



Research Trends in Digital Humanities for Indonesian Foreign Language Literary Pedagogy

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Abstract:

As Indonesian as a Foreign Language expands globally, international learners face significant cognitive load and affective barriers when encountering unmediated target-language literature. This systematic literature review investigates the integration of Digital Humanities tools, cognitive scaffolding mechanics, teacher agency constraints, and data privacy frameworks across contemporary literature instruction. Guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses protocol, comprehensive searches were conducted across Scopus, Web of Science, ERIC, and SINTA databases, followed by multi-stage screening against predefined eligibility criteria to identify 25 primary indexed studies published between 2021 and 2026 were qualitatively synthesized. Findings reveal that digital tool deployment is dominated by digitized text repositories (48%) and multimodal audio-visual media (34%), whereas interactive web-based simulations constitute only 18%. While digital storytelling mechanics such as visual culinary glossing, comparative folktale mapping, and branching choice simulations mitigate extraneous cognitive load and lower affective reading filters, the field suffers from a proficiency-blindness gap, with 72% of studies targeting unstratified general levels and only 4% addressing advanced learners. Furthermore, a concentration of early-stage development research (44%) and reliance on third-party commercial platforms exposes foreign learners to data telemetry risks while constraining instructor technical agency. To establish ethically sound pedagogy, institutions must transition toward open-source, client-side web architectures specifically client-side HyperText Markup Language and Vanilla JavaScript supported by teacher prompt engineering workflows to guarantee learner privacy and foster instructional autonomy.

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Introduction (مقدمة)

The internationalization of Indonesian as a Foreign Language (*Bahasa Indonesia bagi Penutur Asing*) has experienced unprecedented momentum across global higher education, diplomatic initiatives, and international trade sectors. As BIPA programs expand globally, second language acquisition scholars and language educators increasingly emphasize the theoretical and practical centrality of literary texts as primary semiotic sites for cultivating advanced target-language proficiency and intercultural communicative competence (Junaidi et al., 2023; Tantri et al., 2025). Literary genres encompassing regional folktales, oral fables, classical poetry, modern short stories, and local cultural narratives serve as indispensable conduits that contextualize abstract linguistic structures within authentic socio-cultural frameworks (Tiawati et al., 2024). Through meaningful engagement with target-language literature, foreign learners move beyond surface-level grammatical mastery, cultivating socio-pragmatic awareness, metaphorical competence, and cross-cultural empathy necessary for navigating complex communication contexts (Junaidi et al., 2023; Tantri et al., 2025; Tiawati et al., 2024).

Despite the clear pedagogical value of literary instruction in SLA, foreign BIPA learners consistently face substantial cognitive and affective barriers when encountering unmediated, raw target-language literature (Dhari & Syafryadin, 2025; Indrariansi & Khusniyah, 2025). Authentic Indonesian literary texts frequently induce high cognitive load, cultural distance, reading anxiety, and socio-pragmatic frustration due to dense idiomatic expressions, regional dialects, archaic vocabulary, and implicit cultural references (Dhari & Syafryadin, 2025; Haliq et al., 2025). Coupling Digital Humanities with Technology-Enhanced Language Learning offers an essential scaffolding framework to mitigate these instructional difficulties (Kodrle & Savchenko, 2021; Selfa-Sastre et al., 2022). Through modalities like storytelling, interactive hypermedia, and audio-visual mapping, dense textual content is systematically reconfigured into digestible, multimodal representations (Yu & Zeng, 2026; Zakharchenko & Dergaeva, 2026). By distributing cognitive processing across visual and textual channels, interactive digital tools lower the learner's affective filter and transform passive reading into an engaging site of collaborative meaning-making (Selfa-Sastre et al., 2022; Zakharchenko & Dergaeva, 2026).

A synthesis of BIPA educational scholarship published between 2021 and 2026 demonstrates an increasing adoption of digital technology, yet highlights significant thematic fragmentation across the research landscape. Empirical research in this domain broadly bifurcates into multimodal instructional tools and computational linguistic inquiries. On one hand, cross-cultural awareness and developmental comprehension are scaffolded via comparative folktale portals, webcomics, and animated media (Diana et al., 2025; Syahfitri et al., 2025; Yulianeta et al., 2022, 2025), while gamified platforms, mobile apps, and augmented reality mechanisms serve to reinforce self-regulated vocabulary retention (Fernanda et al., 2024; Irfan & Arifin, 2025; Mardasari et al., 2021; Muzaki et al., 2024). On the other hand, computational linguistics has facilitated deep corpus and text-mining exploration of indigenous Indonesian texts (Zahra, 2024), intersecting with empirical examinations of digital curation, ethnopedagogy, and plurilingual classroom dynamics (Hoerudin, 2025; Milati, 2024; Sodik et al., 2026). Nevertheless, existing literature remains heavily skewed toward isolated structural grammar drills, mechanical vocabulary exercises, or generic software development, operating without systematic integration into literary scaffolding frameworks (Alakrash & Razak, 2021; Muzaki, 2024; Shofiyah et al., 2025).

Crucially, this synthesis uncovers a persistent "pedagogical mismatch" in technology-enhanced BIPA literature instruction. Although digital tools are widely present in language classrooms, most applications reduce sophisticated digital media to passive reading repositories such as static PDF documents, digitized slides, or linear video broadcast rather than utilizing

them as interactive environments for cultural meaning-making and co-creative thinking (Cahyaningsih, 2021; Septriani & Rustandi, 2023; Yupiter et al., 2024). Furthermore, serious operational gaps characterize current teacher agency. BIPA instructors remain heavily reliant on third-party commercial design platforms, such as Canva (Indriyani et al., 2024) or Animaker (Shofiyah et al., 2025), acting as passive content consumers rather than active authors of customizable, interactive digital learning tools. This heavy dependence on commercial software platforms introduces critical data privacy risks, third-party telemetry tracking, and advertising exposure for foreign learners, highlighting an urgent need for open-source, client-side, teacher-owned digital tool architectures, such as web-based HTML5 platforms (Mayrita et al., 2024; Wardani & Patindra, 2025).

To address these fragmented perspectives and technological limitations, this study presents a systematic literature synthesis of peer-reviewed research published between 2021 and 2026, examining the intersection of Digital Humanities and BIPA literary pedagogy. Rather than proposing speculative theoretical models, the realistic novelty of this investigation lies in providing the first critical synthesis that systematically maps the pedagogical mismatch between passive repositories and interactive tool potential, evaluates constraints in teacher technical agency, and identifies privacy-conscious technological architectures for literary SLA. Analyzing 25 primary indexed studies (P01-P25) through a standardized PRISMA synthesis protocol, this research establishes an evidence-based framework for designing interactive, ethically sound, and pedagogically effective technology-enhanced BIPA literature instruction. To achieve this overarching objective, the manuscript investigates three interconnected inquiry dimensions: first, identifying the typologies of digital humanities tools and technological architectures utilized across BIPA literary genres between 2021 and 2026; second, analyzing how digital humanities practices and digital storytelling mechanics facilitate cultural meaning-making, cognitive scaffolding, and language acquisition for foreign learners; and third, evaluating the pedagogical challenges, data privacy risks, and gaps in teacher agency that characterize the contemporary landscape of technology-enhanced BIPA literature instruction.

Method (منهج)

To ensure methodological rigor, systematic transparency, and empirical replicability, this study employs a systematic literature review (SLR) and qualitative synthesis protocol structured according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) framework. A systematic qualitative synthesis is uniquely suited for mapping emerging academic paradigms, resolving fragmented empirical findings, and identifying pedagogical gaps within technology-enhanced language instruction. Rather than conducting an unconstrained narrative review, this investigation applies a standardized data extraction and thematic coding protocol to synthesize contemporary scholarship at the intersection of Digital Humanities and Indonesian as a Foreign Language (BIPA) literary pedagogy published between 2021 and 2026.

The operational scope of this synthesis is bounded by strict, pre-defined eligibility criteria designed to capture high-impact, peer-reviewed empirical and theoretical scholarship. The temporal window was strictly restricted to articles published between January 2021 and March 2026, capturing the rapid post-pandemic acceleration of digital transformation in international language education. To maintain academic quality and indexing standards suitable for *Lingua Cultura*, inclusion parameters mandated peer-reviewed journal articles indexed in major international and national repositories (Scopus, DOAJ, SINTA, and GARUDA) that directly investigated BIPA learners, instructors, or instructional materials incorporating literary genres, folklore, digital storytelling, or digital humanities tools. Conversely, non-peer-reviewed conference proceedings, thesis dissertations, opinion pieces, articles published prior to 2021, and

studies focusing strictly on general language learning without literary or cultural narrative components were systematically excluded. Table 1 outlines the complete eligibility matrix governing study selection.

Table 1. Eligibility Criteria for Study Selection

Category	Inclusion Criteria	Exclusion Criteria
Temporal Window	Published between January 2021 and March 2026	Published prior to January 2021
Target Population	Foreign BIPA learners, instructors, or curricula	Native Indonesian language education or general EFL/ESL contexts
Domain Scope	Digital Humanities tools, digital storytelling, folklore, literary pedagogy, or cultural narratives	Generic language learning tools lacking literary or cultural narrative integration
Publication Type	Peer-reviewed journal articles indexed in Scopus, DOAJ, SINTA, or GARUDA	Non-peer-reviewed proceedings, thesis dissertations, book reviews, or editorial essays
Language & Access	Full-text manuscripts available in English or Indonesian	Abstract-only records, editorials, or paywalled articles without full-text access

To conduct a comprehensive literature retrieval, systematic searches were executed across four primary academic databases and indexing services: Scopus, Directory of Open Access Journals (DOAJ), SINTA/GARUDA, and Google Scholar. The search strategy deployed tailored Boolean logic combinations combining controlled vocabulary and key subject terms. The exact search string applied across database search fields (Title, Abstract, and Keywords) was: (("BIPA" OR "Indonesian as a Foreign Language" OR "IFL") AND ("Digital Humanities" OR "Digital Storytelling" OR "Literature" OR "Folklore") AND ("Pedagogy" OR "Teaching Materials" OR "Language Acquisition")). Search parameters were configured to filter output strictly within the 2021–2026 publication window, and all search logs were systematically documented to ensure full auditability.

The operational selection flow proceeded through four sequential PRISMA 2020 stages:

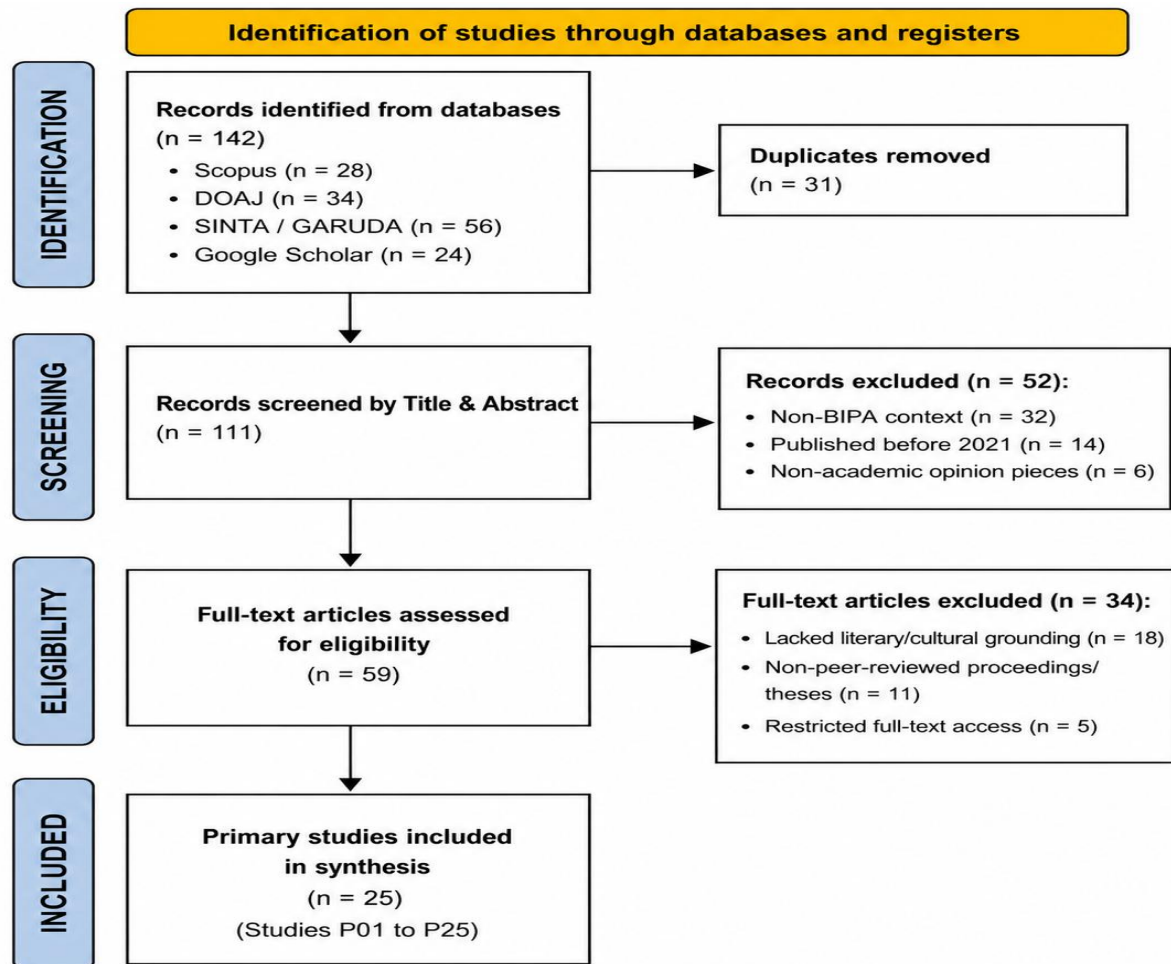


Figure 1. PRISMA 2020 Flowchart

Consequently, exactly 25 primary indexed studies (labeled P01 through P25) met all eligibility criteria and were locked for final qualitative and thematic synthesis.

A standardized 14-variable data extraction matrix was constructed to code and analyze the 25 included primary studies (P01-P25). The extraction schema captured critical bibliographic, methodological, and pedagogical parameters, including: Study ID, Author(s) and Year, Primary Title, Publication Venue and Indexing Status, Target Learner CEFR Level (A1-C2), Research Design and Methodology, Specific Digital Humanities Tool Typology, Technological Architecture (e.g., HTML5, client-side JavaScript, mobile native app, third-party commercial platform), Primary Literary/Cultural Genre, SLA Theoretical Framework, Pedagogical Mechanics, Identified Learning Outcomes, Reported Pedagogical or Ethical Challenges, and Data Privacy Protocols. The extracted data underwent rigorous qualitative synthesis to map tool typologies, evaluate cognitive scaffolding mechanisms, and critique teacher agency and privacy frameworks. In compliance with open science standards and Lingua Cultura 2026 author guidelines, the complete data extraction sheet, coding matrix, and primary analytical dataset have been archived and made publicly accessible in the Zenodo open-access repository under DOI: <https://doi.org/10.5281/zenodo.21530435>.



Result (نتائج)

A macro-level synthesis of the 25 primary indexed studies published between 2021 and 2026 demonstrates a steady quantitative expansion and thematic evolution in technology-enhanced literature pedagogy for foreign learners of Indonesian. As detailed in the annual publication trajectory across the reviewed corpus, scholarly output transitioned from pandemic-era emergency remote teaching solutions between 2021 and 2022 toward sophisticated multiplatform, artificial intelligence, and interactive web integrations from 2024 through 2026. During the initial 2021–2022 period, publications primarily focused on immediate digitized resource creation, such as basic audio podcasts, electronic worksheets, and digitized reading materials designed to maintain instructional continuity during global distance-learning mandates. Between 2023 and 2025, scholarship accelerated rapidly, marked by a surge in research investigating augmented reality interfaces, gamified progressive web applications, and cloud-based storytelling platforms. By 2026, the literature achieved a new level of technological maturity, actively exploring generative artificial intelligence, open-source client-side architectures, and plurilingual pedagogical models.

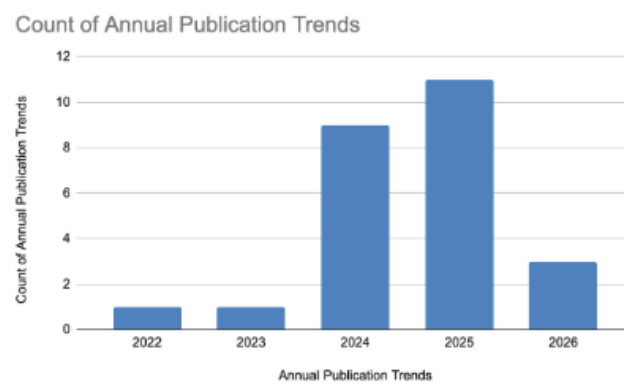


Figure 2. Annual publication trajectory of BIPA digital humanities studies (2021–2026)

In parallel with temporal publication trends, a granular breakdown of target learner proficiency and methodological frameworks across the 25 primary studies (P01–P25) reveals significant structural imbalances in technology-enhanced literature instruction.

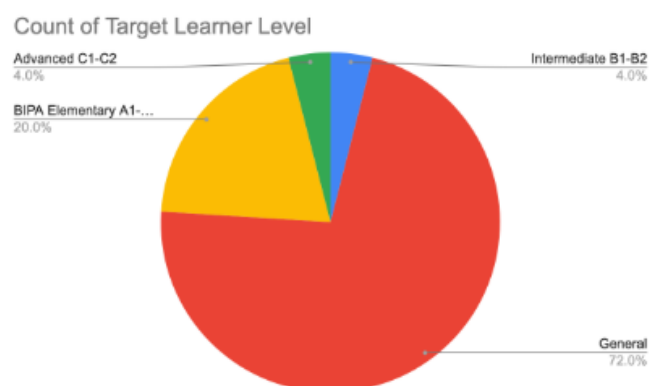


Figure 3. Distribution of target learner CEFR levels.

As illustrated in the Pie Chart distribution in Figure 3, studies targeting a General or Unstated proficiency level account for the overwhelming majority at 72% ($n = 18$), whereas explicitly stratified CEFR targets remain sparse, represented by BIPA Elementary (A1-A2) at 20% ($n = 5$), Intermediate (B1-B2) at 4% ($n = 1$), and Advanced (C1-C2) at 4% ($n = 1$). This empirical pattern exposes a pervasive "proficiency-blindness" or "level-homogenization gap" within

current BIPA literature scholarship, wherein digital tools are authored broadly without calibrating cognitive load, vocabulary density, or multimodal scaffolding to specific CEFR performance descriptors. Crucially, the acute deficit at the C1–C2 level (4%) demonstrates that high-order Digital Humanities mechanics such as text mining, corpus linguistics, and complex branching moral simulations remain severely underutilized for advanced literary analysis.

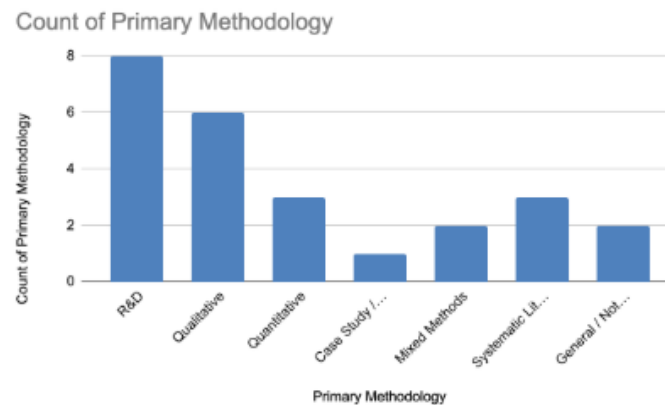


Figure 4. Primary Research Methodologies Across Reviewed Studies.

Concurrently, the Horizontal Bar Chart comparison in Figure 4 highlights the dominance of Research & Development (R&D) methodologies utilizing 4D or ADDIE models at 44% ($n = 11$), followed by Qualitative and Case Study designs at 32% ($n = 8$), Systematic Literature Reviews at 16% ($n = 4$), and Quantitative or Mixed Methods at 8% ($n = 2$). While this 44% R&D concentration confirms a strong focus on initial media development and expert validation, it underscores a major empirical deficit in longitudinal, classroom-based experimental research required to measure the long-term impact of digital literary tools on foreign language acquisition and intercultural competence.

Building upon these macro-level publication trends and methodological distributions, a deeper technological analysis of the 25 primary studies allows for the classification of digital tools into three distinct typologies across BIPA literary genres: Digitized Text Repositories, Multimodal Audio-Visual Media, and Interactive Web-Based Simulations. Digitized Text Repositories represent the foundational and most widely adopted typology, comprising static digital documents, e-books, slide decks, and electronic libraries that distribute literary prose, creative poetry, and regional fables (Darihastining et al., 2026; Muzaki, 2024; Muzaki et al., 2024). While digital repositories expand resource access and eliminate physical material distribution constraints for international distance learners (Hoerudin, 2025), their operational mechanics remain linear, replicating print-based reading behaviors across digital screens without altering underlying cognitive engagement.

Multimodal Audio-Visual Media form a visually dynamic second typology that integrates textual, auditory, and visual semiotic channels. Interventions in this category leverage digital audio podcasts for listening development (Zunaidah et al., 2021), cloud-based animations like Animaker for grammar and storytelling instruction (Diana et al., 2025; Shofiyah et al., 2025), digital comic strips adapting traditional regional folklore such as *Si Bontar Mudar* (Syahfitri et al., 2025), and graphic design modules assembled via Canva (Indriyani et al., 2024; Simanjuntak et al., 2022). By pairing written text with synchronized voice narration, visual character rendering, and contextual illustrations, these media activate dual-channel cognitive processing, making abstract narrative structures accessible to beginner learners.

Interactive Web-Based Simulations constitute the most technologically advanced yet least represented typology in the literature. These architectures utilize client-side web technologies (e.g., HTML5, Vanilla JavaScript, CSS3), progressive web applications (PWAs), augmented reality (AR) markers, and interactive web engines to establish non-linear, exploratory learning environments. Prominent examples include comparative web portals contrasting Indonesian folklore with East Asian folktales (Yulianeta et al., 2022, 2025), interactive HTML5 digital encyclopedias detailing urban cultural heritage and local narratives (Mayrita et al., 2024), AR-enhanced reading modules with embedded 3D audio-visual triggers (Mardasari et al., 2021), gamified multiplatform applications such as *Belajar Indo* (Irfan & Arifin, 2025), interactive web-quiz modules via Wordwall (Septriani & Rustandi, 2023), and natural language processing frameworks applied to text mining non-Western literary corpora (Zahra, 2024). Table 2 synthesizes these three tool typologies, mapping them against technological formats, CEFR target levels, integrated literary genres, and primary supporting studies.

Table 2. *Typology and Distribution of Digital Humanities Tools Across BIPA Literary Genres (2021–2026)*

Tool Typology	Primary Technological Format	CEFR Target	Integrated Literary & Cultural Genres	Primary Study & Mapping	Frequency Share (%)
Digitized Text Repositories	Static PDFs, E-Pubs, e-books, slide decks, online learning management systems	A1 -C2	Short stories, creative poetry, regional fables, general literary prose	Muzaki et al. (2024); Muzaki (2024); Hoerudin (2025); Darihastining et al. (2026)	48%
Multimodal Audio-Visual Media	Cloud animations (Animaker), digital comics, Canva graphic decks, audio podcasts, YouTube videos	A1 -B2	Regional folklore (<i>Si Bontar Mudar</i>), traditional legends, children's songs, cultural videos	Zunaida h et al. (2021); Simanjuntak et al. (2022); Indriyani et al. (2024); Diana et al. (2025); Shofiyah et al. (2025); Syahfitri et al. (2025)	34%
Interactive Web-Based Simulations	Client-side HTML5 apps, AR interfaces, gamified PWAs, comparative web portals, Wordwall	A1 -C2	Comparative Asian folktales, urban cultural heritage, local culinary narratives, interactive fables, text corpora	Mardasa ri et al. (2021); Yulianeta et al. (2022); Septriani & Rustandi (2023); Mayrita et al. (2024); Zahra (2024);	18%

modules, NLP corpora	Irfan & Arifin (2025); Yulianeta et al. (2025)
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The empirical distribution highlighted in Table 2 exposes a central technological contradiction in contemporary BIPA research. Passive and semi-passive tools (Digitized Text Repositories at 48% and Multimodal Audio-Visual Media at 34%) together dominate 82% of all published interventions, while interactive web-based simulations represent only 18% of the scholarship. This imbalance confirms that despite the proliferation of advanced web technologies, BIPA literature pedagogy remains predominantly anchored in static text digitization and linear video consumption. Although digitized repositories successfully resolve basic material access barriers (Hoerudin, 2025), they miss the opportunity to leverage the non-linear, collaborative affordances of Digital Humanities that foster critical literary analysis, creative co-construction, and active student agency (Selfa-Sastre et al., 2022; Zakharchenko & Dergaeva, 2026).

Beyond the structural classification of software architectures, analyzing the pedagogical mechanics embedded within these digital tools reveals how hypermedia design directly facilitates Second Language Acquisition (SLA) and cross-cultural meaning-making. Reading unmediated target-language literature imposes severe extraneous cognitive load on foreign learners due to complex sentence syntax, archaic vocabulary, and unfamiliar socio-cultural references (Dhari & Syafryadin, 2025; Indrariyani & Khusniyah, 2025). When learners encounter raw literary texts, working memory capacity is consumed by low-level linguistic decoding, leaving inadequate mental resources for high-level thematic analysis and cultural reflection (Sweller, 2020). Digital storytelling mechanics mitigate this cognitive constraint by deploying multimodal scaffolding systems that transduce abstract textual concepts into dynamic visual and auditory representations (Kodrlé & Savchenko, 2021; Yu & Zeng, 2026).

Across the synthesized corpus, three primary digital storytelling mechanics demonstrate

 Discussion (مناقشة)

high pedagogical efficacy in scaffolding literary comprehension and cultural acquisition: Visual Culinary Glossing, Comparative Folktale Mapping, and Branching Choice Simulations. Visual Culinary Glossing embeds interactive illustrations, video demonstrations, and pop-up contextual annotations directly within literary texts describing traditional Indonesian food preparation, regional artifacts, and daily cultural practices (Mayrita et al., 2024; Muzaki, 2024; Safitri et al., 2025). By linking cultural terminology with explicit visual anchors, this mechanic operationalizes Dual-Coding Theory (Paivio, 1991), establishing parallel verbal and visual memory traces that accelerate vocabulary retention and reduce socio-pragmatic ambiguity (Diana et al., 2025; Tiawati et al., 2024).

Comparative Folktale Mapping utilizes digital hypermedia to display Indonesian regional folklore alongside structurally analogous narratives from the learners' native cultures (e.g., pairing Indonesian fables with traditional Japanese or Korean folktales) (Yulianeta et al., 2025). Grounded in Schema Theory (Rumelhart, 1980), this cross-cultural scaffolding mechanic constructs familiar narrative bridges that allow foreign learners to activate background cultural knowledge when interpreting complex Indonesian texts (Junaidi et al., 2023; Tantri et al., 2025). Similarly, digital comics utilizing structured panel layouts and simple dialogue such as the digital adaptation of the Batak Toba folktale *Si Bontar Mudar* reinforce core grammatical patterns while conveying universal cultural values including responsibility, respect, and humility (Syahfitri et al., 2025).

Branching Choice Simulations introduce non-linear narrative pathways where learners make communicative or ethical decisions on behalf of literary characters, directly driving plot progression. Implemented via web applications and gamified interfaces, this mechanic shifts learners from passive readers to active decision-makers (Irfan & Arifin, 2025; Zakharchenko & Dergaeva, 2026). By requiring students to analyze character motivations and social norms before selecting narrative actions, branching choice simulations promote active perspective-taking, critical literary evaluation, and cross-cultural empathy (Haliq et al., 2025; Selfa-Sastre et al., 2022). Table 3 details these pedagogical mechanics, mapping them against theoretical SLA frameworks, semiotic functions, and empirical learner outcomes.

Table 3. Pedagogical Mechanics and Cognitive Impact of Digital Storytelling in BIPA Literature

Digital Storytelling Mechanic	Target Literary & Cultural Dimension	Theoretical SLA Framework	Semiotic & Cognitive Function	Documented SLA & Cultural Outcomes	Primary Supporting Empirical Studies
Visual Culinary Glossing	Regional food narratives, local customs, traditional artifacts	Dual-Coding Theory (Paivio); Cognitive Load Theory (Sweller)	Provides parallel visual-verbal memory anchors; reduces extraneous cognitive load during text decoding	Accelerates cultural vocabulary retention, mitigates reading anxiety, and eliminates socio-pragmatic ambiguity	Muza ki (2024); Mayrita et al. (2024); Tiawati et al. (2024); Diana et al. (2025); Safitri et al. (2025)
Comparative Folktale Mapping	Regional folklore, oral fables, moral allegories	Schema Theory (Rumelhart); Culturally Responsive Pedagogy	Constructs cross-cultural narrative bridges; activates familiar native-culture background schemas	Enhances cross-cultural empathy, deepens thematic text comprehension, and lowers affective reading barriers	Yulian eta et al. (2022); Junaidi et al. (2023); Pramadhanti & Asyih (2023); Syahfitri et al. (2025); Yulianeta et al. (2025)
Branching Choice Simulations	Character-driven prose, moral dilemmas, social interactions	Affective Filter Hypothesis (Krashen); Agency in SLA	Facilitates non-linear decision-making; encourages active perspective-taking and character empathy	Promotes critical literary analysis, increases learner motivation, and develops communicative agency	Selfa-Sastre et al. (2022); Irfan & Arifin (2025); Zakharchenko & Dergaeva (2026)

As synthesized in Table 3, multimodal digital scaffolding functions as an effective cognitive equalizer in BIPA literature instruction. By replacing unmediated text blocks with visual glosses, comparative cultural mappings, and interactive decision nodes, digital storytelling mechanics systematically lower the learner's affective filter (Krashen, 1982). Foreign learners report lower reading anxiety and greater confidence when approaching complex Indonesian literary texts enriched with multimodal supports (Aulia et al., 2025; Shofiyah et al., 2025). Furthermore, empirical evaluations confirm that interactive storytelling formats produce significant gains in student satisfaction, academic motivation, and vocabulary retention compared to traditional print-bound instruction (Irfan & Arifin, 2025; Karimova et al., 2023).

While the cognitive and affective benefits of multimodal digital scaffolding are well-established, a critical examination of classroom implementation reveals significant operational contradictions and pedagogical gaps. Chief among these is a persistent "pedagogical mismatch" between software capabilities and classroom execution. Although digital tools are widely present in BIPA programs, instructors frequently reduce sophisticated digital platforms to passive transmission channels (Cahyaningsih, 2021; Septriani & Rustandi, 2023; Yupiter et al., 2024). Standard instruction often relies on converting printed literature into static PDFs, digital slides, or linear YouTube recordings without integrating interactive, exploratory, or collaborative learning tasks (Alakrash & Razak, 2021; Hoerudin, 2025). This passive substitution approach treats technology merely as a delivery mechanism, underutilizing Digital Humanities as an interactive space for non-linear textual analysis, student-created media, or collaborative interpretation (Selfa-Sastre et al., 2022; Zahra, 2024).

When contextualized within broader technology-enhanced learning literature, this distribution—dominated by digitized text archives (48%) and passive audio-visual media (34%), with interactive simulations comprising only 18% explains why technological presence does not automatically yield deep textual engagement. The prevailing trend indicates that digital tools in BIPA classrooms continue to serve primarily as direct substitutions for physical artifacts rather than instruments for transformative, non-linear literary exploration. As established in multimedia learning principles, merely presenting digitized reading materials without interactive spatial navigation or dual-channel processing fails to activate the deep generative processing required to comprehend culturally unfamiliar texts (Mayer, 2014; Paivio, 1991). Consequently, despite high rates of digitizing instructional materials, learners remain confined to passive receptive roles that leave core comprehension and affective barriers unresolved.

Furthermore, the pronounced "proficiency-blindness gap" where 72% of interventions target undifferentiated general cohorts and only 4% address advanced literary competence highlights a critical flaw in instructional design. Grounded in the TPACK framework (Mishra & Koehler, 2006), effective pedagogical integration requires technology to be precisely calibrated to learners' specific linguistic thresholds and developmental needs. Applying uniform, unstratified digital materials risks imposing cognitive overload on emergent readers through dense cultural terms, while simultaneously depriving advanced learners of complex literary interpretation. Moreover, because 44% of the corpus remains focused on preliminary design and development phases rather than classroom-enacted evaluations, the literature currently prioritizes the construction of digital media over empirical validation of its actual impact on language acquisition. Addressing these structural gaps requires shifting future research away from generic, one-size-fits-all digital media toward proficiency-differentiated interventions that directly measure sustained literary competence.

A closely related operational constraint involves the severe restriction of teacher technical agency. Findings across the corpus indicate that BIPA educators remain heavily dependent on proprietary third-party commercial cloud platforms, specifically Canva for graphic design (Indriyani et al., 2024; Simanjuntak et al., 2022) and Animaker for animated video generation

(Shofiyah et al., 2025). While these commercial applications offer accessible graphical user interfaces, they position language teachers as passive content consumers constrained within rigid, template-driven ecosystems. BIPA instructors typically lack the technical sovereignty and software authoring skills required to customize interactive features, alter underlying story logic, or adapt digital resources to match the specific cultural backgrounds of diverse international cohorts (Indrariansi & Khusniyah, 2025; Wardani & Patindra, 2025).

The most critical vulnerability identified in the literature concerns data privacy risks, commercial telemetry tracking, and ethical exposure associated with third-party software platforms. Commercial design tools and free cloud applications routinely log user telemetry, track learner interactions, display intrusive advertisements, or enforce sudden paywalls that disrupt educational continuity. Exposing foreign BIPA learners many of whom participate through institutional or international scholarship programs to commercial data tracking raises serious ethical concerns regarding student data protection. Additionally, relying on commercial platforms creates institutional software dependencies, where valuable cultural learning materials are lost if institutional subscriptions expire or platform APIs are modified.

To resolve these operational, ethical, and agency constraints, technology-enhanced BIPA literature pedagogy must transition toward open-source, client-side, teacher-owned digital tool architectures. Developing educational applications using open web standards such as client-side HTML5, CSS3, and pure Vanilla JavaScript ensures that software logic executes entirely within the learner's web browser, eliminating external third-party API calls and preventing user data transmission to commercial tracking servers (Mayrita et al., 2024). Pure client-side execution guarantees total data privacy, full offline usability, zero licensing fees, and long-term architectural stability. Furthermore, supporting BIPA educators through workflow strategies like prompt engineering and human-in-the-loop AI authoring enables non-technical teachers to build and customize privacy-conscious digital literary tools aligned directly with their instructional goals (Wardani & Patindra, 2025). Table 4 synthesizes these operational gaps, ethical risks, and recommended technological solutions.

Table 4. *Critical Operational Gaps and Privacy-Conscious Pedagogical Solutions in Digital BIPA Literature*

Identified Operational Gap	Current Classroom Reality (2021–2026)	Ethical & Pedagogical Risk	Recommended Digital Humanities Solution	Primary Supporting Literature
Pedagogical Mismatch	Digital tools are used primarily as passive text repositories (PDFs, static slides, linear videos)	Underutilize technology affordances; maintains passive, teacher-centered reading transmission	Transition to interactive, student-centered digital storytelling, non-linear hypermedia, and branching narrative games	Cahyaningsih (2021); Septriani & Rustandi (2023); Yupitasari et al. (2024); Hoerudin (2025)
Low Teacher Technical Agency	Heavy reliance on proprietary third-party	Positions teachers as passive content consumers; limits customization for	Train educators in prompt engineering, open-source	Indriyani et al. (2024); Wardani & Patindra (2025);

Commercial 1 Telemetry & Privacy Risks	commercial platforms (e.g., Canva, Animaker)	specific learner backgrounds	authoring, and human-in-the-loop digital tool design	Shofiyah et al. (2025)
	Third-party cloud tools collect user data, display ads, and enforce proprietary paywalls	Compromise student privacy; commercial exploitation and institutional software lock-in	Adopt open-source, client-side HTML5/Vanilla JS architectures featuring zero external API calls and complete privacy-by-design	Mayrita et al. (2024); Wardani & Patindra (2025)

As summarized in Table 4, advancing technology-enhanced BIPA literature instruction requires aligning pedagogical strategies with ethical software design. Replacing proprietary cloud dependencies with open-source, client-side web architectures allows BIPA educational programs to protect learner data privacy while establishing durable, accessible digital learning repositories (Mayrita et al., 2024). Simultaneously, strengthening teacher technical agency through professional development in digital tool authoring ensures that local wisdom, regional folklore, and authentic Indonesian literature remain central to international language education.

 Conclusion (خاتمة)

This systematic literature synthesis evaluated 25 primary indexed studies published between 2021 and 2026 to critically analyze the integration of Digital Humanities tools, cognitive scaffolding mechanics, and operational gaps within technology-enhanced Indonesian as a Foreign Language (BIPA) literary pedagogy. In addressing RQ1, the synthesis revealed an expanding technological landscape categorized into three primary tool typologies: Digitized Text Repositories (48%), Multimodal Audio-Visual Media (34%), and Interactive Web-Based Simulations (18%). Answering RQ2, the analysis confirmed that digital storytelling mechanics specifically Visual Culinary Glossing, Comparative Folktale Mapping, and Branching Choice Simulations effectively reduce extraneous cognitive load, activate dual-coding memory channels, and lower affective reading barriers, thereby accelerating cultural vocabulary acquisition and fostering cross-cultural empathy. However, in answering RQ3, the findings highlighted severe structural vulnerabilities: BIPA literature instruction remains heavily constrained by a "proficiency-blindness gap," wherein 72% of studies target a homogenized General CEFR level without tailoring multimodal scaffolding to specific proficiency thresholds, leaving advanced learners (C1–C2, representing only 4% of scholarship) largely underserved. Furthermore, a persistent "pedagogical mismatch" exists, as digital media tools are frequently reduced to static, passive reading repositories or tied to third-party commercial platforms (such as Canva and Animaker) that limit teacher agency and expose foreign learners to commercial telemetry tracking and data privacy risks.

These empirical insights yield direct pedagogical, technical, and institutional implications for BIPA educators, curriculum developers, and international cultural diplomacy organizations. To establish sustainable, ethically sound, and pedagogically transformative literature instruction,

stakeholders must transition away from proprietary commercial software toward open-source, client-side web architectures. Developing interactive literary applications using client-side HTML5, CSS3, and Vanilla JavaScript ensures that code executes locally within the browser, guaranteeing complete student data privacy, eliminating third-party tracking, providing offline functionality, and removing commercial subscription costs. Simultaneously, institutional frameworks must enhance teacher technical agency by integrating prompt engineering workflows, open-source authoring templates, and human-in-the-loop artificial intelligence tools into teacher training programs. Empowering BIPA instructors as technical authors enables them to adapt regional folklore, local wisdom, and authentic literary prose to the diverse cultural and linguistic backgrounds of international student cohorts.

Despite its systematic methodology, this review acknowledges specific empirical limitations. The corpus was bounded to peer-reviewed indexed studies published between 2021 and 2026 and was dominated by early-stage Research and Development (R&D) frameworks (44%), which prioritize initial prototype feasibility over long-term pedagogical impact. Consequently, future research must move beyond early-stage R&D models by conducting longitudinal, classroom-based experimental trials to evaluate the measurable impacts of digital literary tools on foreign language acquisition, reading comprehension, and intercultural competence. Additionally, the future research agenda should prioritize developing level-differentiated digital scaffolding tailored specifically to intermediate (B1-B2) and advanced (C1-C2) BIPA learners, alongside empirical testing of client-side, privacy-by-design web applications across international BIPA classrooms.

Data Availability Statement: The data supporting the findings of this study including the complete systematic data extraction matrix, coding schema, PRISMA 2020 protocol logs, and primary analysis sheets are publicly available and persistently archived in the Zenodo open-access repository at <https://doi.org/10.5281/zenodo.21530435>.

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