# DIGITAL READING INTERVENTIONS FOR PRIMARY ENGLISH LEARNERS TO IMPROVE READING COMPREHENSION: A SYSTEMATIC LITERATURE REVIEW

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**Article Info:**

**Abstract:**

Digital approaches to reading have attracted substantial scholarly attention as a sound strategy for improving reading comprehension among primary English learners in technologically integrated learning environments. Despite the growing empirical attention, current scholarly work remains inconsistent across a range of intervention formats, student demographics, and teaching frameworks, underscoring the need for a structured consolidation of current evidence. This extensive literature review explores the prevailing research on digital reading methodologies designed to enhance reading comprehension among primary English pupils, focusing on academic achievement, digital literacy, and inclusivity. Following the PRISMA protocol, a rigorous and transparent review methodology was executed. Extensive evaluations were conducted across two major academic databases, Scopus and ERIC, using the search terms digital reading, interventions, primary children, and reading comprehension. The articles included underwent peer review and were published between 2023 and 2025 within the search parameters. After executing the processes of identification, screening, evaluating eligibility, and quality assessment, we selected a total of 28 primary studies for qualitative synthesis. Thematic analysis of the results yielded three principal themes: (1) Digital Reading Interventions and Literacy Outcomes, which underscore the mixed yet promising effects on comprehension, fluency, and vocabulary acquisition; (2) Digital Literacy, Media Literacy, and Citizenship, which accentuate the significance of both learners' and

educators' digital competencies in fostering meaningful interactions with digital texts; and (3) Inclusive, Adaptive, and Technology-Supported Learning for Diverse Learners, which highlights the importance of adaptive and accessible digital methodologies for learners with a range of cognitive, linguistic, and sensory requirements. In summary, the research highlights that digital approaches to reading can greatly support comprehension when aligned with instructional strategies, context-sensitive, and inclusively crafted. The outcomes present a solid evidence framework designed to aid forthcoming research endeavours, pedagogical design, and policy creation concerning digital reading strategies in primary English teaching.

## Introduction

Digital reading interventions have recently emerged as a promising tool for improving reading comprehension among primary English language learners. These interventions draw on digital tools and technologies to design enjoyable, hands-on learning experiences relevant to the range of young readers. Technology integration into reading instruction has demonstrated promise for enhancing reading skills when the means of instruction have been insufficient. The use of Augmented Reality (AR) integrated with PowerPoint, commonly referred to as PowerAR, has been used, particularly in the intervention implemented specifically to enhance reading comprehension of a group of primary school pupils in Malaysia. The approach uses three skills: active learning, constructivism, and self-directed learning, allowing the students to connect new learning material with existing knowledge. A study of Year 6 pupils revealed that PowerAR somewhat improved reading comprehension skills, indicating the flexibility and advantages of using technology in language classrooms (Sulaiman et al., 2023). As a result, Comprehension Booster, a computerized reading comprehension program, demonstrated substantial gains in reading accuracy and comprehension among poor readers in the UK, demonstrating that digital strategies can have a particular impact for disadvantaged readers (Horne, 2017).

Innovative digital game-based interventions that aim to support reading development have also been proposed as promising strategies for achieving this goal. For example, a syllable-based reading intervention app for German second graders focused on phonological recoding and orthographic representation of syllables. Overall, significantly improved recognition of general words and phonological recoding processes was reported among children in the treatment group. However, the text-level ability to read did not achieve significant improvement (Heß et al., 2024). This suggests that, although digital interventions might be effective for supporting

foundational reading skills, further development of more advanced forms of comprehension is likely needed. Furthermore, the combination of cognitive training and digital reading interventions has been investigated to improve reading comprehension. Third and fourth graders in a new computerized cognitive training program were introduced to executive function (EF) activities through text comprehension exercises. The intervention also resulted in improved reading comprehension, verbal updating, working memory and nonverbal reasoning. This, in turn, suggests the effectiveness of combining cognitive training with digital tools for reading support in promoting reading (Ruffini et al., 2025). Similarly, a digital reading intervention for EFL third graders in Turkey had a positive and significant influence on motivation, attitude, reading comprehension, and vocabulary, consistent with the advantages of digital reading (Karaarslan & Polat, 2025).
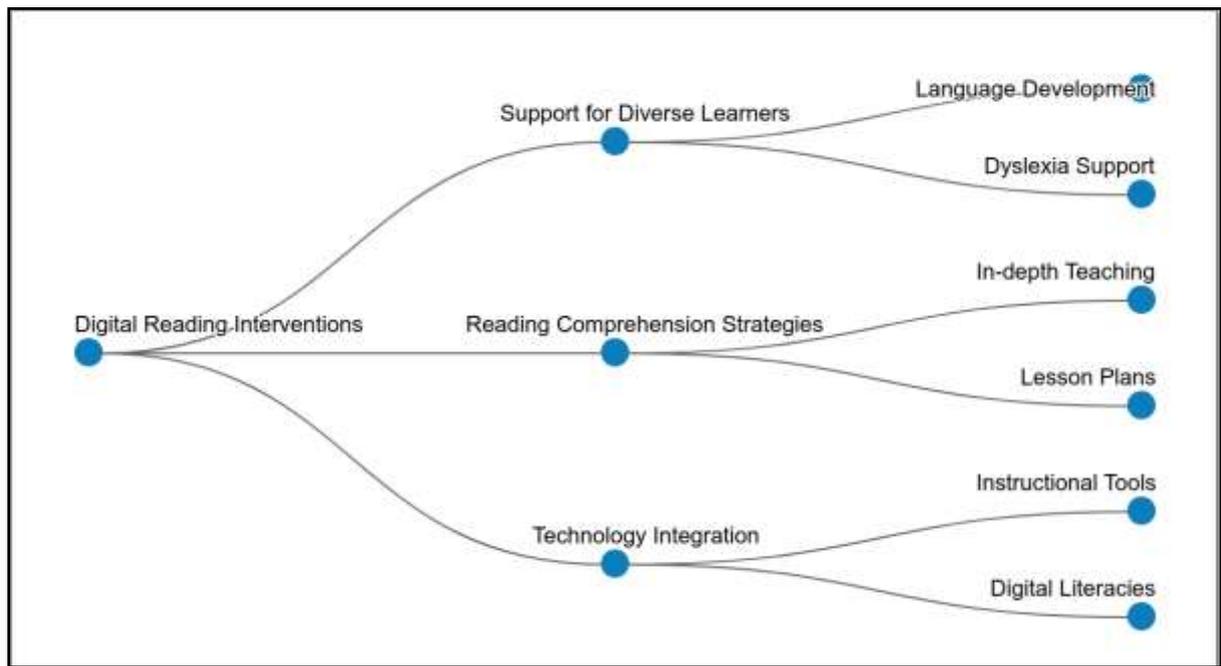


**Figure 1: Concept Map of Digital Reading Interventions and Reading Comprehension Development**

Figure 1 distils the conceptual framing of the study by presenting digital reading interventions as the core strategic anchor for improving reading outcomes across a range of learners. The map depicts how these interventions work to operationalise three intertwined areas, namely, supports for diverse learners (with an emphasis on language development and dyslexia-sensitive design), strategies for reading comprehension (driven by deep teaching and structured lesson planning), and technology integration (via instructional tools and the cultivation of digital literacies). Together, such domains underscore a progressive pedagogical ecology where technology is not an add-on; rather, technology is a value driver that delivers higher-quality instruction, greater inclusion for all and higher-engagement learners. In the overall context, the concept map rationalises the development of a comprehensive and interactive digital reading module to support learners' needs, pedagogic practices, and technological opportunities and to frame an evidence-based, scale-up, and social-impact-oriented study of continuing reading comprehension deficits in English as a Second Language (ESL) elementary school classrooms.

In summary, digital reading interventions provide a multifaceted intervention to support reading comprehension in EFL learners. These interventions, which integrate interactive and purposeful technology, are likely to enhance different aspects of reading development in students from lower-order literacy and basic reading to higher-order reading. Studies prove that digital interventions can serve different learners, many with reading difficulties, some at-risk, or other learners in disadvantaged environments. Digital reading interventions can have a great effect on their development; yet digital technologies only grow in scope as we move to the next stage, as technology will evolve, and it will be critical to use further research to create innovation in them.

**Research Question**

Research questions are the intellectual foundation of a systematic literature review (SLR), offering strategic orientation and methodological continuity as the systematized review proceeds. Explicit research questions establish the review's focus and boundaries, and the study selection decisions, to ensure that the study would be linked to the research question. Through well-formulated questions, which specify what studies are involved, a thorough, systematic review of the literature can be performed, minimizing the possibility of missing studies and minimizing selection bias. Research questions also offer a conceptual template for organising and grouping evidence from such studies to facilitate a more harmonious synthesis of evidence in order to inform meaningful and grounded conclusions. Through this construction role, research questions contribute to improved analytical accuracy and conceptual coherence and ensure that review findings remain appropriate for research and practice.

The development of research questions constitutes the most important element of the SLR planning process and underpins the systematic review strategy in general (Kitchenham, 2007). As the purpose of this SLR is to systematically uncover and question the existing state of the art in the research object area of interest, a well-defined question-development methodology was deemed important. Therefore, this study used the PICo framework, a mnemonic approach proposed by Lockwood et al. (2015) and commonly used in qualitative evidence synthesis. PICo consists of these three important elements: Population, Interest, and Context, enabling the establishment of targeted and analytical research questions. By employing this framework, we ensure conceptual transparency, ease of systematically retrieving literature, and enhance the methodological congruence between the objectives of the review and analytic methodology. This study formulated two research questions using the PICo framework below to facilitate the systematic inquiry and synthesis process.

RQ1: How do digital reading interventions influence reading comprehension and related literacy outcomes among primary English learners within technology-supported educational environments?

RQ2: In what ways do digital and media literacy competencies embedded within digital reading practices shape primary English learners' comprehension and critical engagement with multimodal texts, and how do educators facilitate this process?

RQ3: How do adaptive, inclusive digital reading interventions support the reading comprehension development of diverse primary English learners, and what instructional practices optimise accessibility for learners with varied cognitive, linguistic, or sensory profiles?

## Material and Methods

The Systematic Literature Review (SLR) was undertaken following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework, which is seen to be highly popular internationally in providing good methodological transparency, comprehensiveness, and procedural consistency (Page et al., 2021). Adhering to the PRISMA brings increased analytical accuracy and robust methodological systematic reviews by standardising the procedures for the systematic identification, screening, and selection of eligible studies. Crucially, from that framing, the value of randomised studies is emphasised as a crucial mechanism for mitigating bias within this research and bolstering the evidential basis of review findings. To ensure both coverage and scholarly robustness, this review used two widely used databases, Scopus and ERIC, since each has a wealth of indexing on quality education and interdisciplinary research.

From an organizational perspective, the PRISMA model organizes the review into four consecutive and interrelating steps, i.e., identification, screening, eligibility, and data abstraction. The identification phase is made up of database searches to extract all potentially relevant studies from the database. After this comes the rigorous screening phase; studies are then reviewed against predefined inclusion and exclusion criteria in an effort to avoid irrelevant or methodologically inadequate sources. In the eligibility phase, shortlisted studies are appraised on a rigorous basis to establish whether or not they are fully consistent with the review objectives. Finally, the data abstraction phase entails systematic extraction and synthesis of key findings from the included studies, forming the analytical backbone of the review. Together, this systematic and cyclic approach protects the integrity of methods; provides credible insights that can be acted upon and inform future lines of research and evidence-based educational practice.

### *Identification*

Using the PRISMA framework, the identification phase is the basis for a systematic literature review, as it determines the breadth, relevance, and integrity of the evidence base. A total of 364 publications were identified through the search strategy that collected 150 records from Scopus and 214 records from ERIC (see Table 1), with a clear thematic focus directed towards digital reading interventions for primary English learners focusing on reading comprehension. This variety of records also reflects an increasing scholarly interest in the use of technology in reading instruction at primary school. It also highlights the need for systematic filtering to differentiate evidence-based and context-specific studies from the extant literature.

The selection of Scopus and ERIC is purposely selected and is also a defensible method. Scopus has high interdisciplinary coverage and rigorous indexing criteria covering high-impact peer-reviewed research, while ERIC is a specialist/authoritative database for education-focused studies (e.g., language learning and literacy development). The mutually reinforcing characteristics of such databases strengthen the inclusivity and credibility of the identification process, minimizing the risk of database bias and publication omission. Apart from the number of records identified, the identification of 364 records indicates methodological sensitivity of search strings and that the chosen keywords and descriptors are adequate. Simultaneously, this volume highlights the requirement for subsequent stages of PRISMA, screening and eligibility, to systematically polish the dataset. Together, this rigorous identification establishes a sturdy

evidentiary grounding as the review generates credible, high-impact knowledge that can be used in future research and evidence-informed teaching practice in ESL reading interventions.

**Table 1: The Search String**

| | |
|---|---|
| **Scopus** | TITLE-ABS-KEY ( ( "digital reading" OR "digital literacy" OR "e-reading" OR "electronic reading" OR "online reading" ) AND ( "intervention*" OR "strategy*" OR "program*" OR "approach*" ) AND ( "primary" OR "elementary" OR "young learners" OR "children" ) AND ( "reading comprehension" OR "reading understanding" OR "text comprehension" OR "literacy skills" ) ) AND ( LIMIT-TO ( DOCTYPE , "ar" ) ) AND ( LIMIT-TO ( PUBSTAGE , "final" ) ) AND ( LIMIT-TO ( SRCTYPE , "j" ) ) AND ( LIMIT-TO ( PUBYEAR , 2023 ) OR LIMIT-TO ( PUBYEAR , 2024 ) OR LIMIT-TO ( PUBYEAR , 2025 ) ) AND ( LIMIT-TO ( LANGUAGE , "English" ) ) |
| | **Date of Access: Jan 2026** |
| **WoS** | ( "digital reading" OR "digital literacy" OR "e-reading" OR "electronic reading" OR "online reading" ) AND ( "intervention* OR "strategy*" OR "program*" OR "approach*" ) AND ( "primary" OR "elementary" OR "young learners" OR "children" ) AND ( "reading comprehension" OR "reading understanding" OR "text comprehension" OR "literacy skills" ) |
| | **Date of Access: August 2024** |

*Screening*

After this preliminary stage, the screening process was implemented in compliance with the PRISMA guidance to progressively refine the corpus of retrieved studies and ensure methodological and contextual fit. At this stage, all 364 records were screened against predetermined inclusion and exclusion criteria. After screening the titles and abstracts, 52 records from Scopus and 52 from Web of Science were retained, yielding 104 studies. This significant decrease indicates the use of robust quality-control strategies designed to ensure empirical relevance, topical alignment, and scholarly rigour. The screening findings suggest that although digital reading interventions represent a growing research area, only a small subgroup of studies has been included that meet the rigorous quality of synthesis criteria for primary ESL reading comprehension. Overall, 260 records were excluded based on several strategically justified criteria.

In Table 2, research published in a language other than English was excluded to ensure consistency in analysis and interpretive accuracy. Publications from before 2023 were removed to emphasize current pedagogical concepts, and new digital technologies were highlighted in

advance, enhancing the forward-looking approach to the review. Conference proceedings, books, review articles, and in-press papers were excluded to maintain methodological consistency and to favour peer-reviewed empirical data. In addition, literature beyond the Malaysian setting was excluded to make the study more suitable for the context of the national curricular framework and ESL training conditions. Record duplicates (n = 15) were also systematically culled to avoid data redundancy and analysis bias. Taken together, the screening strategies increase the review's internal validity and contextual specificity and provide assurance that later analyses are based on contemporary, best-quality, and contextually relevant evidence that can inform policy and practice and guide future research on digital reading interventions for ESL learners.

**Table 2: The Selection Criterion in Searching**

| Criterion | Inclusion | Exclusion |
|---|---|---|
| **Language** | English | Non-English |
| **Time line** | 2023 – 2025 | < 2023 |
| **Literature type** | Journal (Article) | Conference, Book, Review |
| **Publication Stage** | Final | In Press |
| **Subject** | Social Sciences, Computer Science, Psychology, Arts and Humanities, Engineering, Environmental Science, Decision Sciences | Besides |

*Eligibility*

The third stage in the PRISMA-guided review process identified by the methodology was the eligibility phase, in which a more granular and critical assessment of the screened studies was conducted to assess for their substantive adherence to the review objectives. At this point in time, 91 articles were obtained for full-text review, allowing for an in-depth consideration of their conceptual framing, methodological approach and empirical significance. This phase is a key quality-assurance checkpoint that allows for consideration of surface-level relevance and the internal consistency and substantive significance of each study. With full-text evaluation replacing abstract-based screening, only studies suggesting a connection between digital reading interventions to improve primary ESL learners' comprehension are kept for review.

After conducting a comprehensive full-text analysis, 63 articles were excluded on the basis of clear, methodologically sound criteria. Studies were excluded if they fell beyond the boundaries of English language education, were relatively insignificant at the title level, or if the content in both the abstract and the full text did not conform to the stated objectives. Articles for which full-text access was not available were also excluded to maintain analytic integrity and

transparency. These exclusions are not just procedural but also tactical, considering that the inclusion of marginally pertinent (or inaccessible) studies can dilute the analysis and undermine the accuracy of the review's findings. There were 28 studies, with all eligibility criteria met, that were eligible and included in the qualitative synthesis. Finally, this final corpus represents an evidence-based study with a high level of thematic relevance, sound methodological rigour and relevance to context. The eligibility phase increases the credibility of the review by restricting the dataset to well-conducted, directly applicable studies, enabling further analyses that yield significant and actionable insights to advance research and practice in digital reading interventions for ESL contexts.

### Data Abstraction and Analysis

Within the project, an integrative analytical approach served as a central evaluative strategy by which evidence from a variety of qualitative research designs was scrutinised and synthesised systematically. The aim of this rigorous analytic process was to identify and crystallize the broad themes, essential patterns, and important patterns that significantly respond to the study's interest area. The thematic development cycle started with structured data extraction, building the analytical framework for further interpretations. As displayed in Figure 2, a total of 28 included studies were systematically analysed, one line at a time, to isolate claims, results, and arguments that addressed the analytic scope of the research.

The authors subsequently performed a general review of these selected studies for their research design, methodologies, and published information concerning digital reading interventions for improving reading comprehension among primary English learners. With this systematic cross-study comparison, we were able to distinguish common and exceptional findings between the studies. Theme generation was then performed through collaborative dialogue among the authors (e.g., through shared reviews) to ensure that developing themes were empirically supported and context appropriate. In order to increase transparency in analysis and facilitate reflection on research, an audit log was created during the development of the study to record analytic decisions, interpretative thoughts, and unresolved questions. The authors critically compared patterns of themes for potential contradictions in and overlaps between the thematic patterns. Discrepancies were resolved through iterative discussion and consensus-building to further strengthen the credibility, dependability, and analytical rigour of thematic synthesis.

## Quality of Appraisal

In line with the methodological guidelines proposed by Kitchenham (2007), the quality appraisal of primary studies is an important phase in which systematic evaluation and quantitative comparison of the evidentiary strength of the included research is conducted. Hence, the present study adopted a structured quality assessment framework adapted from (Abouzahra et al., 2020), comprising six predefined quality assessment (QA) criteria to ensure consistency, transparency, and analytical rigour throughout the review process. It thus provides a strong mechanism for discriminating between methodological robustness and clarity of reporting across these selected studies.

Each QA criterion was scored using a standardised three-point scoring scheme to support objective, replicable evaluation. When a criterion was fulfilled, it received a score of 1 ("Yes"), 0.5 ("Partly") when the criterion was partially met but faced discernible limitations and 0

("No") when the criterion was not met. This structured scoring mechanism allows for fine-grained distinction between studies, underlines quantitative synthesis, and reinforces the systematic review's own robustness, ensuring a conclusion is based on evidence that is methodologically rigorous and transparently reported.

- QA1. Is the purpose of the study clearly stated?
- QA2. Is the interest and the usefulness of the work clearly presented?
- QA3. Is the study methodology clearly established?
- QA4. Are the concepts of the approach clearly defined?
- QA5. Is the work compared and measured with other similar work?
- QA6. Are the limitations of the work clearly mentioned?

All experts have conducted an independent evaluation of the selected studies against the established Quality Assessment (QA) criteria, ensuring objectivity and minimising individual bias. The scores from each expert were aggregated to obtain the overall quality score for each study. For each study to move to the next phase of analysis, the aggregate overall score of each study is required to surpass 3.0, based on the combined ratings of the three experts. Such a predetermined threshold serves as a quality mechanism, allowing only studies that meet an acceptable standard of methodological soundness and reporting clarity to be included for further synthesis.
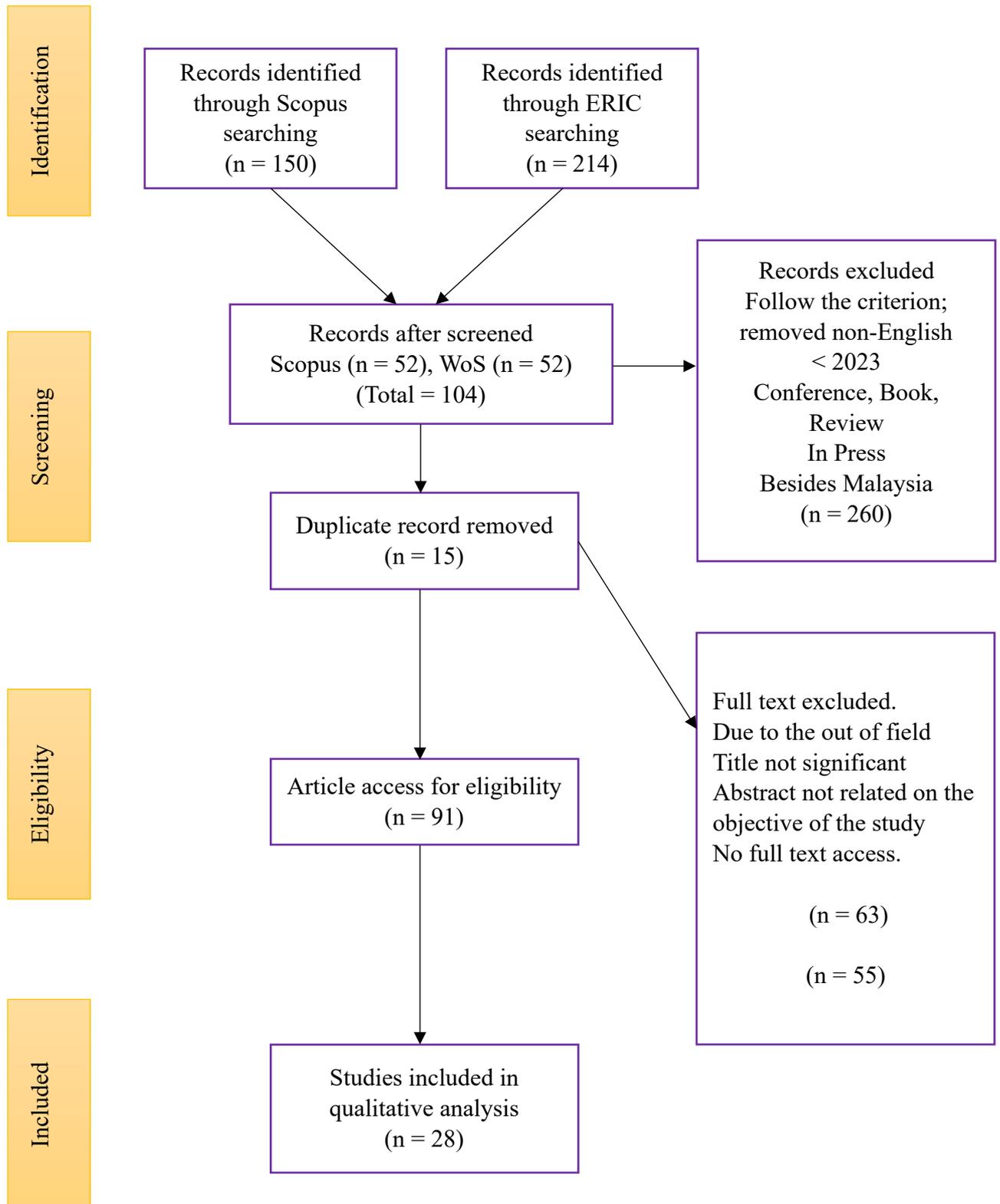
**Figure 2: Flow Diagram of The Proposed Searching Study (Moher D, Liberati A, Tetzlaff J, 2009)**

**Result and Finding**

According to the quality assessment outcomes in Table 3, the quality of the 28 primary studies (PS1 to PS28) reported in the review is acceptable, and all studies were considered as meeting the cut-off quality value for their inclusion into the review. Following the previous rule that studies below 50% had to be excluded, no studies at this stage were excluded due to the quality score reaching above this threshold. Overall, the methodological quality in many papers was moderate to optimal, although the performance of a number of articles was above 75%, signalled by a clear definition of the research aim, well-established methods and a well-defined conceptual model. Studies with lower scores tended to have limited reporting of comparative analyses with related work or of study limitations, but these limitations were more attributed to the depth of reporting than to methodological shortcomings by nature. On the whole, quality assessment outcomes validate that the retained studies form a robust and verifiable evidence base for qualitative synthesis, thus securing the validity and trust within the systematic review results.

**Table 3: Performance of Quality Assessment**

| PS | QA1 | QA2 | QA3 | QA4 | QA5 | QA6 | Total | % |
|---|---|---|---|---|---|---|---|---|
| PS1(Wang et al., 2025) | Y | Y | Y | Y | N | P | 4.5 | 75 |
| PS2(Flynn et al., 2025) | Y | Y | Y | Y | Y | Y | 6.0 | 100 |
| PS3(Zaini et al., 2025) | Y | Y | P | Y | N | N | 3.5 | 58 |
| PS4(Shruthi et al., 2025) | Y | Y | Y | Y | P | Y | 5.5 | 92 |
| PS5(Murcia et al., 2025) | Y | Y | P | Y | N | N | 3.5 | 58 |
| PS6(Rina et al., 2025) | Y | Y | Y | Y | N | N | 4.0 | 67 |
| PS7(Bruno et al., 2025) | Y | Y | Y | Y | P | N | 4.5 | 75 |
| PS8(Nurbekova et al., 2025) | Y | Y | Y | Y | N | N | 4.0 | 67 |
| PS9(Palmqvist et al., 2025) | Y | Y | Y | Y | P | Y | 5.5 | 92 |
| PS10(Hamsiah et al., 2024) | Y | Y | Y | Y | N | N | 4.0 | 67 |
| PS11(Heß et al., 2024) | Y | Y | Y | Y | P | N | 4.5 | 75 |
| PS12(Moss et al., 2024) | Y | Y | Y | Y | P | N | 4.5 | 75 |
| PS13(Schneider, 2024) | Y | Y | Y | Y | N | N | 4.0 | 67 |
| PS14(von Gillern et al., 2024) | Y | Y | Y | Y | N | N | 4.0 | 67 |
| PS15(Abdullina & Zolotovitskaya, 2024) | Y | Y | Y | Y | P | Y | 5.5 | 92 |
| PS16(Yufiarti & Yetti, 2024) | Y | Y | Y | Y | P | Y | 5.5 | 92 |
| PS17(Cockerill et al., 2024) | Y | Y | Y | Y | P | N | 4.5 | 75 |
| PS18(Hauge et al., 2024) | Y | Y | Y | Y | N | N | 4.0 | 67 |
| PS19(Samuelsson et al., 2024) | Y | Y | Y | Y | N | N | 4.0 | 67 |
| PS20(Quinn et al., 2024) | Y | Y | Y | Y | P | N | 4.5 | 75 |
| PS21(Budiman & Syafrony, 2023) | Y | Y | Y | Y | P | Y | 5.5 | 92 |
| PS22(Whitney & Ackerman, 2023) | Y | Y | Y | Y | N | N | 4.0 | 67 |

| PS23(Diprossimo et al., 2023) | Y | Y | Y | Y | Y | N | 5.0 | 83 |
|---|---|---|---|---|---|---|---|---|
| PS24(Wald et al., 2023) | Y | Y | Y | Y | P | N | 4.5 | 75 |
| PS25(Feng & Wang, 2023) | Y | Y | Y | Y | Y | N | 5.0 | 83 |
| PS26(Mann et al., 2023) | Y | Y | Y | Y | N | N | 4.0 | 67 |
| PS27(Moutsinas et al., 2023) | Y | Y | Y | Y | P | N | 4.5 | 75 |
| PS28(Yondler & Blau, 2023) | Y | Y | Y | Y | P | N | 4.5 | 75 |

*Digital Reading Interventions and Literacy Outcomes*

As it stands, recent studies within the theme of digital reading interventions consistently emphasize the potential and complexity of technology-mediated interventions to enhance reading-related outcomes in primary English learners. Large-scale and experimental investigations reveal that digital programmes do not always improve reading comprehension, especially when implementation fidelity and learner engagement are poor. For instance, Flynn et al. (2025), in their cluster randomised controlled trial, reported non-significant overall improvements in reading outcomes after engaging a structured online reading programme vis-à-vis education-as-usual, largely due to low intervention compliance and difficulties with implementation. Similarly, in an empirical study, there was no statistically significant difference in reading comprehension between learners with e-books and print texts, though there was a more positive learner attitude toward digital formats (Moutsinas et al., 2023). In contrast, Hamsiah et al. (2024) noted a correlation between integrative Information Technology (ICT)-based reading instruction and reading comprehension, positively, implying that ICT and reading comprehension instruction should occur within a coherent teaching structure rather than as single tool interventions. Taken together, these results suggest that digital reading interventions are effective in promoting literacy development, albeit the effectiveness of these interventions to varying extents depends on an instructor's pedagogical approach, learner dispositions and contextualizing aspects rather than the overall digital technology use.

A second group of papers highlights the importance of targeted instruction in a digital context that targets foundational reading skills, including fluency, phonological awareness, and vocabulary. Palmqvist et al. (2025) demonstrated that digital reading instruction consisting of multiple components yielded better developmental trajectories in phonological awareness for students with intellectual disabilities than single-component methods. In a similar vein, Whitney and Ackerman (2023) presented that a digital fluency programme (including repeated reading and immediate feedback) was associated with quantifiable increases in oral reading fluency in individuals with significant reading difficulties. The implications of embedded supports are also supported by evidence from large-scale data analytics. Diprossimo et al. (2023) discovered that digital reading platform-based vocabulary scaffolds were related to better comprehension, especially for early readers and low literacy learners. However, Heß et al. (2024) highlighted that improvements in word recognition and phonological processing do not necessarily translate into improvements at the text comprehension level, highlighting the importance of balanced intervention models that tie lower-level decoding skills to higher-order comprehension processes. Collectively, these studies indicate that digital reading tools support literacy at their most efficient when they are pedagogically purposeful and mapped to certain literacy subskills.

A third body of evidence examines learner interaction, engagement, and contextual variation in digital reading and reveals nuanced effects across age groups and learning contexts. Moss et al. (2024) suggested that digital reading tools, such as previewing questions prior to reading, predicted processing time over comprehension accuracy, especially for older students with enhanced cognitive ability. Quinn et al. (2024) emphasized how young children's writing practices differed across digital and traditional contexts, and these digital modalities affect literacy practices in ways that reach beyond comprehension. At the design level of programs, Cockerill et al. (2024) reported a large-scale digital vocabulary intervention protocol that enhanced reading comprehension indirectly through vocabulary building, indicating an increasing focus on extensible technology-supported literacy interventions. Feng and Wang (2023) also suggested that an AI-supported bilingual digital reading environment promoted reading motivation, comprehension, and independent learning more efficiently than paper-based methods adopted by primary learners. Together, these results imply that digital reading interventions contribute to literacy outcomes in diverse ways (motivation, strategy use, and language exposure). Taken together, the evidence from the studies demonstrates potential in digital reading interventions, but it is a case of successful integration of pedagogy, learner needs, and technological affordances, rather than universal uptake in contexts.

### Digital Literacy, Media Literacy, and Citizenship

In the domain of digital literacy and citizenship research, it is increasingly evident that digital competencies are necessary for meaningful access to digital text, assessment and learning environments. According to previous empirical studies, a lack of digital literacy skills significantly restricts learners' proficiency in navigating digital platforms, interpreting online information, and executing task-related operations. Nurbekova et al. (2025) stated that elementary learners with very little exposure to digital tools experienced severe difficulties on electronic reading tests and were challenged to misinterpret the tasks and thus performed lower. Similar skill-related challenges were observed among first-year university students, with Budiman and Syafrony (2023) revealing that overall knowledge, data, and content-making literacy were low, which influenced participation in the online learning setting. Furthermore, extending this concern to learners with extra needs, Wang et al. (2025) asserted that structured and scaffolded instruction has enabled adolescents with developmental disabilities to gain and retain critical digital transaction skills. Generally, these data underscore that digital literacy is not an automatic ability, but a skill acquisition process which needs to be formally taught in an academic framework. Within contexts of technology-mediated learning, digital literacy proficiency emerges as a significant driver of access, equity, and performance, reinforcing the argument that early and ongoing enactment of digital literacy instruction is critical for supporting both early academic participation and literacy development.

In addition to individual learner literacy skills, there exists a wealth of work on how educators and pedagogical systems influence digital and media literacy outcomes. Moreover, research regularly uncovers disconnections between superficial digital engagement and higher-level evaluative competencies necessary for media literacy. Bruno et al. (2025) revealed significant skill gaps in teachers evaluating visual and contextual digital information, although moderate skill levels identified the overt reliability cues. Indeed, these findings are consistent with those of Yondler and Blau (2023), who mentioned that teachers' profiles vary according to their pedagogical centrality and styles of digital mediation, meaning that instruction varies substantially according to their digital literacy orientations and positions. Similar anxieties exist in preservice teacher education, as established in von Gillern et al. (2024), who observed

that digital citizenship concepts such as safety, civic engagement and technological responsibility were recognized as relevant to literacy education but not systematically integrated into curricula. Pedagogic framework development and curricular alignment also contribute to literacy outcomes, as was clearly evident in Yufiarti and Yetti (2024), where pedagogical innovation and culturally relevant adaptation had a robust impact on the development of digital literacy in students. Altogether, such studies highlight that digital literacy and citizenship education are pedagogically mediated processes that require intentional instructional design, teacher development, and curricular cohesion rather than incidental exposure to technology.

An adjacent area of research considers the place of digital literacy in the larger sociocultural and media milieu, highlighting the interpretive pressures on learners in modern multimodal settings. According to Schneider (2024), closed captioning in children's television varies significantly in reading level and linguistic complexity, raising concerns about the availability of accessible, comprehensible media input for young and deaf learners. Findings support the idea that the quality of media literacy goes way beyond reading speed to encompass content appropriateness and cognitive accessibility. Similarly, Wald et al. (2023) also reported that parental digital literacy levels and parents' media mediation practices influenced children's engagement with virtual assistants, suggesting literacy development has become more dependent on family-technology contexts. The development of digital literacy across the lifespan is further illustrated by Hauge et al. (2024), who discovered substantial increases that emerged for adult English learners who received explicit training instruction in digitalized classroom strategies. Across these studies, digital citizenship is presented as a complex and manifold notion of ethical use, critical critique, social interaction and participation, and an environment for cultural knowledge. Taken together, these studies present that digital literacy and media literacy are not tangential to reading development but are structurally embedded in how learners gain access to, evaluate and construct meaning from, and interact with text in computer-mediated societies. Effective literacy education needs to go beyond mere functional reading skills to include critical, ethical and participatory elements of digital citizenship.

### *Inclusive, Adaptive, and Technology-Supported Learning for Diverse Learners*

Research on inclusive and adaptive technology-supported learning consistently indicates that digital interventions are pivotal for facilitating learner diversity, particularly for learners from varied cognitive, linguistic and sensory backgrounds. Adaptive digital environments are often reported to be effective at providing individualized training and reducing barriers to literacy development. Zaini et al. (2025) highlighted that adaptive digital game-based learning environments, created using user-centered practices, developed on the basis of language skills by catering for learner-based needs at the individual level, in features such as feedback systems, adaptive content, and virtual tutors made by artificial intelligence. Equally, a learner-centred design is also observed in early childhood settings, where Rina et al. (2025) discovered that the use of digital media combined with a communication-based pedagogical approach supported the basics of literacy in developmentally appropriate ways. These results are consistent with Murcia et al. (2025), who argued that co-designed digital exhibits based on embodied cognition, mediated in sensory modalities, had a positive impact on engagement and cognitive processing among younger learners. Taken together, these studies suggest that the degree of digital literacy inclusivity is positively correlated with principles of adaptive design, learner agency, and pedagogical alignment in contrast to simply uniform deployment across technology.

A considerable amount of the literature focuses on the experiences of children and young readers with disabilities, and on the role of digital tools in the development of participation, communication, and literacy. Supporting research with learners who have intellectual or communication difficulties indicates that using technology supports for literacy education can have positive effects on learning outcomes when combining numerous strategies. Samuelsson et al. (2024) also reported on this side of their research that teachers saw integrated phonics and comprehension applications as a key tool for designing organized and supportive learning environments for students with intellectual disabilities, as well as supporting literacy and communication. Comparable positive effects were observed within socially inclusive settings. Using digital literacy strategies in mixed-group educational settings leads to improved speech development and social tolerance among children with hearing loss (Abdullina & Zolotovitskaya, 2024). Mann et al. (2023) corroborated these findings. Similar online reading strategies were noted among deaf and hearing students who used similar approaches in appropriate digital contexts, which supports the notion that explicit teaching of online search and evaluation skills must take place. These two studies are consistent with the premise that inclusive digital literacy practices can promote academic advancement while contributing to social integration and equal involvement in engagement between the learner population. In addition to specific learner outcomes, the reviewed literature reveals wider pedagogical and systemic impacts of technology-supported inclusive education.

It has been noted that digital interventions have more successful results when integrated (including deliberate pedagogical processes) in a supportive instructional framework. Teachers' views, as reported by Samuelsson et al. (2024), emphasized that digital tools serve as enablers of instructional planning and differentiation rather than substitutes for pedagogy. In early teaching contexts, Rina et al. (2025) demonstrated that teachers played a mediating role as intermediaries that produced a set of digital and non-digital resources that mediated to deliver sustainable literacy ecosystems responding to the development needs of learners while preserving their learning in such environments. Similarly, Murcia et al. (2025) highlighted the benefit of the co-design process whereby educators and industry partners work together to develop experiences which are inclusive and cognitively meaningful. Through the review papers considered, adaptive and inclusive digital literacy approaches are depicted to be a complex system, which integrates technology, pedagogy and learner diversity. Generally, evidence indicates that inclusive digital reading interventions facilitate literacy development best with a focus on adaptiveness, accessibility, and instructional intentionality. This data supports the perspective that when considering technology-enabled literacy instruction, it should also be viewed as an integrated instructional approach that covers diversity (cognitive, linguistic, social) in our current classrooms.

**Conclusion**

Specifically, this review aims to compile current empirical evidence on interventions using digital reading for primary English learners to improve reading comprehension by focusing on the literature reviewed between 2023 and 2025. Following the PRISMA protocol, we systematically identified, screened, and analysed peer-reviewed journal articles collected from the Scopus and ERIC databases to produce an impressive 28 good primary studies corpus. The review was intended to investigate three key research questions based on the PICo framework related to the literacy effects of digital reading interventions, the significance of digital and media literacy competencies, and the success of inclusive and adaptive digital strategies for various types of learners' literacy. By combining evidence across these dimensions, the review

addresses fragmentation in the current body of literature and promotes a broader comprehension of how digital reading interventions operate in today's primary English studies settings.

In summarizing results, the search findings identified three major and interrelated themes. First, there is evidence for the positive impact of digital tools, under Digital Reading Interventions and Literacy Outcomes, on improving reading comprehension, fluency, vocabulary and motivation. However, the results remain highly dependent on alignment with instruction, fidelity of implementation and student engagement. Second, evidence in Digital Literacy, Media Literacy, and Citizenship indicates that reading comprehension in digital contexts cannot be detached from the digital competencies, critical evaluation practices and ethical use of multimodal texts of learners and teachers. Third, studies have reported that adaptive design, user-centred development, and assistive digital features in learning are positively influential in increasing accessibility and participation for learners with diverse cognitive, linguistic, and sensory characteristics when learning supports Inclusive, Adaptive, and Technology-Supported Learning for Diverse Learners. Together, this evidence emphasizes the transition away from representing digital reading as just an additional technological approach and towards a pedagogically driven, learner-responsive ecosystem. The review is also significant for its contribution to the literature by providing a thematically well-formed model of the interaction between literacy outcomes, digital competencies, and inclusion, something that very few studies have explored in isolation.

On a practical level, the results offer noticeably clear implications for the design and implementation of instructional practices, policies for educators and the development of systems. Digital reading interventions are most successful when developed within well-structured instructionally developed pedagogical structures, supplemented by teacher professional development packages that integrate with, and reflect learners' developmental needs. Digital literacy and citizenship should be specifically embedded in reading curricula by policymakers and curriculum designers, as well as by developers, to foster adaptive and inclusive features that support diverse learners. However, the limitations of this review included data access from two databases, inclusion of only English-language publications, and a fixed publication window for the most part, which could limit access to pertinent emerging studies. Future studies should extend these assessments to longitudinal designs, wider geographical contexts, and mixed methods to assess long-term comprehension outcomes and the dynamics of implementation. This review collectively emphasizes the need for consistent synthesis of evidence to unpack complex research environments and support informed decisions. The systematic reviews in this space are critical to moving forward theoretical understanding, promoting evidence-based practice, and informing potential new approaches to improving digital reading interventions for primary learners of English.

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| **Conflict of Interest Statement:** | The authors declare that there is no conflict of interest regarding the publication of this paper. All authors have contributed to this work and approved the final version of the manuscript for submission to the International Journal of Modern Education (IJMOE). |
| **Ethics Statement:** | This study did not involve any human participants, animals, or sensitive data requiring ethical approval. The authors confirm that the research was conducted in accordance with accepted academic integrity and ethical publishing standards. |
| **Author Contribution Statement:** | All authors contributed significantly to the development of this manuscript. Nadhirah Nor Azmi was responsible for the conceptualization, methodology, and overall supervision of the study. Khazaila Zaini handled data collection, analysis, and interpretation of results. Ainor Salikin Jamaludin contributed to the literature review, drafting, and critical revision of the manuscript. All authors read and approved the final version of the manuscript prior to submission. |

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