

Development of a Nature-Themed Picture Storybook to Improve Reading Literacy of Fourth-Grade Elementary School Students

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Abstract

Low reading literacy attainment among Indonesian elementary pupils calls for learning media whose quality has been examined systematically. This study developed a nature-themed picture storybook for fourth-grade pupils at SDN 16 Limboto and examined its validity and practicality. The research applied the ADDIE development model across analysis, design, development, implementation, and evaluation. Respondents comprised three expert validators covering subject matter, language, and media, one class teacher, and all pupils of the single grade IV class selected through total sampling. Data were collected through observation, validation questionnaires, and response questionnaires, and were analysed descriptively through percentage conversion. Subject-matter and language validation each reached 85% in the very feasible category, while media validation reached 65% in the feasible category, giving a mean validity of 78.3%. Pupil response and teacher response each reached 82.5% in the very good category. The product is valid and practical for classroom use, with visual presentation identified as the component most in need of refinement. Testing whether the product raises measured reading literacy requires a design with a control class and is positioned as the next stage of the work.

Keywords: ADDIE model; elementary school; nature theme; picture storybook media; reading literacy

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INTRODUCTION

Reading literacy holds a central place in elementary education because nearly every school subject requires pupils to locate information within a text, interpret what that information means, and relate it to knowledge they already hold. The construct reaches well past letter recognition and word decoding, since it also covers the capacity to reflect on a text and to evaluate the ideas it carries. National attainment on this construct remains a pressing concern. Indonesia recorded a mean reading score of 359 in the 2022 cycle of the Programme for International Student Assessment, a result that sits well below the international average and below the score the country obtained in the preceding cycle (OECD, 2023). Policy analyses of that outcome argue that the decline is systemic rather than incidental, and that recovery depends on the quality of instruction delivered in the earliest grades (Bilad et al., 2024).

Grade four marks the transition from learning to read toward reading to learn, so comprehension weaknesses left unresolved at this level tend to accumulate across the whole curriculum. A systematic review of reading interventions implemented in Indonesian primary classrooms sorted effective practices into materials-based, technology-based, instruction-based, and culture-based categories, and identified well-designed learning materials as one of the most accessible levers available to an ordinary classroom teacher (Gildore et al., 2025). Four decades of intervention research synthesised meta-analytically show that gains in reading are attainable yet consistently moderate in size, which places a premium on materials that are carefully designed before they are placed in front of children (Hall et al., 2023). Reading motivation operates as a parallel mechanism, because engaged readers read more and the volume of reading feeds back into comprehension growth (Barber & Klauda, 2020).

Classroom practice in many Indonesian elementary schools still relies on a single printed textbook that presents long stretches of unbroken prose with minimal visual support. The cognitive theory of multimedia learning clarifies why that arrangement constrains young readers: verbal and pictorial information travel through separate processing channels, and meaningful learning emerges only when the learner selects, organises, and integrates both representations within a limited working memory (Mayer, 2024). Research on picture processing adds a further layer by showing that one image may give rise to several mental representations at once, so illustrations function as reasoning resources rather than decoration (Schnotz et al., 2022). Fourth-grade pupils, who are still automating decoding, gain substantial support when narrative text is paired with illustrations that carry part of the meaning.

Empirical warrant for picture storybooks has strengthened over the past five years. A three-level meta-analysis of twenty intervention studies involving 2,145 participants reported a moderate pooled effect of picture book interventions on literacy, language, and vocabulary outcomes, with a Hedges' g of 0.71 accompanied by high heterogeneity across settings (Auliya et al., 2026). An earlier synthesis restricted to graphics embedded in reading material reached a convergent conclusion about the contribution of visual elements to comprehension (Guo et al., 2020). Experimental and quasi-experimental work with young readers points in the same direction, reporting gains in understanding and in language development after structured picture book reading (Wang & Shao, 2025; Zheng et al., 2022). The heterogeneity reported in these syntheses matters for practice, since it signals that outcomes depend heavily on how a particular product is designed and on the care taken during that design.

A theme drawn from the immediate environment gives the visual channel something familiar to anchor. Natural beauty is observable in the daily surroundings of

pupils in Limboto, which allows illustrations to activate prior knowledge quickly and permits comprehension questions to draw on lived experience. A development study that embedded ecoliteracy content in an interactive storybook for early-grade readers obtained high validity and practicality ratings, and reported growth in reading interest along with environmental awareness (Hendratno et al., 2022; Romadhan et al., 2021). Analyses of text-image narration explain the mechanism behind such results, describing how pictures and words jointly construct a storyworld that neither mode conveys alone (Elmiana & Shen, 2024). Reviews of visual literacy and of multiliteracies pedagogy converge on the same claim about the interpretive work children perform on images (Farrar et al., 2024; Pereira et al., 2025).

A preliminary study was conducted at SDN 16 Limboto to ground the problem in the local setting rather than to assume it. Non-participant observation of Indonesian language lessons in grade IV, combined with a semi-structured interview with the class teacher, produced a consistent picture. Pupils encountered difficulty in restating the content of a passage and in identifying its main idea, attention faded during extended stretches of continuous prose, and the government textbook served as the only reading material in routine use. The teacher attributed the pattern to the absence of reading material matched to the interests and the reading level of the class. These observations define the design problem addressed here, and the study reports how a product was built in response and how its quality was judged.

Development studies carried out in Indonesian elementary schools have produced storybooks and comics that earned high feasibility ratings, and the accumulated body of such work now allows a sharper question than whether a product can be declared feasible (Lestari et al., 2025; Yuninda et al., 2024). This study reports the development of a nature-themed picture storybook and evaluates it against two of the three quality criteria conventional in design research. Two questions guide the enquiry. First, how is the product developed through the five phases of the ADDIE procedure for fourth-grade pupils at SDN 16 Limboto. Second, how do subject-matter, language, and media validators rate its validity, and how do the class teacher and the pupils rate its practicality after classroom use. The third criterion, effectiveness in raising measured reading literacy, requires a controlled comparison that lies outside the scope of this report and is positioned as the next stage of the work.

RESEARCH METHOD

Research Design

This study applied research and development, a design whose purpose is to produce an instructional product and to examine its quality under classroom conditions. The procedure followed the ADDIE model, which organises development into analysis, design, development, implementation, and evaluation (Branch, 2009). ADDIE was selected over alternative procedural models because each of its phases carries a formative evaluation loop, so weaknesses are corrected before they propagate into the next phase, and because comparative work in instructional design documents its adaptability across delivery settings (Spatioti et al., 2022). Two quality criteria were applied. Validity was established through expert judgement of content, language, and media aspects. Practicality was established through teacher and pupil response after the product had been used in ordinary lessons. Effectiveness, understood as measured change in reading literacy attributable to the product, requires a comparison group and is reported neither as a finding nor as an implication of the present data.

Research Setting, Subjects, and Respondents

The study took place at SDN 16 Limboto, Gorontalo Regency. The research object was the nature-themed picture storybook. Respondents fell into three groups. Three expert validators judged the product, one for subject matter, one for language, and one for media presentation. The teacher of the grade IV class judged its practicality and conducted the trial lessons. The pupils of that class supplied response data, and sampling used a total sampling technique because the school operates a single grade IV class, which made every enrolled pupil eligible. Table 1 records each group, its size, the criteria applied to it, and the data it supplied.

Table 1. Research respondents, selection criteria, and data supplied

Respondent group	Number	Selection criteria	Data supplied
Subject-matter validator	1	Lecturer in elementary education with expertise in Indonesian language content	Content validation questionnaire
Language validator	1	Lecturer in Indonesian language education	Language validation questionnaire
Media validator	1	Lecturer in instructional media and educational technology	Media validation questionnaire
Class teacher	1	Teacher responsible for the grade IV class of SDN 16 Limboto	Teacher response questionnaire and implementation observation
Pupils	[n]	All pupils enrolled in the single grade IV class, present during the trial lessons	Pupil response questionnaire and classroom observation

Each validator held a minimum qualification at master level and was selected for expertise in the aspect assigned, so that content, language, and visual presentation were judged independently rather than by a single generalist reviewer. Permission to conduct the study was granted by the school principal, the class teacher agreed to conduct the trial lessons, and pupils were informed that participation carried no consequence for their school marks. Responses were recorded without names and were reported in aggregate form. Pupil respondents supplied practicality data only, since no comparison class was involved and no claim about learning gain is advanced.

Development Procedure

The analysis phase examined the curriculum, the learners, the material, and the conditions of instruction. Curriculum analysis identified the learning outcomes and objectives for Indonesian language in grade IV that relate to comprehending narrative text. Learner analysis drew on the preliminary observation and the teacher interview to establish reading level, interest, and the kind of support pupils required. Material analysis fixed the scope of the content to be carried by the storybook and mapped it onto the natural surroundings familiar to pupils in Limboto. Condition analysis recorded the reading materials already available in the classroom, the time allocated to Indonesian language, and the constraints on printing and distributing a new product.

The design phase converted the analysis into a specification. A storyboard fixed the sequence of scenes, the characters, the setting, and the moral message. Layout decisions covered the position of text relative to illustration, the typeface, line spacing, and the colour palette. Language was calibrated to grade IV by controlling sentence length and restricting vocabulary to words within the expected range for the level. Comprehension exercises were drafted at this point rather than appended later, and each item was

written against one of the three literacy processes set out in Table 2. The research instruments were drafted in parallel so that the product and its measurement developed together.

The development phase produced the physical product. Illustrations were drawn to match each storyboard scene and were positioned adjacent to the text they support, following the spatial contiguity principle derived from multimedia learning theory (Mayer, 2024). Text and image were then combined, the comprehension exercises were placed at the close of each episode, and a printed prototype was produced. The prototype was submitted to the three validators, whose numerical ratings and written suggestions guided a revision carried out before any pupil saw the product. The revised version is the one reported in the results.

The implementation phase placed the revised product in the grade IV classroom. The class teacher conducted the lessons, using guided reading followed by questioning that moved from information retrieval toward interpretation and reflection, and pupils then worked on the comprehension exercises printed in the book. The researcher acted as a non-participant observer and completed an implementation observation sheet during each lesson. Response questionnaires for pupils and for the teacher were administered at the close of the final lesson, once respondents had accumulated enough experience with the product to judge it.

The evaluation phase assembled the evidence generated by the preceding phases. Formative evaluation had already operated within every phase in the form of expert judgement and classroom observation. Summative evaluation converted the validation and response scores into percentages and interpreted them against the criteria in Table 3, yielding a judgement on validity and on practicality. The phase also identified which components of the product require further refinement, which is the function an evaluation phase is designed to serve within the ADDIE cycle (Spatioti et al., 2022).

Instruments and Data Collection

Three instruments generated the data reported here. The implementation observation sheet recorded teacher and pupil behaviour during each lesson, covering the use of the product, pupil participation in the questioning sequence, and difficulties encountered. Three validation questionnaires, one for each expert, used a rating scale across items grouped by aspect: content coverage and curricular alignment for the subject-matter expert, sentence structure and vocabulary suitability for the language expert, and illustration quality, typography, and layout for the media expert. Response questionnaires for pupils and for the teacher used the same scale and covered attractiveness, clarity of language, usefulness, and ease of use. Table 2 sets out the framework against which the comprehension exercises inside the product were written.

Table 2. Framework of the comprehension exercises in the product

Literacy process	Indicator	Question form
Access and retrieve	Locating explicitly stated information, characters, setting, and the sequence of events	Short answer
Integrate and interpret	Determining the main idea, drawing inferences, explaining relations between events	Short answer and retelling
Reflect and evaluate	Relating content to personal experience, judging the message and the conduct of characters	Open response

Organising the exercises around these three processes keeps the comprehension demand visible rather than allowing questions to collapse into literal recall, which is the pattern that reading intervention reviews identify as a recurrent weakness of classroom materials (Gildore et al., 2025). The framework also gives the product an internal structure that a teacher can follow without additional training, since each episode carries the same progression from retrieval toward reflection.

Data Analysis

Validation and response data were analysed with descriptive quantitative techniques. Scores awarded by each validator were summed and converted into an average, and the resulting figure was expressed as a percentage.

$$\text{Average score} = \frac{\text{Sum of obtained scores}}{\text{Number of assessment items}}$$

Percentages were then interpreted against the criteria in Table 3. A product reaching the top band is treated as very valid and very feasible for classroom use, while a product in the second band is feasible and carries an obligation to specify which component pulled the figure down. Qualitative data drawn from observation notes and from the open sections of the questionnaires were reduced, displayed, and verified, and served to explain the quantitative pattern rather than to substitute for it.

Table 3. Interpretation criteria for product feasibility

No	Achievement level	Qualification	Interpretation
1	76% - 100%	Very good	Very valid / very feasible
2	51% - 75%	Good	Valid / feasible
3	26% - 50%	Poor	Less valid / less feasible
4	0% - 25%	Very poor	Not valid / not feasible

RESULTS AND DISCUSSION

Analysis Phase (*Analysis*)

Analysis established the distance between the intended and the actual condition of reading instruction in grade IV. The curriculum expects pupils at this level to comprehend narrative text, identify main ideas, draw simple inferences, and respond to what they read. Observation and the teacher interview indicated that classroom practice fell short of that expectation, with difficulty concentrated in tasks that required pupils to connect information across sentences rather than to locate a single stated fact. Learner analysis pointed to a preference for material containing pictures and colour. Material analysis confirmed that natural beauty fits the curriculum content for the semester and is directly observable in the surroundings of the school.

The difficulty concentrated in integrative tasks carries a design implication rather than a merely descriptive one. Integration across sentences is the process most sensitive to the form of the reading material itself, since a reader who spends working memory on decoding has little left for building connections (Mayer, 2024). That diagnosis pointed toward a product able to reduce the processing burden of continuous prose while keeping the comprehension demand intact, a specification that illustrated narrative satisfies in principle because images carry part of the propositional content and give the reader a second route to the same meaning (Schnotz et al., 2022).

Design Phase (*Design*)

The design output was a complete specification of the product rather than a sketch. Each double page pairs a block of narrative with an illustration positioned beside the text

it depicts, so pupils do not have to hold verbal content in working memory while searching for the matching image. Type was set at a size and line spacing generous enough for sustained reading at this grade level, and paragraphs were kept short so that each unit of meaning fits within a single visual field. The story follows a child who explores a lake, a hill, and a rice field near the village, and each episode closes with questions that move from retrieval toward interpretation and reflection. Decorative elements carrying no narrative function were removed, in line with the coherence principle of multimedia design (Mayer, 2024).

Aligning the illustrations with the meaning of the text, rather than treating them as ornament, reflects what analyses of text-image narration report about how picturebooks construct meaning across two modes at once (Elmiana & Shen, 2024). Placing the questions inside the book keeps interpretive work close to the passage that prompted it, an arrangement consistent with accounts of interactive read-aloud practice in which the teacher and the text jointly guide attention (Shimek, 2024). The choice of a familiar local setting follows evidence that culturally proximate content supports engagement among young Indonesian readers (Yuninda et al., 2024). Each of these decisions is traceable to a specific analysis finding, which is the property that separates a designed product from an assembled one.

Development Phase (*Development*)

The prototype was completed and submitted to the three validators. Table 4 reports their ratings. Subject-matter validation reached 85% and language validation reached 85%, both of which fall in the very feasible band of Table 3. Media validation reached 65%, which falls in the feasible band. The mean across the three aspects was 78.3%, placing the product as a whole in the very feasible category and supporting a decision to proceed to classroom trial after revision.

Table 4. Expert validation results

Validation aspect	Percentage	Category
Subject matter	85%	Very feasible
Language	85%	Very feasible
Media	65%	Feasible
Mean	78.3%	Very feasible

The gap of twenty percentage points between the media rating and the other two aspects carries diagnostic information and deserves comment rather than concealment. Content and language were judged appropriate for the grade level, while the visual execution attracted reservations. Reading that figure as a design signal matters, because meta-analytic evidence attributes much of the variation in picture book outcomes to differences in how the visual material is constructed and used (Auliya et al., 2026). Illustration quality bears on comprehension only when images support the propositions of the text, a condition that graphics research has established across a wide range of materials (Guo et al., 2020). The media aspect stands as the priority for the next revision cycle of this product.

An uneven validation profile of this kind is not unusual in storybook development. A culturally responsive picture storybook developed for Indonesian primary schools returned coefficients above 0.85 on most aspects while one component reached only 65, a pattern close to the one observed here (Yuninda et al., 2024). Development work on digital comics for elementary pupils reports comparable variation between the content and the presentation dimensions (Lestari et al., 2025). Reporting the weakest aspect separately, instead of allowing the mean to absorb it, gives the next developer something usable rather than a single reassuring number.

Implementation Phase (*Implementation*)

The revised product was used in the grade IV classroom under the lesson structure agreed with the teacher. Observation notes recorded that pupils worked through the illustrated episodes without requiring the teacher to reread passages aloud, and that participation in the questioning sequence was concentrated in the retrieval and interpretation questions rather than in the reflective ones. Table 5 reports the response data collected at the close of the final lesson. Pupil response reached 82.5% and teacher response reached 82.5%, both within the very good band, which supports a judgement that the product is practical under ordinary classroom conditions.

Table 5. Practicality of the product based on pupil and teacher response

Respondent	Percentage	Category
Pupils	82.5%	Very good
Class teacher	82.5%	Very good
Mean	82.5%	Very good

Response data of this type measure acceptance and usability, and they carry no information about learning. Their value lies in establishing the conditions under which learning becomes possible, since a product that pupils decline to open produces no gain whatever the quality of its content. The engagement recorded during the lessons is consistent with the motivational pathway described in reading research, where engagement increases reading volume and reading volume supports comprehension over time (Barber & Klauda, 2020). Teacher acceptance carries similar weight, because sustained classroom use depends on whether the teacher finds the material workable within the lesson time available (Deliman et al., 2024).

The identical figure returned by both respondent groups deserves a cautious reading. Pupil questionnaires administered in the presence of the researcher who produced the material are exposed to social desirability, and a single teacher cannot represent the range of instructional styles that the product would meet in wider use. The practicality finding is best treated as evidence that the product functions in the setting for which it was designed, and as an invitation to test it with teachers who had no part in its development (Shimek, 2024).

Evaluation Phase (*Evaluation*)

Evaluation drew the preceding phases together against the two criteria adopted in the research design. On validity, the product reached a mean of 78.3% across three independently judged aspects, which places it in the very feasible category while identifying media presentation as the component that limits the figure. On practicality, pupil and teacher response each reached 82.5%, which places the product in the very good category. The evaluation also confirmed that the comprehension exercises operate as designed, since the questioning sequence proceeded through all three literacy processes in every episode without additional material from the teacher.

The third criterion is deliberately left open. Establishing that a product raises reading literacy requires a comparison that separates the contribution of the material from maturation, from ordinary instruction, and from the effect of taking a test twice. Evidence of that kind is generated by quasi-experimental or experimental designs with a control class and a delayed post-test, and intervention syntheses attribute much of the variance in reported outcomes to precisely these design features (Hall et al., 2023; Dahl-Leonard et al., 2024). Published effect sizes indicate what such a study would need to detect, since picture book interventions pool at a Hedges' g near 0.71 across twenty studies while general reading interventions average closer to a third of a standard deviation (Auliya et al., 2026). Reporting a validated and practical product without an

effectiveness claim states what the present data support and leaves the remaining question in a testable form.

Limitations and Implications

Three limitations bound the conclusions. The study involved one class in one school, which restricts generalisation to comparable settings rather than to fourth-grade pupils at large. Validity rests on one validator per aspect, so a coefficient of agreement between raters could not be computed, and a larger validation panel would give a more stable estimate. Practicality rests on self-report gathered by the developer, a source vulnerable to social desirability. None of these limitations undermines the product itself, and each of them identifies a specific improvement for the next cycle of work.

The findings carry practical implications despite these bounds. Teachers working with fourth-grade classes obtain a reading resource aligned to the curriculum and matched to the local environment, together with comprehension exercises organised around three literacy processes rather than around recall alone. Elementary teacher education programmes obtain a documented development procedure in which each design decision is traceable to an analysis finding and each revision is traceable to a validator comment. Reviews of visual literacy and of multiliteracies pedagogy suggest that the interpretive demands children meet in illustrated narrative deserve explicit instructional attention, which the exercises in this product are designed to provide (Farrar et al., 2024; Sutrisno et al., 2024; Pereira et al., 2025; Parker et al., 2024).

CONCLUSION AND SUGGESTIONS

This study developed a nature-themed picture storybook for fourth-grade pupils at SDN 16 Limboto through the five phases of the ADDIE procedure and examined the product based on validity and practicality criteria. The development process consisted of analysis, design, development, implementation, and evaluation, in which the analysis identified the gap between curricular expectations and observed classroom practice, the design translated the identified needs into product specifications, the development phase produced and revised the prototype following expert validation, the implementation phase introduced the revised product into Grade IV lessons, and the evaluation phase consolidated the resulting evidence. Subject-matter and language validation each reached 85%, corresponding to the very feasible category, while media validation reached 65%, corresponding to the feasible category, resulting in an overall mean of 78.3%. These findings indicate that the product is valid for classroom use, although its visual aspect remains the component requiring further improvement. Pupil and teacher responses each reached 82.5%, falling within the very good category and indicating that the product is practical under ordinary classroom conditions. However, these response data demonstrate acceptance and usability rather than learning gains. No claim is made regarding the product's effect on measured reading literacy because the present design does not provide evidence for determining learning gains..

Two directions follow for subsequent research. A quasi-experimental study with a control class, a validated reading literacy test, and a delayed post-test would establish whether the product raises attainment and whether any gain persists. Extending the trial across several schools with different reading profiles, and enlarging the validation panel so that inter-rater agreement can be computed, would establish whether the design holds beyond the setting reported here. Teachers adopting the product are advised to keep the questioning sequence that moves from retrieval toward reflection, since that sequence carries the comprehension demand the illustrations are designed to support.

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