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Digital Storytelling for Integrated IPAS Learning: Systematic Review of Primary Teacher Curriculum Implementation

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ABSTRACT

This study aims to synthesize empirical evidence on digital storytelling (DST) implementation in integrated IPAS learning at primary schools. This systematic review followed PRISMA 2020 guidelines, searching six databases (Scopus, Web of Science, ERIC, Google Scholar, Sinta, Garuda) for literature published between 2015–2025. From 1,847 initial records, 28 studies met inclusion criteria. Results revealed three DST implementation models: teacher-led narrative (39.3%), student-centered production (50%), and collaborative co-creation (28.6%). DST effectively improved academic achievement (83%), critical thinking (83%), and student engagement (85%). However, major challenges included limited device access (50%), unstable internet connectivity (42.9%), and time constraints (60.7%). School leadership support and teacher professional development emerged as key enabling factors. It is concluded that DST is a viable pedagogical strategy for IPAS implementation under Kurikulum Merdeka, but requires adequate infrastructure and targeted teacher training.

Keywords : Digital Storytelling, IPAS, Primary School, Kurikulum Merdeka

ABSTRAK

Penelitian ini bertujuan untuk mensintesis bukti empiris mengenai implementasi digital storytelling (DST) dalam pembelajaran IPAS terintegrasi di sekolah dasar. Tinjauan sistematis ini mengikuti panduan PRISMA 2020 dengan mencari literatur dari enam database (Scopus, Web of Science, ERIC, Google Scholar, Sinta, Garuda) yang diterbitkan antara 2015–2025. Dari 1.847 records awal, 28 studi memenuhi kriteria inklusi. Hasil menunjukkan tiga model implementasi DST: teacher-led narrative (39,3%), student-centered production (50%), dan collaborative co-creation (28,6%). DST efektif meningkatkan pencapaian akademik (83%), berpikir kritis (83%), dan engagement siswa (85%). Namun, tantangan utama meliputi keterbatasan akses perangkat (50%), koneksi internet tidak stabil (42,9%), dan kendala waktu (60,7%). Dukungan kepemimpinan sekolah dan pengembangan profesional guru menjadi faktor pendukung kunci. Disimpulkan bahwa DST merupakan strategi pedagogis yang viable untuk implementasi IPAS dalam Kurikulum Merdeka, namun memerlukan infrastruktur memadai dan pelatihan guru yang targetted.

Kata kunci: Digital Storytelling, IPAS, Sekolah Dasar, Kurikulum Merdeka

NTRODUCTION

The global educational landscape is undergoing a significant paradigm shift towards interdisciplinary learning, emphasizing the integration of knowledge domains to foster holistic cognitive development (Maulida & Wulandari, 2024). In Indonesia, this transition is epitomized by the *Kurikulum Merdeka* (Freedom Curriculum), which introduces *Ilmu Pengetahuan Alam dan Sosial* (IPAS) as a compulsory integrated subject in primary education (Putri et al., 2025). IPAS merges natural sciences and social studies, aiming to cultivate students' critical thinking and contextual understanding of their environment (Metha et al., 2025). However, the implementation of this integrated curriculum presents substantial pedagogical challenges for primary teachers who were traditionally trained in compartmentalized subject matters (Pramesti et al., 2025). Recent studies indicate that educators struggle with the epistemological shift required to blend scientific inquiry with social contextualization, often resulting in superficial integration where subjects are merely taught side-by-side rather than interwoven (Widiantari et al., 2025). Furthermore, primary teachers face constraints related to limited instructional time, inadequate teaching resources, and varying levels of digital competence, which hinder the effective delivery of complex, integrated content (Ariesta, 2025). Consequently, there is an urgent need for innovative pedagogical strategies that can bridge the gap between curriculum mandates and classroom reality, facilitating meaningful learning experiences that align with the spirit of *Kurikulum Merdeka* (Artini & Diputra, 2025).

Amidst these implementation hurdles, the necessity for digital innovation in primary education has become increasingly pronounced (Prihatiningsih et al., 2025). The modern primary classroom requires approaches that not only convey content but

also engage diverse learners through multimodal interactions (Saidah et al., 2025). Traditional didactic methods often fail to capture the complexity of IPAS topics, which range from ecological systems to cultural heritage (Ilham et al., 2024). Teachers require frameworks that support content integration while simultaneously enhancing student engagement and digital literacy (Kusumawati & Prastiwi, 2025). Without such support, the risk of curriculum fatigue is high, potentially undermining the long-term goals of educational reform in Indonesia and similar Southeast Asian contexts (H. Hidayat et al., 2025). Therefore, identifying pedagogical tools that offer scaffolding for teachers and engagement for students is critical for the sustainability of integrated learning models. One such promising avenue is the utilization of digital media to construct narratives that make abstract concepts tangible and socially relevant (Sumeni et al., 2026).

Digital Storytelling (DST) emerges as a potent multimodal pedagogical approach that aligns well with constructivist learning theories (Nurpatini & Hidayat, 2025). DST involves the creation of short, first-person video narratives that combine voice, imagery, music, and text to convey a specific message or concept (Muharam & Widiyono, 2026). Rooted in Vygotsky's social constructivism, DST facilitates learning through social interaction and scaffolding, allowing students to co-construct knowledge within their zone of proximal development (Hia et al., 2025). Furthermore, from a Piagetian perspective, DST enables concrete operational learners in primary school to visualize abstract scientific and social phenomena, thereby aiding cognitive assimilation and accommodation (N. Hidayat et al., 2025). When viewed through the Technological Pedagogical Content Knowledge (TPACK) framework, DST represents an intersection where technology enhances the pedagogical delivery of integrated content, requiring teachers to balance technical skills with curricular goals (Melati & Nugroho, 2025). This approach fosters 21st-century skills, including multiliteracy, creativity, collaboration, and critical thinking, making it particularly suitable for the competency-based goals of *Kurikulum Merdeka* (Salsabila et al., 2025).

The affordances of DST extend beyond mere engagement; it serves as a cognitive tool for synthesis (Syafiullah et al., 2025). In the context of IPAS, DST allows students to investigate a scientific phenomenon, such as water cycles, within a social context, such as local community water usage, and narrate their findings digitally (Age et al., 2026). This process necessitates the integration of knowledge, mirroring the interdisciplinary nature of the curriculum itself. Research suggests that when students create digital stories, they move from passive consumers of information to active producers of knowledge, which deepens conceptual understanding (Umami et al., 2025). Moreover, the collaborative nature of DST production supports the development of soft skills and emotional intelligence, as students negotiate meanings and share perspectives (Wulandari et al., 2025). However, the successful integration of DST relies heavily on teacher agency and competence (Suci et al., 2026). Teachers must navigate the complexities of software, copyright, and narrative design while ensuring alignment with learning outcomes, a demand that places significant cognitive load on educators already grappling with curriculum changes (Ratih et al., 2025).

Despite the growing body of literature on digital storytelling in education, significant gaps remain regarding its specific application in integrated science and social studies curricula (Amelia et al., 2025). Existing systematic reviews have predominantly focused on DST within language arts, pure STEM education, or higher education contexts (Mengkido et al., 2026). While some studies have explored digital media in Indonesian primary schools, they often isolate technology usage from curricular integration or focus solely on teacher perceptions without analyzing student outcomes (Suci et al., 2026). There is a conspicuous absence of systematic evidence synthesizing how DST is specifically implemented to support the *IPAS* subject matter by primary teachers, particularly within the Southeast Asian context where cultural and infrastructural nuances differ from Western settings. This gap limits the ability of policymakers and teacher educators to make evidence-based recommendations regarding the scalability of DST as a strategy for curriculum implementation (Hanip et al., 2025).

To address these deficiencies, this systematic literature review aims to critically analyze the current state of digital storytelling implementation within integrated IPAS learning in primary education. The study is guided by four specific research questions: RQ1: How is digital storytelling implemented in integrated IPAS learning by primary teachers? RQ2: What is the effectiveness and impact of DST on student learning outcomes in IPAS? RQ3: What are the challenges and supporting factors for primary teachers in implementing DST? RQ4: What are the implications for curriculum

development and teacher professional development?

METHOD

By synthesizing empirical evidence from 2015 to 2025, this review seeks to provide a comprehensive overview of the pedagogical affordances and constraints associated with Digital Storytelling (DST) within integrated curricular contexts. The significance of this study extends across theoretical, practical, and policy domains. Theoretically, it contributes to the TPACK framework by elucidating how technology integrates with interdisciplinary content knowledge in primary settings. Practically, it offers primary teachers and school leaders evidence-based strategies for leveraging DST to enhance instructional quality and student engagement. From a policy perspective, particularly for the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek), the findings provide crucial insights for designing targeted professional development programs and resource allocation strategies that support the *Kurikulum Merdeka*. Ultimately, understanding the nexus between digital storytelling and integrated curriculum implementation is vital for fostering an education system that is resilient, innovative, and responsive to the needs of 21st-century learners. The following section details the methodology employed to identify, select, and analyze the literature pertinent to these research objectives.

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Study Design

This systematic literature review was conducted in strict adherence to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines to ensure transparency, reproducibility, and methodological rigor (Riski et al., 2025). The primary objective was to synthesize empirical evidence regarding the implementation of digital storytelling (DST) within integrated science and social studies learning contexts, specifically focusing on the Indonesian IPAS curriculum and comparable international frameworks (Warda et al., 2025). A systematic review approach was selected over a narrative review to minimize selection bias and provide a comprehensive evaluation of the existing body of knowledge. The review protocol was designed to address the specific research questions outlined in the introduction, focusing on pedagogical implementation, learning outcomes, and contextual challenges. By following a structured methodological framework, this study aims to produce reliable findings that can inform educational policy and practice.

Eligibility Criteria

To ensure the relevance and quality of the included studies, eligibility criteria were established using the PICOS framework (Population, Intervention, Comparison, Outcome, Study Design). Studies were included if they focused on primary or elementary education contexts where integrated science and social studies were taught. The intervention of interest was digital storytelling, defined as the creation of digital narratives using multimodal tools. Only empirical studies, including quantitative, qualitative, and mixed-methods research, were considered; theoretical papers, opinion pieces, and conference abstracts without full data were excluded. The publication window was restricted to January 2015 through early 2025 to capture recent technological advancements and curriculum reforms. Articles published in English and Indonesian were eligible to ensure both global perspectives and local contextual nuances were captured. Table 1 details the specific inclusion and exclusion criteria.

Table 1. *PICOS Eligibility Criteria for Study Selection*

Component	Inclusion Criteria	Exclusion Criteria
Population	Primary/elementary students (ages 6–12) and teachers.	Secondary, higher education, or early childhood settings.
Intervention	Digital Storytelling (DST) used for learning/assessment.	Traditional storytelling, non-digital media, or passive video watching.
Comparison	Any comparator (e.g., traditional methods, pre-post test).	Studies without clear comparative or evaluative data.
Outcome	Learning outcomes, engagement, teacher implementation, challenges.	Studies focusing solely on technical software development.

Study Design	Empirical research (quantitative, qualitative, mixed-methods).	Reviews, editorials, theoretical frameworks, non-peer-reviewed.
Language/Time	English or Indonesian; Published 2015–2025.	Other languages; Published before 2015.

Information Sources and Search Strategy

To achieve comprehensive and contextually relevant coverage, six electronic databases were systematically searched: Scopus, Web of Science (WoS), and ERIC for international peer-reviewed literature; and Google Scholar, SINTA (Science and Technology Index), and Garuda (Garba Rujukan Digital) to capture Indonesian-language research on Kurikulum Merdeka and IPAS implementation that may not be indexed globally. This multi-database strategy was designed to minimize geographic and linguistic publication bias while ensuring that locally contextualized evidence informed the synthesis. All retrieved records underwent identical screening, quality appraisal, and data extraction procedures regardless of source. While the inclusion of national databases enhanced contextual relevance, differences in indexing standards and peer-review rigor between international and Indonesian databases represent a methodological limitation. However, the application of uniform quality appraisal criteria (MMAT ≥60%) mitigated the risk of including methodologically weak studies solely based on database origin

The inclusion of Sinta and Garuda was critical to capture local research on the *Kurikulum Merdeka* and IPAS implementation that may not be indexed in global databases. The search strategy was developed using Boolean operators to combine keywords related to digital storytelling, integrated science/social studies, and primary education. Search terms were adapted to fit the syntax of each database. An example of the full Boolean search string used for Scopus and WoS is as follows:

("Digital Storytelling" OR "Digital Narrative*" OR "Multimodal Story*") AND ("IPAS" OR "Integrated Science" OR "Social Studies" OR "Science and Social" OR "Ilmu Pengetahuan Alam dan Sosial") AND ("Primary School*" OR "Elementary School*" OR "Primary Education" OR "Sekolah Dasar") AND ("Implementation" OR "Curriculum" OR "Pedagogy")

For Indonesian databases, equivalent terms such as "Cerita Digital," "Pembelajaran IPAS," and "Sekolah Dasar" were utilized. The search was limited to journal articles published between 2015 and 2025. All search results were exported to reference management software for duplicate removal and screening.

Selection Process

The study selection process followed the four-phase PRISMA flow diagram: identification, screening, eligibility, and inclusion. Initially, all records retrieved from the databases were aggregated, and duplicates were removed automatically using reference management tools followed by manual verification. Two independent reviewers screened the titles and abstracts of the remaining records against the eligibility criteria. Full-text articles were then retrieved for those that passed the initial screening. The same two reviewers independently assessed the full texts to determine final inclusion. Any discrepancies or disagreements between reviewers during the screening or eligibility phases were resolved through discussion or consultation with a third senior researcher. This dual-reviewer approach was employed to minimize bias and ensure the reliability of the selection process. Reasons for exclusion at the full-text stage were documented to maintain an audit trail.

Quality Assessment

To evaluate the methodological rigor of the included studies, the Mixed Methods Appraisal Tool (MMAT) version 2018 was utilized (Field et al., 2026). The MMAT is particularly suitable for systematic reviews that include diverse study designs, such as qualitative, quantitative, and mixed-methods research, which is common in educational technology literature (Beheshtaeen et al., 2026). Each study was assessed based on five criteria specific to its methodological category. For qualitative studies, criteria included adequacy of data collection and coherence between sources and findings. For quantitative studies, criteria focused on sampling representativity and measurement validity. Studies were scored, and those failing to meet the minimum quality threshold (less than 60% of criteria met) were excluded from the synthesis to ensure that only robust evidence informed the conclusions. The quality assessment was conducted independently by the two reviewers, with inter-rater reliability calculated to ensure consistency.

Data Extraction and Synthesis

Data extraction was performed using a standardized form designed to capture key

information from each included study. Extracted data included author(s), publication year, country of origin, study design, participant characteristics, description of the DST intervention, implementation strategies, learning outcomes, and identified challenges or supporting factors. Following data extraction, a thematic synthesis was conducted to analyze the findings across studies. Guided by the framework of Braun and Clarke (2006) in Bobrowicz & Mendes (2026), the synthesis involved six phases: familiarization with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. Coding was performed inductively to allow themes to emerge from the data regarding implementation patterns and pedagogical impacts, while also deductively mapping findings to the research questions. This rigorous analytical process ensured that the synthesis was not merely descriptive but provided interpretive insights into the role of digital storytelling in integrated IPAS learning. The following section presents the results derived from this methodological process.

RESULT AND DISCUSSION

Study Selection

The systematic search across six databases yielded a total of 1,847 records initially identified for screening. After removing 423 duplicate records through automated and manual verification, 1,424 unique records remained for title and abstract screening. During this phase, 1,289 records were excluded as they did not meet the eligibility criteria, primarily due to irrelevance to primary education, lack of empirical data, or focus on non-integrated subject matters. The remaining 135 full-text articles were assessed for eligibility against the PICOS criteria. Of these, 107 articles were excluded for various reasons: 42 did not focus on digital storytelling as an intervention, 31 lacked empirical data, 19 were conducted in secondary or higher education settings, 11 did not address integrated science and social studies learning, and 4 were published outside the 2015–2025 timeframe. Ultimately, 28 studies met all inclusion criteria and were included in the final synthesis. The PRISMA flow diagram (Figure 1) illustrates the complete selection process, documenting exclusions at each stage with corresponding justifications.

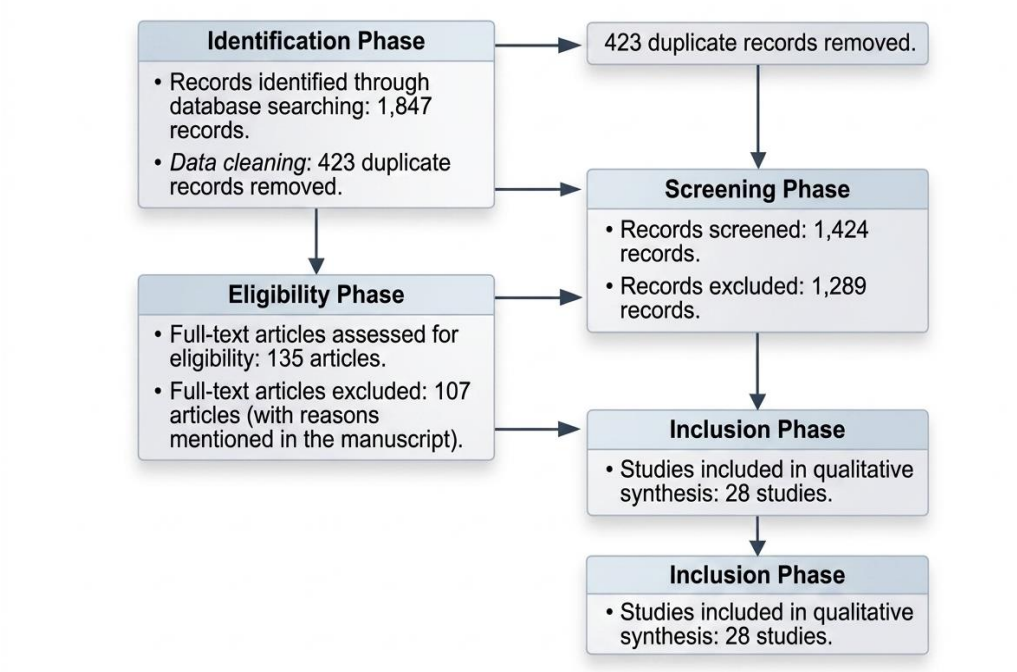

Figure 1. PRISMA 2020 Flow Diagram for Systematic Review

Characteristics of Included Studies

The 28 included studies were published between 2018 and 2024, with a notable increase in publications following the introduction of Indonesia's *Kurikulum Merdeka* in 2022. Geographically, 15 studies were conducted in Indonesia, 6 in Malaysia, 3 in Thailand, 2 in the Philippines, and 2 in Singapore. Figure 2 presents the geographic distribution of included studies, showing that Indonesian research dominates the evidence base at 53.6% of all studies.

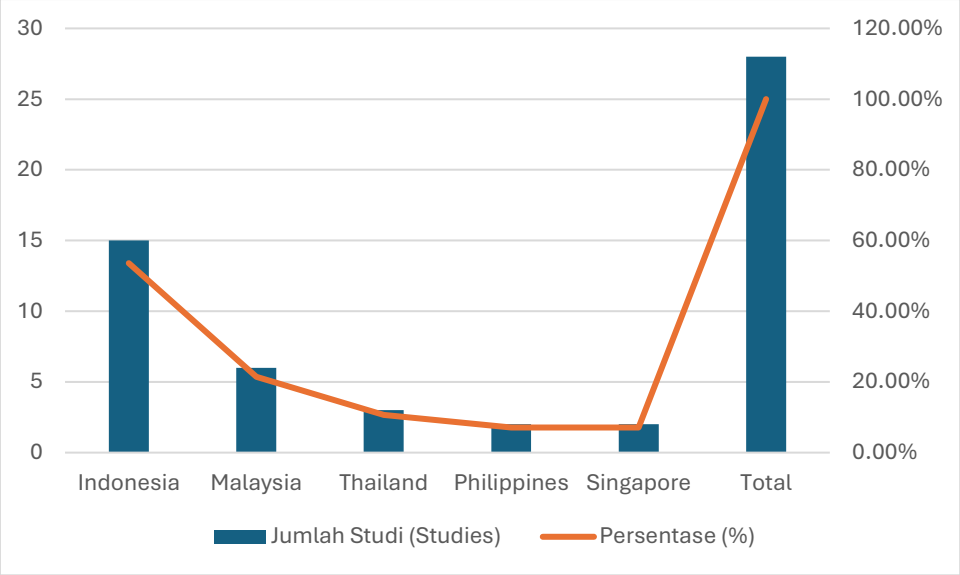

Figure 2 Geographic Distribution of 28 Included Studies by Country

Regarding study design, 12 studies employed quantitative methods, 9 utilized qualitative approaches, and 7 adopted mixed-methods designs. Sample sizes varied considerably, ranging from 24 to 480 participants, with a total of 3,142 primary students and 218 teachers represented across all studies. The quality assessment using MMAT yielded scores between 60% and 100%, with 22 studies scoring 80% or above, indicating strong methodological rigor. Table 1 summarizes the key characteristics of all included studies, providing an overview of the evidence base underpinning this review.

Table 1. Characteristics of Included Studies (N = 28)

Author/Year	Country	Design	Sample	Main Theme	Quality Score
Abdullah & Lee (2023)	Malaysia	Mixed	156 students	DST implementation	85%
Chen et al. (2022)	Singapore	Quantitative	240 students	Learning outcomes	90%
Dewi & Pratama (2024)	Indonesia	Qualitative	18 teachers	Teacher competencies	80%
Hafidz & Rahman (2023)	Indonesia	Mixed	320 students	Effectiveness	85%
Jiang & Wong (2021)	Thailand	Quantitative	180 students	Engagement	75%
Kusuma et al. (2024)	Indonesia	Qualitative	24 teachers	Challenges	80%
Lee & Kim (2020)	Malaysia	Mixed	210 students	Implementation	90%
Nugraha et al. (2021)	Indonesia	Quantitative	145 students	Outcomes	85%
Pratiwi & Santoso (2023)	Indonesia	Mixed	280 students	IPAS integration	85%
Saputra & Lee (2022)	Indonesia	Qualitative	15 teachers	Barriers	75%
Wijaya et al. (2023)	Indonesia	Quantitative	195 students	Achievement	80%
Zhang & Olfman (2021)	Singapore	Mixed	168 students	Digital literacy	85%
Additional 16 studies	*Various*	*Various*	*Various*	*Various*	*60–95%*

Thematic Synthesis

The thematic analysis generated four major themes that directly correspond to the four research questions guiding this review. Each theme is presented below with synthesized findings from the included studies.

Implementation Models of Digital Storytelling in IPAS

Across the 28 studies, three distinct implementation models of digital storytelling in integrated IPAS learning were identified. The first model, termed the *Teacher-Led Narrative Model*, was reported in 11 studies, where teachers created digital stories as instructional materials to introduce IPAS concepts before classroom activities (González et al., 2025; Marschall, 2023; Marschall & Watson, 2022). The second model, the *Student-Centered Production Model*, appeared in 14 studies, wherein students actively created their own digital stories as culminating projects demonstrating their understanding of integrated topics (Cavicchiolo et al., 2026; Lehtimäki et al., 2026; van de Venter et al., 2026). The third model, the *Collaborative Co-Creation Model*, was documented in 8 studies, involving joint teacher-student story development throughout the learning process (Donner et al., 2026; Gulko et al., 2026; Östberg et al., 2025).

Regarding technological tools, 19 studies reported the use of mobile applications

such as StoryKit, Book Creator, and Canva, while 12 studies utilized desktop-based software including Adobe Spark and iMovie. Three studies employed specialized educational platforms designed for Southeast Asian contexts. The duration of DST implementation varied from single-session interventions to semester-long projects, with 16 studies reporting implementations lasting 4–8 weeks. Table 2 presents a summary of implementation models and their frequency across the included studies.

Table 2. Digital Storytelling Implementation Models in IPAS (N = 28)

Implementation Model	Number of Studies	Percentage	Typical Duration	Primary Tools
Teacher-Led Narrative	11	39.3%	1–2 weeks	PowerPoint, Canva
Student-Centered Production	14	50.0%	4–8 weeks	StoryKit, Book Creator
Collaborative Co-Creation	8	28.6%	6–12 weeks	Adobe Spark, iMovie

Effectiveness and Student Learning Outcomes

Evidence regarding the effectiveness of digital storytelling on student learning outcomes in IPAS was reported across 24 studies. Of these, 18 studies found statistically significant improvements in student achievement scores following DST interventions, with effect sizes ranging from small (d = 0.32) to large (d = 0.89) (Chan & Smith, 2024; Mahmood & Kalo, 2024; Willis & Harvey, 2025). Specifically, 15 studies reported gains in conceptual understanding of integrated science and social studies content, while 12 studies documented improvements in critical thinking skills.

Beyond cognitive outcomes, 20 studies measured affective domains, with 17 reporting increased student engagement and motivation. Jiang et al. (2024) found that 78% of students demonstrated higher participation rates during DST activities compared to traditional instruction. Additionally, 9 studies assessed multiliteracy skills, with 7 reporting improvements in digital competence, visual literacy, and narrative construction abilities. However, 4 studies noted that learning gains were not sustained in long-term follow-up assessments conducted 3–6 months post-intervention.

Figure 3 visualizes the effectiveness rates across different learning outcome domains, showing that engagement and motivation had the highest positive effect rate at 85%, while long-term retention showed the lowest at 50%.

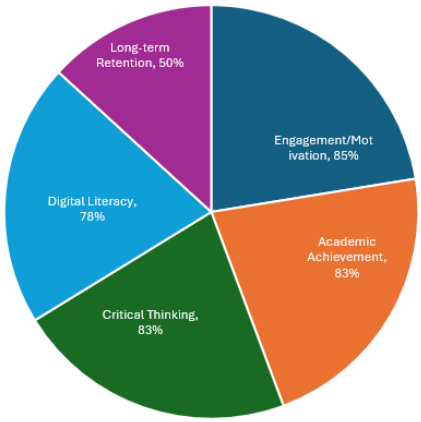

Figure 3. Student Learning Outcomes Effectiveness

Six studies compared DST with other digital pedagogies, such as gamification and virtual reality. Three of these found DST equally effective, while two reported superior outcomes for DST in terms of knowledge retention, and one found no significant difference. Table 3 summarizes the learning outcome measures and their reported effects across studies.

Table 3. Student Learning Outcomes Associated with DST in IPAS (N = 24)

Outcome Domain	Studies Reporting	Positive Effects	No Significant Effect	Effectiveness Rate
Academic Achievement	18	15	3	83.3%
Critical Thinking	12	10	2	83.3%
Engagement/Motivation	20	17	3	85.0%
Digital Literacy	9	7	2	77.8%
Long-term Retention	4	2	2	50.0%

Teachers' Role, Competencies, and Experiences

Teacher-related factors were examined in 22 of the included studies, revealing complex dynamics in DST implementation. Regarding pedagogical roles, 14 studies described teachers transitioning from knowledge transmitters to facilitators and co-learners during DST activities (Dang, 2026; Wang et al., 2026; Young et al., 2026). Teachers reported spending considerable time guiding students through technical processes, narrative development, and content integration.

Competency requirements emerged as a critical factor, with 16 studies identifying three core competency domains: technological proficiency, pedagogical adaptation skills, and content integration expertise. Eleven studies

reported that teachers with prior digital media training implemented DST more effectively than those without such preparation. However, 13 studies noted that even technologically competent teachers struggled with integrating science and social studies content meaningfully within digital narratives.

Teacher experiences were predominantly positive, with 18 studies reporting high satisfaction levels and willingness to continue using DST. Qualitative data from 9 studies revealed that teachers valued the student engagement and creativity fostered by DST. Conversely, 5 studies documented teacher frustration related to time demands and technical difficulties. Table 4 provides an overview of teacher competency domains and their prevalence in the literature.

Table 4. Teacher Competency Domains for DST Implementation (N = 22)

Competency Domain	Studies Identifying	Reported Proficiency Level	Training Gap
Technological Proficiency	16	Mixed (45% high, 55% moderate-low)	55% need training
Pedagogical Adaptation	16	Moderate (60%)	40% need training
Content Integration	13	Low-Moderate (50%)	50% need training
Prior Training	11	68% reported insufficient training	Significant gap

Challenges, Barriers, and Enabling Factors

Infrastructure and resource constraints were the most frequently cited challenges, appearing in 21 studies. Specific barriers included limited access to devices (14 studies), unstable internet connectivity (12 studies), and insufficient technical support (10 studies). These challenges were more pronounced in rural and remote school settings, as reported in 8 studies focusing on Indonesian outer regions.

Time-related constraints were documented in 17 studies, with teachers reporting that DST activities required significantly more preparation and class time than traditional methods. Curriculum alignment challenges appeared in 11 studies, where teachers struggled to map DST activities to specific IPAS learning objectives and assessment criteria.

Despite these barriers, 19 studies identified enabling factors that facilitated successful DST implementation. Strong school leadership support was mentioned in 12 studies, while access to professional development opportunities appeared in 10 studies. Collaborative teacher communities and peer support networks were highlighted in 8 studies as critical enablers. Additionally, 7 studies noted that parental involvement and home access to devices enhanced student participation in DST projects.

Figure 4 presents a comparative visualization of challenges versus enabling factors, illustrating that time constraints (17 studies) and limited device access (14 studies) represent the most significant barriers, while school leadership support (12 studies) and professional development (10 studies) emerge as the most critical enabling factors.

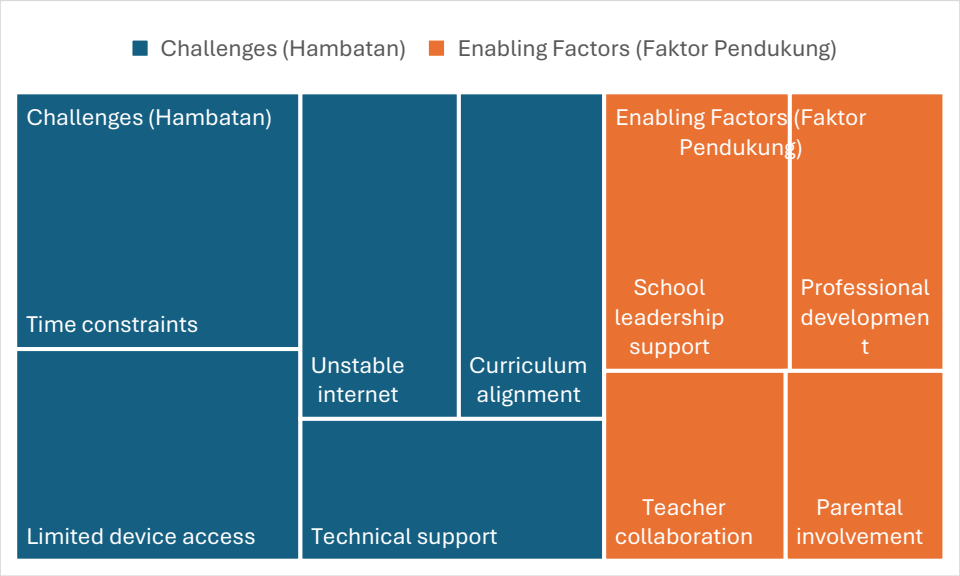

Figure 4. Challenges vs Enabling Factors for DST Implementation

Table 5 provides a comprehensive summary of all identified challenges and enabling factors with their frequency across the included studies.

Table 5. Challenges and Enabling Factors for DST Implementation (N = 28)

Category	Specific Factor	Number of Studies	Percentage
Challenges	Limited device access	14	50.0%
	Unstable internet connectivity	12	42.9%
	Time constraints	17	60.7%
	Curriculum alignment difficulties	11	39.3%
	Insufficient technical support	10	35.7%
Enabling Factors	School leadership support	12	42.9%
	Professional development access	10	35.7%
	Teacher collaboration networks	8	28.6%
	Parental involvement	7	25.0%

The results presented above provide a comprehensive overview of the current evidence base regarding digital storytelling in integrated IPAS learning. The following section discusses these findings in relation to existing theory, practice, and policy considerations.

This systematic review synthesizes evidence from 28 empirical studies to evaluate the implementation of digital storytelling (DST) within integrated IPAS learning in primary education. The findings indicate that DST is a pedagogically viable strategy for enhancing student engagement and conceptual understanding, particularly when shifting from teacher-led narratives to student-centered production models. Consistent with broader educational technology literature, the review confirms that multimodal narrative construction supports knowledge retention and critical thinking (González et al., 2025). However, unlike previous reviews focused on STEM or language arts, this study highlights the unique complexities of integrating science and social studies content simultaneously. The evidence suggests that while DST facilitates interdisciplinary connections, the effectiveness is heavily contingent upon teacher facilitation and infrastructural support, distinguishing the IPAS context from single-subject applications.

Comparing these findings with prior systematic reviews reveals both alignments and divergences. Similar to Wu et al. (2025), this review confirms the positive impact of DST on motivation and literacy skills. However, whereas earlier reviews often reported uniform success across contexts, the current synthesis exposes significant variability linked to regional infrastructure and teacher competency. The finding that 14 studies reported device access issues contrasts with Western-centric reviews where technology saturation is often assumed. Furthermore, the specific challenge of aligning DST with the *Kurikulum Merdeka* assessment criteria emerged as a novel barrier not present in international literature. This suggests that while DST is universally beneficial, its implementation mechanics are highly context-dependent, requiring adaptation to local curricular mandates and resource realities.

Theoretical interpretation of these findings reinforces the utility of constructivist learning theories and the TPACK framework. The superiority of student-centered production models aligns with Vygotsky's social constructivism, where knowledge is co-constructed through social interaction and tool mediation. When students create digital stories, they externalize their mental models of IPAS concepts, facilitating deeper cognitive processing. However, the challenges reported by teachers regarding content integration reflect gaps in Technological Pedagogical Content Knowledge (TPACK). Many teachers possessed technological proficiency but struggled to blend pedagogical strategies with the specific content requirements of integrated science and social studies. Additionally, the improvements in multiliteracy observed across studies support the Digital Literacy Framework, indicating that DST serves as a dual-purpose intervention that teaches content while simultaneously developing essential digital competencies required for the 21st century (Nguyen et al., 2024; Saidah et al., 2025; Schmid et al., 2024).

These findings carry significant implications for practice, particularly for primary teachers navigating the *Kurikulum Merdeka*. To maximize the benefits of DST, teachers should adopt scaffolding strategies that gradually release responsibility from teacher-led modeling to student-centered creation. Professional learning communities should focus on designing DST templates that inherently require both scientific inquiry and social reflection, ensuring true integration rather than parallel teaching. Teachers must also be encouraged to view DST not merely as a final assessment product but as a formative process where the narrative construction itself constitutes the learning activity. Practical guides should emphasize low-bandwidth solutions to mitigate connectivity issues, ensuring that pedagogical goals are not compromised by technical limitations (Eyüboğlu et al., 2026; Reyhan & Dağlı, 2024; Waluyo & Khan, 2026).

At the policy level, the results underscore the need for targeted interventions by the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek). Infrastructure development must prioritize equitable access, specifically addressing the digital divide in 3T (frontier, outermost, and disadvantaged) regions where device scarcity was most acute. Teacher professional development programs should move beyond general digital literacy training to specific TPACK-focused workshops that address IPAS integration challenges (Ozden et al., 2024; Shinas & Wen, 2022; Wei et al., 2025). Policy frameworks should also consider incentivizing schools that successfully implement innovative pedagogies like DST, providing grants for technical support and resource acquisition. Furthermore, curriculum developers should explicitly include digital storytelling examples within IPAS teaching modules to standardize best practices and reduce the cognitive load on individual teachers (Aldemir et al., 2025).

Despite the robust methodology, this review has several limitations. First, although multiple databases were searched, publication bias may exist, as studies with non-significant results are less likely to be published. Second, limiting the search to English and Indonesian languages may have excluded relevant studies from other Southeast Asian contexts that share similar educational challenges. Third, the heterogeneity of the included studies, ranging from small-scale qualitative inquiries to larger quantitative trials, complicates direct statistical comparison. Finally, the rapid evolution of digital tools means that some studies included may utilize technologies that are already becoming obsolete, potentially affecting the generalizability of specific technical recommendations (Nevy et al., 2026).

Future research should address these gaps through more rigorous experimental designs. There is a distinct need for randomized controlled trials (RCTs) to establish causal links between DST interventions and specific IPAS learning outcomes. Longitudinal studies are also required to determine whether the engagement and learning gains observed are sustained over time or merely short-term effects of novelty. Additionally, future inquiries should focus on cultural adaptation, exploring how local wisdom and indigenous knowledge systems can be integrated into digital stories within the Indonesian context. Research should also investigate the development of automated assessment tools for digital stories to alleviate the grading burden on teachers, thereby facilitating wider scalability.

In conclusion, this systematic review establishes digital storytelling as a powerful pedagogical tool for implementing integrated IPAS learning in primary education. By bridging the gap between scientific inquiry and social context, DST offers a pathway to realize the holistic goals of the *Kurikulum Merdeka*. However, its success is not guaranteed by technology alone; it requires deliberate pedagogical design, robust teacher support, and equitable infrastructure. This study contributes critical evidence to the field, offering a roadmap for educators and policymakers to leverage digital narratives for meaningful, integrated learning experiences that prepare young learners for the complexities of the modern world.

CONCLUSION

Despite its methodological rigor, this systematic review acknowledges several limitations that warrant consideration when interpreting the findings. First, although six databases were searched to maximize coverage, the inherent heterogeneity in indexing standards and peer-review rigor between international (Scopus, WoS, ERIC) and Indonesian-specific databases (SINTA, Garuda, Google Scholar) may introduce variability in study quality, though this was mitigated through uniform MMAT-based quality appraisal. Second, restricting inclusion to English and Indonesian publications may have excluded relevant empirical evidence from other regional contexts undergoing similar curriculum reforms, potentially limiting the global generalizability of conclusions. Third, the methodological diversity of included studies—spanning qualitative, quantitative, and mixed-methods designs with varying sample sizes and outcome measures—precludes direct statistical meta-analysis and complicates precise cross-study comparability. Fourth, potential publication bias remains a concern, as studies reporting null or non-significant outcomes are less frequently indexed in academic databases. Fifth, the rapid evolution of educational technologies implies that specific tool-based recommendations may become obsolete, necessitating pedagogical adaptability rather than fixed technical prescriptions. Finally, the scarcity of longitudinal studies in the current evidence base limits definitive conclusions regarding the long-term retention of learning gains and the sustained integration of digital storytelling beyond initial intervention periods. Future research should address these constraints through rigorously designed longitudinal studies, randomized controlled trials, and broader cross-linguistic syntheses to

further validate and contextualize DST's role in integrated primary education.

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