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Storytelling Through Visual Aids and Literal Reading Comprehension in Early Adolescence: A Human Development and Life-Course Perspective

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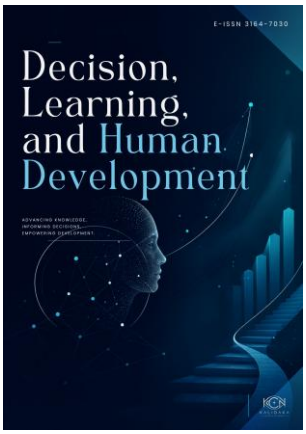
ABSTRACT

Literal reading comprehension is a foundational competence for adolescents' continued learning, yet English-as-a-foreign-language learners may struggle when vocabulary demands and unfamiliar text structures exceed available processing support. This study examined changes in literal reading comprehension after a storytelling-with-visual-aids intervention among 29 ninth-grade students at SMP Negeri 3 Sungguminasa, Indonesia. A pre-experimental one-group pre-test–post-test design was implemented across four instructional sessions combining narrated stories, pictures, vocabulary explanation, guided questions, rereading, and recall. Reading-test scores were analyzed descriptively, with a paired-samples t test and normalized gain. Mean scores increased from 67.13 (SD = 4.96) to 91.62 (SD = 5.54), a 24.48-point gain, 95% CI [21.61, 27.35], $t(28) = 17.456$, $p < .001$; the within-group standardized change was $dz = 3.24$ and normalized gain was 0.74. The proportion of students in the very-good category rose from 0% to 96.55%. These findings indicate a substantial short-term within-group improvement following the intervention. From human-development and life-course perspectives, narrative-visual scaffolding may strengthen a proximal literacy resource during adolescence; however, the absence of a control group and delayed follow-up precludes causal or long-term developmental conclusions.

IMPACT STATEMENT

Adolescence is a period in which classroom experiences can support competencies that accumulate across later educational transitions. Four sessions combining storytelling, pictures, vocabulary support, and guided reading were followed by large short-term gains in literal reading comprehension among Indonesian ninth-graders with low initial performance. The evidence supports developmentally responsive, low-cost multimodal literacy instruction while also showing the need for controlled and longitudinal studies before claims are made about enduring life-course effects.

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1. Introduction

Adolescence is not simply a waiting period between childhood and adulthood; it is a developmental interval in which cognitive, motivational, and social resources are reorganized while young people negotiate increasingly consequential educational demands. Life-span developmental theory emphasizes that development remains multidirectional, plastic, and context-dependent across the life course [1]. Life-course theory further situates individual development within linked social contexts and transitions, drawing attention to how experiences in institutions such as schools can accumulate and alter later pathways without implying that any single classroom event determines a life trajectory [2]. Developmental-cascade models similarly describe how change in one domain can spread to other domains over time when competencies and contexts interact [3]. These perspectives make school-based literacy a human-development issue as well as an instructional one.

Adolescence has also been characterized as a period of heightened learning potential and sensitivity to social-affective contexts [4]. Changes in goal flexibility, social engagement, and cognitive control create opportunities for educational environments to shape how learners approach demanding academic tasks [5]. Schools therefore function as developmental contexts rather than neutral delivery sites for content [6]. At the same time, adolescents continue to refine cognitive and affective systems that support planning, attention, and learning [7]. Engagement in school is especially important because behavioral, emotional, and cognitive participation mediate students' contact with learning opportunities [8], while autonomy-supportive and competence-supportive environments can strengthen internalized motivation [9]. Situational interest may also be triggered by features of tasks and then maintained when the learning environment supports sustained attention and value [10].

Literacy is one of the academic resources through which these developmental processes become educationally consequential. Evidence across developmental research shows that earlier academic competencies predict later achievement patterns, although prediction does not mean inevitability [11]. Reading comprehension, in particular, is a complex product of word-level processes, language comprehension, background knowledge, strategic regulation, and task demands [12]. Contemporary reading science therefore moves beyond a single-factor explanation and treats comprehension as an interaction among reader, text, knowledge, and purpose [13]. For learners reading in a foreign language, this interaction is often intensified by limited lexical knowledge and reduced automaticity.

The present study focuses on literal reading comprehension: the ability to identify and recall information that is explicitly stated in a text. Although literal comprehension is less inferential than higher-level interpretation, it is not trivial. Accurate access to word meanings and proposition-level information provides a foundation for constructing coherent mental representations of text. Meta-analytic evidence links decoding and language comprehension to reading comprehension [14], while lexical-quality accounts emphasize the importance of precise word knowledge for efficient integration [15]. Vocabulary knowledge is strongly associated with academic reading performance [16], and meta-analytic work in second-language reading indicates that vocabulary and other language components are substantial correlates of comprehension [17]. Models of discourse comprehension likewise emphasize the integration of textual information with activated knowledge structures [18], and component-skill research shows that reading comprehension depends on coordinated verbal, memory, and language processes [19]. Policy-oriented syntheses consequently identify vocabulary, background knowledge, inference, and comprehension monitoring as durable instructional targets [20].

Storytelling with visual aids is a plausible way to support these processes because it combines narrative organization with concrete representational cues. Storytelling and story reading have been associated with gains in language complexity and story comprehension in younger learners [21], and narrative/play-based programs can support oral language and emergent literacy [22]. More recent experimental work also indicates that structured oral and digital storytelling activities can enhance early literacy development [23]. These findings come largely from younger populations, so they cannot be transferred mechanically to ninth-grade students; nevertheless, they identify mechanisms—narrative coherence, repeated exposure to language, and active reconstruction—that are developmentally relevant to literacy instruction.

1.1. Research problem and gap

The original study addressed a practical problem at SMP Negeri 3 Sungguminasa: a group of ninth-grade students had low literal English reading comprehension, particularly in recognizing vocabulary and locating explicitly stated information. The intervention combined four features—storytelling, pictures, vocabulary explanation, and guided questioning—across four sessions. Prior research provides a strong cognitive

rationale for integrating words and pictures. Multimedia learning research argues that well-designed combinations of verbal and pictorial information can support deeper representation than words alone [24], while cognitive-load principles warn that multimodal materials are beneficial only when they reduce unnecessary processing and guide attention toward essential relations [25]. Pictorial illustrations can improve learning from text [26], and frameworks for multiple representations emphasize that representations must serve complementary and constraining functions rather than add decorative complexity [27].

Dual-coding theory provides a complementary account: verbal and nonverbal representational systems can support memory and comprehension through interconnected processing [28]. Later formulations emphasize that dual coding is not a claim that every additional picture improves learning; rather, meaningful verbal–imagery connections can provide alternative retrieval and elaboration routes [29]. Integrated text–picture models similarly stress the construction and coordination of mental representations across formats [30]. Empirical studies show that appropriately simplified diagrams can facilitate mental-model development [31], and interactive multimodal environments are most effective when learners receive guidance, feedback, control, and pretraining [32]. Meta-analytic work on modality [33] and classic cognitive-load research [34] further caution that working-memory demands must be managed. In language education, visual aids are commonly used to support attention, clarification, and contextualization [35].

Despite this foundation, three gaps remain. First, classroom studies of storytelling and visual media are often framed narrowly as technique evaluations rather than as developmentally situated literacy experiences. Second, studies rarely distinguish short-term within-group learning gains from claims about durable human-development or life-course effects. Third, evidence from Indonesian secondary-school EFL contexts remains limited and dispersed across technology- and vocabulary-focused studies. Indonesian work has demonstrated the feasibility of mobile learning media for secondary language learning, including research involving Muhammad Aridan [36] and related smart-app media work [37]. Research involving Joseph Agbuya Villarama has also documented vocabulary gains through fairy tales [38] and examined digital platforms for second-language teaching [39]. These studies support the relevance of multimodal and narrative resources in regional language-learning contexts, but they do not resolve whether a brief storytelling-with-visual-aids sequence is associated with substantial change in literal reading comprehension among adolescents.

Accordingly, this revision reframes the original classroom experiment as evidence about a proximal literacy outcome during early adolescence. The life-course interpretation is deliberately bounded: the study measures immediate pre-to-post change, not longitudinal educational attainment, developmental cascades, or later-life outcomes. Its contribution is to connect a short-term literacy intervention to a developmentally informed mechanism while maintaining a clear distinction between what was observed and what remains a theoretical or future-research proposition.

1.2. Research objectives and questions

The study aimed to examine whether literal reading-comprehension scores changed after four sessions of storytelling supported by visual aids. The primary research question was: To what extent did ninth-grade students' literal reading-comprehension scores change from pre-test to post-test following the intervention? Two secondary questions were addressed: (a) how did the distribution of students across performance categories change, and (b) what did normalized gain and within-group standardized change indicate about the magnitude of improvement? The directional hypothesis was that post-test scores would be higher than pre-test scores. Because the design did not include a comparison group, these questions concern within-group change rather than an unbiased causal treatment effect.

2. Literature review

2.1. Adolescent literacy as a developmental resource across the life course

A life-span perspective treats literacy development as part of an open, plastic developmental system rather than a competence fixed in early childhood [1]. Adolescents continue to acquire vocabulary, disciplinary language, comprehension strategies, and motivational orientations while educational demands become more abstract. Life-course theory adds a temporal and contextual dimension: school experiences occur within age-graded transitions and institutional pathways, and their implications depend on timing, prior resources, and subsequent opportunities [2]. For that reason, a literacy gain in Grade IX is best

conceptualized as a proximal resource that may support later transitions—not as evidence that a four-session intervention has altered the life course.

This distinction matters analytically. Developmental-cascade theory predicts that competence in one domain may influence another through repeated transactions over time [3], but demonstrating a cascade requires longitudinal evidence. The present design can only establish that a measurable literacy outcome changed over a short interval. Still, the developmental framing is informative because adolescence is a period in which youths become more responsive to peer, motivational, and goal-relevant features of context [4], [5]. School environments can either expand or constrain opportunities for competence, belonging, and participation [6]. When reading instruction is experienced as accessible, meaningful, and socially supported, it may reduce avoidance and increase contact with texts; when it is experienced as persistently difficult, disengagement may accumulate. Engagement theory [8], self-determination theory [9], and interest-development models [10] therefore help explain why narrative and visual supports may be particularly useful for adolescents who approach English reading with limited confidence or interest.

The literacy pathway itself is multidimensional. The science of reading now emphasizes interactions among decoding, language comprehension, knowledge, executive processes, and reading purpose [12], [13]. Literal comprehension draws heavily on lexical access and accurate construction of text propositions, which makes vocabulary a particularly plausible intervention target. Meta-analytic and correlational evidence confirms the importance of word-level and language skills [14], [16], [17], whereas models of text comprehension explain how readers integrate propositions into a coherent representation [18]. Thus, an intervention that makes lexical information more accessible and supplies cues for narrative sequence could improve the immediate retrieval of explicitly stated information even if it does not directly train higher-order inference.

2.2. Storytelling, visual scaffolding, and multimodal comprehension

Storytelling provides a temporal and causal structure that can make text events easier to organize. Narrative activities invite learners to anticipate, encode, reconstruct, and communicate event sequences. In younger populations, storytelling and story reading have supported oral-language complexity and comprehension [21], while structured narrative/play interventions have improved language, literacy, and social outcomes [22]. Storytelling programs that combine oral or digital presentation with follow-up activity can also produce literacy gains [23]. The age difference between those samples and the current ninth-grade group should be kept explicit; the relevance lies in the narrative mechanism, not in assuming developmental equivalence.

Visual aids can strengthen that mechanism when they represent information that is semantically aligned with the text. The multimedia principle is not a simple prescription to add images; meaningful integration of words and pictures is required [24]. Visuals may reduce search demands, cue story sequence, and make unfamiliar vocabulary referents more concrete, but extraneous or redundant material can instead impose cognitive load [25], [34]. Pictorial illustrations have shown reliable benefits for text learning [26], and multiple-representation theory explains that representations can complement one another, constrain interpretation, and support construction [27]. Dual-coding accounts [28], [29] and integrated text–picture models [30] converge on the idea that coordinated verbal and visual representations can create multiple routes for elaboration and retrieval. Diagram research [31], interactive multimodal theory [32], and modality meta-analysis [33] further show that benefits depend on design and learner processing.

In the present intervention, pictures were not used as stand-alone decoration. They were paired with teacher storytelling, explicit vocabulary explanation, questions about the story, student rereading, and recall/retelling. This sequence is theoretically important because the visual cue is embedded in guided language processing. Regional work on visual aids [35], mobile language-learning media [36], [37], fairy-tale vocabulary instruction [38], and digital language-learning platforms [39] suggests that multimodal supports are feasible and pedagogically salient in EFL contexts. The current study extends that line by focusing on literal reading comprehension in an early-adolescent school sample and by interpreting the observed gain through a bounded human-development lens.

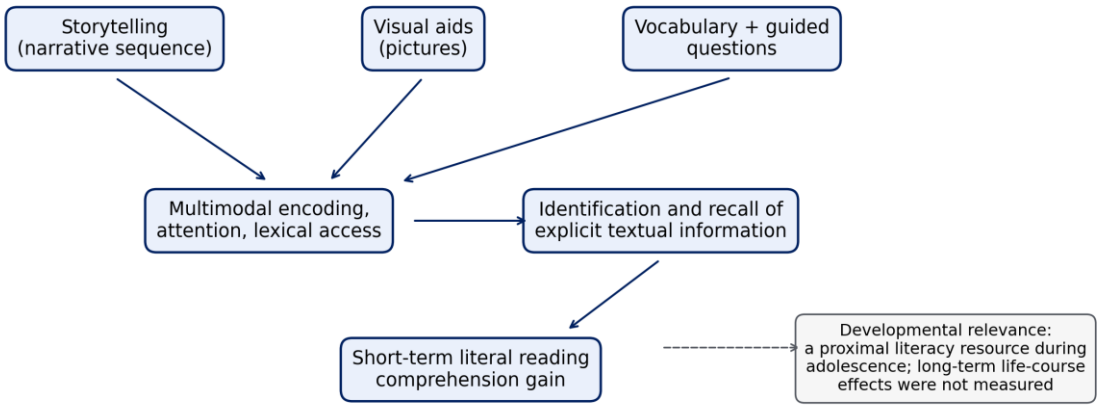


Figure 1. Developmentally informed conceptual framework linking storytelling and visual scaffolding to short-term literal reading comprehension.

Note. The pathway to long-term educational or life-course outcomes is conceptual only and was not tested in the one-group pre-test–post-test design.

3. Methods

3.1. Research design

The study used a pre-experimental one-group pre-test–post-test design. One intact group completed a baseline reading test (T1), received the storytelling-with-visual-aids treatment (X), and completed a post-test (T2). No control or comparison group was included. The design therefore estimates observed within-group change across the intervention period, but it cannot by itself separate treatment-related change from testing, history, maturation, regression to the mean, or other time-varying influences. This limitation is central to the interpretation rather than treated as a minor statistical caveat.

3.2. Data universe and analytical units

Participants were 29 ninth-grade students from class IX.K at SMP Negeri 3 Sungguminasa, Indonesia, in the 2025/2026 academic year. The detailed method section of the source manuscript describes purposive selection because the class had low literal reading comprehension; this specification was retained in the revised manuscript. The analytical unit for the quantitative comparison was the individual student measured at two time points. The data universe used for this revision was limited to the summary statistics, score-category counts, treatment description, and inferential statistics reported in the original study; no unreported student-level values were generated or imputed.

Table 1. Data sources, participants, materials, and analytical roles.

Source / sample / material	Coverage	Role in this study
Students	N = 29; Grade IX, class IX.K	Paired analytical units for pre–post comparison
Reading tests	Pre-test and post-test	Primary outcome measurement
Storytelling + visual-aid sessions	Four sessions	Instructional exposure between tests
SPSS output reported in source	Version 27	Descriptive statistics and paired-samples t test
Peer-reviewed literature	Development, reading, storytelling, multimedia	Theoretical and interpretive context

3.3. Operational definitions

Literal reading comprehension was operationalized through reading-test performance emphasizing vocabulary recognition and information explicitly stated in narrative texts. Storytelling referred to teacher presentation of the story in a narrated form. Visual aids referred primarily to pictures used to represent story events and support vocabulary and recall. The pre-test and post-test were the same analytical scale

as reported in the source manuscript. Normalized gain was calculated from the reported mean scores using the conventional formula g = (post − pre)/(maximum possible score − pre), with 100 treated as the score-scale maximum; the calculation follows the normalized-gain convention introduced by Hake [40].

Table 2. Operational definitions of the principal variables and indicators.

Variable / indicator	Definition / calculation	Interpretive role
Literal reading comprehension	Reading-test score focused on vocabulary and explicit information	Primary proximal literacy outcome
Storytelling	Teacher-narrated presentation of story content	Narrative instructional scaffold
Visual aids	Pictures aligned with story events/content	Nonverbal representational scaffold
Pre–post change	Post-test mean − pre-test mean	Observed within-group change
Normalized gain	(Post − Pre)/(100 − Pre)	Proportion of available score gain realized
Cohen's dz	|t|/√N for paired observations	Standardized within-group change; not a controlled treatment effect

3.4. Data collection and extraction

Data collection occurred in three phases. First, students completed a pre-test to establish baseline literal reading comprehension. Second, the class participated in four treatment sessions. Across sessions, the teacher introduced reading materials using pictures and storytelling, explained key vocabulary, posed stimulating questions, asked students to read the previously narrated text, and used questions and vocabulary recall to check understanding. Later sessions increasingly required students to retell or reconstruct story content with visual support. Third, a post-test was administered after completion of the treatment. The revision preserves this sequence and does not add unreported duration, item counts, or psychometric properties.

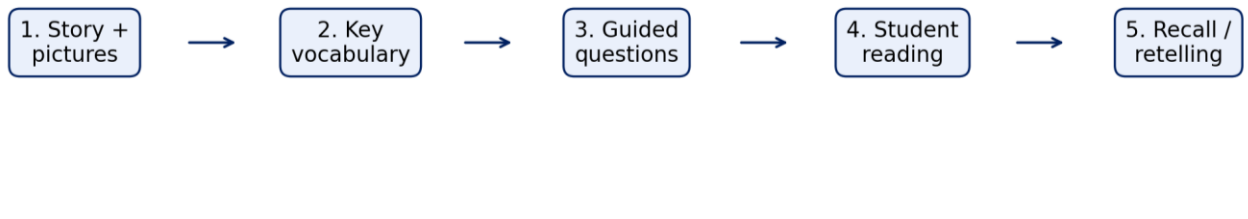


Figure 4. Core instructional sequence used across the four treatment sessions.

3.5. Data analysis

Descriptive statistics were used to summarize pre-test and post-test performance. The original analysis used IBM SPSS Statistics version 27 and a paired-samples t test to compare the two measurements from the same 29 students. Statistical significance was interpreted at α = .05. In addition to the reported test, this revision derives a 95% confidence interval for the mean change from the reported mean difference and standard deviation of difference scores. The reported pre–post ordering produced a negative t value because the difference was calculated as pre-test minus post-test; for interpretive clarity, results below report the equivalent positive post-test-minus-pre-test change while preserving the absolute t statistic and df.

Two magnitude indices were also used. First, normalized gain was recalculated from the reported means: (91.62 − 67.13)/(100 − 67.13) = 0.745, reported as 0.74. Second, Cohen's dz was derived from the paired t statistic as |17.456|/√29 = 3.24. Both are descriptive measures of within-group change. Neither controls for counterfactual change that could have occurred without the intervention, so they should not be interpreted as causal effect sizes in the same sense as a randomized between-group standardized mean difference.

3.6. Validation, reliability, and uncertainty

The source manuscript did not report item-level reliability, test–retest reliability, expert content-validation coefficients, or a complete item blueprint for the reading test. Those properties were therefore not invented for this revision. Analytical uncertainty was addressed instead by reporting the 95% confidence interval around the mean change and by separating observed gain from causal attribution. A further internal consistency check compared the reported means with the normalized-gain calculation. The recalculated value (0.745) is consistent with the body of the original manuscript, which reported approximately 0.74, and resolves the conflicting values appearing elsewhere in the earlier draft by using the documented means and score maximum.

4. Results and Discussion

4.1. Results

4.1.1. Change in literal reading-comprehension scores

Students' mean literal reading-comprehension score increased from 67.13 (SD = 4.96) before the intervention to 91.62 (SD = 5.54) after the four sessions. The mean increase was 24.48 points. Based on the reported standard deviation of the paired differences (7.552) and N = 29, the 95% confidence interval for the mean increase was 21.61 to 27.35 points. Table 3 summarizes the principal quantitative results, and Figure 2 visualizes the pre-test and post-test means.

Table 3. Summary of the principal study results.

Outcome / indicator	Pre-test	Post-test	Change / statistic
Mean score	67.13	91.62	+24.48 points
Standard deviation	4.96	5.54	—
Mean-change 95% CI	—	—	21.61 to 27.35
Paired-samples test	—	—	t(28) = 17.456, p < .001
Cohen's dz	—	—	3.24
Normalized gain	—	—	0.74

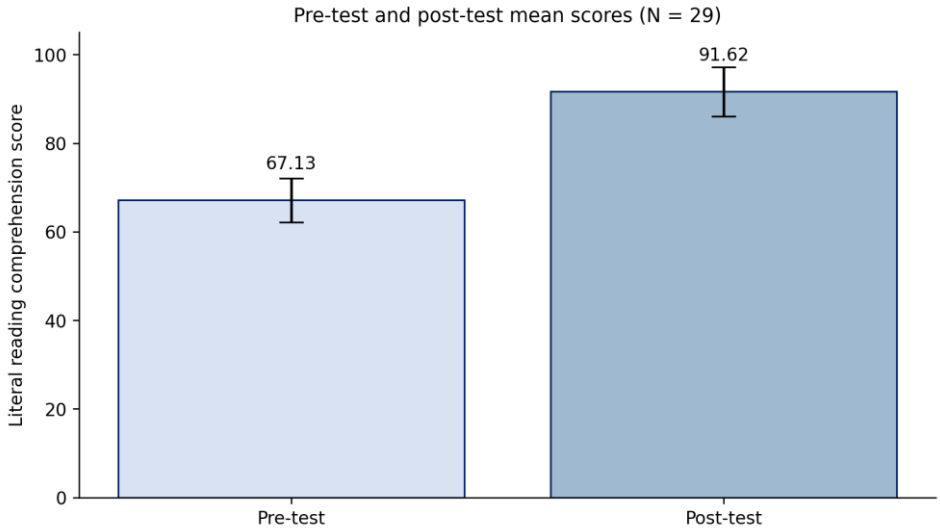


Figure 2. Mean pre-test and post-test literal reading-comprehension scores.

4.1.2. Shift across performance categories

The distribution of performance categories changed markedly. At pre-test, 5 students (17.24%) were classified as bad/requiring guidance, 17 (58.62%) as sufficient, and 7 (24.14%) as good; these counts sum to all 29 students, leaving no student in the very-good category. At post-test, 28 students (96.55%) were in the very-good category and 1 (3.45%) was in the good category, with no students remaining in the two lower categories. Table 4 and Figure 3 present this redistribution.

Table 4. Distribution of students across achievement categories before and after the intervention.

Performance category	Score interval	Pre-test, n (%)	Post-test, n (%)
Bad / requiring guidance	0–60	5 (17.24%)	0 (0.00%)
Sufficient	61–70	17 (58.62%)	0 (0.00%)
Good	71–80	7 (24.14%)	1 (3.45%)
Very good	81–100	0 (0.00%)	28 (96.55%)

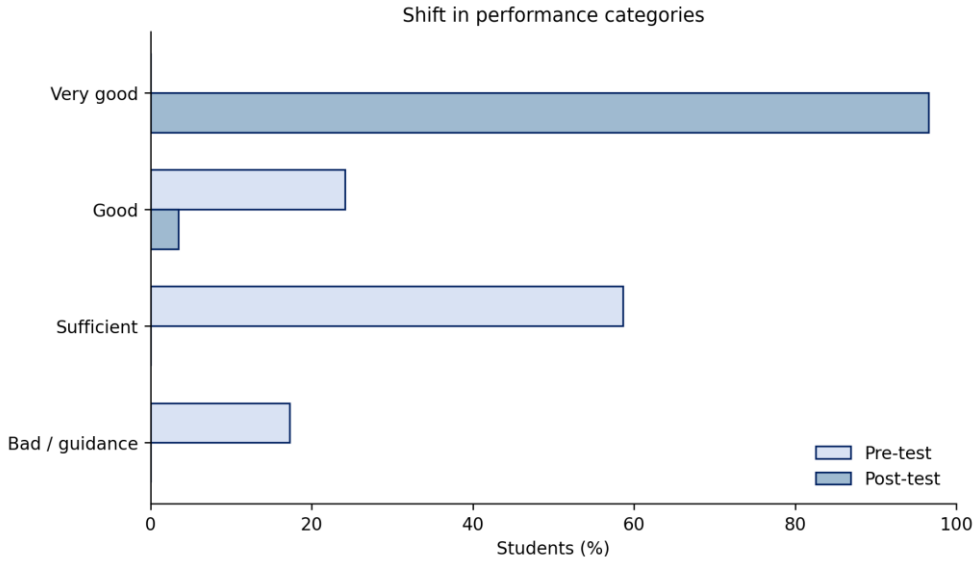


Figure 3. Percentage distribution across achievement categories at pre-test and post-test.

4.1.3. Inferential and gain-based evidence

The paired-samples analysis yielded an absolute t value of 17.456 with 28 degrees of freedom and $p < .001$. The original output reported a mean pre-minus-post difference of −24.48 with a standard deviation of 7.552; reversing the subtraction order gives the same magnitude as a +24.48-point post-minus-pre increase. The associated 95% confidence interval does not include zero. The normalized gain calculated from the documented means was 0.745 (0.74 when rounded), which falls in the high-gain band under the conventional Hake classification [40]. The paired standardized change, dz = 3.24, is also large as a within-group descriptive index.

Table 5. Analytical consistency and derived within-group metrics.

Metric	Reported / derived value	Basis	Interpretation
Mean difference	24.48 points	91.62 − 67.13	Large absolute score increase
SE of mean difference	1.40	7.552 / √29	Sampling uncertainty for paired mean change
95% CI	21.61 to 27.35	t28 critical value × SE	Interval excludes zero
Normalized gain	0.745 ≈ 0.74	(91.62–67.13)/(100–67.13)	High by conventional classification
Cohen's dz	3.24	|17.456|/√29	Very large within-group standardized change

4.1.4. Treatment-process observations

The source manuscript also described a progression in classroom participation across the four sessions. Early activities emphasized teacher-led storytelling, pictures, and key vocabulary. Subsequent sessions added rereading, retelling with picture support, identification of characters and story events, and class discussion. Students were described as becoming more confident in retelling and more active in discussing and recalling vocabulary. These observations are useful for interpreting the intervention process, but they

were not collected with a validated engagement scale or coded observational protocol. They are therefore reported as qualitative process descriptions rather than independent outcome evidence.

Table 6. Instructional process across the four treatment sessions.

Session focus	Instructional emphasis	Reported classroom indication	Analytical status
Session 1	Introduce literal comprehension; story pictures; key vocabulary	Initial familiarization with narrative and lexical cues	Process description
Session 2	Review; supported reading; picture-aided retelling	Greater recall and emerging confidence	Process description
Session 3	Storytelling; vocabulary clarification; guided questions	More active discussion and identification of information	Process description
Session 4	More independent reading; retelling; vocabulary recall	Consolidation before post-test	Process description

4.2. Discussion

4.2.1. Developmental interpretation of the principal findings

The principal finding is a substantial short-term improvement in literal reading-comprehension scores after four sessions of storytelling with visual aids. The mean increase of 24.48 points, narrow confidence interval, high normalized gain, and strong redistribution into the very-good category all point in the same descriptive direction. This convergence strengthens confidence that performance at the second measurement was materially higher than at baseline. It does not, however, identify which component of the intervention produced the change or how much of the change would have occurred under ordinary instruction.

The finding is theoretically compatible with several complementary mechanisms. First, the storytelling format may have organized events into a coherent narrative sequence, reducing the need for students to build structure from unfamiliar English text alone. Story-comprehension research shows that narrative presentation can support language and comprehension [21], [23]. Second, explicit vocabulary explanation targeted a known bottleneck in reading: lexical knowledge is strongly associated with reading performance [16], [17], and precise word representations facilitate integration during comprehension [15]. Third, pictures may have provided referential and sequencing cues. Research on pictorial illustrations [26], dual coding [28], [29], and text–picture integration [30] supports the view that coordinated verbal and visual information can improve encoding and retrieval when the representations are meaningfully aligned.

The classroom sequence also resembles design principles from multimedia learning. Students were not simply shown pictures; they received guidance, vocabulary pretraining, questions, rereading, and opportunities to reconstruct the story. Those features are consistent with the importance of signaling, pretraining, guided activity, and controlled processing described in cognitive-load and interactive-multimodal research [25], [32], [34]. The result therefore should not be reduced to a claim that 'visual aids work.' A more defensible interpretation is that a structured narrative–visual–lexical scaffold was followed by improved performance on an outcome closely aligned with those supports.

From a human-development perspective, the significance lies in timing and function. Early adolescence is a period when students encounter more demanding texts at the same time that motivation, peer orientation, and goal systems are changing [4], [5], [7]. A learning design that makes English reading more comprehensible and participatory may provide an accessible competence experience. Engagement research [8], self-determination theory [9], and interest-development theory [10] suggest plausible motivational pathways by which such experiences could increase willingness to persist. Yet these pathways were not directly measured here. The study therefore provides evidence about literacy performance, not proof of motivational mediation.

The life-course interpretation should be similarly restrained. Literacy competence is a resource that can contribute to subsequent academic participation, and developmental research demonstrates that earlier academic competencies can predict later achievement [11]. Life-course and developmental-cascade frameworks explain why repeated experiences and accumulated competencies may matter over time [2], [3]. Nevertheless, a four-session pre–post study cannot demonstrate a cascade, a turning point, or a change

in later educational trajectory. The appropriate contribution is conceptual: the observed short-term literacy gain identifies a proximal process that is worthy of longitudinal testing.

4.2.2. Implications for developmentally responsive EFL instruction

For practice, the results support a design principle rather than a single branded technique: combine narrative structure, semantically relevant visuals, explicit vocabulary support, and active comprehension checks. This principle is consistent with regional evidence that language-learning media can be successfully designed for secondary students [36], [37], that fairy-tale narratives can support vocabulary growth [38], and that digital platforms can extend interaction in second-language environments [39]. The present study adds a low-technology version of the same broader idea: multimodal support does not require sophisticated infrastructure when the instructional sequence itself is coherent.

For adolescent learners, developmental responsiveness also means avoiding two extremes. Materials should not be so difficult that lexical barriers consume most cognitive resources, but they should not be infantilizing merely because they use stories or pictures. Narrative topics, visual representations, and questions should be age-appropriate, culturally meaningful, and sufficiently challenging to sustain interest. The visual material should serve a clear representational function, consistent with research showing that multiple representations help when they complement or constrain interpretation [27] rather than add redundant detail.

Assessment should likewise remain aligned with the intended developmental target. Because the intervention and outcome emphasized literal comprehension, improved scores should not automatically be generalized to inferential comprehension, critical reading, writing, or long-term vocabulary retention. Teachers could extend the sequence gradually—from locating explicit information to explaining causal relations, making inferences, evaluating claims, and transferring vocabulary to new texts. Such progression would better connect a proximal literal-comprehension gain to broader adolescent literacy development.

Table 7. Synthesis of implications for instruction, development, and future evidence.

Domain / stage	Priority action / implication	Expected pathway / outcome
Pedagogical design	Integrate story sequence, relevant pictures, vocabulary, and guided questions	Reduce lexical/representational barriers to literal comprehension
Adolescent engagement	Use age-appropriate narratives and active reconstruction	Support situational interest and competence experiences
Visual design	Use visuals that explain, cue, or organize—not decorate	Support coordinated verbal–visual processing
Assessment	Separate literal from inferential/critical outcomes	Avoid overgeneralizing the observed gain
Research design	Add control groups, delayed follow-up, and repeated measures	Test causality, retention, and developmental persistence

4.2.3. Methodological implications, limitations, and future research

Several limitations define the evidentiary boundary. First, the one-group pre-test–post-test design is vulnerable to internal-validity threats. A significant paired t test shows that scores differed across time, not that the intervention alone caused the difference. Future studies should use randomized or well-matched comparison groups and report baseline equivalence. Second, the sample was small (N = 29), drawn from one class and one school, and purposively selected because of low initial comprehension. Generalization should therefore be to similar instructional contexts, not to Indonesian adolescents as a whole.

Third, the source manuscript did not provide item-level psychometric evidence for the reading test. Future research should report content-validation procedures, reliability estimates, item difficulty/discrimination where appropriate, and evidence that pre- and post-test forms are comparable. Fourth, the intervention bundled multiple components. A factorial or sequential design could distinguish the incremental contribution of storytelling, visuals, vocabulary pretraining, and guided questioning. Fifth, the post-test occurred immediately after the instructional sequence; delayed follow-up is needed to determine whether vocabulary and comprehension gains are retained.

Finally, the life-course framing generates a longer research agenda rather than a stronger causal claim for the current data. Longitudinal work could follow literacy, engagement, and academic self-regulation

across transitions from junior high to senior high school. Repeated measures would allow researchers to test whether brief competence-building experiences are associated with sustained reading engagement or later achievement and whether effects differ by initial literacy level, gender, socioeconomic resources, or access to English outside school. Such designs would move the field from short-term intervention response toward genuinely developmental evidence.

5. Conclusion

Among 29 ninth-grade students at SMP Negeri 3 Sungguminasa, literal reading-comprehension performance was substantially higher after four sessions of storytelling supported by visual aids, vocabulary explanation, guided questions, rereading, and recall. Mean scores rose from 67.13 to 91.62; the 24.48-point increase had a 95% confidence interval of 21.61 to 27.35, the paired comparison was statistically significant ($p < .001$), normalized gain was 0.74, and 96.55% of students were classified in the very-good category at post-test. These converging indicators document a strong short-term within-group improvement.

The study's contribution is strengthened—not weakened—by distinguishing the observed outcome from broader developmental interpretation. Storytelling with relevant visuals can be understood as a developmentally responsive scaffold that coordinates narrative structure, lexical support, and multimodal representation during early adolescence. Such literacy gains may constitute proximal resources for continued learning, but this design does not establish causal treatment effects, developmental cascades, or life-course consequences. Controlled studies with validated measures and longitudinal follow-up are required to test whether short-term comprehension gains persist and contribute to later educational trajectories.

Author contribution statement

Apriani Hamka: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, and Writing – original draft. Maemuna Muhayyang: Methodology, Validation, Supervision, and Writing – review & editing. Geminastiti Sakkir: Conceptualization, Validation, Supervision, Project administration, and Writing – review & editing. All authors contributed to the interpretation of the findings, critically reviewed the manuscript, and approved the final version for publication.

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Disclosure statement

The authors declare no conflict of interest.

AI-assisted technologies disclosure

AI-assisted technologies were used for language and structural editing of the manuscript. The authors reviewed and verified the final text and remain fully responsible for the accuracy, originality, source verification, interpretation, and integrity of the article.

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Data availability statement

The de-identified data supporting the findings of this study are available from the corresponding author upon reasonable request, subject to applicable institutional and participant-protection requirements.

References

[1] P. B. Baltes, "Theoretical propositions of life-span developmental psychology: On the dynamics between growth and decline," *Developmental Psychology*, vol. 23, no. 5, pp. 611–626, 1987. https://doi.org/10.1037/0012-1649.23.5.611.

[2] G. H. Elder Jr., M. K. Johnson, and R. Crosnoe, "The emergence and development of life course theory," *Handbook of the Life Course*, pp. 3–19, 2003. https://doi.org/10.1007/978-0-306-48247-2_1.

[3] A. S. Masten and D. Cicchetti, "Developmental cascades," *Development and Psychopathology*, vol. 22, no. 3, pp. 491–495, 2010. https://doi.org/10.1017/S0954579410000222.
[4] R. E. Dahl, N. B. Allen, L. Wilbrecht, and A. B. Suleiman, "Importance of investing in adolescence from a developmental science perspective," *Nature*, vol. 554, pp. 441–450, 2018. https://doi.org/10.1038/nature25770.
[5] E. A. Crone and R. E. Dahl, "Understanding adolescence as a period of social-affective engagement and goal flexibility," *Nature Reviews Neuroscience*, vol. 13, no. 9, pp. 636–650, 2012. https://doi.org/10.1038/nrn3313.
[6] J. S. Eccles and R. W. Roeser, "Schools as developmental contexts during adolescence," *Journal of Research on Adolescence*, vol. 21, no. 1, pp. 225–241, 2011. https://doi.org/10.1111/j.1532-7795.2010.00725.x.
[7] L. Steinberg, "Cognitive and affective development in adolescence," *Trends in Cognitive Sciences*, vol. 9, no. 2, pp. 69–74, 2005. https://doi.org/10.1016/j.tics.2004.12.005.
[8] J. A. Fredricks, P. C. Blumenfeld, and A. H. Paris, "School engagement: Potential of the concept, state of the evidence," *Review of Educational Research*, vol. 74, no. 1, pp. 59–109, 2004. https://doi.org/10.3102/00346543074001059.
[9] R. M. Ryan and E. L. Deci, "Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions," *Contemporary Educational Psychology*, vol. 61, Art. no. 101860, 2020. https://doi.org/10.1016/j.cedpsych.2020.101860.
[10] S. Hidi and K. A. Renninger, "The four-phase model of interest development," *Educational Psychologist*, vol. 41, no. 2, pp. 111–127, 2006. https://doi.org/10.1207/s15326985ep4102_4.
[11] G. J. Duncan et al., "School readiness and later achievement," *Developmental Psychology*, vol. 43, no. 6, pp. 1428–1446, 2007. https://doi.org/10.1037/0012-1649.43.6.1428.
[12] N. K. Duke and K. B. Cartwright, "The science of reading progresses: Communicating advances beyond the simple view of reading," *Reading Research Quarterly*, vol. 56, no. S1, pp. S25–S44, 2021. https://doi.org/10.1002/rrq.411.
[13] A. Castles, K. Rastle, and K. Nation, "Ending the reading wars: Reading acquisition from novice to expert," *Psychological Science in the Public Interest*, vol. 19, no. 1, pp. 5–51, 2018. https://doi.org/10.1177/1529100618772271.
[14] J. R. García and K. Cain, "Decoding and reading comprehension: A meta-analysis to identify which reader and assessment characteristics influence the strength of the relationship in English," *Review of Educational Research*, vol. 84, no. 1, pp. 74–111, 2014. https://doi.org/10.3102/0034654313499616.
[15] C. A. Perfetti and J. Stafura, "Word knowledge in a theory of reading comprehension," *Scientific Studies of Reading*, vol. 18, no. 1, pp. 22–37, 2014. https://doi.org/10.1080/10888438.2013.827687.
[16] D. D. Qian, "Investigating the relationship between vocabulary knowledge and academic reading performance: An assessment perspective," *Language Learning*, vol. 52, no. 3, pp. 513–536, 2002. https://doi.org/10.1111/1467-9922.00193.
[17] E. H. Jeon and J. Yamashita, "L2 reading comprehension and its correlates: A meta-analysis," *Language Learning*, vol. 64, no. 1, pp. 160–212, 2014. https://doi.org/10.1111/lang.12034.
[18] W. Kintsch, "The role of knowledge in discourse comprehension: A construction-integration model," *Psychological Review*, vol. 95, no. 2, pp. 163–182, 1988. https://doi.org/10.1037/0033-295X.95.2.163.
[19] K. Cain, J. Oakhill, and P. Bryant, "Children's reading comprehension ability: Concurrent prediction by working memory, verbal ability, and component skills," *Journal of Educational Psychology*, vol. 96, no. 1, pp. 31–42, 2004. https://doi.org/10.1037/0022-0663.96.1.31.
[20] A. M. Elleman and E. L. Oslund, "Reading comprehension research: Implications for practice and policy," *Policy Insights from the Behavioral and Brain Sciences*, vol. 6, no. 1, pp. 3–11, 2019. https://doi.org/10.1177/2372732218816339.
[21] R. Isbell, J. Sobol, L. Lindauer, and A. Lowrance, "The effects of storytelling and story reading on the oral language complexity and story comprehension of young children," *Early Childhood Education Journal*, vol. 32, no. 3, pp. 157–163, 2004. https://doi.org/10.1023/B:ECEJ.0000048967.94189.a3.
[22] A. Nicolopoulou, K. S. Cortina, H. Ilgaz, C. B. Cates, and A. de Sá, "Using a narrative- and play-based activity to promote low-income preschoolers' oral language, emergent literacy, and social competence," *Early Childhood Research Quarterly*, vol. 31, pp. 147–162, 2015. https://doi.org/10.1016/j.ecresq.2015.01.006.
[23] I. Y. Maureen, H. van der Meij, and T. de Jong, "Evaluating storytelling activities for early literacy development," *International Journal of Early Years Education*, vol. 30, no. 4, pp. 679–696, 2022. https://doi.org/10.1080/09669760.2021.1933917.
[24] R. E. Mayer, "The promise of multimedia learning: Using the same instructional design methods across different media," *Learning and Instruction*, vol. 13, no. 2, pp. 125–139, 2003. https://doi.org/10.1016/S0959-4752(02)00016-6.
[25] R. E. Mayer and R. Moreno, "Nine ways to reduce cognitive load in multimedia learning," *Educational Psychologist*, vol. 38, no. 1, pp. 43–52, 2003. https://doi.org/10.1207/S15326985EP3801_6.
[26] R. N. Carney and J. R. Levin, "Pictorial illustrations still improve students' learning from text," *Educational Psychology Review*, vol. 14, no. 1, pp. 5–26, 2002. https://doi.org/10.1023/A:1013176309260.
[27] S. Ainsworth, "DeFT: A conceptual framework for considering learning with multiple representations," *Learning and Instruction*, vol. 16, no. 3, pp. 183–198, 2006. https://doi.org/10.1016/j.learninstruc.2006.03.001.
[28] J. M. Clark and A. Paivio, "Dual coding theory and education," *Educational Psychology Review*, vol. 3, no. 3, pp. 149–210, 1991. https://doi.org/10.1007/BF01320076.
[29] A. Paivio, "Dual coding theory: Retrospect and current status," *Canadian Journal of Psychology/Revue canadienne de psychologie*, vol. 45, no. 3, pp. 255–287, 1991. https://doi.org/10.1037/h0084295.
[30] W. Schnotz, "Towards an integrated view of learning from text and visual displays," *Educational Psychology Review*, vol. 14, no. 1, pp. 101–120, 2002. https://doi.org/10.1023/A:1013136727916.
[31] K. R. Butcher, "Learning from text with diagrams: Promoting mental model development and inference generation," *Journal of Educational Psychology*, vol. 98, no. 1, pp. 182–197, 2006. https://doi.org/10.1037/0022-0663.98.1.182.
[32] R. Moreno and R. E. Mayer, "Interactive multimodal learning environments," *Educational Psychology Review*, vol. 19, no. 3, pp. 309–326, 2007. https://doi.org/10.1007/s10648-007-9047-2.
[33] P. Ginns, "Meta-analysis of the modality effect," *Learning and Instruction*, vol. 15, no. 4, pp. 313–331, 2005. https://doi.org/10.1016/j.learninstruc.2005.07.001.

[34] J. Sweller, "Cognitive load during problem solving: Effects on learning," *Cognitive Science*, vol. 12, no. 2, pp. 257–285, 1988. https://doi.org/10.1207/s15516709cog1202_4.
[35] M. Pateşan, A. Balagiu, and C. Alibec, "Visual aids in language education," *International Conference Knowledge-Based Organization*, vol. 24, no. 2, pp. 356–361, 2018. https://doi.org/10.1515/kbo-2018-0115.
[36] A. N. Mizan, M. Aridan, M. Akmansyah, S. Adelia, I. N. Asiyah, and L. M. Sholikha, "The development of Arabic learning media based on Android for senior high school students," *LISANIA: Journal of Arabic Education and Literature*, vol. 6, no. 2, pp. 178–189, 2022. https://doi.org/10.18326/lisania.v6i2.178-189.
[37] U. Hijriyah, Koderi, Erlina, Irwandani, and M. Aridan, "Arabic learning media based on Smart Apps Creator for students of Islamic junior high school," *Arabiyat: Jurnal Pendidikan Bahasa Arab dan Kebahasaaraban*, vol. 9, no. 2, pp. 217–230, 2022. https://doi.org/10.15408/a.v9i2.27586.
[38] N. A. Suhardi, A. Muliati, G. Sakkir, and J. A. Villarama, "Increasing students' vocabulary using fairy tales at SMKN 6 Makassar," *Journal of Language Learning and Assessment*, vol. 1, no. 2, pp. 73–80, 2023. https://doi.org/10.71194/jlla.v1i2.101.
[39] J. A. Villarama, R. V. Pilien, and C. I. Villamar, "Utilization of Padlet in second language teaching: Practices, challenges, and opportunities," *LLT Journal: A Journal on Language and Language Teaching*, vol. 28, no. 1, pp. 257–274, 2025. https://doi.org/10.24071/llt.v28i1.9015.
[40] R. R. Hake, "Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses," *American Journal of Physics*, vol. 66, no. 1, pp. 64–74, 1998. https://doi.org/10.1119/1.18809.