

## **Digital Literacy in the Early Years: Enhancing Language Acquisition through Interactive Media**

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### **Abstract**

The digital media are now an integral part of the communicative ecology of early childhood, positioning young children at the center of a significant social experiment concerning learning, language, and attention (Hirsh-Pasek et al. 3). This paper argues that early digital literacy should not be viewed as an early technical process, but as an emergent and multimodal sense-making process shaped by relationships, cultural contexts, and ethical limitations. Drawing on the synthesis of existing evidence, the article examines the power of interactive storybooks, literacy apps, and socially contingent video interactions to stimulate vocabulary development, narrative understanding, and pragmatic language, particularly when digital capabilities support, rather than disrupt, the story world (Takacs, Swart, and Bus 698; Bus, Takacs, and Kegel 81). Simultaneously, empirical evidence cautions against poorly conceptualised interactivity replacing dialogic interaction, augmenting cognitive load, and impairing story understanding (Parish-Morris et al. 200; Takacs, Swart, and Bus 699). The article offers a critical reflection on design, pedagogy, and power, contextualising early digital literacy within issues of surveillance, persuasive design, and the commodification of attention (Zuboff 8; Radesky et al. 1). It concludes with a proposal of evidence-based principles for ethically sound, language-sensitive interactive media to be implemented in inclusive early childhood environments.

### **Keywords**

Digital literacy, early childhood, language acquisition, interactive media, digital storybooks, multimodality, dialogic reading, inclusive pedagogy.

## Introduction

The prekindergarten years are increasingly characterised by ubiquitous touchpoints, app platforms, and digitally mediated stories that permeate households and educational settings. Consequently, the central pedagogical question shifts from whether children will experience interactive media to how these experiences can be language-rich rather than language-thin. Modern scholars caution that young children are undergoing a significant, unplanned experiment in technology exposure, and educational assertions often precede educational evidence (Hirsh-Pasek et al. 3). For early childhood educators, particularly those working in inclusive and special education contexts, this presents a dual challenge: not only to mediate access to contemporary literacies but also to safeguard developmentally appropriate conditions for language acquisition, such as sustained engagement, shared attention, and play-based meaning-making.

This article argues that digital literacy in the early years is fundamentally a linguistic and interpretive activity, rather than solely a technical one. During early childhood, literacy extends beyond the simple process of decoding print; it encompasses the acquisition of narrative schemas, vocabulary, pragmatic competence, and the development of metalinguistic awareness. These capacities are fostered through social interaction and repeated exposure to stories, symbols, and the systematic structure of language. Online environments offer the potential to enhance such interaction, as multimedia resources can support comprehension by linking words to images, sound, and movement (Bus, Takacs, and Kegel 81). However, digital design also presents potential challenges, including numerous interruptions, reward loops, and non-concurrent "hotspots," which may impede sustained attention required for narrative construction and collaborative reading (Takacs, Swart, and Bus 699; Parish-Morris et al. 200).

The central argument presented here posits that interactive media stimulate early language acquisition only when their interactivity is linguistically and narratively contingent. Specifically, adult guidance—or carefully designed scaffolds—directs a child's attention toward meaning, and ethical standards constrain the extraction and manipulation of children's data and attention. This argument is supported by three key moves. First, it alters digital literacy in early childhood by configuring multiliteracies and multimodality, which foreshadows the interpretive over instrumental aspect of digital literacy (Law et al 5; Nascimbeni and Vosloo 4).

5; Nascimbeni and Vosloo 4). Third, it summarises empirical evidence concerning digital storybooks, apps, and video chat and critically discusses inclusive pedagogy and power, paying attention to the political economy of children's media spaces (Zuboff 8; Radesky et al. 1). Second, it summarises empirical evidence concerning digital storybooks, apps, and video chat and critically discusses inclusive pedagogy and power, paying attention to the political economy of children's media spaces (Zuboff 8; Radesky et al. 1).

Digital literacy is frequently discussed as an educational need, yet its definition lacks global uniformity within policy and research. A World Systems Commission, commissioned by UNESCO, identifies digital literacy as multidimensional, compositional, and interwoven with other literacies, rather than as a distinct concept (Law et al. 5). This framing is particularly important in early childhood, as an overly functional definition—such as pressing buttons or navigating menus—risks conflating operational fluency with interpretative competence. Young children can be highly effective using gesture-based navigation, but require substantial assistance in deriving meaning from narratives, symbols, and multimedia texts.

One of the most notable UNICEF scoping documents on digital literacy frameworks highlights this heterogeneity: these frameworks align around information and data literacy, communication, collaboration, safety, and content creation, and often mirror various political presuppositions about childhood, risk, and agency (Nascimbeni 17). Frequently, these structures are constructed with older children or adults in mind. During the early childhood stage, the focus on literacy shifts from independent critical evaluation to participation in language practices through guided interaction. It is during these early years that a developmental transition from competence as performance to competence as supported meaning-making is needed.

This translation employs a multiliteracies approach, defining literacy as design—the ability to create meaning across modes, media, and cultural contexts (New London Group, 60). Multimodality is fundamental in early childhood, representing an initial state of communication involving gesture, intonation, images, movement, and touch as children learn language and narrative. Interactive media are not merely screens; they constitute multimodal spaces where symbolic systems converge. Literarily-critically, the digital storybook functions as a hybrid text, combining narration, visual design, soundscapes, and interactive prompts. A key interpretive

question is whether these multimodal resources enhance narrative and vocabulary comprehension, or whether they introduce distractions, fragmenting the text into a series of decontextualised stimuli.

This difference aligns with empirical studies of technology-enhanced storybooks. Reviews emphasise that congruency between multimedia elements and narration supports comprehension and directs the child's attention to narrative information (Bus, Takacs, and Kegel 81). Conversely, incongruent interactivity can lead to interpretive issues, transforming the text from a coherent world into a series of discrete events accessible through interaction. Philosophically, this represents a non-neutral shift in form. Furthermore, the child's experience of narrative is intrinsically linked to temporality—the development of meaning through sequence, pattern, and anticipation. This interactive design, which promotes the option of continually swapping when used, poses a threat to undermining the conditions in which narrative grammar is internalised.

The quality of digital literacy in the early years encompasses the supported capacity for multimodal meaning-making, extending language, maintaining narrative coherence, and developing ethical awareness regarding media practices. This definition is anti-technophobic and anti-technophilic. This definition is neither technophobic nor technophilic; it approaches interactive media as cultural artefacts whose value is determined by form, context, and legislation, rather than solely by the presence of technology.

Learning a language involves more than simply encountering words; it requires communicative interaction. An original investigation examining video chat and toddler learning found that language learning occurs in a social context (Roseberry, Hirsh-Pasek, and Golinkoff 956). This assertion has significant implications for interactive media. Specifically, the crucial variable is not the presence of the screen, but rather the extent to which the surrounding environment responds significantly to the child's attention and verbal expressions. Video chat can estimate the contingent responsiveness of face-to-face communication more accurately than non-contingent video, and this contingency influences the acquisition of verbs and the generalisation of language forms among toddlers (Roseberry, Hirsh-Pasek, and Golinkoff 956).

Another claim that is inclusive of a dialogic view of learning is the one that it makes. Another claim, framed within a dialogic view of learning, is that research studies in early literacy utilising dialogic reading consistently demonstrate that children acquire language when adults encourage predictions, inferences, and explanations, rather than simply listening. The implication for digital environments is that dialogue can be displaced or supported by interactivity. Specifically, when an app's interactivity is designed as prompting with responsive feedback (open-ended), it may simulate dialogic scaffolding. Conversely, interactivity created through tapping animations lacking relevance to the story's meaning prioritises sensory novelty over engagement with the language itself.

This is exacerbated by cognitive processing limitations. Multimedia learning and cognitive load hypotheses emphasise that, due to the limited processing capacity of the learner, extraneous stimuli may deplete resources required for comprehension and retention of the material (Takacs, Swart, and Bus 699). In the case of young children, whose executive functions and sustained attention are still developing, the risk of overload is particularly acute. A meta-analysis of technology-enhanced storybooks indicates that children may be required to constantly alternate between listening and playing, and the resultant effects on story comprehension stem from cognitive overload (Takacs, Swart, and Bus 699). Consequently, divided attention results in divided language intake—a reduced ability to associate words with unified referents, a diminished capacity for communicating through full narrative syntax, and a reduction in conversational turns to unify vocabulary and pragmatics.

In comparison, encoding can be reinforced by design that favours temporal contiguity, which is the alignment of narration and related visuals. An electronic storybook review makes the argument that understanding is better when an image and sound accompany the story and that it also provides better understanding when the sources are coherently available simultaneously, (Bus, Takacs, and Kegel 81). This can be considered in line with dual coding methods and it proposes a principle of early years digital pedagogy, namely that multimodality should operate as interpretive reinforcement, rather than as parallel entertainment. Interactive media are constituted through language spaces that are more or less accommodating to acquisition. These are the following key mediators: social contingency, narrative coherence, adult co-engagement and

cognitive load. However, these mediators are not coincidental, but the processes that transform the interactive media into a language development scaffold or an attention rival.

The empirical literature on interactive media and early literacy lacks definitive support or condemnation. Instead, this study establishes conditional effects: in specific design and situational circumstances, small advantages may be observed, while in others, quantifiable risks related to distraction or social isolation may exist.

One of the most concise syntheses has been developed through a large meta-analysis. According to its report, technologically enriched storytelling yielded a small but significant positive effect on story understanding and expressive language use compared to conventional storytelling (Takacs, Swart, and Bus 698). Notably, the analysis distinguished between multimedia and interactive elements: multimedia content—such as animated images, music, and sound effects—was reported to be beneficial, while interactive content—including hotspots, games, and dictionaries—was found to be distracting (Takacs, Swart, and Bus 698). This does not imply that digital media are inherently superior, but rather that certain digital characteristics can support language development under specific conditions—namely, when they are semantically sound and do not disaggregate attention.

The design problem is addressed through a complementary review of electronic storybooks. It frames the challenge as specifying the conditions under which technology-enhanced narratives affect story retention, potentially increasing or decreasing their effectiveness, and offers evidence-based design recommendations to maximise learning and minimise adverse effects (Bus, Takacs, and Kegel, 81). This shift moves the focus from a format-function dichotomy to the roles of the educator and designer, centering the pedagogical question on how interactive capabilities impact listening, speaking, and meaning-making.

Studies of shared reading consistently reveal a common concern: dialogic interaction can be diminished by electronic features. Researchers comparing electronic console books with traditional books among parent-child dyads concluded that the presence of an electronic feature adversely influenced parent-child dialogic reading and children's story comprehension (Parish-Morris et al. 200). Linguistic cost reduction reduces comprehension, and conversational turns are

minimised—specifically, interactions that construct vocabulary and pragmatic competence. When digital reading is dominated by device management and feature activation, language-fulfilled talk is replaced.

According to other studies, co-reading by adults remains an important scaffolding, even within digital contexts. Researchers, in a study of e-books with audio narration among children, found that children remembered the most information about the e-book after reading with a parent (Dore et al. 24). This parental advantage is not emotional but rather abstract. Adults function as interpretive mediators, making connections in vocabulary, situating the narrative, and controlling pacing, as well as facilitating the transfer of the narrative into a conversation. While audio narration may facilitate independent access for pre-readers, it is not a sufficient replacement for responsive dialogue.

The engagements also highlight the complexities inherent in comparing print and digital narration within research. One study in \* AERA Open \* indicates that children can exhibit comparable engagement across formats, albeit with subtle differences in comprehension and vocalisation; participants in the e-book condition tended to discuss the device more frequently (Reich et al. 1). This is significant for language learning because discussion of device functionality does not equate to discussion of narrative coercion. For example, a child saying "Swipe!" demonstrates a procedural register, constructing language rather than narrative. The pedagogical objective is not merely to produce speech, however, but to produce speech that will perform interpretive labour—predictions, explanations, and retellings of stories.

Apps exacerbate the issue, as they are frequently marketed as educational despite insufficient regulation. Researchers, in a programmed-setting review of educational apps, found that these apps are largely unregulated and untested (Hirsh-Pasek et al. 3). They argue that learning science emphasises the distinction between genuine education and simple interactions. In early childhood, language learning is most effectively reinforced through social interaction—learning is strengthened by active, engaging, meaningful, and social activities rather than repetitive exercises disguised with animations (Hirsh-Pasek et al. 4). That is, interactivity does not equate to learning; it becomes educational only when it facilitates understanding of language use within a communicative context.

Video chat studies offer a valuable counterpoint, as they preempt contingency. Language learning is enhanced compared to non-contingent video interactions when a child's responses modify the course of the interaction (Roseberry et al. 1996). This suggests a critical design and pedagogical understanding: interactive media can facilitate language acquisition when they mimic the responsiveness of human conversation and when adults are co-engaged in their use. Collectively, these observations support a hypothetical hypothesis: interactive media can support early language learning if they (a) maintain narrative coherence, (b) reduce incidental interactive load, (c) encourage dialogic interaction, and (d) provide contingent feedback on language meaning, rather than on clicking.

An inclusive early year's practice would not only need to raise the question of whether interactive media have the potential to facilitate language development generally, but also seek to determine whether they can help to eliminate barriers to children whose access to conventional literacy practices is limited due to disability, language background, or socioeconomic influences. The study in this case is provisional and not conclusive, but a number of results indicate significant possibilities.

To begin with, there is growing evidence in the realm of large-scale reviews that offer the hypothesis that children perceived to be disadvantaged because of environmental influences (e.g., low socioeconomic status or bilingual family backgrounds) are particularly vulnerable to the advantages and the traps of the technological additions. Supported visualisations and synchronised narration in multimedia facilitate learning, while distracting interactive features can be especially detrimental (Takacs, Swart, and Bus, 2013). This bilateral sensitivity should inform special educational design; carefully selecting multimedia to avoid subjecting vulnerable students to the cognitive demands of meaningless games and hotspots may offer a benefit.

Second, research on electronic storybooks suggests that well-designed technology-enhanced materials can improve learning experiences for vulnerable children, aligning with theories of differential susceptibility and learner-environment interaction (Bus, Takacs, and Kegel, 2011). Regarding early childhood special education, the conclusion is nuanced: technology should not be considered a universal solution but rather a potentially effective accommodation,

particularly when it reduces language barriers, enhances meaningful repetition, and facilitates active engagement.

Third, inclusive pedagogy requires a deliberate design ethic. Universal Design for Learning (UDL) emphasises providing multiple means of representation, engagement, and expression; interactive media can implement these concepts by offering audio narration, adjustable pacing, visual scaffolding, and opportunities for expressive response, such as through speech, gesture, or symbol-based communication (Meyer, Rose, and Gordon). However, these affordances must be tested within real classroom contexts. While such resources can enhance representation, they may also disperse attention, potentially hindering language development. The challenge lies in aligning feature sets with learning goals—for example, integrating narration with highlight-tracking to support word awareness, or utilising story apps that promote narrative inference rather than simple tapping.

Relationships cannot be detached from language development in special educational contexts. Responsive caregiving and pedagogic interaction should be enhanced, rather than discarded, through the use of digital tools. Studies on early technology use demonstrate that children acquire operational abilities by observing and receiving assistance from others, indicating that adult mediation is a crucial aspect regardless of the tool's ease of use (Ploughman et al. 9). This mediation can be facilitated within an inclusive environment, potentially involving structured co-use—such as scheduled dialogic activities, predictable turn-taking routines, and communication resources—that integrate digital actions into language-rich interactions.

Inclusive digital literacy in early childhood requires careful pedagogical consideration and orchestration. Although interactive media may increase access to stories and language practices, this effectiveness is contingent upon integration within relationships and guided by designs that account for cognitive and communicative limitations.

An ideographic narration of digital literacy in the early years should also consider the issue of power: who creates children's interaction spaces, what interests influence their creation, and what kinds of agency children and caregivers possess. This is not an abstract concern. Contemporary children's media are becoming increasingly complex due to data mining and

commercialisation. To articulate the moral stakes clearly, Shoshana Zuboff describes surveillance capitalism as a new economic regime that treats human experience as free raw material for covert commercial activities of extraction, anticipation, and sales (Zuboff, 2019). Although Zuboff does not specifically address early childhood education, its consequences are acutely felt by children, who cannot yet provide meaningful consent to data practices and whose attention, developmentally susceptible, is easily influenced.

In the early childhood literacy context, the political economy is evident in educational apps, which are prioritised based on engagement metrics rather than pedagogical significance. The app marketplace values retention; however, language development is often perceived as tedious, dialogic, and relational. This discrepancy between market motivators and developmental imperatives helps to explain why research consistently demonstrates distinctions between useful multimedia support and distracting interactivity (Takacs, Swart, and Bus 698). This trend poses a risk not only of wasted time but also of cultivating habits of attention focused on novelty and reward, rather than sustained narrative comprehension.

This is also related to family-level dynamics. The phenomenon of parental device distraction has been studied, and the term \*techno fence\* has been coined to refer to technology-related disruptions of parent-child relationships, correlating these disruptions with a lack of responsiveness and an increase in behavioural issues (McDaniel & Radesky). Specifically, in the context of language learning, this manifests as a reduction in the number of conversations, the amount of contingent feedback, and the proportion of fragmented joint attention. Psychologically, language development relies on quality interaction; philosophically, the initiation of the child into language is also an initiation into forms of mutual life. Consequently, a technologically interrupted communicative space may exert pressure, thinning the dialogic space within which language becomes meaningful.

These issues are examined through a literary-critical lens, focusing on the workings of narratives. Stories are not simply vehicles for vocabulary; they are symbolic worlds within which children develop a sense of temporal sequencing, causality, and the process of inference. When interactive media approach stories as vessels for mini-games, they risk eroding narrative absorption and undermining the foundational architecture of understanding. The text transforms

into an environment of clickable surfaces rather than a consistent world that demands an interpretive approach. Consequently, research measuring the quantity of talk during digital reading tends to distinguish between content-rich discourse and device-management talk (Reich et al. 1; Parish-Morris et al. 200). This distinction is significant, suggesting that children are either practising interpretive discourse or procedural instruction-following.

The reviewed evidence suggests that interactive media can facilitate language acquisition when they imitate, encourage, or maintain dialogue; however, they may inhibit it when they replace sensation with interaction or disrupt story structure. Consequently, early years digital literacy can be operationalised based on principles integrating psychology, literary theory, and ethics.

Contingent co-engagement—characterised by adults co-reading, co-playing, or co-watching in a manner that fosters conversational turns and joint attention, particularly in digital reading contexts (Dore et al. 24; Roseberry, Hirsh-Pasek, and Golinkoff 956).

Narrative-congruent multimodality refers to the integration of multimedia elements—such as sound, images, and text—that reinforce the meaning of a narrative through their temporal and sequential association, rather than through the provision of extraneous stimulation (Bus, Takacs, and Kegel, 81).

Limited extraneous interactivity—such as hotspots and games lacking narrative meaning—increases cognitive load and interferes with comprehension (Takacs, Swart, and Bus 698; Parish-Morris et al. 200).

Non-punitive flexibility, coupled with monitoring, is crucial. The flexibility features should be more representative and expressive; however, tools must be selected and regulated to prevent manipulative design and data mining of children (Zuboff 8; Radesky & Gleaves 1).

These assumptions imply a pragmatic reversal: the pedagogical value of interactive media in early childhood derives not from novelty or interactivity, but from its function as a site for dialogic meaning-making, which develops language skills and maintains children's agency.

## Conclusion

The issue of digital literacy in the early years should be understood as emergent participation in multimodal meaning-making through dialogue, narrative coherence, and ethical considerations, rather than solely tool mastery established in early childhood. Reviewed research indicates that interactive media can facilitate vocabulary learning and storytelling when multimedia characteristics are semantically consistent and when adults engage in multimedia interaction to produce language-rich interactions (Takacs, Swart, and Bus 698; Dore et al. 24). Conversely, interruptions to the narrative through electronic characteristics and the dominance of electronic means may decrease the dialogic reading process and diminish comprehension levels (Parish-Morris et al. 200). Consequently, an informed early years pedagogy must evaluate interactive media based on its language and ethical implications, considering what children can do through interaction—specifically, what they are able to do, say, comprehend, and become as a result of engaging with modern texts.

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