).

The use of tourist attractions as Edupark-based physics learning media can shift the negative perception of physics often seen as difficult and uninteresting into a more enjoyable and contextually relevant learning process (Rifai et al., 2019). Edupark also supports the idea of local wisdom-based education by serving as a learning resource that helps students connect with nature and understand concepts within a relevant contextual framework (Sari et al., 2020). Physics edupark facilitates the learning process by assisting both teachers and students in discovering facts and formulating principles or concepts during physics instruction (Afrinaldi & Rifai, 2019).

Previous studies have shown that teaching materials integrated with the Edupark concept can assist educators in explaining physics concepts more concretely, while also helping students to better understand the material by relating it to their surrounding environment, as demonstrated through the use of the Rumah Gadang Edupark (Sadraini & Rifai, 2019). The use of tourist attractions as Edupark-based learning media can transform the negative perception of physics as a difficult and tedious subject into an enjoyable and relevant learning process connected to real life (Rifai et al., 2019). Edupark also facilitates the implementation of local wisdom-based education, serving as a learning resource that allows students to better engage with nature and comprehend physics concepts within a meaningful context (Sari et al., 2020). Edupark-based physics learning supports instruction by enabling both teachers and students to discover facts and formulate scientific principles or concepts during the learning process (Afrinaldi & Rifai, 2019).

This study aims to examine the practicality and effectiveness of the Edupark Physics Enrichment Book Batang Tabik Waterpark in enhancing students' conceptual understanding of physics at SMAN 1 Sarolangun, Jambi Province. The expected impact of this research includes strengthening local potential as a learning medium to address issues such as students' low conceptual understanding in physics and the limited availability of instructional materials aligned with the *Merdeka* Curriculum. Furthermore, through the utilization of the edupark-based enrichment book, it is expected that students will develop stronger problem-solving skills and better recognize the relevance of physics learning to real-life contexts.

## 2. METHODS

This study is a continuation of previous research conducted by Kinanti et al. (2023), who developed the *Edupark Physics Enrichment Book Batang Tabik Waterpark* based on the Problem-Based Learning (PBL) model using the Plomp development model. The Plomp model consists of three phases: (1) preliminary research, (2) prototyping phase, and (3) assessment phase. In the preliminary phase, the book was validated by three experts who evaluated material feasibility, graphical quality, and content relevance. The validation results showed that the material feasibility aspect received a score of 93.4%, the graphical aspect 94.2%, and the content relevance 93.1%, all of which were categorized as "very valid." These results indicate that the enrichment book not only provides high-quality content but is also relevant and

suitable for physics learning. Therefore, the present study focuses on evaluating the practicality and effectiveness of the enrichment book within the context of classroom-based physics instruction.

The research design used in this study was a pre-experimental design with a one-group pretest-posttest model. Students were given a pretest to assess their conceptual understanding prior to the intervention, then received instruction using the *Edupark Physics Enrichment Book Batang Tabik Waterpark*, and finally completed a posttest to measure the improvement in their understanding after the intervention. The study was conducted during the even semester of the 2024/2025 academic year at SMAN 1 Sarolangun, Jambi Province. The research subjects were 33 students from class XI phase F-2. The sampling technique used was purposive sampling, based on the consideration that this class had implemented the *Merdeka* Curriculum and demonstrated a low level of conceptual understanding in physics, as indicated by initial observations.

The instruments used in this study consisted of questionnaires and tests. The questionnaire was designed to assess the practicality of the enrichment book and was constructed using a Likert scale with four response categories: strongly agree (4), agree (3), disagree (2), and strongly disagree (1). The percentage score was calculated using the following formula.

$$P = \frac{f}{N} \times 100\% \quad (1)$$

The results of the calculations were then interpreted based on the practicality categories established for the *Edupark Physics Enrichment Book: Batang Tabik Waterpark*, as presented in Table 1.

**Table 1.** Practicality of the Enrichment Book Based on Students Responses

Percentage (%)	Criteria
0 - 20	Not Practical
21 - 41	Less Practical
41 - 60	Fairly Practical
61 - 80	Practical
81 - 100	Very Practical

Source : (Riduwan., 2012)

Meanwhile, to measure effectiveness, an instrument in the form of a physics conceptual understanding test was used, consisting of 10 multiple-choice questions accompanied by reasoning. The questions were designed at the C2 cognitive level according to Bloom's Taxonomy and were previously tested for validity. The validity of the items was analyzed using point-biserial correlation, which indicated that all items were valid, with indices ranging from 0.41 to 0.94, falling into the moderate to high category (Arikunto, 2009). The reliability of the test was measured using the Kuder-Richardson formula (KR-21), yielding a reliability coefficient of 0.88, which is categorized as high (Latisma, 2011). Therefore, the instrument was considered reliable.

The data collected were analyzed using two approaches. For the practicality test, the questionnaire results were calculated using descriptive statistics based on percentages, and the results were classified into practicality categories. For the effectiveness test, the pretest and posttest data were analyzed using inferential statistics. Normality testing was first conducted using the Shapiro-Wilk test to determine whether the data were normally distributed. If the data were normally distributed, a paired sample t-test was performed to determine whether there was a significant difference between the pretest and posttest results. All data analyses were conducted using IBM SPSS Statistics version 27.

### 3. RESULT AND DISCUSSION

The practicality of the Edupark Physics Enrichment Book Batang Tabik Waterpark was evaluated based on student responses. A total of 33 students participated in the assessment after using the enrichment book during classroom learning. The instrument used was a Likert-scale questionnaire that measured four aspects: Easy to Use, Usable, Appealing, and Cost Effective. The results of the practicality test are presented in Table 2.

**Table 2.** Practicality of the Enrichment Book Based on Students' Responses

aspect	Percentage (%)	Criteria
Easy to Use	92.12 %	Very Practical
Usable	89.70 %	Very Practical
Appealing	92.73 %	Very Practical
Cost Effective	95.76 %	Very Practical
<b>Average</b>	<b>92.58 %</b>	<b>Very Practical</b>

Based on Table 2, the practicality of the Edupark Physics Enrichment Book Batang Tabik Waterpark was rated as very practical by students, with an average score of 92.58%. This indicates that students found the enrichment book to be practical in terms of efficiency, ease of use, and visual appeal. This is further supported by the high scores given by students for each aspect of practicality Easy to Use, Usable, Appealing, and Cost Effective all of which fell into the "very practical" category.

In addition to its practicality, the enrichment book systematically integrates the Problem-Based Learning (PBL) model. Each chapter begins with a real-life phenomenon from Batang Tabik Waterpark, which is presented as a problem scenario to orient learners to the problem. Students are then guided to organize their learning tasks and identify the underlying physics concepts. Through the activities and guiding questions provided in the book, learners carry out individual and group investigations, gather information, and develop possible solutions. Furthermore, the book provides opportunities for students to develop and present their work, followed by reflection activities at the end of each chapter to analyze and evaluate the problem-solving process. This design demonstrates how the PBL model is embedded in the enrichment book to actively engage students in contextual and meaningful problem-solving. Similar approaches that integrate contextual learning with project-based designs have also been shown to enhance students' conceptual understanding in physics learning (Sabandiah et al., 2024; Wilujeng et al., 2024). To provide a clear overview, Figure 1 shows the cover of the enrichment book, while Figures 2–5 present selected sections that illustrate its content design and the integration of PBL phases. Only selected sections of the book are shown in these figures.

The cover provides an overview of the book's theme and its focus on Batang Tabik Waterpark Physics Edupark.

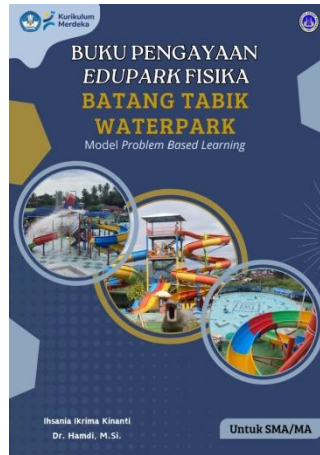


Figure 1. Cover of the Edupark Physics Enrichment Book Batang Tabik Waterpark

The main sections of the enrichment book include general instructions, explanations of the Batang Tabik Waterpark location and facilities, initial materials with images and questions, methods for deriving physics concepts from play facilities, concept identification and analysis, important notes, example exercises, scientist profiles, QR codes for online access, practice materials, learning objectives, and PBL syntax as shown in Figure 2.



Figure 2. Section of the enrichment book

The Batang Tabik Waterpark location and facilities are illustrated, highlighting swimming pools, the water slide tower, and the tipping bucket as examples of areas used for physics learning activities as illustrated in Figure 3.

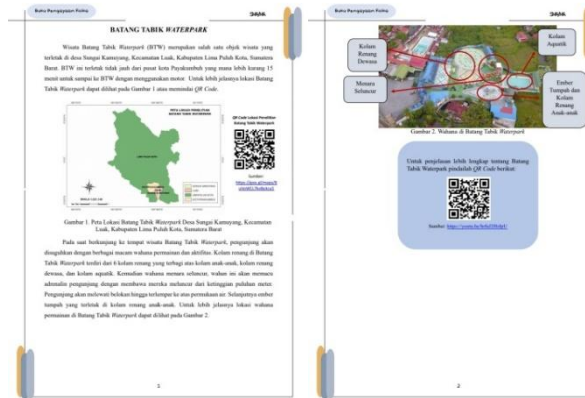


Figure 3. Description of the location and facilities of Batang Tabik Waterpark

Examples of concept identification are presented, covering the main topics to be discussed, along with concept analysis that differentiates the physics material associated with each play facility as presented in Figure 4.

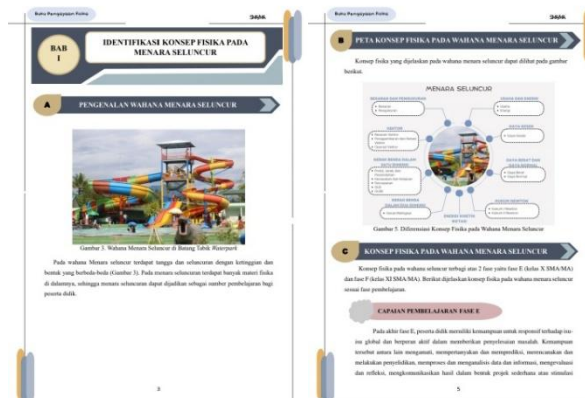


Figure 4. Identification and analysis of concepts

The PBL syntax implemented in the enrichment book is illustrated, showing all stages: orientation to the problem, organizing students, guiding investigation, developing and presenting results, and analyzing and evaluating the problem can be seen in Figure 5.

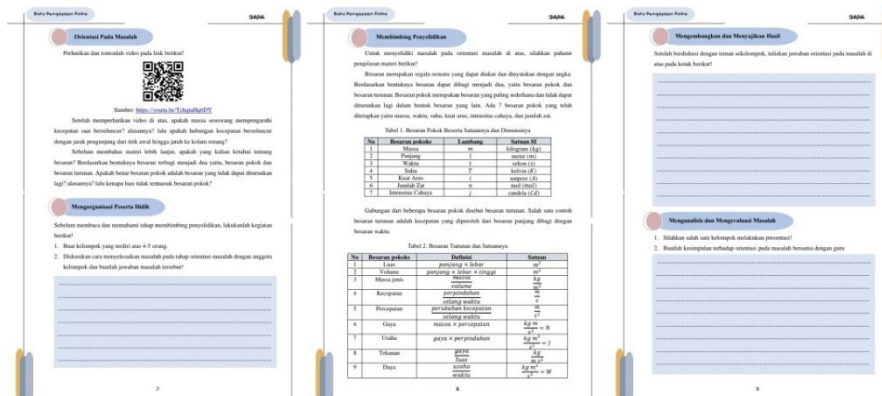


Figure 5. Problem-Based Learning (PBL) syntax

Regarding the Easy to Use aspect, the book achieved a score of 92.12%, meeting the criteria for being highly practical. It is user-friendly in the learning process, with clear and easy-to-understand instructions. The content is relevant to the surrounding environment, facilitating the concept discovery phase. Moreover, the book supports students in focusing on understanding physics concepts by relating them to the Waterpark tourism site. This practicality is further supported by previous studies indicating that books based on local wisdom and environmental contexts enhance students' deep conceptual understanding (Jufrida et al., 2021; Elvisa & Rifai, 2021).

In terms of Usable, the book received a score of 89.70%, also categorizing it as highly practical. The content is relevant to students' real-life experiences, offering flexibility for repeated use according to individual needs. Additionally, it supports independent learning by enabling students to review the material at home to reinforce their understanding. Studies have shown that locally based educational materials enhance self-directed learning at home (Misbah & Fuad, 2019; Fatmawati, Jailani, Hasanah, & Efendi, 2023). Contextually designed enrichment books can assist students in independent study, concept discovery, and formulating questions that stimulate curiosity about physical phenomena in their surroundings (Liany, Desnita, & Raihanati, 2018). Therefore, this study aligns with previous findings, demonstrating that the Edupark Physics Batang Tabik Waterpark enrichment book is highly practical in both the Easy to Use and Usable aspects, as it is designed with a local context and incorporates an active learning approach relevant to students' environments.

Regarding the Appealing aspect, the book scored 92.73%, classifying it as highly practical. This is attributed to its attractive cover design and engaging content layout, complemented by motivating images and colors. The presentation effectively connects physics phenomena with the Waterpark context, thereby enhancing student interest and focus. It fosters an interactive and enjoyable learning experience that prevents boredom. Additionally, the appealing visuals in the book strengthen students' engagement with the material, making the learning process more meaningful (Nursyahidah, Zulaikah, & Sari, 2021).

Finally, in terms of Cost Effective, the Edupark Physics Batang Tabik Waterpark enrichment book achieved the highest score of 95.76%, categorizing it as highly practical. This reflects its efficiency in providing easy access without the need for an internet connection, saving time, and offering flexibility to be used anytime and anywhere. Consequently, it serves as an optimal learning solution. Physics enrichment books that integrate concepts with local wisdom are considered efficient as they align well with the school's context (Liany, Desnita, & Raihanati, 2018; Jufrida et al., 2022).

After the practicality test, the book's effectiveness in enhancing students' understanding of physics concepts was evaluated. The evaluation began with a normality test of the pretest and posttest data to determine whether the data were normally distributed. The Shapiro-Wilk test was conducted using SPSS software. The results of the normality test are presented in Table 3.

**Table 3.** Normality Test Results Using SPSS

	<b>Statistic</b>	<b>Df</b>	<b>Sig</b>	<b>Decision</b>
Pretest	.952	32	0.148	Normally Distributed
Posttest	.971	32	0.508	Normally Distributed

The output results above show that the significance values for the pretest and posttest data were 0.148 and 0.508, respectively, both greater than 0.05. Based on these results, it can be concluded that the pretest and posttest data are normally distributed, thus meeting the assumptions for conducting the hypothesis test using a paired sample t-test.

**Table 4.** Paired Sample t-Test Results Using SPSS

Paired Differences									
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	Df	Sig.(2-tailed)
					Lower	Upper			
Pair 1	Pre-post	-38.939	5.556	.967	-40.910	-36.969	-40.260	32	<.001

The Paired Samples Test (Table 4) revealed a mean difference of -38.939, with  $t = -40.260$ ,  $df = 32$ , and a significance level of  $p < 0.001$ . The significance value, being less than 0.05, indicates a statistically significant difference between the pretest and posttest scores. These results demonstrate that the use of the Edupark Physics Batang Tabik Waterpark enrichment book significantly improved students' understanding of physics concepts. Therefore, the null hypothesis ( $H_0$ ) is rejected, and the alternative hypothesis ( $H_1$ ) is accepted. In conclusion, the Edupark Physics Batang Tabik Waterpark enrichment book is effective in significantly enhancing students' conceptual understanding of physics.

These findings reinforce that a contextual learning approach through an Edupark-based enrichment book can serve as a solution to the gap between theory and practice in physics education. The integration of physics concepts with direct experiences at Waterpark attractions has been shown to activate students' cognitive processes and provide deeper learning meaning. The use of local context in the book also demonstrates that resources in students' immediate environment can be utilized as effective and engaging learning media. In addition to its contextual foundation, the book adopts the Problem-Based Learning (PBL) model, which has been proven effective in enhancing students' conceptual understanding of physics through active involvement in solving real-world problems (Ilahiyah, Darvina, Ratnawulan, & Jhora, 2025; Hasanah, Festiyed, Desnita, & Suherman, 2025).

#### 4. CONCLUSION

The use of the Edupark Physics Batang Tabik Waterpark enrichment book has been proven practical and effective in enhancing the conceptual understanding of physics among eleventh-grade students at SMAN 1 Sarolangun, Jambi Province. The study results indicate that the book demonstrates a very high level of practicality and is suitable for use in learning. Furthermore, pretest and posttest results show significant improvement in students' conceptual understanding after using the book. The Edupark-based approach assists students in grasping physics concepts through real-world phenomena, making the learning process more contextual and meaningful. The findings of this study provide practical implications for physics learning. The enrichment book developed through the integration of edupark contexts can be used by teachers as an alternative learning resource that supports contextual and problem-based learning, thereby increasing student engagement and conceptual understanding. In addition, the product also carries theoretical implications, showing that the use of local edupark-based phenomena can strengthen the relevance of physics learning materials and contribute to the development of contextual learning models in physics education.

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## REFERENCES

- Adawiyah, V. R., Bektiarso, S., & Sudarti, S. (2021). Pengaruh model pembelajaran problem based learning (pbl) dengan vee map terhadap hasil belajar dan kemampuan berpikir kritis siswa sma pada pokok bahasan alat-alat optik. *Phi: Jurnal Pendidikan Fisika dan Terapan*, 7(2), 62-67. <https://doi.org/10.22373/p-jpft.v7i2.13372>
- Afrinaldi, & Rifai, H. (2019). Evaluation of garden functions of SMAN 2 Lubuk Basung as science-based education park. *Journal of Physics: Conference Series*, 1185(1). <https://doi.org/10.1088/1742-6596/1185/1/012126>
- Amelia, O., Sundari, P. D., Mufit, F., & Dewi, W. S. (2024). Analisis kebutuhan pengembangan e-modul dengan pendekatan contextual teaching and learning untuk meningkatkan pemahaman konsep pada materi energi terbarukan. *Jurnal Ilmiah Profesi Pendidikan*, 9(1), 34-39. <https://doi.org/10.29303/jipp.v9i1.1849>
- Arikunto, S. (2009). *Dasar-Dasar Evaluasi Pendidikan*. Jakarta: Bumi Aksara.
- Ayu, F., & Fuzi, A. (2020). The Praktikalitas Pengembangan E-Book Fisika Berbantuan Edmodo Berbasis Discovery Learning dalam Proses Pembelajaran Fisika. *Jurnal Inovasi Pendidikan Dan Sains*, 1(3), 66-71. <https://doi.org/10.51673/jips.v1i3.442>
- Azis, Hasbi. (2019). Validitas, Realibilitas, Praktikalitas, dan Efektifitas Bahan Ajar Cetak Meliputi Hand Out, Modul, Buku (Diktat, Buku Ajar, Buku Teks). Universitas Negeri Padang. Retrieved from <https://osf.io/preprints/inarxiv/fcx9e/>
- Dani, R., Latifah, N. A., & Putri, S. A. (2019). Penerapan Pembelajaran Berbasis Discovery Learning Melalui Metode Talking Stick Untuk Meningkatkan Pemahaman Konsep Gerak Lurus. *EduFisika*, 4(02), 24–30. <https://doi.org/10.22437/edufisika.v4i02.6058>
- Darmadi, I. W. (2021). Pengembangan Media Pembelajaran Komik Eksperimen Fisika Berbasis Kearifan Lokal Untuk Sekolah Menengah Pertama. *JPFT (Jurnal Pendidikan Fisika Tadulako Online)*, 9(3), 84-88. <https://doi.org/10.22487/jpft.v9i3.1649>
- Elvisa, G. O., & Rifai, H. (2021). Praktikalitas E-Book Edupark IPA dengan Pendekatan Saintifik Berdasarkan Destinasi Wisata Pantai Padang. *Jurnal Penelitian Pembelajaran Fisika*, 7(2), 128-135. <https://doi.org/10.24036/jppf.v7i2.112044>
- Fitri, A. D., & Mufit, F. (2022). Kepraktisan Bahan Ajar Berbasis Konflik Kognitif Menggunakan Software Tracker Untuk Mengkonstruksi Konsep Momentum Dan Impuls. *EduFisika: Jurnal Pendidikan Fisika*, 7(2), 147-153. <https://doi.org/10.59052/edufisika.v7i2.20372>
- Hasanah, A. N., Festiyed, F., Desnita, D., & Suherman, D. S. (2025). Pembuatan E-Modul Berbasis Problem Based Learning pada Materi Fluida untuk Memfasilitasi Science Explanation Skill Siswa. *Indo-MathEdu Intellectuals Journal*, 6(3), 3122–3131. <https://doi.org/10.54373/imeij.v6i3.3098>
- Hajratun, S., Susilawati, S., & Ayub, S. (2022). Validitas perangkat pembelajaran hukum Newton menggunakan model concept Attainment untuk meningkatkan pemahaman konsep peserta didik. *Jurnal Ilmiah Profesi Pendidikan*, 7(2b), 480-485. <https://doi.org/10.29303/jipp.v7i2b.485>
- Hermanto, I. M., Tahir, I., & Yunus, M. (2023). Penerapan model guided context-and problem-based learning untuk meningkatkan pemahaman konsep pada materi gelombang bunyi. *JPF (Jurnal Pendidikan Fisika) Universitas Islam Negeri Alauddin Makassar*, 11(1), 151-162. <https://doi.org/10.24252/jpf.v11i1.36233>

- Hidayat, R., Prihandono, T., & Sudarti, S. (2022). Inovasi bahan pembelajaran Fisika materi fluida menggunakan kajian aliran air bendungan. *Jurnal Inovasi dan Teknologi Pembelajaran*, 9(1), 80-89. <https://doi.org/10.17977/um031v9i12022p080>
- Ilahiyah, F., Darvina, Y., Ratnawulan, R., & Jhora, F. U. (2025). Pengembangan Bahan Ajar Digital Suhu dan Kalor Berbasis Model PBL Berbantuan Flip Pdf Professional untuk Siswa Fase F SMAN 7 Padang. *Jurnal Ilmiah Profesi Pendidikan*, 10(1), 245-256. <https://doi.org/10.29303/jipp.v10i1.3097>
- Jufrida, J., Kurniawan, W., Basuki, F. R., & Oksaputra, M. F. (2021). Pengembangan buku pengayaan fisika materi bunyi pada alat musik tradisional Jambi. *Physics and Science Education Journal (PSEJ)*, 57-66. <https://doi.org/10.30631/psej.v1i2.706>
- Kinanti, I. I., & Rifai, H. (2023). Needs Analysis Of Physics Edupark Enrichment Book Batang Tabik Waterpark Design Integrated Problem-based Learning. *PILLAR OF PHYSICS EDUCATION*, 16(4), 284-296. <https://doi.org/10.24036/15319171074>
- Liany, D. N., Desnita, D., & Raihanati, R. (2018). Pengembangan Buku Pengayaan Pengetahuan" Penarapan Konsep Fisika pada Pesawat Terbang Komersial" untuk Siswa SMA. *Journal Universitas Pendidikan Indonesia*. <https://doi.org/10.17509/wapfi.v3i1.10932>
- Liza, S. (2021). Upaya peningkatan minat dan hasil belajar fisika siswa kelas XII. IPA. 3 SMAN 3 Muaro Jambi melalui media pembelajaran animasi 3 dimensi tahun pelajaran 2018/2019. *SCIENCE: Jurnal Inovasi Pendidikan Matematika dan IPA*, 1(2), 170-176. <https://doi.org/10.51878/science.v1i2.522>
- Maulidina, S., & Bhakti, Y. B. (2020). Pengaruh media pembelajaran online dalam pemahaman dan minat belajar siswa pada konsep pelajaran fisika. *ORBITA: Jurnal Pendidikan dan Ilmu Fisika*, 6(2), 248-251. <https://doi.org/10.31764/orbita.v6i2.2592>
- Nurul, D. (2022). Analisis kesulitan kemampuan pemecahan masalah pada peserta didik dalam pembelajaran fisika. *Jurnal Inovasi dan Teknologi Pendidikan*, 1(1), 20-30. <https://doi.org/10.46306/jurinotep.v1i1.2>
- Oksaputra, M. F. (2021). *Pengembangan Buku Pengayaan Fisika Berbasis Kearifan Lokal Alat Musik Tradisional Jambi* (Doctoral dissertation, Universitas Jambi).
- Purwanto, A. eko, Hendri, M., & Susanti, N. (2016). Studi perbandingan (Agus) hal :22-27. *Jurnal Pendidikan Fisika*, 1(1), 22-27
- Puspitasari, R., Mufit, F. dan Asrizal. 2022. "Kepraktisan E-Book Berbasis Konflik Kognitif Menginterasikan Real Experiment Vidio Analysis untuk Meningkatkan Pemahaman Konsep Siswa," *Jurnal Penelitian dan Pembelajaran Fisika*, 8(1), <https://doi.org/10.24036/jppf.v8i1.115724>
- Quality, T. H. E., Physics, O. F., In, L., & Negeri, S. M. A. (2019). *Perangkat Pembelajaran, Pendekatan Sainifik*. April, 52-59.
- Radiusman, R. (2020). Studi Literasi: Pemahaman konsep anak pada pembelajaran matematika. *FIBONACCI: Jurnal Pendidikan Matematika Dan Matematika*, 6(1), 1-8. <https://doi.org/10.24853/fbc.6.1.1-8>
- Rifai, H., Yohandri, Y., Sari, D. P., & Emafri, W. (2019). Pengintegrasian wahana permainan wisata alam ngarai sianok dan wisata buatan mifan water park padang ke dalam materi Fisika. *Jurnal Eksakta Pendidikan (JEP)*, 3(2), 109-116. <https://doi.org/10.24036/jep/vol3-iss2/400>

- Riwanto, D., Azis, A., & Arafah, K. (2019). Analisis pemahaman konsep peserta didik dalam menyelesaikan soal-soal fisika kelas x mia sma negeri 3 soppeng. *Jurnal Sains Dan Pendidikan Fisika*, 15(2), 23-31.
- Sabandiah, T., Annisa, F., & Ahmad, N. H. B. (2024). Development of Student Worksheets Based on Project Based Learning on Renewable Energy Material for Senior High School. *Phi: Jurnal Pendidikan Fisika dan Terapan*, 10(2), 27-32. <https://doi.org/10.22373/p-jpft.v10i2.23539>
- Sari, D. P., Rifai, H., Yohandri, & Emafri, W. (2020). Design and manufacture of teaching edupark physics Mifan water park Padang Panjang, Indonesia with discovery learning model. *Journal of Physics: Conference Series*, 1481(1). <https://doi.org/10.1088/1742-6596/1481/1/012097>
- Sadraini, S., & Rifai, H. (2019). Meta Analisis E-Book dan Edupark Terhadap Landasan Pendidikan Pada Pembelajaran Revolusi Industri 4.0. *Jurnal Penelitian Pembelajaran Fisika*, 5(2). <https://doi.org/10.24036/jppf.v5i2.107436>
- Sadraini, A., & Hamdi, H. (2021). Praktikalitas dari Pengembangan E-book Edupark Fisika dengan Pendekatan Saintifik Berdasarkan Destinasi Rumah Gadang. *Jurnal Penelitian Pembelajaran Fisika*, 7(1). <https://doi.org/10.24036/jppf.v7i1.111942>
- Trisma, E., Hamdi, H., & Sari, D. P. (2020). Tingkat Penerapan Pendekatan Saintifik antara Buku Ajar Edupark Fisika Mifan Waterpark Padang Panjang dengan Buku Standar. *JURNAL EKSAKTA PENDIDIKAN (JEP)*, 4(1), 66-72. <https://doi.org/10.24036/jep/vol4-iss1/424>
- Ulumiyah, W., Masturoh, L., & Nuraini, L. (2021). Efektivitas Penerapan Model Pembelajaran Problem Based Learning Disertai PhET Simulation Pada Pokok Bahasan Elastisitas dan Hukum Hooke di SMA. *Phi: Jurnal Pendidikan Fisika dan Terapan*, 7(1), 71-74. <https://doi.org/10.22373/p-jpft.v7i1.11066>
- Wati, D. K., Supriana, E., & Sulur, S. (2019). Pengembangan E-Book Fisika Berbasis Multi Representasi dengan Corrective Feedback pada Materi Gerak Lurus untuk Kelas X SMA/MA. In *Seminar Nasional Fisika dan Pembelajarannya* (pp. 60-65). <http://dx.doi.org/10.17977/um058v4i1p34-41>
- Wilujeng, I., Wibowo, H. A. C., & Akbar, M. A. A. (2024). Analisis Kebutuhan Penerapan Model PBLA Berbantuan PhET Simulation untuk Meningkatkan Keterampilan Berpikir Kritis pada Materi Gerak Parabola. *Phi: Jurnal Pendidikan Fisika Dan Terapan*, 10(1), 15-20. <https://doi.org/10.22373/p-jpft.v10i1.20649>
- Ziya, K. (2024). *Efektifitas Penggunaan E-Book Bagi Siswa SMA Negeri 5 Banda Aceh* (Doctoral dissertation, UIN Ar-Raniry Fakultas Adab dan Humaniora).