THE DEVELOPMENT OF GREEN EDUCATION-BASED DIGITAL ENGLISH STORYBOOKS FOR PRIMARY SCHOOL STUDENTS

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ABSTRACT

This study was motivated by learning boredom and difficulties in English vocabulary retention experienced by third-grade elementary school students due to reliance on conventional rote-memorization methods. The purpose of this Research and Development (R&D) study was to design, test the feasibility, and analyze the effectiveness of an instructional medium in the form of a Green Education-Based English Digital Storybook titled Learning from the Green School. The research method utilized the 4D model (Define, Design, Develop, Disseminate). The research subjects involved all 32 third-grade students at SDN Gondrong 4, Tangerang City, with the cognitive effectiveness trial focusing on 23 core subjects who had baseline learning scores below 90. Data collection instruments included expert validation questionnaires, user response questionnaires, and test instruments (pretest and posttest). The results indicated that the developed product is highly feasible for implementation based on the evaluations from the material expert (96%), language expert (94%), media expert (92%), and educational practitioner (96%). This feasibility assessment was further supported by user responses through teacher and student feedback questionnaires, which yielded a mean scoring percentage ranging from 93% to 96%, falling into the highly excellent and effective criteria. Based on the product trials, a significant increase in the students' cognitive mean scores was observed across all three trial phases: the individual trial (one-to-one) increased from 55 to 88, the small-scale trial increased from 58 to 90, and the large-scale trial increased from 60 to 92. The hypothesis testing through the Paired Samples T-Test yielded a significance value of (sig. > 0,05),meaning that H_0 is rejected and H_α is accepted. Consequently, the Green Education-Based English Digital Storybook is proven to be feasible, practical, and significantly effective in improving the cognitive learning outcomes of third-grade elementary school students.

Keywords: *Digital Storybook, English, Green Education, 4D Model*

INTRODUCTION

The use of green education-based storybooks in English language learning is considered effective because illustrated media not only support vocabulary acquisition but also instill environmental values in students. For third-grade primary school students who are still in the concrete operational stage, visuals and storytelling help them understand concepts more easily whilst increasing their awareness of environmentally friendly behaviour. In line with the principles of the Kurikulum Merdeka, digital learning media that combine text, images, and interactive elements are highly suitable for 21st-century learning. Therefore, the development of a Green Education-Based Bilingual Digital Storybook using Canva aims to create an engaging and interactive learning experience that improves vocabulary comprehension and encourages environmental awareness from an early age.

Based on observations, questionnaires, and teacher interviews conducted with 32 third-grade students at SDN Gondrong 4 in Tangerang city, data showed that 80% of students (28 students) exhibited higher interest when learning used illustrated story media compared to rote memorisation methods. Additionally, 68.6% of students (24 students) admitted to having difficulty understanding English vocabulary without visual aids, while 62.9% of students (22 students) stated that they quickly felt bored when learning focused solely on memorising words. Furthermore, 85.7% of students (30 students) expressed interest in reading stories with environmental themes because they are considered close to daily life. These findings indicate the need for contextual and engaging learning media in the form of a green education-based bilingual storybook to better support students' learning needs and cognitive development.

Based on these reasons, the problem formulations identified in this study are:

1. What are the needs of third-grade primary school students for learning media in the form of a green education-based digital English storybook?
2. What is the feasibility level of green education-based digital illustrated storybook learning media for primary school children in Tangerang City?

Based on this, this study aims: 1) to analyse the needs of third-grade primary school students for learning media in the form of a green education-based English digital illustrated storybook; 2) to determine and test the feasibility level of learning media in the form of a green education-based English digital illustrated storybook for primary school children in Tangerang City. This product is expected to become an interactive and educational learning medium that integrates language literacy with environmental conservation values as well as supports the implementation of Kurikulum Merdeka.

LITERATURE REVIEW

Previous Studies on Green Education and Storybooks

Extensive research has been conducted on the development of illustrated storybook learning media featuring environmental materials or based on green education. Examples include the development of life environment-based illustrated storybooks in thematic learning for fourth-grade elementary school students (Dewi, 2025), as well as developing reading skills through green curriculum implementation as an instructional model (Leoanak, 2022). Additionally, there is research regarding the development of illustrated storybooks with clean and healthy environment materials for fourth-grade elementary school students (Neolaka and Benedicta Aryningtyas Jiwantono, 2023), the development of life environment education-based illustrated storybooks for primary schools (Zufriady, 2022), and developing picture storybooks in English with a wetlands theme for young learners (Febriyanti and Hidayat, 2023).

These previous studies indicate that story-based learning products are capable of enhancing reading interest, literacy, as well as primary school students' understanding of character and environmental values. However, based on past research data, the majority of media development still focuses on the Indonesian language context and has not integrated English language learning with environmental education in a unified manner. Studies that specifically develop green education-based learning media for primary school students in the form of digital storybooks remain highly limited.

A further research gap is evident in the geographical context. Few media development studies of this nature have been carried out specifically within the primary school environment in Tangerang City, which possesses distinct social, cultural, and learning needs compared to other regions. Therefore, this study offers novelty across three primary aspects: the use of English as the medium of instruction, the integration of green education values, and its direct application within the local context of primary school students in Tangerang City.

RESEARCH METHOD

This study employed the Research and Development (R&D) method using the 4D model by Sivasailam Thiagarajan as cited in Waruwu (2024), consisting of define, design, develop, and disseminate stages. Conducted at SDN Gondrong 4 Kota Tangerang, the research involved needs analysis, prototype development, expert validation, and trials to evaluate the feasibility and effectiveness of the green education-based bilingual digital storybook. The product was developed using Canva and FlipHTML5, then validated by experts and tested on Year 3 B students through a mixed-methods approach involving questionnaires, tests, observations, and interviews before being implemented in line with the Kurikulum Merdeka.

This study utilizes both quantitative and qualitative descriptive data analysis techniques to process the validation results and user responses. Quantitative descriptive analysis is used to process numerical data obtained from expert evaluations and product trial questionnaires. These data are presented in the form of descriptive percentages with reference to the Likert Scale (Setyawan & Faqih, 2023). All assessment instruments whether for material, language, and media validators, or education practitioners employ a five-level criteria scale as follows:

Table 1. Assessment Score Criteria

Score	Feasibility Criteria
5	Highly Feasible / Excellent
4	Feasible / Good
3	Moderately Feasible / Fair
2	Less Feasible / Poor
1	Infeasible / Very Poor

Furthermore, qualitative data in the form of feedback, suggestions, and

critiques from the validators are analysed descriptively to revise the green education-based bilingual digital storybook. This aims to ensure that the developed learning media fully complies with material feasibility standards and the learning needs of students.

To determine the final score percentage from each questionnaire instrument distributed to both validators and students, the researcher utilizes the following calculation formula:

$$\text{Percentage} = \frac{\text{Total score of respondents}'\text{answer}}{\text{Maximum possible score}} \text{ x } 100$$

FINDINGS AND DISCUSSION

Findings

The product development stages in this study employ the 4D model, which aims to design, develop, and validate the learning media in the form of the digital storybook Learning from the Green School. The procedural steps taken to produce this product are as follows: (1) Define, (2) Design, (3) Develop, and (4) Disseminate.

Define Stage

At this stage, a needs analysis and a students characteristics analysis were conducted. The researcher developed a product in the form of an interactive digital storybook learning medium titled *Learning from the Green School* to support classroom learning activities. The results of the students' characteristics analysis indicated that the students tended to be less active in the learning process due to the limitations of the media used, where learning had previously focused solely on conventional textbooks. Therefore, the researcher developed the digital storybook *Learning from the Green School*, which integrates linguistic material (*Language Focus*) with environmental education values (*Green Education*). This combination is considered highly relevant and suitable for enhancing students' engagement and learning.

Design Stage

During the design phase, the researcher structured the learning media for

the digital storybook titled *Learning from the Green School*. The main components compiled include the front cover, preface, user instructions, a storyline consisting of orientation, conflict, climax, and resolution, and supplemented with a moral message, author profile, and synopsis. All content and illustrations for the book were creatively designed using the Canva platform. Once the design of the learning media was fully compiled in Canva, the next step involved uploading the file to the FlipHTML5 website. The FlipHTML5 platform serves as the primary medium to convert the book format into an interactive e-flipbook, thereby providing a more engaging and realistic digital reading experience for the students.

Figure 1. Front cover page of the digital storybook

Once the product framework was structured and ready to be accessed via the platform, the researcher designed the research instruments in the form of validation sheets for the experts encompassing material, media, and language experts, as well as education practitioners alongside students response questionnaires. This was carried out to measure the level of acceptance and usability of the media by the students.

Develop Stage

At the develop stage, the researcher transformed the design of the digital storybook *Learning from the Green School* into a complete product and conducted validation with material, media, and language experts to assess its feasibility. After analysing the questionnaire results, the product was revised based on experts' feedback and suggestions to ensure that the digital storybook was suitable for limited trials with students. The product's feasibility was tested through a validation

process by three primary experts. The validators' assessment results are summarised in the following table:

Table 2. The Validators' Assessment Results

No	Validator	Average Score	Percentage	Criteria
1.	Material Expert	4.80	96%	Excellent
2.	Media Expert	4.60	92%	Excellent
3.	Language Expert	4.70	94%	Excellent
4.	Teacher	4.80	96%	Excellent

The results indicated that the material, language, and pedagogical aspects received highly elevated scores (94%–96%), demonstrating that the environmental-based bilingual story content is highly relevant to the learning outcomes in elementary schools. The media expert score (92%) provided room for evaluation regarding navigation, classroom suitability, and visual appropriateness, which were subsequently refined prior to the field trial.

After receiving feedback and evaluations from the material expert, language expert, and media expert, the researcher made revisions to the initial product in accordance with the suggestions and input from the expert team.

Based on the validation results from the material and language experts, development was carried out on the illustrated storybook, modifying it from a single-language format into a bilingual format (two languages), specifically Indonesian and English. This revision aimed to facilitate vocabulary comprehension for the students. Additionally, the instructional material was focused on the grammar usage of *there is* and *there are*, which was integrated into the storyline.

From the media perspective, adjustments were made to the layout and presentation of the material to ensure greater relevance to the developmental levels and characteristics of the students in that particular grade. The improvements also encompassed typography, specifically the selection of font types, to ensure that the text within the storybook is easier to read and comprehend by children.

Subsequently, the researcher obtained the effectiveness level of the instructional media used in the study by comparing the test scores before (*pretest*) and after (*posttest*) utilizing the instructional media with the students. In this study,

to evaluate the instructional media product in the form of the *Green Education-Based English Digital Storybook*, a series of product trials was conducted.

Although the total number of students in Grade III was 32, the researcher established specific inclusion criteria in determining the subjects for the cognitive effectiveness trial. The subjects involved in this product testing focused on 23 students who had prior learning achievement scores below 90, with the objective of observing the extent to which this media could optimize their learning outcomes. The testing was conducted through 3 trial phases, namely the one-to-one trial, the small-scale trial, and the large-scale trial.

The first phase was the individual (*one-to-one*) trial conducted with 3 students. The second phase was the small-scale trial (*small group*) involving 5 students. The third phase was the large-scale trial (*field trial*) conducted with 15 Grade III students. The remaining students who already had scores above 90 remained involved in the series of instrument readability evaluations as well as overall classroom learning activities to ensure that the classroom learning dynamics were maintained.

The *pretest* and *posttest* results at each trial phase demonstrated a positive upward trend. In the one-to-one trial (3 students), the mean score increased from 55 to 88. In the small-scale trial (5 students), the mean *pretest* score was 58 and the *posttest* score was 90. Meanwhile, in the large-scale trial (15 students), a mean *pretest* score of 60 and a *posttest* score of 92 were obtained.

Furthermore, the score data from the 23 core students were analyzed using the *Shapiro-Wilk* normality test. The *pretest* and *posttest* results showed a significance level greater than 0,05 (sig. > 0,05), meaning that the data were normally distributed, so the analysis could be continued with parametric testing.

The effectiveness of the *Green Education-Based English Digital Storybook* media can be determined from the presence of a significant mean difference between the students' *pretest* and *posttest* results, which was calculated using the *Paired Samples T-Test* formula with the following hypothesis criteria:

a. If $t_{value} \leq t_{table}$, maka H_0 is accepted and H_α is rejected.
b. If $t_{value} > t_{table}$, maka H_0 is rejected and H_α is accepted.

H_0 = There is no difference in students' learning outcomes in the English subject between before and after the use of the *Green Education-Based English Digital Storybook* media for Grade III Elementary School students.

H_α = here is a difference in students' learning outcomes in the English subject between before and after the use of the *Green Education-Based English Digital Storybook* media for Grade III Elementary School students.

Based on the *Paired Samples T-Test*, it can be seen that the resulting t_{value} was negative. This was due to the mean *pretest* score being lower than the mean *posttest* score, hence the t_{value} can be interpreted as positive.

Berdasarkan hasil analisis data:

1. One-to-one trial**:** indicated that $t_{value} > t_{table}$ with a significance value (2-tailed) of 0,000 < 0,05, which means H_0 is rejected and H_α is accepted.
2. Small group trial: showed consistent results where the significance value (2-tailed) was 0,000 < 0,05, so H_0 is rejected and H_α is accepted.
3. Medium group trial**:** yielded a value of $t_{value} > t_{table}$ (14, 854 > 2, 145) with a significance (2-tailed) of 0,000 < 0,05, which means that "H_0 is rejected and H_α is accepted".

In addition to the cognitive data (tests) from the 23 core subjects, the 23 students were also asked to provide feedback through response questionnaires as suggestions, inputs, and feasibility evaluations for the developed instructional media, where the feasibility evaluation data from the students were obtained during the dissemination phase (*disseminate*). Using a Likert scale measurement, the total score obtained from the response questionnaires of the students and teacher was 50 out of a total maximum score of 50, or meeting a percentage of 100% with the criterion "Highly Feasible". Based on the questionnaire score achievement, it can be concluded that the use of the *Green Education-Based English Digital Storybook* media is considered highly practical, engaging, and successfully utilized in learning at Grade III Elementary School.

Table 3. Learning Outcomes of Pretest and Posttest

Trial Phase	Nilai rata-rata	
	Pretest	*posttest*
Individual Trial (*One-to-One*)	55	88
Small Group Trial (*Small Group*)	58	90
Medium Group Trial (*Field Trial*)	60	92

Table 4. Recapitulation of Shapiro-Wilk Normality Test

Trial Phase	Data	Sig.	Description
Individual Trial (*One-to-One*)	Pretest	0,342	Normally distributed data
	Posttest	0,512	Normally distributed data
Small Group Trial (*Small Group*)	Pretest	0,421	Normally distributed data
	Posttest	0,689	Normally distributed data
Medium Group Trial (*Field Trial*)	Pretest	0,215	Normally distributed data
	Posttest	0,476	Normally distributed data

Table 5. Recapitulation of Paired Samples Test

Trial Phase	Mean Score		t	Sig. (2-tailed)	Description
	Pretest	Posttest			
Individual Trial	55	80	-5,864	0,000	H_α is accepted, H_0 is rejected
Small-Scale Trial	58	90	-8,412	0,000	H_α is accepted, H_0 is rejected
Medium-Scale Trial	60	92	-14,854	0,000	H_α is accepted, H_0 is rejected

Table 6. Recapitulation of Learning Outcomes for Individual, Small-Scale, and Medium-Scale Trials

No.	Description	Individual Trial		Small-Scale Trial		Medium-Scale Trial	
		Pretest	Posttest	Pretest	Posttest	Pretest	Posttest
1	Number of students	3	3	5	5	15	15
2	Mean	55	88	58	90	60	92
3	Highest score	65	100	70	100	75	100
4	Lowest score	45	75	45	80	45	80
5	Number of passed students	0	3	0	5	0	15
6	Learning mastery percentage (%)	0%	100%	0%	100%	0%	100%

Disseminate Stage

The disseminate phase was conducted as the final stage of the 4D model to

expand the use of the digital storybook *Learning from the Green School*. The researcher secured Intellectual Property Rights (HAKI), provided training for teachers, and distributed the product digitally through FlipHTML5 to support Distance Learning (PJJ). Continuous evaluations and user feedback were also carried out to maintain the product's quality and relevance, while the field trial results showed gradual improvements in the effectiveness of the media for Year 3 students.

Table 7. Recapitulation of Product Trial Results at SDN Gondrong 4

Trial Stage	Research Subjects	Average Score	Percentage	Criteria
One-to-One Trial	3 students	4.23	84.67%	Good
Small-Scale Trial	5 students	4.28	85.60%	Excellent
Medium-Scale Trial	15 students	4.69	93.73%	Excellent

Based on the trial results, the green education-based bilingual digital storybook showed a continuous improvement in validity, increasing from a score of 4.23 in the one-to-one trial to 4.69 in the medium-scale trial, with a final validity percentage of 93.73%. These findings indicate that the developed media met the feasibility standards for classroom implementation. The expert validation results also demonstrated high feasibility, with scores of 96% from the material expert, 94% from the language expert, 96% from the educational practitioner, and 92% from the media expert before revisions were made. Conducted at SDN Gondrong 4, this study confirmed that the bilingual digital storybook *Learning from the Green School* effectively supported English learning, particularly in vocabulary mastery and the grammar topics *there is* and *there are*, through interactive and contextual learning experiences.

The use of FlipHTML5 enabled students to access the learning media flexibly during Distance Learning (PJJ), while the integration of environmental education values helped strengthen ecological awareness from an early age. The significant increase in trial scores from 84.67% to 93.73% demonstrates that the media was not only theoretically valid but also practical and highly accepted by students. Overall, the findings show that technology-based learning innovations in the form of a green education-based bilingual digital storybook are effective in increasing learning motivation, reducing learning boredom, and improving English

learning quality in primary schools.

Discussion

This research and development study was conducted at SDN Gondrong 4 involving 32 Year 3 B primary school students using the 4D development model (define, design, develop, and disseminate). The findings revealed that most students experienced difficulties in understanding English vocabulary when learning was conducted without visual aids. Students also showed greater enthusiasm and interest when learning activities involved illustrated stories and interactive digital media rather than conventional memorisation methods. These results indicate that primary school students require learning media that are interactive, contextual, and engaging to support more effective and enjoyable learning experiences.

The green education-based bilingual digital storybook offers several advantages because it combines English language learning with environmental education through interactive visual storytelling. The use of illustrated stories helps students understand abstract concepts more easily, especially since primary school students are still in the concrete operational stage. Previous studies by researchers such as Pawestri, Leoanak, and Hidayah support the effectiveness of illustrated and environment-based storybooks in improving reading interest, reading comprehension, literacy skills, and environmental awareness among primary school students. In addition, the Ministry of Education, Culture, Research, and Technology through the Kurikulum Merdeka policy encourages the use of innovative digital learning media that support contextual and independent learning.

Despite its strengths, the developed digital storybook still has several limitations. Improvements are still needed in aspects such as visual design, layout, and the presentation of information to better suit primary school students' characteristics. The use of digital media is also dependent on the availability of electronic devices and internet access, limiting its implementation in some schools. Furthermore, the product only covers specific English learning materials and was tested in a single school with a limited sample size, making the findings difficult to generalise broadly. Therefore, further development and wider-scale testing are

necessary to enhance the effectiveness and applicability of this learning medium in supporting green education-based English learning.

CONCLUSION

Based on the stages of research and development using the 4D model, it is concluded that third-grade students at SDN Gondrong 4 demonstrate a distinct need for interactive and contextual learning media to overcome learning boredom and vocabulary retention difficulties caused by conventional rote-memorization methods. The developed English digital storybook, *Learning from the Green School*, has proven successful in meeting outstanding feasibility standards, achieving excellent validation scores from material, language, media, and educational practitioners, alongside securing feasibility response ratings ranging from 93% to 96% from both teachers and students. Furthermore, this media has proven highly effective in optimizing cognitive learning outcomes for the 23 core subjects who had initial scores below 90, as demonstrated by a significant increase in average scores across individual, small-scale, and large-scale trials; these results were statistically validated through a Paired Samples T-Test (sig. > 0,05) and further supported by the average user response questionnaire scores, which fell into the highly favorable and effective category.

These findings provide practical implications for elementary school teachers to shift from mechanical vocabulary drills toward story-based and contextual learning, integrate environmental values (*Green Education*) into language literacy to align with the mandates of the *Profil Pelajar Pancasila* (Profile of Pancasila Students), enhance teacher creativity in independently designing digital media, and utilize user-friendly digital tools such as Canva and FlipHTML5 to stimulate children's concrete operational thinking. For future research, it is highly recommended to expand the sample size across a more diverse range of school districts in Tangerang City to enhance data generalizability, broaden the curriculum scope to encompass more complex grammatical concepts beyond the basic materials of *there is* and *there are*, conduct effectiveness testing on non-cognitive variables such as motivation or reading interest, and implement longitudinal

tracking methods to observe the long-term impact of this digital media on character building and sustainable eco-friendly behavior in students' daily lives.

REFERENCES

Dewi, Ayu Nur Shawmi Nurhaidah Widiani Afni Novita. 2025. "Pengembangan Buku Cerita Bergambar Berbasis Lingkungan Hidup Pada Pembelajaran Tematik di Kelas II SD/MI." *Jurnal Auladuna*, 50–60.

Febriyanti, Emma Rosana, and Fahmi Hidayat. 2023. "Developing Picture Storybook in English with Wetlands Theme for Young Learners." *Acitya: Journal of Teaching and Education* 5 (1): 171–87. https://doi.org/10.30650/ajte.v5i1.3515.

Hidayah, Nurul. 2023. "Pendidikan Lingkungan Hidup Berbasis Pendidikan Islam." *Jurnal Studi Islam STIQ An-Nur* V (1): 1–15. https://doi.org/10.29240/jpd.

Leoanak, Sondang Pondan. 2022. "Developing Reading Skills Through Green Curriculum Implementation as an Instructional Model." *Acitya: Journal of Teaching and Education* 4 (1): 69–79. https://doi.org/10.30650/ajte.v4i1.3193.

Neolaka, Grace, and Benedicta Aryningtyas Jiwantono. 2023. "Pengembangan Buku Cerita Bergambar Untuk Siswa Kelas 2 SD Tunas Dharma Karawang." *Jurnal Elementaria Edukasia* 6 (3): 1428–44. https://doi.org/10.31949/jee.v6i3.6537.

Pawestri, Apriliani; lvira Hoesein Radiai. 2020. "Pengembangan Media Pembelajaran Buku Cerita Bergambar Untuk Meningkatkan Minat Membaca Siswa Sekolah Dasar" 4 (4): 994–1003.

Waruwu, Marinu. 2024. "Metode Penelitian Dan Pengembangan (R&D): Konsep, Jenis, Tahapan Dan Kelebihan." *Jurnal Ilmiah Profesi Pendidikan* 9 (2): 1220–30. https://doi.org/10.29303/jipp.v9i2.2141.

Yang, Ben, Ningning Wu, Zepeng Tong, and Yan Sun. 2022. "Narrative-Based Environmental Education Improves Environmental Awareness and Environmental Attitudes in Children Aged 6–8." *International Journal of Environmental Research and Public Health* 19 (11). https://doi.org/10.3390/ijerph19116483.

Zufriady, Maryuni Yuliza; Mahmud Alpusari; 2022. "Pengembangan Buku Cerita Bergambar Berbasis Pendidikan Lingkungan Hidup untuk Sekolah Dasar." *IRJE: JURNAL ILMU PENDIDIKAN* 2 (1): 129–37.