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From the Border to Education: Developing A Local Resource Potential Booklet as A Learning Media

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ABSTRACT

Malaka Regency, which borders Timor-Leste, faces challenges in utilizing its natural resources, thus requiring learning media to explore local potential. This study aims to develop a learning booklet based on local renewable energy sources and test its effectiveness. This study employed a research and design model developed by Borg and Gall. For analysis, N-Gain was used to evaluate pre-test and post-test results, involving 98 eighth-grade students and 27 social studies teachers in the dissemination stage. The results showed a significant increase in student understanding with an N-Gain of 0.6647 (66.47%), which is considered effective. A paired t-test revealed a highly significant difference between pre-test and post-test scores ($p < 0.001$), with an effect size (Cohen's $d = 2.568$) indicating a substantial impact. 78.15% of teachers considered the booklet suitable for classroom use. These findings indicate that the developed booklet is effective and pedagogically appropriate.

***Keywords*:**

Local Resource; Media Development; Borg & Gall; N-Gain; Cohen's d.

ABSTRAK

Kabupaten Malaka, yang berbatasan dengan Timor-Leste, menghadapi tantangan dalam memanfaatkan sumber daya alamnya, sehingga membutuhkan media pembelajaran untuk mengeksplorasi potensi lokal. Studi ini bertujuan untuk mengembangkan buku pembelajaran berbasis sumber energi terbarukan lokal dan menguji efektivitasnya. Studi ini menggunakan model penelitian dan desain yang dikembangkan oleh Borg dan Gall. Untuk analisis, N-Gain digunakan untuk mengevaluasi hasil pre-test dan post-test, yang melibatkan 98 siswa kelas delapan dan 27 guru IPS pada tahap

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diseminasi. Hasil menunjukkan peningkatan pemahaman siswa yang signifikan dengan N-Gain sebesar 0,6647 (66,47%), yang dianggap efektif. Uji t berpasangan menunjukkan perbedaan yang sangat signifikan antara skor pre-test dan post-test (p < 0,001), dengan ukuran efek (Cohen's d = 2,568) yang menunjukkan dampak substansial. 78,15% guru menganggap buku tersebut cocok untuk digunakan di kelas. Temuan ini menunjukkan bahwa buku yang dikembangkan efektif dan sesuai secara pedagogis.

***Kata kunci*:**

Sumber Daya Lokal; Pengembangan Media; Borg & Gall; N-Gain; Cohen's d.

1. Introduction

Learning materials are a crucial aspect in developing instructional media. The relationship between learning materials and learning media is inseparable. Materials are used to adapt to the media being designed (Ahmed & Kumalasari, 2023; Sudarsana, Arini, Mastini, & Sukerni, 2020). Material overload due to the current education system is also a problem in itself (Bagindo & Yulia, 2019; Haryana, Warsono, Achjari, & Nahartyo, 2022). The need for appropriate media in delivering material for better understanding (Daryanes et al., 2023; Moghavvemi, Sulaiman, Jaafar, & Kasem, 2018).

Malaka's position as a border region directly adjacent to Timor Leste underscores the importance of understanding and managing local natural resources (Yusliana, Fahik, & Devi, 2023). Border regions require strong resource-based resilience, as optimal utilization of natural resources can support national security and contribute significantly to long-term regional development (Qiang & Jian, 2020; Zhang & Dilanchiev, 2022). However, previous studies have primarily focused on mapping the potential of renewable energy without integrating this potential into regionally based social studies educational materials (Megantari, Margunayasa, & Agustiana, 2021; Setyono, Mardiansjah & Astuti, 2019). Moreover, existing social studies research has tended to prioritize learning models rather than contextual materials rooted in students' real-life environment (Sumadyanti, Sriartha, & Maryati, 2024). This creates a clear educational research gap, where students do not receive learning resources that connect curriculum content with the local natural resource potential of Malaka Regency.

Junior high school students in Malaka Regency also experience this problem. An interviewed teacher explained that students struggle to understand the material because many of the examples provided come from contexts outside East Nusa Tenggara. The teacher further emphasized that examples in natural resource topics seldom illustrate Malaka's own local potential. As a result, students are unable to connect classroom content with the realities of their surroundings, which limits the development of meaningful, contextual understanding.

Because of these problems, this research focuses on Malaka Regency, given its strategic location on the border, its abundant renewable energy potential that has not been optimally utilized, and the lack of contextual teaching materials that reflect local conditions. Therefore, the objectives of this study are: (1) to develop a learning media booklet based on renewable energy resources in Malaka Regency, and (2) to know the effectiveness of learning media in improving students' understanding of natural resources. This study is expected to contribute to the development of learning media resources grounded in local potential and aligned with sustainable development education.

2. Methods

2.1 Research Design

This research is a development model research and design that uses the Borg and Gall model. This model was used for its comprehensive trial stages, direct user involvement, and integration of research and development (Purba, 2024). The steps in the Borg and Gall model are: preliminary study, research planning, product draft development, individual trials, revision of trial results, limited trials, product refinement based on limited trial results, widespread implementation trials, final product refinement, and dissemination (Aka, 2019; Harerimana, Duma, & Mtshali, 2023).

2.2 Population and Sample

The research population consisted of all eighth-grade students in Malaka Regency. The sample size for this development stage was 98 eighth-grade students, divided as follows: 20 in the individual trial stage, 40 in the limited-trial stage, and 98 in the large-trial stage. In addition to student participants, experts were also involved in the validation stage, including one learning media expert, one subject matter expert, and one language expert. The dissemination stage involved 27 social studies teachers in Malaka Regency.

2.3 Data Collection Techniques

Data were collected through interviews, observations, questionnaires, and pre- and post-test assessments. Interviews were conducted before the trial to gather information on students' difficulties and teachers' perceptions of the existing teaching materials. Observations were then conducted during the preliminary study phase and during the development process to document student responses during the trial. Questionnaires were used to determine the feasibility of the learning media. Pre-test and post-test were used to determine the effectiveness of the learning media. The pre-test and post-test for effectiveness were conducted in the large-class trial phase in Borg and Gall.

2.3.1 Expert Validation Instrument

The experts' assessments are based on aspects of media suitability, material suitability, presentation quality, and language suitability. Indicators for each expert domain are listed in Table 1 (Laksana, 2024; Perez et al., 2023):

Table 1. Instrument for Reviewing

Expert	Feasibility Aspects	Aspects Assessed
Learning Media Expert	Media	Media Model Size Cover Design Content Design
Subject Content Expert	Material	Material Relevance to Core Competencies Material Accuracy Material Up-to-Date Encourages Curiosity
	Presentation	Presentation techniques Presentation support Learning presentation Coherence and sequence of thought flow
Language Expert	Language	Language Use Readability Language appropriateness to the learner's level

2.3.2 Student and Teacher Assessment Instrument

Students evaluated the attractiveness, clarity of the material, and language of the booklet as shown in Table 2 (Alobaid, 2020; Astuti, Suranto, & Masykuri, 2020):

Table 2. Group Instrument

No	Aspect	Indicator
1	Attractiveness	The attractiveness of the display of the booklet media The appeal of using images in booklet media
2	Material	Clarity of material presented in the Booklet Completeness of the material in the Booklet Appropriate images accompany the discussion of material in the Booklet
3	Language	Readability of writing on the Booklet

Then, in the dissemination stage, teachers conducted evaluations based on competency-based, material accuracy, topicality, curiosity-building, presentation techniques, presentation support, learning presentation, coherence and sequence, flow of thought, contextual nature, and contextual components (Hairida, 2019; Setuju, Ratnawati, Wijayanti, Widodo, & Setiadi, 2020).

2.4 Data Analysis Techniques

The data analysis techniques used are feasibility analysis, effectiveness analysis (N-Gain Score), statistical test (Paired Sample t-Test), and effect size analysis (Cohen's d and Hedges' g).

2.4.1 Feasibility Analysis

The feasibility aspect was obtained from assessments by experts, students, and social studies teachers in Malaka Regency. The expert, student, and teacher evaluation scores were analyzed using a four-point Likert scale, as shown below:

Table 3. Criteria Score

Criteria	Score
Strongly agree	4
Agree	3
Disagree	2
strongly disagree	1

Next, the achievement conversion with a scale of 4 is used, as shown in Table 4 below:

Table 4. Conversion Scale

Score	Criteria	Information
1%-25%	Invalid	total revision
26%-50%	less valid	partial revision and reassessment
51%-75%'	quite valid	partial revision
76%-100%	Valid	no revision

Source: Calculation Results, 2025

2.4.2 Effectiveness Analysis (N-Gain Score)

To determine the level of media effectiveness, use the N-gain score and N-gain percent. The N-Gain score and N-Gain percent are used to assess the proportional increase in pre-test to post-test scores, indicating whether the increase is low, medium, or high. The formula is as follows (Oktavia & Prasasty, 2019; Yaniawati, Kariadinata, Sari, Pramiarsih, & Mariani, 2020):

$$N\ Gain\ score = \frac{(average\ post{-}test\ score - average\ pre{-}test\ score)}{maximum\ score - (average\ pre{-}test\ score)} \quad (1)$$

$$N\ Gain\ Percent = N\ Gain\ score\ \ x\ 100 \quad (2)$$

Next, enter it in the following Table 5 (Wati, Siahaan, & Wiyono, 2021):

Table 5. Criteria N-Gain Score

N Gain Score	Category
N Gain < 0.3	Low
0.3< N Gain <0.7	medium
N Gain > 0.7	high

Then the following is the table for N-Gain percent (Lathifa, 2025):

Table 6. Criteria N Gain Score

N Gain Percent	Category
< 40%	Low
40–55%	Medium
56–75%	Effective
> 75%	Very Effective

2.4.3 Statistical Test (Paired Sample t-Test)

To determine whether there was a significant difference between pre-test and post-test scores, a paired sample t-test was performed because the same group of students was measured twice. This test confirmed whether the improvements in student scores were statistically significant and not due to chance.

2.4.4 Effect Size Analysis (Cohen's d and Hedges'g)

To determine the strength of the impact of the learning media on student outcomes, Cohen's d and Hedges'g were calculated. Effect size analysis provides practical significance, showing how meaningful the improvement is beyond statistical significance.

3. Results and Discussion

Knowing the potential of local resources is essential for a region's residents. A clear understanding of the complexity of local resources is a prerequisite for understanding the potential of a region and developing meaningful integration recommendations and policies (Bennett et al., 2018; Schilling, Saulich, & Engwicht, 2018). The development of learning media based on local resource potential was carried out in accordance with the stages outlined in the Borg and Gall model. This process emphasized the integration of renewable energy potential, such as livestock biomass, solar radiation, wind speed, and sorghum crops into learning materials aligned with the social studies curriculum for eighth-grade students. The development process consisted of 10 interrelated phases, as described by Borg and Gall.

The preliminary study was conducted through observations and teacher interviews. The interviews were conducted with three social studies teachers. The results indicated that the teaching materials used in the lessons were very limited in variety, leading many students to pay little attention. Therefore, there was a clear need for more interactive teaching materials in learning activities. In line with Nasir's research, he stated that the advantage of learning materials for teachers was that they did not need to rely on textbooks, which were sometimes difficult to obtain, while for students, one advantage was that the learning process became more interesting (Nasir, Akram, Ayu, Hambali, & Ikbar, 2022).

Before developing a product draft, it is necessary to plan the teaching materials, starting with a needs analysis and then preparing tools and materials. The following is a summary of the needs analysis results (Kosasih, 2021) using the variables of material difficulty, understanding difficulty,

and learning process problems, which 33 eighth-grade students filled out. The result is as follows:

Table 7. Needs Analysis Recapitulation

No.	Criteria	Score (%)			
		High	Medium	Low	Very Low
1.	Level of Difficulty of Natural Resources Material	69.69	18.18	8.11	4.01
2.	Difficulty in Understanding Natural Resources Material	57.57	24.24	14.09	4.09
3.	Problems in the Learning Process	72.72	21.21	4.02	2.04

Source: Research Result, 2025

Based on Table 7, the difficulty level of the material with score 69.69%, the level of understanding with score 57.57%, and the problems in the learning process with score 72.72%. The following are suggestions or input from students: Requires teaching materials that are interesting and easy to carry, and uses examples from students' lives, as well as games. Based on the data and observations, the next step is to develop teaching materials that meet students' needs. The draft version of the learning media development was developed based on the needs analysis and interviews. This stage then involved identifying learning outcomes, adapting materials and models, and designing the structure of the teaching materials. This stage included (a) materials; (b) media design; and (c) designing the researcher's questionnaire.

Picture 1. Development Product

Picture 1 shows the potential for wind energy and biogas energy in Malaka Regency. The learning materials focused on the potential for renewable energy and its distribution in Malaka Regency. Wind energy is obtained from the speed and direction of the wind that occurs in an area, while biogas potential is obtained from the number and type of livestock (Rahmawati & Ariawan, 2025). Expert validation included media, linguistics, and materials experts. These experts were selected purposively based on their competence and experience in fields related to the model developed. The expert validation assessment based on the feasibility component:

Table 8. Expert Score Result

Experts	Feasibility Aspects	Score	High Score	Result	Information
Learning Media Expert	Media	35	48	72.9166	Quite Valid
Subject Content Expert	Material	50	64	78.125	Valid
	Presentation	48	64	75.00	Quite Valid
Language Expert	Language	34	48	70.8333	Quite Valid

Source: Research Result, 2025

Table 8 shows that the media feasibility aspect reached 72.9166%, indicating sufficient validity. The material feasibility reached 78.125%, which falls within the Valid category. The presentation's feasibility reached 75.00%, indicating it is quite valid. The linguistic aspect had a score of 70.8333%, indicating it is quite valid. This means the media is suitable for use but requires minor revisions. An individual trial was then conducted with 20 eighth-grade students. The results of the individual trials are as follows:

Table 9. Individual Trials Score

No	Criteria	Score (%)			
		High	Medium	Low	Very Low
1	Interest Aspect	50	37.5	12.5	0
2	Material	50	50	0	0
3	Language	37.5	50	0	0

Source: Research Result, 2025

Table 9 shows that 50% of the Interest Aspects are in the high category. 50% of the Material Aspects are in the high category, and 50% are in the moderate category. And 50% of the Language Aspects are in the moderate category. This means that improvements are being made to both the material and the language. Based on the individual trials, revisions were made to the visuals and writing. The following are the revision results: Some spelling errors, color usage in the text needs improvement, and the language should be simplified. After that, the limited trial was conducted on 40 eighth-grade students. The trial results are as follows:

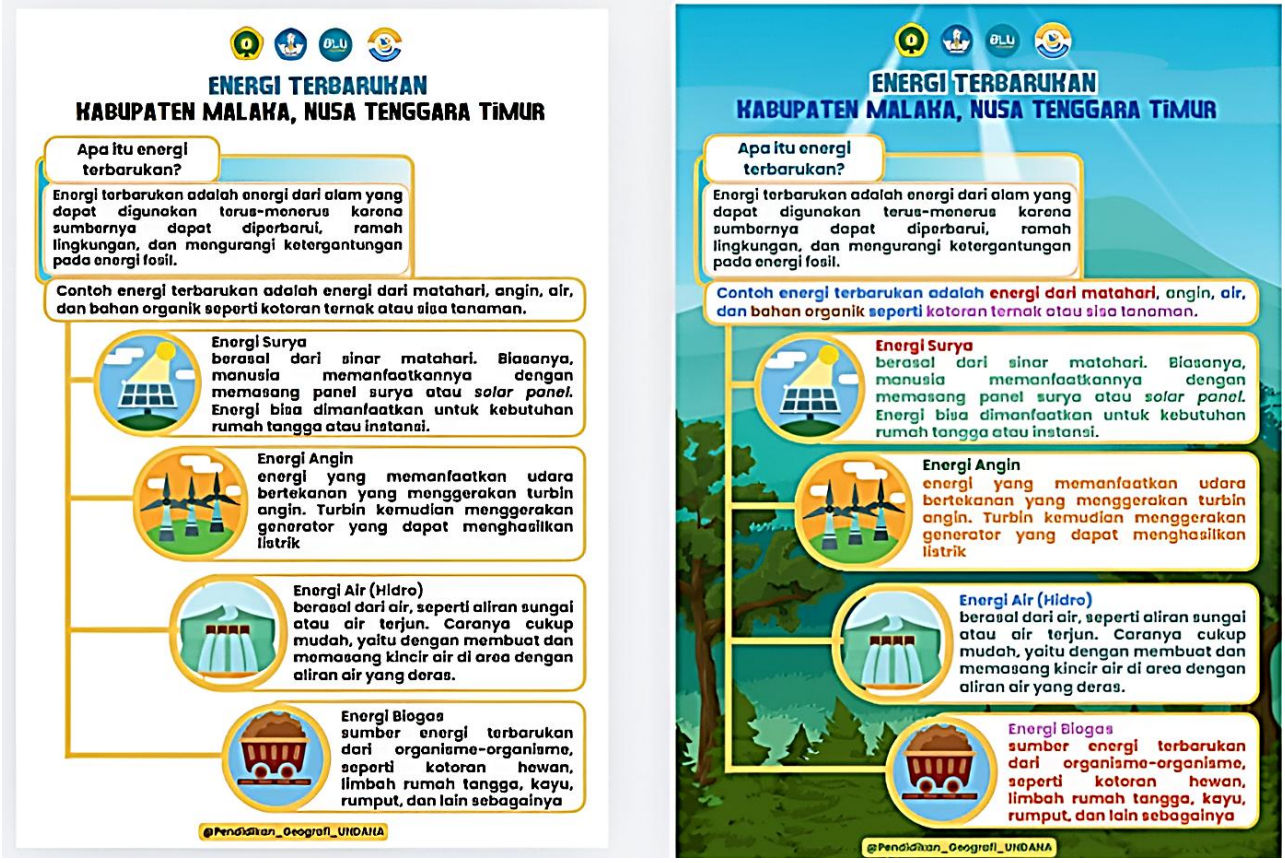
Table 10. Limited Trial Score

No	Criteria	Score (%)			
		High	Medium	Low	Very Low
1	Interest Aspect	66.67	26.67	6.67	0

2	Material	73.33	20.00	6.67	0
3	Language	73.33	20.00	6.67	0

Source: Research Result, 2025

Table 10, based on a limited trial of 40 students, shows that 66.67% of the interest scores, 73.33% of the material scores, and 73.33% of the language scores were in the high category. This means the media can be used in large-class trials. Next, for product refinement based on limited trial results, revisions are made to improve the visual aspects, namely the use of color in teaching materials.



Picture 2. Product Refinement

In Picture 2, the left panel shows the media before revision, while the right panel shows the revised media. The addition of a background to the previously created media. A large-scale implementation trial was then conducted with 98 eighth-grade students. The results are as follows:

Table 11. Large Scale Implementation Score

No.	Criteria	Score (%)			
		High	Medium	Low	Very Low
1	Interest Aspect	82.50	10.00	7.50	0
2	Material	87.50	7.50	5.00	0
3	Language	87.50	10.00	2.50	0

Source: Research Result, 2025

Table 11, based on a large-scale trial of 98 students, shows that 82.50% of the interest scores were in the high category, 87.50% of the material scores were in the high category, and 87.50% of the language scores were in the high category. For the level of effectiveness using the N-Gain Score. The Effectiveness Score was obtained from the pre-test and post-test scores of 98 students; the results are as follows:

Table 12. Effectiveness Score

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
N-Gain Score	98	.17	1.00	.6647	.17203
N-Gain Percent	98	16.67	100.00	66.4696	17.20305
Valid N (listwise)	98				

Source: Research Result, 2025

The descriptive analysis showed that the N-Gain values for 98 students ranged from 0.17 to 1.00, with an average of 0.6647 and a standard deviation of 0.17203. This means that the use of learning media provides a fairly strong increase in understanding of the material being studied. The N-Gain Percent value was in the range of 16.67% to 100%, with an average of 66.47% and a standard deviation of 17.20. This value also falls into the medium effective category. These results strengthen the finding that most students experienced a significant increase in learning outcomes after using the developed learning media. A paired-samples t-test was then conducted to determine whether the increase was significant. The results are as follows:

Table 13. Paired Sample T-Test

Paired Samples Test

		Paired Differences					T	df	Significance	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			One-Sided p	Two-Sided p
Pair 1	Pretest-Posttest	-18.85714	7.34286	.74174	-20.32929	-17.38499	-25.423	97	<.001	<.001

Source: Research Result, 2025

The results of the paired-samples t-test showed a significant difference between pre-test and post-test scores after using the booklet. The results of the statistical test showed a t-value of -25.423 with df = 97 and a p-value of < 0.001, indicating that the increase is highly statistically significant. The 95% confidence interval ranges from -20.33 to -17.38, all of which are negative, indicating an increase for all students. Thus, it can be concluded that the use of booklet media has a very significant effect on improving student learning outcomes. Furthermore, to determine the strength of the influence of learning media on learning outcomes, Cohen's d and Hedges' g were used. The results are as follows:

Table 14. Paired Samples Effect Sizes (Cohen's d and Hedges' g)

Paired Samples Effect Sizes

					95% Confidence Interval	
			Standardizer[a]	Point Estimate	Lower	Upper
Pair 1	Pretest-Posttest	Cohen's d	7.34286	-2.568	-2.978	-2.155
		Hedges' correction	7.40025	-2.548	-2.955	-2.138

a. The denominator used in estimating the effect sizes.
Cohen's d uses the sample standard deviation of the mean difference.
Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

Based on the effect size calculation, the use of learning media has a very significant impact on student learning outcomes. Cohen's d value of -2.568 indicates that the difference in scores between the pre-test and post-test is very large. This means that after students used the learning media, their scores increased significantly compared to before. This result is also supported by the Hedges' g value of -2.548, indicating that the learning media used were truly effective in helping students understand the material. The confidence interval distance for both is negative, confirming that the influence of learning media on improving grades is not only statistically significant but also has a very high effect size. The final product of the teaching materials was refined based on the trial results and then printed.

Picture 3. Final Product

Picture 3 shows the final product of the learning media before printing. Before printing, the material included information that the Malaka Regency has renewable energy resources, such as wind energy in Malaka Barat and Kobalima. The final product is a booklet that will then be disseminated to all social studies teachers in Malaka Regency.

The dissemination of this activity involved the dissemination of teaching materials through joint training with 27 junior high school teachers in Malaka Regency. Integration into learning was achieved through the teaching materials. The results of this integration, in the form of teaching materials, were well received by junior high school teachers throughout Malaka Regency. The feasibility assessment indicators were based on the 2014 BNSP criteria (Tpoenifu, Mamangkey, & Silalahi, 2023) this was proven by the teaching material dissemination activities, which achieved the following results:

Table 15. Dissemination Result

No	Criteria	Score (%)			
		High	**Medium**	**Low**	**Very Low**
1	Alignment with Core Competencies	85.19	14.81	0	0
2	Material Accuracy	77.78	11.11	11.11	0
3	Material Up-to-Date	85.19	7.41	7.41	0
4	Encouraging Curiosity	81.48	7.41	11.11	0
5	Presentation Techniques	74.07	11.11	14.81	0
6	Presentation Support	66.67	25.93	7.41	0
7	Learning Presentation	74.07	22.22	3.70	0
8	Coherence and Sequence of Thought Flow	77.78	18.52	3.70	0
9	Contextual Nature	77.78	14.81	7.41	0
10	Contextual Components	81.48	14.81	3.70	0

Source: Research Result, 2025

Based on the assessment of the feasibility of the teaching materials during dissemination, the average score across the 10 components was 78.15%, indicating that these teaching materials are suitable for use.

3.1 Develop a Contextual Learning Booklet Based on Renewable Energy Resources in Malaka Regency

Incorporating learning materials on renewable energy resources in Malaka Regency, such as wind and biogas, provides students with new experiences. For example, students living in the Malaka Barat learn that there is potential for wind energy in their area. This knowledge can help students understand the local potential in their environment and utilize it wisely. This aligns with previous research conducted by Mardaragawan & Agung (2024) and Rasidi & Istiningsih (2025), which emphasized the need for diverse teaching materials, everyday contexts, and local wisdom. This research presents something new by incorporating renewable energy issues rooted in local potential into learning media. According to Shahi & Parajuli (2024) this not only increases students' interest and understanding but also teaches the values of sustainability and energy independence from an early age. Thus, this research broadens the scope of utilizing local resources in education. The resulting learning innovation addresses the issue of low diversity of classroom teaching materials and contributes to strengthening energy and environmental literacy. This novelty connects previous research with emerging practices in this field, namely, renewable energy-based learning as a strategy to foster contextual understanding, learning interest, and sustainability awareness among students and teachers. Furthermore, the dissemination results from 27 social studies teachers showed a 78.15%

response rate, indicating the feasibility of this teaching material. This indicates that locally relevant potential-themed learning materials are highly suitable for media development. This aligns with Shofa et al. (2021) who emphasized the importance of integrating local potential into learning.

3.2 The Effectiveness of Learning Media in Improving Students' Understanding of Natural Resources

The effectiveness of the developed learning media was further strengthened by the results of the learning improvement test, which used N-Gain analysis. The average N-Gain score of 98 students was 0.6647, with an N-Gain percentage of 66.47%. This result indicates that this booklet substantially improved students' conceptual understanding of the potential of natural resources. The statistical significance of this improvement was confirmed by a paired-samples t-test, which showed a highly significant difference between pre-test and post-test scores ($t = -25.423$, $p < 0.001$). This indicates that the improvement in learning outcomes was not due to chance, but was directly related to the use of the developed learning media. The effect size analysis further strengthened the strength of this improvement. Cohen's d was 2.568, and Hedges' g was 2.548, indicating that the improvement produced by this booklet was not only statistically significant but also very strong in practice, with a substantial and meaningful impact on student learning outcomes. These findings support previous research by Nasir et al. (2022), which found that more interactive and relevant learning media can substantially increase student motivation to learn. Furthermore, Nugrahartanti (2022) stated that local wisdom, as culturally based knowledge that shapes Indonesian social civilization, should be instilled from an early age through appropriate learning media to enhance learning effectiveness. The strength of this research lies in its gradual implementation, from individual trials to dissemination to teachers, which demonstrates a consistent improvement in product quality.

4. Conclusion

This study concludes that integrating the renewable energy potential of Malaka Regency into learning media increases instructional relevance and students' understanding of the concept of natural resources. Experts have validated the learning booklet developed using the Borg and Gall model and have found it highly effective. The pre-test and post-test results showed high N-Gain, statistically significant t-test findings, and large effect sizes. This was reinforced by the dissemination results presented to social studies teachers. These results strengthen the theoretical argument that media grounded in local potential and context can enhance conceptual mastery in social studies and support sustainability-oriented education. The resulting product offers practical, empirically tested learning media for educators that connect curriculum content to students' local environments. Further research involving a wider sample and an interdisciplinary approach is recommended to expand the application and impact of locally based renewable energy material education.

5. References

Ahmed, M. A., & Kumalasari, N. (2023). ANDIN-MU: Development of Android-Based Descriptive Text Interactive Multimedia Materials in High School English Subjects. *Assyfa Learning Journal, 1*(1), 49–59. doi:10.61650/alj.v1i1.17.

Aka, K. A. (2019). Integration Borg & Gall (1983) and Lee & Owen (2004) Models as an Alternative

Model of Design-Based Research of Interactive Multimedia in Elementary School. *Journal of Physics: Conference Series, 1318*, 012022. doi:10.1088/1742-6596/1318/1/012022.

Alobaid, A. (2020). Smart Multimedia Learning of ICT: Role and Impact on Language Learners' Writing Fluency Youtube Online English Learning Resources as an Example. *Smart Learning Environments, 7*(1), 24. doi:10.1186/s40561-020-00134-7.

Astuti, F. N., Suranto, S., & Masykuri, M. (2020). The Appropriateness of Developing The Media: Experts' Validation and Students' Response of Learning Media Based on Augmented Reality Technology For Natural Science Lesson. *Journal of Physics: Conference Series, 1567*(4), 042023. doi:10.1088/1742-6596/1567/4/042023.

Bagindo, R., & Yulia, P. (2019). Efektivitas Model Pembelajaran Aptitude Treatment Interaction (ATI) Dengan Team Assisted Individualization (TAI) terhadap Hasil Belajar Siswa. *PYTHAGORAS: Jurnal Program Studi Pendidikan Matematika, 8*(1), 41–48. doi:10.33373/pythagoras.v8i1.1787.

Bennett, N. J., Whitty, T. S., Finkbeiner, E., Pittman, J., Bassett, H., Gelcich, S., & Allison, E. H. (2018). Environmental Stewardship: A Conceptual Review and Analytical Framework. *Environmental Management, 61*(4), 597–614. doi:10.1007/s00267-017-0993-2.

Daryanes, F., Darmadi, D., Fikri, K., Sayuti, I., Rusandi, M. A., & Situmorang, D. D. B. (2023). The Development of Articulate Storyline Interactive Learning Media Based on Case Methods to Train Student's Problem-Solving Ability. *Heliyon, 9*(4), 1–14. doi:10.1016/j.heliyon.2023.e15082.

Hairida, H. (2019). The Development of Blended Learning Media for Flipped Classroom Model on Direct Learning in Process Evaluation Courses and Chemistry Learning Outcomes. *Proceedings of the International Conference on Educational Sciences and Teacher Profession (ICETeP 2018) 295*, 211–217. Paris, France: Atlantis Press. doi:10.2991/icetep-18.2019.52.

Harerimana, A., Duma, S. E., & Mtshali, N. G. (2023). Measuring Perceived Learning Gains of Undergraduate Nursing Students in ICT Skills: One Group Pre-Test and Post-Test Design. *Contemporary Nurse, 59*(2), 114–131. doi:10.1080/10376178.2023.2230309.

Haryana, M. R. A., Warsono, S., Achjari, D., & Nahartyo, E. (2022). Virtual Reality Learning Media With Innovative Learning Materials to Enhance Individual Learning Outcomes Based On Cognitive Load Theory. *International Journal of Management Education, 20*(1–8). doi:10.1016/j.ijme.2022.100657.

Kosasih, E. (2021). *Pengembangan Bahan Ajar (B. S. Fatmawati, Ed.) (1st ed.)*. Jakarta: Bumi Aksara.

Laksana, D. N. L. (2024). Validation Instruments for Local Culture-Based Learning Media. *Journal of Education Technology, 8*(2), 264–274. doi:10.23887/jet.v8i2.74446.

Lathifa, F. W. (2025). Efektivitas Model Problem Based Learning Bermetode Eksperimen dengan Media PAREPIA untuk Meningkatkan Pemahaman Konsep IPAS Materi Sistem Pernapasan Manusia. *JagoMIPA: Jurnal Pendidikan Matematika dan IPA, 5*(1), 247–258. doi:10.53299/jagomipa.v5i1.1350.

Mardaragawan, I. M. L., & Agung, A. A. G. (2024). Video Media For Learning Cultural Diversity in the Surrounding Environment Based on Local Wisdom of the Ngerebong Tradition for Grade IV Elementary Schools. *Jurnal Pendidikan Multikultural Indonesia, 7*(1), 48–62. doi:10.23887/jpmu.v7i1.74649.

Megantari, K., Margunayasa, I. G., & Agustiana, I. G. (2021). Belajar Sumber Daya Alam Melalui Media Komik Digital. *MIMBAR PGSD Undiksha, 9*(1), 139. doi:10.23887/jjpgsd.v9i1.34251.

Moghavvemi, S., Sulaiman, A., Jaafar, N. I., & Kasem, N. (2018). Social Media as a Complementary Learning Tool for Teaching and Learning: The Case of Youtube. *International Journal of Management Education, 16*(1), 37–42. doi:10.1016/j.ijme.2017.12.001.

Nasir, N., Akram, A., Ayu, S., Hambali, U., & Ikbar, I. (2022). Pelatihan Penyusunan Bahan Ajar Berbasis Multimedia Interaktif Terhadap Guru di Desa Balibo Kecamatan Kindang. *PATIKALA: Jurnal Pengabdian Kepada Masyarakat, 2*(1), 469–473. doi:10.51574/patikala.v2i1.545.

Nugrahartanti, T. (2022). The Development of Vikrama Media Based on Local Wisdom in Citizenship Subjects to Improve the Character of Elementary School Students. *ICCCM Journal of Social Sciences and Humanities, 1*, 30–35. doi:10.53797/icccmjssh.v1i4.5.2022.

Oktavia, M., & Prasasty, A. T. (2019). Uji Normalitas Gain untuk Pemantapan dan Modul dengan One Group Pre and Post Test. *Simposium Nasional Unindra: Simponi, 1*(1), 596–601. doi:10.30998/simponi.v1i1.439.

Perez, O., Garza, T., Hindera, O., Beltran, A., Musaad, S. M., Dibbs, T., …& Chug, S. (2023). Validated Assessment Tools for Screen Media Use: A Systematic Review. *PLoS ONE, 18*(4), e0283714. doi:https://doi.org/10.1371/journal.pone.0283714.

Purba, A. (2024). Indonesian Teaching Materials in Competency-Based Universities Text Orientation; Research and Development at The University of Jambi through the Borg & Gall Model. *Pakistan Journal of Life and Social Sciences (PJLSS), 22*(2), 24355–24369. doi:10.57239/pjlss-2024-22.2.001739.

Qiang, Q., & Jian, C. (2020). Natural Resource Endowment, Institutional Quality and China's Regional Economic Growth. *Resources Policy, 66*(101644). doi:10.1016/j.resourpol.2020.101644.

Rahmawati, A., & Ariawan, R. (2025). The Renewable Energy Potential Mapping of Each District in Cilacap Regency. *IOP Conference Series: Earth and Environmental Science, 1438*(1), 012013. doi:10.1088/1755-1315/1438/1/012013.

Rasidi, R., & Istiningsih, G. (2025). Education Based on Local Wisdom: an Alternative Model for the Integration of Cultural Values in the School Curriculum in Indonesia. *BIS Education, 1*(2), V125027. doi:10.31603/bised.175.

Schilling, J., Saulich, C., & Engwicht, N. (2018). A Local to Global Perspective on Resource Governance and Conflict. *Conflict, Security & Development, 18*(6), 433–461. doi:10.1080/14678802.2018.1532641.

Setuju, Ratnawati, D., Wijayanti, A., Widodo, W., & Setiadi, B. R. (2020). ICT-Based Learning Media Development. *Journal of Physics: Conference Series, 1446*(1), 012038. doi:10.1088/1742-6596/1446/1/012038.

Setyono, A. S., Mardiansjah, F. H., & Astuti, M. F. K. (2019). Potensi Pengembangan Energi Baru dan Energi Terbarukan di Kota Semarang. *Jurnal Riptek, 13*(2), 177–186. doi:10.35475/riptek.v13i2.68.

Shahi, B. B., & Parajuli, T. R. (2024). Contextual Education and Curriculum for Local Resource

Utilization. *Shiksha Shastra Saurabh, 24*, 105–117. doi:10.3126/sss.v24i1.75378.

Shofa, A., Su'ad, & Murtono. (2021). Development of Learning Media Technology Based on Natural Science Local Wisdom Materials. *Journal of Physics: Conference Series, 1823*(1), 012080. doi:10.1088/1742-6596/1823/1/012080.

Sudarsana, I. K., Arini, N. W., Mastini, G. N., & Sukerni, N. M. (2020). *Learning Media: The Development and Its Utilization*. Sulawesi Selatan: Yayasan Hmar Cendekia.

Sumadyanti, U. V., Sriartha, I. P., & Maryati, T. (2024). Implementasi Model Pembelajaran Earthcomm dalam Mata Pelajaran IPS. *Jurnal Pendidikan IPS Indonesia, 8*(1), 54–61. doi:10.23887/pips.v8i1.3533.

Tpoenifu, E. Y., Mamangkey, J., & Silalahi, M. (2023). Pengembangan Modul Keanekaragaman Hayati Berbasis Pangan Tradisional Nusa Tenggara Timur. *Bioscientist: Jurnal Ilmiah Biologi, 11*(2), 1195–1207. doi:10.33394/bioscientist.v11i2.8370.

Wati, D. S., Siahaan, S. M., & Wiyono, K. (2021). Efektivitas Learning Management System Chamilo Materi Gerak Harmonik Sederhana Terhadap Hasil Belajar Peserta Didik. *LENSA (Lentera Sains): Jurnal Pendidikan IPA, 11*(2), 100–109. doi:10.24929/lensa.v11i2.166.

Yaniawati, P., Kariadinata, R., Sari, N. M., Pramiarsih, E. E., & Mariani, M. (2020). Integration of E-Learning for Mathematics on Resource- Based Learning: Increasing Mathematical Creative Thinking and Self-Confidence. *International Journal of Emerging Technologies in Learning (IJET), 15*(06), 60–78. doi:10.3991/ijet.v15i06.11915.

Yusliana, Fahik, S. A., & Devi, M. K. (2023). Karakteristik dan Interaksi Perdagangan di Kabupaten Malaka Wilayah Perbatasan Indonesia–Republik Demokratik Timor Leste. *Jurnal Pendidikan Geografi Undiksha, 11*(1), 24–33. doi:10.23887/jjpg.v11i1.53777.

Zhang, Y., & Dilanchiev, A. (2022). Economic Recovery, Industrial Structure and Natural Resource Utilization Efficiency in China: Effect on Green Economic Recovery. *Resources Policy, 79*(102958). doi:10.1016/j.resourpol.2022.102958.