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DEVELOPMENT OF FLIPBOOK TEACHING MATERIALS BASED ON CULTURE FUSION SEDATI TO IMPROVE CLASS V STUDENTS' SCIENCE LEARNING OUTCOMES SD NEGERI 45 BANDA ACEH

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ABSTRACT

This study aims to develop flipbook teaching materials based on Sedati culture fusion in the subject of science to improve the learning outcomes of fifth-grade students at SD Negeri 45 Banda Aceh. This research was conducted in Banda Aceh City as part of the study in the Master of Elementary Education Program at Bina Bangsa Getsempena University. The type of research used is Research and Development (R&D) with the ADDIE development model which includes the stages of Analyze, Design, Development, Implementation, and Evaluation. The subjects of the study were fifth-grade students with the material "Harmony in Ecosystems". Data collection instruments included expert validation sheets (language, materials, and media), teacher and student response questionnaires to measure practicality, and learning outcome tests to measure effectiveness through N-Gain calculations. The results showed that the flipbook teaching materials based on Sedati culture fusion met the criteria of very valid based on expert assessments. From the practicality aspect, teacher and student responses showed a category of very practical and easy to use in learning. Meanwhile, the results of the effectiveness test showed an increase in student learning outcomes with a moderate to high increase category based on the N-Gain value. Thus, Sedati's culture fusion-based flipbook teaching materials are declared valid, practical, and effective in improving fifth-grade elementary school students' science learning outcomes and supporting the integration of local cultural values into contextual and meaningful learning.

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1. INTRODUCTION

Education is a strategic process in developing quality human resources with faith, knowledge, and character. At the elementary school level, education plays a crucial role in laying the foundation for students' knowledge, attitudes, and skills. Law Number 20 of 2003 concerning the National Education System emphasizes that education aims to develop students' potential to become individuals who are faithful, pious, and possess noble morals, possessing the skills necessary for themselves, society, the nation, and the state (Ali, 2025). Therefore, learning in elementary schools must be designed innovatively to meet the challenges of modern development.

With the advancement of information and communication technology, the world of education is required to undergo a digital transformation in the learning process. Teachers no longer serve solely as sources of information, but also as facilitators capable of utilizing technology to create interactive and engaging learning. The

use of digital-based learning media can increase student motivation, interest in learning, and active engagement in the learning process (Sihombing, H. B. 2020). This is especially important in the implementation of the Independent Curriculum, which encourages student-centered learning.

In the Independent Curriculum, Natural and Social Sciences (IPAS) is an integrative subject that combines science and social science concepts at the elementary school level. Learning IPAS aims to enable students to understand natural and social phenomena in an integrated manner and to develop a sense of concern for the surrounding environment. However, based on observations at SD Negeri 45 Banda Aceh, IPAS learning still tends to use conventional methods and limited teaching materials, resulting in less active students and less than optimal learning outcomes (Ayu, 2021). This situation indicates the need for innovation in teaching materials that are more engaging and contextual.

One alternative solution that can be developed is digital flipbook-based teaching materials. Flipbooks are electronic learning media that display material in the form of interactive digital books with page-turning effects and can include images, animations, audio, and video. This media is considered capable of improving conceptual understanding because it presents information visually and systematically (Amalia, S. N, 2023). Therefore, the development of flipbooks in IPAS learning is expected to help students understand the material more deeply.

In addition to the use of digital media, learning also needs to integrate local cultural values to make it more meaningful and contextual. The culture fusion approach emphasizes the incorporation of local cultural elements into learning materials so that students not only acquire academic knowledge but also develop cultural identity and character (Sari, 2024). Integrating local culture into learning can strengthen students' character and increase the relevance of the material to everyday life.

In Banda Aceh City, the "A Day with Acehnese Culture PASTI" (Sedati) program aims to instill Acehnese cultural values in students through school activities. The Sedati program encourages the use of the Acehnese language, traditional clothing, and the introduction of customs in learning activities. The integration of Sedati values into science and natural sciences teaching materials is considered to support cultural preservation while enriching students' learning experiences (Harahap, 2024).

Based on this description, the development of flipbook teaching materials based on Sedati culture fusion for science and natural sciences is an urgent need. This development is expected to produce valid, practical, and effective teaching materials to improve the learning outcomes of fifth-grade elementary school students. By combining digital technology and local cultural values, science and science learning can take place in a more interesting, contextual and meaningful way, so as to support optimal achievement of educational goals.

2. RESEARCH METHODS

The research method used in this study is Research and Development (R&D). R&D is a research method aimed at producing and developing a specific product and testing its feasibility before widespread use (Sugiyono, 2022). Research and development is seen as an effective approach to improving and refining existing learning practices through a systematic and structured process. In this study, the product developed was a flipbook-based science and education (IPAS) open-source learning material using the Sedati culture fusion approach to improve elementary school student learning outcomes (Waruwu, M. 2024).

Based on the learning materials developed, namely flipbook-based science and education teaching materials integrated with local Sedati culture, the development process was carried out through five stages of the ADDIE model: (1) Analysis, (2) Design, (3) Development, (4) Implementation, and (5) Evaluation (Branch, 2009). The ADDIE model was chosen because it provides systematic steps in designing, developing, and launching learning products to align with student needs and established learning objectives.

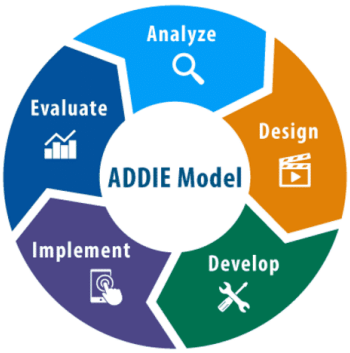

Figure 1. ADDIE Development Stages (Sugiyono, 2019)

This research was conducted at SD Negeri 45 Banda Aceh, located in Banda Aceh. The study took place during the odd semester of the 2025/2026 academic year. The subjects were 28 fifth-grade students studying the topic "Harmony in Ecosystems" in the Natural Sciences (IPS) subject. Subjects were selected purposively based on research needs and suitability for the material being developed.

Data collection techniques in this study aimed to obtain information as a basis for a needs analysis and to measure the quality of the developed product. The techniques used included observation, interviews, documentation, questionnaires, and learning outcome tests. Observations and interviews were conducted during the analysis stage to determine the current state of IPS learning and students' needs for digital, culture-based learning materials. The questionnaire was used to measure the validity and practicality of the product, while the test was used to determine the effectiveness of the learning materials on improving student learning outcomes.

Data analysis techniques in this study included qualitative and quantitative data analysis to produce a product that met the criteria for validity, practicality, and effectiveness. Qualitative data were obtained from suggestions, comments, and input from validators, as well as teacher and student responses. The data was analyzed by describing, categorizing, and summarizing the feedback as a basis for product improvement. Meanwhile, quantitative data was obtained from the validation questionnaire and student learning test results.

a. Qualitative Data Analysis

Qualitative data analysis was conducted on the input, criticism, and suggestions provided by validators—material experts, media experts, and language experts. This feedback was used to revise and refine the Sedati culture fusion-based flipbook teaching materials to better align with student characteristics and the objectives of science learning.

b. Quantitative Data Analysis

Quantitative data analysis was conducted on the scores from the validation questionnaire and teacher and student response questionnaires using a five-level Likert scale: 5 (Very Good), 4 (Good), 3 (Fair), 2 (Poor), and 1 (Very Poor). Furthermore, quantitative analysis was also conducted on the pretest and posttest results to determine improvements in student learning outcomes using the N-Gain formula.

c. Product Feasibility Analysis Based on Expert Validation

Data analysis is performed by calculating the percentage of product feasibility based on the scores obtained by the validators using the formula:

$$\text{Score} = \frac{\text{Number of indicators each category}}{\text{Total number of indicators}} \times 100\%$$

Table 1. N-gain Categories

No	Answer	Score
A	Very Good	81% ≤ X < 100%
B	Good	61% ≤ X < 80%
C	Fair	41% ≤ X < 60%
D	Poor	21% ≤ X < 40%
E	Very Poor	0% ≤ X < 20%

3. RESULT AND ANALYSIS

The initial stage conducted by the researchers was a needs analysis. This needs analysis aimed to identify student needs in the development of flipbook-based science teaching materials using the Sedati culture fusion approach to improve the learning outcomes of fifth-grade elementary school students. The needs analysis was conducted through observations and interviews with fifth-grade teachers at SD Negeri 45 Banda Aceh, preparing several relevant questions related to the science learning process.

The analysis revealed that science teaching still relies on textbooks as the primary source and does not utilize digital media optimally. Furthermore, the material taught has not been fully linked to local Acehnese culture, resulting in students lacking a sense of connection between ecosystem concepts and their daily lives. Teachers also reported that some students had difficulty understanding the material on "Harmony in Ecosystems" because the presentation was still theoretical and lacked context. Therefore, open-ended materials are needed that are interactive and engaging, integrating local cultural values through the Sedati culture fusion approach.

Tabel 2. Summary of Students' Pre-Test Results

No	Respondent	Pre-Test	Maximum Score
1	S	55	100
2	ZM	20	100

3	KZ	40	100
4	AJI	25	100
5	Z	30	100
6	SM	55	100
7	AS	50	100
8	NH	75	100
9	AS	75	100
10	NU	50	100
11	APP	45	100
12	QL	55	100
13	RP	30	100
14	MS	55	100
15	N	85	100
16	ARM	50	100
17	SA	90	100
18	RR	40	100
19	MQ	70	100
20	MAFPS	50	100
21	LU	60	100
22	AFNM	65	100
23	F	70	100
24	MY	90	100
25	AH	60	100
26	TM	50	100
27	L	55	100
	Mean	57,4	100

Based on Table 2, Summary of Students' Pre-Test Results, the average score was 57.4 out of a maximum score of 100. These results indicate that students' initial abilities before using flipbook teaching materials were still relatively low and below the minimum completion criteria (KKM), which is generally set at 75.

Of the 27 students, only 5 students scored ≥75 (NH, AS, N, SA, and MY), while the other 22 students scored below 75. This indicates that most students had not yet mastered the learning material before the intervention or application of the developed teaching materials.

Thus, the pre-test results indicate an urgent need for innovation in learning to improve students' understanding of the material. This data provides a strong foundation for continuing the development and implementation of flipbook teaching materials based on Sedati's culture fusion approach to significantly improve student learning outcomes.

Desain Stage

In the design phase, researchers developed an initial product design, a flipbook-based science and science teaching material integrating local cultural values from Sedati. This phase began with the formulation of learning objectives, mapping the material on "Harmony in Ecosystems," and integrating contextual examples related to the environment and culture of the Banda Aceh community.

Next, researchers designed the flipbook's structure, consisting of an introduction, material presentation, contextual illustrations, discussion activities, and practice questions. The design also took into account linguistic aspects, visual appearance, color combinations, and readability to suit the characteristics of elementary school students. This initial design then served as the basis for the development and validation phase by experts.

Development Stage

During the development stage, flipbook products were created according to the predetermined design. The teaching materials were systematically structured, with attention to material accuracy, local cultural integration, and engaging visual presentation. The initial product was then validated by media experts, material experts, and language experts to assess the appropriateness of the content, design, and language.

After validation by three experts, the following evaluation results were obtained:

Tabel 3. Summary of Expert Validation Results

Validation Aspect	Percentage (%)	Feasibility Category
Media Expert	92%	Very Feasible
Content Expert	96%	Very Feasible
Language Expert	100%	Very Feasible
Overall Average	96%	Highly Feasible for Use

Based on validation results from three experts, an overall average score of 96% was obtained, categorized as very feasible. Thus, the Sedati culture fusion-based flipbook teaching material was declared suitable for use without requiring substantial revision and can proceed to the implementation stage.

Implementation

At this stage, the validated and revised flipbook-based science teaching materials were implemented in fifth-grade science lessons at SD Negeri 45 Banda Aceh. The implementation took place over several meetings, using flipbooks as the primary teaching material.

During the learning process, students appeared more active and enthusiastic in participating in the activities. They engaged in group discussions, observed illustrations of ecosystems linked to local culture, and completed practice questions provided in the flipbooks. At this stage, researchers also collected data on the practicality and effectiveness of the product through student and teacher response questionnaires and a posttest.

The posttest results showed an increase in students' average scores compared to the pretest. Based on the N-Gain calculation, the improvement in learning outcomes was in the moderate to high category. This indicates that the Sedati culture fusion-based flipbook teaching materials were effective in improving fifth-grade science learning outcomes.

Figure 2. Pre-test

Figure 3. Implementation of Teaching Materials

Figure 4. Post-test

Evaluation

The evaluation phase is the final stage in the ADDIE development model, which aims to assess the quality and effectiveness of the Sedati culture fusion-based flipbook teaching materials after the implementation phase. A comprehensive evaluation (formative and summative) was conducted to determine the extent to which the developed product met the criteria of validity, practicality, and effectiveness in improving fifth-grade science learning outcomes at SD Negeri 45 Banda Aceh.

Formative evaluation was conducted at each stage of development, particularly during the validation process by media experts, material experts, and language experts. The validators' suggestions and input were used as the basis for product improvements, such as refining the visual appearance, simplifying the language for greater communication, and adding contextual examples appropriate to the students' environment. These improvements aimed to ensure the product truly aligned with the characteristics of elementary school students.

Summative evaluation was then conducted after the implementation phase, analyzing posttest results and calculating N-Gain to measure improvements in student learning outcomes. The posttest results are as follows:

Tabel 4. Summary of Student Post-Test Results

No	Respondent	Post-Test	Maximum Score
1	S	80	100
2	ZM	40	100
3	KZ	50	100
4	AJI	75	100
5	Z	75	100
6	SM	80	100
7	AS	90	100
8	NH	85	100
9	AS	80	100
10	NU	85	100
11	APP	90	100
12	QL	85	100
13	RP	95	100
14	MS	70	100
15	N	60	100
16	ARM	73	100
17	SA	90	100
18	RR	85	100
19	MQ	80	100
20	MAFPS	85	100
21	LU	80	100
22	AFNM	90	100
23	F	80	100
24	MY	100	100

25	AH	80	100
26	TM	85	100
27	L	75	100
	Mean	82,4	100

The average post-test score was 82.4, indicating a 25-point improvement in learning outcomes compared to the previous pre-test average of 57.4. This improvement demonstrates that the use of flipbook-based teaching materials with the Sedati culture fusion approach had a positive impact on students' understanding of the science material being studied.

The distribution of scores shows that most students experienced significant improvement, with the majority reaching or exceeding the minimum completion criterion (75). This indicates that the developed teaching materials not only helped students better understand concepts but also improved their accuracy in answering assessment questions.

Although some students still scored below 75, overall, there was a shift in scores toward higher achievement. The increase in the class average from 57.4 to 82.4 demonstrates a significant increase in material mastery after the intervention.

Thus, the progress of the score which is getting closer to the maximum score (100) is a strong indicator that the flipbook teaching material based on Sedati culture fusion is effective in improving student learning outcomes, strengthening conceptual understanding, and supporting more contextual and meaningful science learning.

N-Gain

To determine the effectiveness level of learning outcome improvement, the N-gain calculation was employed:

Table 5. N-Gain

Variable	N	Minimum	Maximum	Mean	Std. Deviation
N-Gain Skor	27	.00	.81	.5841	.22562
N-Gain Persen	27	00.00	81.00	58.4113	21.85567
Valid N (listwise)	27				

Based on Table 5, the N-Gain score averaged 0.5841, equivalent to 58.41%. Based on the N-Gain interpretation criteria, this value falls into the moderate category ($0.3 \leq g < 0.7$). This indicates that the use of Sedati's culture-fusion-based flipbook teaching materials provides a fairly effective improvement in student learning outcomes.

The minimum N-Gain value of 0.00 indicates that some students experienced no improvement, while the maximum value of 0.81 indicates that some students experienced significant improvement. The standard deviation of 0.22562 indicates variation in learning outcomes among students, but overall, the improvement was positive and consistent.

With a sample size of 27 students (Valid N = 27), the data indicate that the overall learning intervention had a significant impact on improving learning outcomes. Therefore, the developed flipbook teaching materials can be considered quite effective in improving fifth-grade students' science learning outcomes.

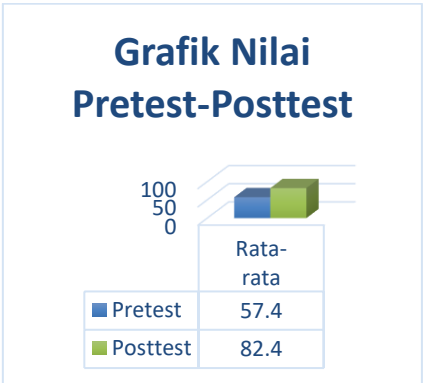

Figure 5. Pre-Test and Post-test Scores

Based on the results of the descriptive statistical analysis, the average N-Gain score was 0.5841, which falls into the moderate category, with a minimum score of 0.00 and a maximum score of 0.81. This finding indicates that most students experienced improved learning outcomes after participating in learning using Sedati's culture fusion-based flipbook teaching materials, although the level of improvement varied among students.

The standard deviation of 0.22562 indicates that the distribution of N-Gain values is quite diverse, but remains within the positive range of improvement. This indicates that the improvement in learning outcomes was not limited to a few students, but was experienced by the majority of students at varying levels of achievement.

Furthermore, the average N-Gain percentage of 58.41% indicates that the effectiveness of the learning process is in the moderately effective (moderate) category. Therefore, it can be concluded that the use of Sedati's culture fusion-based flipbook teaching materials significantly contributed to improving student learning outcomes.

Therefore, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted. In conclusion, the development of flipbook teaching materials based on Sedati culture fusion is effective in improving the science learning outcomes of fifth grade students, although there is still room for further optimization to achieve a higher category of effectiveness

4. CONCLUSION

Based on the results of the descriptive statistical analysis, the average N-Gain value was 0.5841, or 58.41%, which falls into the moderate category. The minimum value of 0.00 and the maximum value of 0.81 indicate that the level of improvement in student learning outcomes varied, but generally improved after using the Sedati culture fusion-based flipbook teaching materials. This indicates that the learning intervention had a positive impact on student understanding.

The standard deviation value of 0.22562 indicates that the variation in learning outcomes among students was at a fairly controlled level. Most students showed consistent progress, although some students' progress was not optimal. Overall, these results demonstrate that the developed teaching materials were able to help students understand the material better than before using the media.

Therefore, it can be concluded that the Sedati culture fusion-based flipbook teaching materials were effective in improving fifth-grade students' science learning outcomes with a moderate level of effectiveness. These results support the acceptance of the alternative hypothesis (H_1) and indicate that the integration of digital media with local cultural values can be an innovative and meaningful learning strategy in improving the quality of learning in elementary schools.

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