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Interactive Storytelling Framework for Narrative and Literacy Development in Children Aged 6-7 Years

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Abstract:
Early literacy instruction in Indonesia remains dominated by conventional approaches emphasizing isolated technical skills, with minimal attention to holistic narrative competence development. This study aimed to (1) develop an Interactive Storytelling Framework grounded in emergent literacy theory, narrative theory, and sociocultural learning principles, and (2) examine its effectiveness in enhancing literacy and narrative abilities of children aged 6-7 years. A Design-Based Research approach with sequential explanatory mixed methods was employed over eight months. Participants included 267 first-grade students from three public elementary schools in Medan Denai District, North Sumatra, assigned to experimental (n=133) and control (n=134) groups using a quasi-experimental design. Results revealed statistically significant between-group differences favoring the experimental group. For literacy skills, ANCOVA showed F (1,264) =112.09, $p<0.001$, $\eta p^2=0.298$, Cohen's d=1.07. The experimental group achieved mean gains of 20.87 points versus 11.45 points in controls (82% greater improvement). For narrative abilities, F (1,264) =286.14, $p<0.001$, $\eta p^2=0.520$, Cohen's d=1.48, with experimental gains of 6.92 versus 2.84 points (144% greater improvement). Student engagement was significantly higher in the experimental group (M=14.03 vs. 11.39, d=1.51) and correlated strongly with literacy gains (r=0.628) and narrative gains (r=0.712). Thematic analysis identified five mechanisms: meaningful contextual learning, active participation, narrative metacognition development, adaptive differentiation, and real-life transfer.

Keywords: *Interactive Storytelling, Early Literacy, Elementary Education*

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INTRODUCTION

Literacy in early childhood is a crucial foundation that determines children's academic success and cognitive development in later stages (Mamuladze, 2024; Brown, 2014). At the age of 6–7 years, especially first-grade primary school students, children are in a critical phase of transition from emergent literacy to conventional literacy, where they begin to develop integrated reading, writing, speaking, and listening skills (UNESCO., 2017; Kalaitzi, 2023; Permana, 2025). This phase is very decisive because the literacy skills developed during this period

will affect the entire educational journey of children into adulthood (Schoon, 2010; Merriam, 2020). However, current approaches to literacy learning tend to focus on technical skills such as letter recognition and word decoding, without paying adequate attention to the development of holistic narrative skills (Bus, 1995). In fact, the ability to tell and understand narratives is an essential component of functional literacy that supports deep understanding of texts and meaningful communication (Clay, 2001).

Previous studies have shown that storytelling has great potential in supporting children's literacy development (Miller, 2008; Melzi, 2023). Stories not only provide a rich context for language learning, but also facilitate the development of children's cognitive, socio-emotional, and imaginative skills. Gil and Sylla (2021), in their pilot study of 6-7-year-old children, found that interactive digital narratives (IDN) provide a broad window into various aspects of literacy development, including story planning, understanding narrative system rules, developing empathy for characters, and acquiring new vocabulary. These findings indicate that interactive narrative approaches have strong potential to support early literacy practices at the pre-school and early primary school levels. However, most existing studies are still descriptive or only explore one aspect of literacy partially, such as early reading skills or listening skills alone (Gil, 2021).

A significant gap exists in systematic frameworks that integrate interactive storytelling with comprehensive literacy components oral narration, story comprehension, written expression, and verbal reflection specifically designed for 6-7 year old developmental characteristics (Indonesia., 2021). While studies have explored digital storytelling approaches, including O'Byrne et al.'s (2018) "Emerging Digital Storytellers" model emphasizing narrative construction and collaborative literacy practices, a critical need remains for structured, measurable frameworks adaptable across diverse learning contexts, including resource-limited settings where digital access is constrained (O'Byrne, 2018).

Advances in technology and interactive learning approaches have opened up new opportunities in the development of children's literacy. Ye et al. (2024) developed the "Colin" system, a multimodal platform that supports co-creation of storytelling between humans and AI to improve children's multi-level narrative skills. This system is designed in three phases: generation (facilitators and AI jointly compose text and images), understanding (question-feedback models help children understand cause-and-effect relationships and connections between story elements), and building (children draw and tell stories to connect story elements). A study involving 20 children showed significant improvements in narrative skills, understanding of cause-and-effect relationships, and the quality of the new stories they created. These findings reinforce the argument that structured interactive

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approaches can have a real impact on the development of children's narrative and literacy skills.

Even more innovatively, Choi et al. (2025) developed "Tinker Tales", an interactive storytelling framework in the form of a board game that combines physical and digital elements through NFC-enabled pawns and tokens, speakers, and microphones to interact with AI. In this framework, children select and define story elements such as characters, places, objects, and emotions, then provide details to the AI, which subsequently helps build the story similar to the process of adults giving prompts to AI. The resulting stories are evaluated for quality and safety, and this research emphasises the great potential of combining physical and digital elements to develop narrative skills and AI literacy at an early age. Frameworks such as this show that interactive storytelling can not only improve traditional literacy but also prepare children for 21st-century literacy, which includes an understanding of technology and artificial intelligence.

In the context of 21st-century education and the implementation of the Merdeka Curriculum in Indonesia, there is a strong emphasis on contextual, student-centred learning and the development of holistic competencies. Literacy is no longer seen as merely the mechanical ability to read and write, but as a functional skill that enables individuals to understand, interpret, and communicate information in various contexts. Zini (2024), in her research on digital storytelling in early childhood education, developed a digital story analysis instrument that focuses on narrative coherence and media literacy as part of the Erasmus+ STORIES project. This instrument is highly relevant for designing a rubric for assessing narrative skills within the framework of interactive storytelling, as it provides clear criteria for measuring the quality of children's narratives and the media literacy competencies they develop through the storytelling process.

Interactive storytelling, which places children as active participants in the construction and exploration of narratives, offers a pedagogical approach that is in line with contemporary educational paradigms. This approach allows children to not only be passive consumers of stories, but also active creators involved in the process of meaning-making. However, the implementation of interactive storytelling in formal learning settings still faces challenges in the form of a lack of a structured, measurable framework that can be adapted by education practitioners in the field. Teachers need clear guidance on how to design interactive storytelling activities, how to facilitate the process, and how to assess children's literacy development through this approach.

This research gap is even more pressing when considering the reality in the field, where many first-grade primary school students experience difficulties in developing coherent narrative skills. They may be able to recognize letters and read

simple words, but they are not necessarily able to retell a story with a clear structure, understand cause-and-effect relationships in narratives, or express their ideas meaningfully in writing. This phenomenon indicates the need for a learning approach that not only trains technical literacy skills but also builds narrative capacity as a bridge to broader functional literacy. Strong narrative skills will help children understand more complex texts, organise their thoughts, and communicate effectively in various academic and social situations.

This study aims to fill this gap by developing and testing the effectiveness of an Interactive Storytelling Framework specifically designed to improve narrative and literacy skills in children aged 6–7 years. This framework integrates principles of child language development, cognitive theories of narrative comprehension, and best practices in early literacy pedagogy (Saracho, 2017). The novelty of this research lies in its holistic approach, which combines narrative interactivity with the development of multidimensional literacy skills, including receptive (listening and reading), productive (speaking and writing), and reflective (critical thinking about stories) aspects in a systematic and implementable framework.

Based on previous research findings, the framework developed in this study adopts the principle of multimodality as applied in the Colin system (Ye, 2024), a combination of physical-digital elements such as Tinker Tales (Choi, 2025) and comprehensive evaluation instruments such as those developed by Zini (2024). However, this framework is designed with consideration for the Indonesian educational context, the availability of resources in schools, and the cultural and linguistic characteristics of Indonesian students (Zini, 2024). Thus, this framework is not only theoretically sound, but also practical and applicable for use in literacy learning in Grade 1 primary schools.

This study advances beyond existing interactive storytelling frameworks in four fundamental ways. First, unlike the Colin System (Ye, 2024), which focuses on AI-mediated multimodal story co-creation requiring sophisticated technology infrastructure, or Tinker Tales (Choi, 2025), which integrates physical-digital elements through NFC-enabled components and speakers, this framework is designed for adaptability across diverse resource contexts from technology rich to minimal-technology classrooms making it particularly relevant for Indonesian educational realities where digital access varies considerably. Second, while Colin and Tinker Tales emphasize technological integration and AI literacy development, this framework prioritizes comprehensive pedagogical scaffolding that systematically develops multidimensional literacy (receptive, productive, and reflective) alongside narrative competence through structured teacher-student interactions, regardless of technology availability. Third, this study provides the first rigorous quasi-experimental evidence (N=267) with large to very large effect

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sizes for both literacy (d=1.07) and narrative abilities (d=1.48) in the Indonesian context, including identification of student engagement as a mediating mechanism empirical validation absent in previous framework proposals. Fourth, beyond theoretical modeling, this research delivers complete practical implementation protocols including validated assessment instruments (narrative rubrics, literacy tests), teacher professional development guidelines, and 12-week lesson progressions aligned with Merdeka curriculum principles, enabling immediate classroom adoption by Indonesian educators.

This study thus makes dual contributions: conceptually, it enriches academic discourse by demonstrating how interactive storytelling can be systematically integrated with early literacy pedagogy in diverse educational contexts; practically, it provides evidence-based, culturally responsive strategies to improve literacy quality for Indonesian primary school children through a framework tested and validated in authentic classroom settings.

The research questions that are the focus of this study are: (1) How to design an effective Interactive Storytelling Framework to improve the narrative and literacy skills of 6-7 year old children? (2) Does the implementation of this framework have a significant effect on improving the early reading skills and narrative abilities of first-grade primary school students? (3) Which interactive components in the framework contribute most to the development of children's functional literacy? Through these questions, the study is expected to produce findings that not only enrich scientific knowledge but also have a real impact on improving the quality of literacy learning in Indonesia.

METHOD

This study employed a Design-Based Research (DBR) approach with sequential explanatory mixed methods to develop and test the Interactive Storytelling Framework's effectiveness in improving narrative and literacy skills of children aged 6-7 years (McKenney, 2012; Anderson, 2012). DBR was selected for its dual focus on intervention effectiveness and iterative framework development within authentic educational contexts.

The study progressed through four DBR phases over eight months (February-September 2025): (1) Problem analysis through classroom observations, teacher interviews, and pre-testing; (2) Framework design via literature review, expert validation (n=3 experts), and Focus Group Discussions with first-grade teachers; (3) Implementation and testing using quasi-experimental design with iterative refinement cycles; and (4) Evaluation and framework revision based on comprehensive data analysis and stakeholder feedback.

Table 1. *Summarizes the phases and timeline*

Phase	Activities	Duration	Output
1: Problem Analysis	Observations, interviews, pre-tests	2 months	Literacy problem mapping, initial framework specifications
2: Design & Development	Literature review, expert validation, FGD, instrument development	2 months	Conceptual framework model, assessment instruments
3: Implementation & Testing	Classroom intervention, data collection, iterative refinement	3 months	Empirical effectiveness data
4: Evaluation & Revision	Data analysis, stakeholder reflection, framework refinement	1 month	Validated framework with implementation guidelines

The study involved 267 first-grade students from three public elementary schools in Medan Denai District, North Sumatra (School 060935: 89 students; School 060936: 92 students; School 060937: 86 students). Using purposive sampling with pre-test equivalence verification, students were assigned to experimental (n=133) and control (n=134) groups across six classes per condition, distributed evenly across schools. A quasi-experimental nonequivalent control group design was employed, with existing classes serving as experimental units due to practical and ethical considerations. The experimental group received 12 weeks of Interactive Storytelling Framework instruction (36 sessions, 60 minutes each, 3×/week), while the control group received conventional literacy instruction.

Three validated quantitative instruments were employed: (1) Early Literacy Assessment Test adapted from ELLCO, measuring phonological awareness (15 items), letter recognition (26 items), word reading (20 items), and reading comprehension (10 items), with Cronbach's $\alpha>0.70$; (2) Narrative Ability Rubric based on Zini's (2024) framework, assessing structure, coherence, language use, detail/elaboration, and creativity on 1-4 scales; and (3) Student Engagement Scale adapted from the Behavioral Engagement Scale, measuring attention, participation, persistence, and enthusiasm via 4-point Likert scale (20 items total). All instruments were validated through expert judgment and pilot-tested with 30 students outside the research sample. Qualitative data were collected through semi-structured interviews with 12 teachers, 36 students, and 36 parents, plus 12 weeks of participatory classroom observations documented through field notes and video recordings.

Quantitative data were analyzed using Analysis of Covariance (ANCOVA) controlling for pre-test scores, with Cohen's d and partial eta-squared (ηp^2) calculated for effect sizes. Independent samples t-tests assessed pre-test

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equivalence. Qualitative data underwent thematic analysis following Braun and Clarke's (2006) six-stage approach: familiarization, initial coding, theme searching, theme reviewing, defining/naming, and report production. Data integration employed convergent triangulation and joint displays to generate meta-inferences connecting quantitative outcomes with qualitative implementation mechanisms (Braun, 2006).

Internal validity was ensured through pre-test matching, covariate control in ANCOVA, and treatment fidelity monitoring. External validity considerations included purposive site selection representing urban Indonesian elementary contexts. Qualitative credibility was established through member checking, peer debriefing, and data source triangulation.

RESULTS AND DISCUSSION

This study involved 267 first-grade students from three public elementary schools in Medan Denai District, divided into experimental (n=133) and control (n=134) groups. The participants were balanced in terms of demographic characteristics, with gender distribution showing 51.1% male and 48.9% female in the experimental group, compared to 51.5% male and 48.5% female in the control group. The mean age was 6.47 years (SD=0.50) for the experimental group and 6.45 years (SD=0.50) for the control group. Chi-square tests confirmed no significant differences between groups in gender (χ^2=0.006, p=0.937) or age (χ^2=0.036, p=0.849), establishing demographic equivalence at baseline.

Pre-test for Equality of Initial Abilities

Prior to intervention, comprehensive pre-testing confirmed both groups were equivalent across all literacy and narrative measures. For early literacy skills, the experimental group scored 36.69±9.87 on total literacy (range 0-71), while the control group scored 37.29±9.76. Component scores showed similar patterns: phonological awareness (experimental: 8.23±2.41, control: 8.31±2.38), letter recognition (experimental: 16.45±4.32, control: 16.72±4.28), word reading (experimental: 7.89±3.15, control: 8.02±3.21), and reading comprehension (experimental: 4.12±1.85, control: 4.24±1.79). Independent samples t-tests revealed no significant differences (all $p > 0.05$), with Cohen's d values below 0.07, confirming practical equivalence.

For narrative ability, total pre-test scores were 9.19±2.43 (experimental) versus 9.33±2.47 (control) on a 5-20 scale. Individual narrative components (narrative structure, story coherence, narrative language, detail & elaboration, and creativity) all scored between 1.76-1.93 on a 1-4 scale across both groups, with no

significant differences (all $p > 0.05$, Cohen's $d < 0.06$). These findings validate that any post-test differences can be confidently attributed to the intervention effects.

Statistical Assumptions for ANCOVA

All prerequisite tests confirmed that ANCOVA assumptions were satisfied. Shapiro-Wilk tests showed normal distribution for all post-test variables (experimental literacy: W=0.986, p=0.189; control literacy: W=0.983, p=0.097; experimental narrative: W=0.988, p=0.274; control narrative: W=0.985, p=0.142). Levene's tests indicated homogeneous variances (total literacy: F=1.247, p=0.265; total narrative: F=0.892, p=0.346). Slope homogeneity was confirmed with no significant covariate×group interactions (literacy: F=0.428, p=0.513; narrative: F=0.316, p=0.574). With all assumptions met, the analysis proceeded using ANCOVA.

Table 2. *Comprehensive Results: Pre-test and Post-test Outcomes with Effect Sizes*

Variable	Experimental Group (n=133)	Control Group (n=134)	ANCOVA Results
Early Literacy Skills	Pre-test → Post-test	Pre-test → Post-test	F (p-value)
Phonological Awareness (0-15)	8.23±2.41 → 12.68±1.89	8.31±2.38 → 10.52±1.95	F=162.38, p<0.001, ηp^2=0.381
Letter Recognition (0-26)	16.45±4.32 → 22.87±2.64	16.72±4.28 → 20.35±2.89	F=84.02, p<0.001, ηp^2=0.241
Word Reading (0-20)	7.89±3.15 → 14.56±2.78	8.02±3.21 → 11.89±3.04	F=101.89, p<0.001, ηp^2=0.279
Reading Comprehension (0-10)	4.12±1.85 → 7.45±1.62	4.24±1.79 → 5.98±1.71	F=91.85, p<0.001, ηp^2=0.258
Total Literacy (0-71)	**36.69±9.87 → 57.56±7.23**	**37.29±9.76 → 48.74±8.12**	**F=112.09, p<0.001, ηp^2=0.298**
Narrative Ability			
Narrative Structure (1-4)	1.85±0.62 → 3.24±0.58	1.88±0.64 → 2.47±0.61	F=182.01, p<0.001, ηp^2=0.408
Story Coherence (1-4)	1.79±0.58 → 3.18±0.61	1.82±0.61 → 2.38±0.64	F=185.63, p<0.001, ηp^2=0.413
Narrative Language (1-4)	1.91±0.65 → 3.32±0.59	1.93±0.63 → 2.52±0.62	F=198.92, p<0.001, ηp^2=0.430
Detail & Elaboration (1-4)	1.76±0.59 → 3.09±0.64	1.79±0.57 → 2.31±0.66	F=165.87, p<0.001, ηp^2=0.386
Creativity (1-4)	1.88±0.67 → 3.28±0.63	1.91±0.69 → 2.49±0.67	F=180.34, p<0.001, ηp^2=0.406
Total Narrative (5-20)	**9.19±2.43 → 16.11±2.35**	**9.33±2.47 → 12.17±2.51**	**F=286.14, p<0.001, ηp^2=0.520**

Note: ANCOVA controlled for pre-test scores. All group differences were statistically significant at p<0.001. Effect size interpretation: Cohen's d of 0.2=small, 0.5=medium, 0.8=large, >1.2=very large; ηp^2 of 0.01=small, 0.06=medium, 0.14=large.

The experimental group demonstrated substantial improvements across all measures following the Interactive Storytelling Framework intervention. For

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literacy skills, the overall Cohen's d of 1.07 represents a gain exceeding one standard deviation compared to the control group equivalent to advancing student progress by approximately one academic year. Phonological awareness showed the strongest effect (d=1.06), while all other literacy components also achieved large effect sizes (d=0.81-0.89).

Remarkably, narrative ability outcomes surpassed literacy gains, with an overall Cohen's d of 1.48 and partial eta-squared of 0.520, indicating that group membership explained 52% of post-test narrative variance after controlling for initial ability an extraordinarily large effect in educational research. All five narrative components demonstrated very large effects (d=1.14-1.23, ηp^2=0.386-0.430), confirming comprehensive development rather than isolated skill improvement. The stronger effects on narrative versus literacy suggest the framework directly targets narrative competence while literacy develops instrumentally to support storytelling purposes.

Table 3. *Learning Engagement and Its Relationship with Learning Outcomes*

Engagement Dimension	Experimental Group (n=133)	Control Group (n=134)	Group Comparison	Correlation with Gains
	Mean ± SD	Mean ± SD	t (p-value), Cohen's d	Literacy r (p) / Narrative r (p)
Attention & Focus	3.42 ± 0.51	2.87 ± 0.58	t=8.23, p<0.001, d=1.01	r=0.542 (<0.001) / r=0.615 (<0.001)
Active Participation	3.56 ± 0.48	2.79 ± 0.63	t=11.07, p<0.001, d=1.35	r=0.614 (<0.001) / r=0.687 (<0.001)
Persistence in Task	3.38 ± 0.54	2.92 ± 0.61	t=6.51, p<0.001, d=0.79	r=0.489 (<0.001) / r=0.558 (<0.001)
Enthusiasm	3.67 ± 0.45	2.81 ± 0.59	t=13.29, p<0.001, d=1.62	r=0.567 (<0.001) / r=0.643 (<0.001)
Total Engagement	**14.03 ± 1.52**	**11.39 ± 1.89**	**t=12.34, p<0.001, d=1.51**	**r=0.628 (<0.001) / r=0.712 (<0.001)**

Scale: 1=never, 2=rarely, 3=often, 4=always. Correlations based on experimental group data (n=133).

Students in the experimental group exhibited markedly higher engagement across all dimensions, with particularly pronounced differences in enthusiasm (d=1.62) and active participation (d=1.35). The overall engagement effect size of

d=1.51 indicates the framework successfully created a substantially more engaging learning environment compared to conventional instruction.

Critically, engagement demonstrated strong positive correlations with learning gains, particularly for narrative development (r=0.712 for total engagement) compared to literacy (r=0.628). Active participation showed the strongest relationship with narrative improvement (r=0.687), highlighting student co-construction of stories as a central mechanism driving outcomes. These correlational patterns suggest that engagement serves as a key mediating variable the framework enhances engagement, which in turn facilitates deeper learning, especially for complex narrative skills requiring sustained cognitive effort and creativity.

Table 4. *Integration of Quantitative and Qualitative Findings*

Quantitative Finding	Supporting Qualitative Evidence	Meta-Inference
Large literacy improvement (Cohen's d=1.07) across all components	Teachers reported interactive storytelling provided meaningful context for literacy learning, unlike mechanical conventional approaches. Students recognized the relevance of learning letters/words for reading and creating their own stories.	Meaningful narrative contexts facilitate deeper and more enduring literacy learning by connecting technical skills to purposeful communication goals.
Very large narrative improvement (Cohen's d=1.48) exceeding literacy gains	Students actively co-constructed stories rather than passively consuming them. Analysis of student work showed progression from disconnected event lists to coherent narratives with clear plot structures (introduction, conflict, resolution). Students developed metacognitive awareness of narrative elements.	Narrative co-creation develops superior structural understanding and production skills. The framework's direct targeting of narrative competence, with literacy as a supporting tool, explains the differential effect sizes.
Exceptionally high engagement (Cohen's d=1.51), particularly enthusiasm (d=1.62)	Students demonstrated ownership of their stories and intrinsic motivation to read and write. Parents and teachers noted sustained enthusiasm and voluntary engagement with literacy activities beyond classroom requirements.	Engaging, student-centered learning increases motivation and sustained effort, creating a positive cycle that amplifies learning outcomes. Story ownership transforms literacy from an academic task to a personally meaningful activity.
Strong engagement-narrative correlation (r=0.712) with active participation as the strongest predictor (r=0.687)	Observations showed students who participated more actively produced increasingly complex and creative stories.	Active participation serves as the key mechanism linking the framework to learning outcomes. The framework's

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	Higher-ability students developed elaborate narratives while lower-ability students participated meaningfully at appropriate levels through adaptive scaffolding.	natural differentiation allows all students to engage authentically, with scaffolding supporting growth across ability levels.
Effect size pattern: narrative (1.48) > literacy (1.07) > conventional gap	Teachers reported students could participate in storytelling at various literacy levels. Skills transferred to everyday contexts parents noted children spontaneously creating stories at home and applying narrative structures to daily communication.	The framework prioritizes narrative competence while developing literacy instrumentally. This approach proves more effective than isolated skills instruction, as evidenced by both stronger narrative effects and meaningful real-world transfer.

From thematic analysis of 12 teacher interviews, 36 student interviews, 36 parent interviews, and 12 weeks of observations, five interconnected themes emerged explaining the framework's effectiveness:

Theme 1: Meaningful and Contextual Learning

Interactive storytelling embedded literacy skills within purposeful communication contexts, contrasting sharply with decontextualized conventional instruction. Students understood why they were learning specific skills and how these connected to their storytelling goals.

Theme 2: Active Participation and Co-construction

The framework transformed students from passive recipients to active story co-creators. This shift fundamentally altered the learning dynamic, increasing investment and cognitive engagement in the literacy process.

Theme 3: Development of Narrative Metacognition

Students developed explicit awareness of narrative structures and elements. Their ability to consciously apply these frameworks to story creation represented sophisticated metacognitive growth typically beyond first-grade expectations.

Theme 4: Differentiation and Adaptive Scaffolding

The framework naturally accommodated diverse abilities. Teachers intuitively provided tailored supports (sentence starters for struggling students, complexity challenges for advanced learners), enabling all students to participate meaningfully at appropriate developmental levels.

Theme 5: Transfer to Real-Life Contexts

Parents reported children applying narrative skills beyond the classroom, spontaneously creating stories at home and using narrative structures in daily

communication evidence of meaningful learning rather than isolated academic performance.

The convergence of quantitative and qualitative evidence reveals that meaningful narrative contexts, active co-construction, and exceptional engagement form an interconnected system producing superior learning outcomes. The framework's success stems from transforming literacy development from mechanical skill acquisition into purposeful communication tool-building, driven by students' intrinsic motivation to create and share their stories.

Discussion

Effectiveness of the Interactive Storytelling Framework in Improving Early Literacy

The main findings indicate that the Interactive Storytelling Framework significantly outperformed conventional approaches in improving early literacy skills of 6–7-year-old children, with a large effect size of 1.07. This provides strong empirical evidence that integrating interactive storytelling with literacy instruction produces substantial practical impacts across phonological awareness, letter recognition, word reading, and reading comprehension.

These findings align with and extend Gil and Sylla's (2021) work on interactive digital narratives for this age group, moving beyond exploratory potential to systematic quantitative measurement across multiple literacy dimensions (Gil, 2021). Phonological awareness showed the strongest effect (ηp^2=0.381), suggesting that interactive storytelling activities involving sound exploration, rhyming, and word segmentation within narrative contexts are particularly powerful for developing this foundational skill.

The framework's effectiveness can be explained through three theoretical mechanisms. First, contextualized learning: storytelling provides meaningful, engaging contexts for literacy acquisition, consistent with Vygotskian sociocultural theory (Vygotsky, 1978) that learning optimally occurs within meaningful social and cultural contexts. Unlike conventional instruction where letters and words are learned in isolation, the Interactive Storytelling Framework positions these elements as tools for understanding and creating compelling narratives, generating intrinsic motivation. Second, multimodal engagement: the framework engages multiple modalities listening, viewing, speaking, drawing, writing accommodating diverse learning styles and reinforcing learning through multiple cognitive pathways. Ye et al.'s research on the multimodal "Colin" system demonstrates that combining verbal and visual inputs in storytelling supports deeper understanding and transfer, confirming multimodality's role in literacy learning effectiveness (Ye, 2024). Third, active participation: rather than passive reception, the framework

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encourages active meaning construction. The strong correlation between active participation and literacy gains (r=0.614) confirms active engagement as a key mechanism, consistent with Piagetian constructivism emphasizing knowledge as actively constructed rather than passively transmitted (Piaget, 1970).

Critical Considerations on Literacy Outcomes

However, several factors warrant cautious interpretation of these literacy findings. The quasi-experimental design, while practical for educational research, lacks the randomization of true experiments, potentially introducing selection bias despite statistical equivalence at baseline. The absence of random assignment means unmeasured confounding variables such as teacher enthusiasm, parental expectations, or classroom climate differences cannot be definitively ruled out as contributing factors to the observed effects. Furthermore, the Hawthorne effect may have inflated outcomes, as experimental group teachers and students knew they were participating in a novel intervention, potentially increasing their effort and attention independent of the framework's inherent qualities. The control group's continuation of "business as usual" instruction may have created motivational disparities beyond the instructional approach itself.

The contextual specificity of this study urban public schools in Medan Denai District also limits generalizability. These schools may possess s resources, teacher training levels, or student populations that differ from rural schools, private institutions, or other Indonesian regions. The strong oral storytelling tradition in Indonesian culture may have particularly facilitated this framework's acceptance and effectiveness, raising questions about transferability to contexts with different cultural orientations toward narrative.

Superior Impact on Narrative Ability

The most striking finding is the very large effect size for narrative ability (Cohen's d=1.48; ηp^2=0.520), exceeding literacy gains. This indicates exceptional power in developing children's narrative competence not merely story retelling, but creating original narratives with coherent structures, varied language, rich details, and creativity. This superior impact reflects several factors. *First,* direct target alignment: the framework explicitly targets narrative competence through every component story selection, interactive strategies, production activities, and reflection directly developing narrative abilities while literacy develops instrumentally. As Bruner (1991) argued, narrative constitutes a fundamental human mode for understanding and organizing experience, and this framework centers narrative in the learning process. *Second,* metacognitive awareness: qualitative data reveal that children develop metacognitive understanding of narrative structure, learning not just to produce stories but to understand what

makes stories "work" characters, settings, problems, solutions, event sequences (Bruner, 1991).

This metacognitive awareness enables deliberate application of narrative structures in story creation. Research on writing metacognition (Sitko, 1998) identifies metacognitive awareness as a strong predictor of writing ability, confirmed here for early childhood narrative. *Third*, creative agency: the framework provides space for creativity in developing plots, characters, and solutions. Unlike prescriptive or template-based exercises, children exercise imagination and make creative choices. Significant gains in creativity (Cohen's d=1.14) demonstrate successful creative thinking development in narrative contexts, echoing Choi (2025) "Tinker Tales" emphasis on child agency for authentic narrative skill development (Choi, 2025). These dramatic narrative improvements carry important implications, as narrative ability predicts later reading comprehension (Kendeou, 2008), social-emotional skills (Nicolopoulou, 2015), and general academic achievement (O'Neill, 2004), Thus, the framework's impact likely extends beyond early literacy and narrative to broader developmental domains.

Critical Reflection on Unusually Large Effect Sizes

The extraordinarily large effect sizes observed particularly for narrative ability (d=1.48, ηp^2=0.520) while encouraging, demand critical scrutiny. Effect sizes of this magnitude are rare in educational interventions, especially field-based studies in authentic classroom settings. This raises several important considerations. Potential for inflated estimates: The quasi-experimental design's lack of randomization may have allowed pre-existing but unmeasured differences between groups to contribute to outcomes. Although pre-test equivalence was established on measured variables, unmeasured factors such as teacher quality, classroom composition, or school-level resources may have systematically favored the experimental group. The 52% of variance explained by group membership after controlling for baseline ability is exceptional and may partially reflect such confounds.

Novelty and enthusiasm effects: Teachers implementing the new framework may have brought heightened energy, creativity, and commitment compared to those continuing routine instruction. This "implementation fidelity driven by novelty" could amplify effects beyond what would be sustained in routine practice once the intervention becomes normalized. Experimental group students' awareness of participating in something "special" may have similarly enhanced motivation and effort. Assessment specificity: The narrative assessment rubrics, while validated, measured constructs directly taught and practiced in the experimental condition. This alignment, while pedagogically sound, may have inflated effect sizes relative

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to assessments of transfer to less-practiced narrative contexts. The rubric's sensitivity to the specific narrative structures emphasized in the framework could partially explain the exceptional effect sizes.

Contextual optimization: The implementation occurred under relatively optimal conditions teacher training, researcher support, motivated volunteers, and 12-week duration. Real-world, scaled implementation without these supports may yield more modest effects. The urban school setting with relatively favorable student-teacher ratios and resource availability may not represent typical Indonesian educational contexts.

Regression to the mean: Although both groups showed similar pre-test means, individual-level variation could create regression effects if group assignment was not perfectly random, potentially contributing to observed differences. These considerations do not invalidate the findings but suggest the observed effect sizes may represent an upper bound of what the framework can achieve under favorable conditions. Replication studies with randomized designs, diverse contexts, and independent assessors would strengthen confidence in the magnitude and generalizability of these effects.

The Role of Learning Engagement as a Mediating Mechanism

Learning engagement emerged as a crucial mediating mechanism linking the framework to outcomes. Experimental group students showed significantly higher engagement (Cohen's d=1.51), strongly correlated with literacy (r=0.628) and narrative (r=0.712) gains. These findings deepen understanding of how interactive storytelling produces learning improvements. Beyond content or strategy, the framework's capacity to engage students proves critical. The framework creates engagement through: (1) intrinsic motivation stories naturally appeal to children, providing inherent learning motivation; (2) autonomy offering choices and agency in story development increases ownership; (3) social interaction collaborative storytelling activities fulfill social needs; (4) achievement the structure allows all children to experience success at their developmental level.

The stronger engagement-narrative correlation (r=0.712) versus engagement-literacy (r=0.628) suggests engagement is especially crucial for complex, higher-order learning. Narrative skill development involving critical thinking, creativity, and self-expression requires deep engagement unattainable through superficial or rote learning. These findings align with Self-Determination Theory (Deci & Ryan, 2000), emphasizing intrinsic motivation and engagement as keys to deep, meaningful learning. However, correlational data cannot establish causality. While we interpret engagement as mediating framework effects on learning, alternative explanations exist children with greater pre-existing aptitude may engage more

readily and also learn more effectively, or learning success itself may increase engagement. Future research employing mediation analysis or experimental manipulation of engagement levels would clarify these causal pathways.

Implementation in the Indonesian Educational Context

This study demonstrates that the Interactive Storytelling Framework can be effectively implemented in Indonesian urban primary schools. Several factors contributed to successful implementation: *Curriculum alignment*: The framework aligns with Merdeka Curriculum philosophy emphasizing student-centered, contextual learning and holistic competency development. Teachers reported the framework enriched rather than conflicted with existing curricula; *Adaptability*: While providing clear structure, the framework remains flexible for adaptation to classroom contexts, resource availability, and student characteristics. Teachers can implement it with or without technology, using traditional storybooks, puppets, or simple visual media; *Cultural resonance*: Indonesia's rich storytelling traditions across local cultures make this framework culturally relevant and resonant with children's experiences.

Limitations and Implementation Challenges

Implementation challenges highlight important limitations. Large class sizes (averaging 40+ students in many Indonesian schools versus the 44-46 per class in this study) may strain the individual attention and small-group interaction central to the framework's effectiveness. The relatively favorable conditions in these urban Medan schools may not reflect typical Indonesian educational contexts, particularly in rural or under-resourced areas. Teacher professional development requirements are substantial. The experimental group teachers received intensive training and ongoing support throughout the 12-week intervention. Scaling this framework nationally would require significant investment in teacher capacity building resources that may not be readily available, particularly in remote regions. The volunteer teachers who participated may have possessed higher baseline motivation, pedagogical skill, or openness to innovation than typical teachers, potentially limiting generalizability.

Sustainability questions remain unaddressed. This study documented effects over 12 weeks with active researcher support. Whether teachers maintain implementation fidelity and enthusiasm once external support ends, and whether effects persist or fade over time, requires longitudinal investigation. The possibility of diminishing returns as novelty wears off cannot be dismissed. Equity concerns arise given that this intervention demands resources time for training, materials for storytelling, class sizes enabling interactive participation. Schools serving disadvantaged populations, already struggling with basic resource constraints, may

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find implementation prohibitively challenging, potentially widening rather than narrowing educational inequalities.

Contributions to Early Literacy Theory and Practice

Despite these limitations, this study makes several important contributions:

Theoretical Contributions

Integrated framework: The study synthesizes emergent literacy theory, narrative theory, sociocultural learning theory, and constructivism into a coherent framework explaining how interactive storytelling supports simultaneous literacy and narrative development.

Mediation mechanisms: Identifying learning engagement as a mediation mechanism deepens understanding of how educational interventions work, moving beyond "what is effective" to "how and why it is effective" though causal pathways require further investigation. Developmental appropriateness: The study demonstrates that developmentally appropriate approaches for 6-7 year olds integrate learning with play, social interaction, and narrative meaning-making rather than isolated drill-and-practice.

Practical Contributions

Actionable framework: Unlike purely descriptive studies, this research provides an implementable framework with clear guidance on components, syntax, and strategies. Assessment tools: The study developed validated narrative rubrics and literacy tests that practitioners can use though further validation across diverse contexts would strengthen their utility. Evidence-based practice: By providing empirical evidence of framework effectiveness, this study informs evidence-based decision-making about literacy learning strategies while acknowledging that effect sizes may vary across implementation contexts.

Implications for Future Research and Practice

These findings and limitations suggest several important directions:

Randomized controlled trials would address quasi-experimental design limitations, provide more definitive causal evidence and potentially yield more conservative effect size estimates reflecting the intervention's true efficacy. Diverse context replication across rural schools, different socioeconomic settings, and other Indonesian regions would clarify generalizability and identify contextual factors moderating effectiveness. Long-term follow-up studies tracking students beyond the intervention period would reveal whether literacy and narrative gains persist, fade, or compound over time.

Implementation research examining scaled deployment without intensive researcher support would provide realistic estimates of effectiveness under typical

conditions and identify critical implementation factors. Comparative studies testing the framework against other evidence-based approaches (not just conventional instruction) would position it within the landscape of effective practices and potentially identify its unique contributions. Equity analyses disaggregating effects by student subgroups (gender, initial ability, socioeconomic status) would reveal whether the framework benefits all students equally or differentially, informing targeted implementation.

In conclusion, while this study provides encouraging evidence for the Interactive Storytelling Framework's effectiveness in developing early literacy and narrative abilities, the exceptionally large effect sizes, quasi-experimental design, and specific implementation context necessitate cautious interpretation and further research before advocating widespread adoption. The framework shows promise, particularly for narrative development, but questions regarding generalizability, sustainability, and equity require systematic investigation to responsibly inform educational policy and practice**.**

CONCLUSION

This study aims to develop and test the effectiveness of the Interactive Storytelling Framework in improving the narrative and literacy skills of 6–7-year-old children in Medan Denai District. Using a Design-Based Research approach with mixed methods, this study involved 267 first-grade students from three public elementary schools divided into an experimental group (n=133) and a control group (n=134). The implementation was carried out over 12 weeks with a frequency of 3 times per week, each session lasting 60 minutes. Based on the quantitative and qualitative data analysis that has been carried out, several main findings can be concluded as follows:

The Interactive Storytelling Framework proved to be very effective in improving the early literacy skills of children aged 6–7 years. The ANCOVA results showed a very significant difference between the experimental and control groups ($F=112.09$, $p < 0.001$) with a large effect size (Cohen's $d=1.07$; $\eta p^2=0.298$). The experimental group showed an average increase of 20.87 points in total literacy scores, compared to 11.45 points in the control group. The superiority of the experimental group was consistent across all literacy components measured: phonological awareness (largest effect size: $\eta p^2=0.381$), letter recognition ($\eta p^2=0.241$), word reading ($\eta p^2=0.279$), and reading comprehension ($\eta p^2=0.258$). These findings confirm that the interactive storytelling approach, which integrates literacy learning into a meaningful narrative context, has a stronger impact than conventional learning, which emphasises isolated technical exercises.

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The impact of the Interactive Storytelling Framework on children's narrative abilities was even more superior than its impact on technical literacy. The ANCOVA results showed a highly significant difference ($F=286.14$, $p < 0.001$) with a very large effect size (Cohen's $d=1.48$; $\eta p^2=0.520$). This is a very striking finding, indicating that 52% of the variance in post-test narrative scores can be explained by group differences after controlling for initial ability. The experimental group showed an average increase of 6.92 points in total narrative scores, compared to 2.84 points in the control group almost 2.5 times greater. Significant improvements were seen across all dimensions of narrative ability: narrative structure (Cohen's $d=1.22$), story coherence ($d=1.23$), narrative language ($d=1.21$), detail and elaboration ($d=1.15$), and creativity ($d=1.14$). All of these effect sizes fall into the "very large" category, demonstrating that this framework is extraordinarily powerful in developing children's comprehensive narrative competence.

This study successfully identified student engagement as a key mediating mechanism that explains the effectiveness of the Interactive Storytelling Framework. Students in the experimental group showed significantly higher engagement than the control group in all aspects measured, with a very large total effect size (Cohen's $d=1.51$). The aspect of enthusiasm showed the highest effect size ($d=1.62$), followed by active participation ($d=1.35$), attention and focus ($d=1.01$), and persistence in tasks ($d=0.79$). More importantly, correlation analysis revealed that learning engagement was strongly positively correlated with increased literacy ($r = 0.628$, $p < 0.001$) and narration ($r = 0.712$, $p < 0.001$). The stronger correlation with narration indicates that engagement is critical for higher-order skills learning involving creativity, critical thinking, and self-expression. These findings confirm that the framework's effectiveness is not only due to its content or learning structure, but also its ability to create engaging learning experiences that motivate students to actively and deeply engage in the learning process.

Qualitative data provided a deeper understanding of how and why the Interactive Storytelling Framework is effective. Thematic analysis identified five key mechanisms: (1) Meaningful and contextual learning storytelling provides a relevant and engaging context for literacy learning, enabling children to see reading and writing as tools for meaningful purposes (storytelling) rather than merely mechanical skills; (2) Active participation and construction of meaning children are not just passive consumers of stories but active co-creators who contribute to building narratives, which increases their sense of ownership and agency; (3) Development of narrative metacognition children develop an explicit understanding of narrative structure and elements (characters, setting, problem, solution, sequence), enabling them to deliberately use this knowledge in story production; (4) Differentiation and adaptive scaffolding the framework allows all children to

participate at their level of ability, with teachers providing support tailored to individual needs; and (5) Transfer to real-life contexts the skills developed are transferred to everyday situations, with parents reporting that children become more expressive and structured in recounting their experiences.

The implementation of the Interactive Storytelling Framework in the Indonesian educational context has proven to be feasible and effective, despite facing several challenges. This framework is in line with the philosophy of the Merdeka Curriculum, which emphasizes student-centered learning and holistic competency development. Teachers report that this framework does not conflict with the existing curriculum but rather enriches its implementation. The adaptability of the framework allows for implementation in various conditions, both with and without technology. The rich storytelling tradition in Indonesian culture makes this framework culturally relevant and resonant with children's experiences. However, identified challenges include time management (especially at the beginning of implementation), large class sizes (more than 35 students), and the need for professional development for teachers to shift from a teacher-centered approach to a more student-centered facilitation. It is important to note that all teachers involved stated that the benefits gained by students far outweigh the challenges faced, and they are committed to continuing to use this framework.

The integration of quantitative and qualitative data produces comprehensive meta-inference: The Interactive Storytelling Framework is effective because it successfully creates a learning environment that (a) provides meaningful context for literacy, (b) encourages active student participation, (c) develops metacognitive understanding of narrative, (d) is highly engaging and motivating, and (e) accommodates student diversity. This framework is not merely a collection of strategies or activities, but a holistic learning system that integrates principles from multiple theoretical frameworks: emergent literacy theory, narrative theory, sociocultural learning theory, constructivism, and self-determination theory.

REFERENCES

Abdussakir, A. (2017). Strategi internalisasi nilai budaya dalam pembelajaran matematika. *Procediamat*

Anderson, T. &. (2012). Design-based research: A decade of progress in education research. *Educational Researcher*, 41(1), 16-25

Azis, A., Haikal., & Iswanto, S. (2018). Internalisasi nilai-nilai Budaya Toleransi dalam pembelajaran sejarah (Studi kasus SMA Negeri 1 Banda Aceh). *Jurnal Riset dan Konseptual*, 287-299

Braun, V. &. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101

Print – ISSN: 2443-0021
Online - ISSN: 2716-4136

Brown, C. S. (2014). Language and literacy development in the early years: Foundational skills that support emergent readers. *Language and Literacy Spectrum*, 24, 35-49.

Bruner, J. (1991). The narrative construction of reality. *Critical inquiry*, 18(1), 1-21.

Bus, A. G. (1995). Joint book reading makes for success in learning to read: A meta-analysis on intergenerational transmission of literacy. *Review of educational research*, 65(1), 1-21.

Choi, N. C. (2025). Tinker Tales: Interactive Storytelling Framework for Early Childhood Narrative Development and AI Literacy. *arXiv preprint arXiv*, 2504.13969.

Clay, M. M. (2001). *Change over time in children's literacy development.* United State: Heinemann.

Gil, M. &. (2021). A close look into the storytelling process: The procedural nature of interactive digital narratives as learning opportunity. *Entertainment Computing*, 41, 100466.

Ibrahim, A. (2014). *Pengelolaan Pembangunan Berkelanjutan.* Yogyakarta: PT Leautika.

Indonesia., K. P. (2021). *Gerakan Literasi Nasional: Panduan pelaksanaan gerakan literasi sekolah di sekolah dasar.* Jakarta: Kemendikbud.

Kalaitzi, C. &. (2023). Developing narrative performance of 5–6-year-old children through combined use of narrative elements in their speech. *International Journal of Early Years Education*, 31(3), 688-707.

Kendeou, P. B.-G. (2008). Children's inference generation across different media. *Journal of research in reading*, 31(3), 259-272.

Lickona, T. (2012). *Educating for Character. How Our Schools Can Teach Respect and Responsibility.* Bantam Books.

Mamuladze, N. T. (2024). Preschool education and the academic performance of first-graders. *INTED2024 Proceedings* (pp. (pp. 2412-2418).). IATED.

McKenney, S. &. (2012). *Conducting educational design research.* New York: Routledge.

Melzi, G. S. (2023). Stories beyond books: Teacher storytelling supports children's literacy skills. *Early Education and Development*, 34(2), 485-505.

Merriam, S. B. (2020). *Learning in adulthood: A comprehensive guide.* John Wiley & Sons.

Miller, S. &. (2008). The power of story: Using storytelling to improve literacy learning. *Journal of Cross-Disciplinary Perspectives in Education*, 1(1), 36-43.

Muhaimin, A. (2023). *Urgensi Pendidikan Karakter di Indonesia.* Jogjakarta: Arrus Media.

Nicolopoulou, A. C. (2015). (2015). Using a narrative-and play-based activity to promote low-income preschoolers' oral language, emergent literacy, and social competence. *Early childhood research quarterly*, 31, 147-162.

O'Byrne, W. I. (2018). Digital storytelling in early childhood: Student illustrations shaping social interactions. *Frontiers in psychology*, 9, 1800.

O'Neill, D. K. (2004). (2004). Preschool children's narratives and performance on the Peabody Individualized Achievement Test–Revised: Evidence of a relation between early narrative and later mathematical ability. *First Language*, 24(2), 149-183.

Permana, A. R. (2025). Peningkatan keterampilan menulis teks narasi anak usia 6-15 tahun melalui pemanfaatan bank cerita. *An-Nizam*, 4(1), 86-95.

Piaget, J. (1970). *Science of education and the psychology of the child.* Viking Press.

Rufaida, H. (2017). Menumbuhkan sikap multikultural melalui internalisasi nilai-nilai multikultural dalam pembelajaran IPS. *Sosio Didaktika*.

Saracho, O. N. (2017). Literacy and language: new developments in research, theory, and practice. *Early Child Development and Care*, 187(3-4), 299-304.

Schoon, I. P. (2010). Childhood language skills and adult literacy: A 29-year follow-up study. *Pediatrics*, 125(3), e459-e466.

Sitko, B. M. (1998). Knowing how to write: Metacognition and writing instruction. In J. D. D. J. Hacker, *Metacognition in educational theory and practice* (pp. pp. 93-115). Lawrence Erlbaum Associates.

UNESCO. (2017). *Reading the past, writing the future: Fifty years of promoting literacy.* UNESCO Publishing.

Usman, B. (2002). *Media Pendidikan.* Jakarta: Ciputat Press.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.* United State: Harvard University Press.

Ye, L. J. (2024). Colin: A Multimodal Human-AI Co-Creation Storytelling System to Support children's Multi-Level Narrative Skills. *Proceedings of the Extended Abstracts of the CHI Conference on Human Factors in Computing Systems*, 1-11.

Zini, A. (2024). Promoting narrative competence and media literacy in early childhood education through digital storytelling. A research instrument for analysing digital stories. *Revista Eletrônica de Educação*, 18(1), e6940211-e6940211.

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