



Digital Parenting in the Era of Artificial Intelligence: The Role of Parents in Guiding Early Childhood Interaction with Smart Technology

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Abstract

This study explores the role of parents in guiding early childhood interactions with artificial intelligence (AI)-based technologies within a digital parenting framework. Employing a descriptive qualitative approach, data were collected from ten parents of children aged 4–6 through in-depth interviews, limited observations, and documentation. The findings indicate that active mediation was practiced by 8 out of 10 parents, while restrictive mediation remained dominant in regulating screen time and access. Co-using strategies were consistently applied by only 3 parents, primarily due to time constraints and limited digital literacy. A key quantitative finding reveals that approximately 70% of parents lacked sufficient understanding of AI principles, resulting in supervision focused more on technical control than reflective educational guidance. The novelty of this study lies in integrating parental AI literacy into the digital parenting mediation model, an aspect that has received limited attention in early childhood research. Theoretically, this study extends digital parenting theory by positioning AI literacy as a critical mediating variable. Practically, it highlights the need for AI literacy programs for parents and the development of child-centered AI technologies that promote active family engagement and meaningful parent–child interaction.

Keywords: artificial intelligence, digital parenting, early childhood.

Introduction

In today's rapidly evolving digital era, early childhood interactions are no longer confined to conventional media but increasingly involve intelligent technologies powered by artificial intelligence (AI), such as educational robots, adaptive learning applications, and interactive toys. Recent global studies, such as those by Neugnot-Cerioli and Muss Laurenty, highlight from an interdisciplinary perspective that the integration of AI into children's environments can enhance both cognitive and socio-emotional stimulation, while also posing risks that must be addressed through parental involvement and ethical regulation (Neugnot-Cerioli et al., 2024). Within the Indonesian context, early childhood digital literacy has become increasingly relevant alongside the exponential adoption of digital devices starting from preschool age (Khairunnisa et al., 2025).

Several studies in Indonesia indicate that parents' understanding of digital literacy has relatively improved. Reswita et al. (2025) reported that following a digital-literacy outreach program at TK IT Model Madani Ar-Rahman, parents' understanding increased significantly from 47.9% to 69.2% (Reswita et al., 2025). Khotimah et al. (2023) found that parents at an integrated early childhood education (PAUD) center in Pontianak demonstrated readiness to

teach digital literacy to children aged 5–6 years, with operational readiness scores reaching 86% (Hikmah Husnul Khotimah, Dian Miranda, 2024). Rahayu et al. (2022) likewise noted that parents' digital-literacy levels in Depok were high in terms of access and comprehension, although content selection still needs improvement (Rahayu et al., 2022).

The use of the term “digital parenting” in local literature has grown over the past five years. Maisari and Purnama examined digital-parenting practices at RA Bunayya Giwangan (Yogyakarta) and found that parents set rules for gadget use, accompany their children, employ parental controls, and balance digital interactions with real-world activities. These strategies were effective in stimulating logical thinking among children aged 5–6 years (Maisari & Purnama, 2019). Meanwhile, Nugerahani et al., writing in the journal PrimEarly, concluded that digital parenting in the digital era encompasses diverse parenting patterns, digital-mediation strategies, challenges faced by parents, and collaboration with early childhood institutions and the wider community (Ilise et al., 2024).

Another study by Annisa Nur et al. states that parents serve as primary role models in children's interactions with technology. Although parents facilitate access, the effectiveness of mediation and the management of children's digital use are not yet optimal and require clearer guidance and greater support (Annisa Nur et al., 2024). These findings clarify that parental mediation is not merely about providing access; it also entails understanding, filtering, and accompanying children's media consumption.

Thematically, most Indonesian studies foreground digital literacy and general digital parenting, yet few explicitly connect these topics to AI technologies. International work such as shows that families using AI-infused video systems for language learning experience increased parental involvement in children's learning and greater reflection on their role as digital companions (An et al., 2022). Likewise, demonstrates how AI can mediate video content by embedding reflective activities for parent–child dialogue, thereby strengthening socio-emotional learning through digital media (Shen et al., 2025). However, adaptations of such approaches to Indonesian PAUD contexts and local parenting practices remain underexplored.

Taken together, these studies point to an urgent need to develop a digital-parenting framework that goes beyond screen rules or content control to include parental AI literacy namely, parents' understanding of the AI technologies their children use, their risks and benefits, and appropriate mediation approaches. The gap between the growth of AI-based educational technologies and parents' readiness in local environments remains a central challenge. From an academic standpoint, local contributions such as those from Riau (Reswita et al., 2025) and Depok provide a quantitative foundation and insights into digital mediation; however, the integration of AI-related aspects into family digital parenting remains limited.

Building on this background, the present research is designed as an exploratory study focusing on digital parenting in the AI era specifically, how parents understand the potentials and risks of intelligent technologies, guide young children's AI-mediated digital interactions, and implement accompaniment strategies attuned to local culture and adaptive parenting styles. The objectives are to explore the forms of early childhood interaction with AI-based smart technologies at home; to understand parents' perceptions of the positive and negative impacts of

these technologies; and to identify the digital-parenting strategies used to oversee children's interactions with AI. Using an exploratory approach that combines qualitative data with a digital-literacy survey, this study aims to contribute theoretically to early-childhood education studies and the practice of digital parenting, while also serving as a reference for policy and practical interventions in Indonesia's PAUD context.

Methods

This study employs a qualitative, exploratory design to probe parents' understandings, experiences, and strategies in accompanying young children as they interact with artificial-intelligence (AI)-enabled smart technologies. This approach was chosen because the topic remains relatively nascent in early childhood education, particularly within the digital-parenting framework that intersects with AI use. The study focuses on how parents monitor, facilitate, restrict, and evaluate children's interactions with smart technologies, whether educational or entertainment-oriented. This focus is articulated into three core aspects: parents' understanding of smart technologies; the forms of children's interactions with AI; and the digital-parenting strategies implemented in the household context.

The research was conducted in Tanjung Pinang Kota Subdistrict, Tanjung Pinang City, Riau Islands Province an urban area with relatively high technology penetration and internet access compared to surrounding subdistricts, and representative of middle-class family characteristics. The informants comprised ten parents with children aged 4–6 years who had been introduced to digital technologies such as educational tablets, AI-based learning applications, or voice-activated interactive toys. Participants were selected purposively based on children's exposure to AI technologies, parents' educational backgrounds, and parents' active involvement in digital parenting. The sample size was determined using the principles of information-rich cases and data saturation.

The primary instrument was a semi-structured interview guide developed from a literature review on digital parenting and AI literacy in early childhood education. Interviews were conducted either face-to-face or online via video calls, depending on informants' readiness and convenience. In addition, observation sheets were used to conduct indirect observations of children's interactions with smart technologies at home, either through parent-shared video documentation or limited real-time online observation sessions. Documentation such as screenshots, activity photographs, and parents' digital diaries was also collected as supplementary data. Data collection was conducted over a two-month period.

The study began with providing participants with detailed information about the research and obtaining informed consent. Interviews were conducted either face-to-face or online, depending on participants' availability. Observations and documentation were carried out indirectly to minimize disruption to family routines and children's daily activities. All data were anonymized and securely stored to ensure participant confidentiality.

Data were gathered through three main methods: in-depth interviews, limited participatory observation, and documentation. The interviews elicited narratives, perceptions, and strategies that parents employed in response to their children's interactions with AI

technologies. Observation captured the context of technology use in the home and how accompaniment was enacted in practice. Documentation enriched the dataset and supported triangulation of information from interviews and observations. Data collection took place over two months, from March to April 2025.

Data were analyzed using thematic analysis through the following stages: transcribing interview data; open coding to identify initial categories; grouping codes into themes; and interpreting meanings in light of relevant theories and context. The analysis was supported by qualitative data-analysis software (e.g., NVivo) to facilitate data organization and to visualize relationships among themes. Trustworthiness was ensured through source triangulation (interviews, observations, documentation), time triangulation, and member checking with informants to confirm the accuracy of interpretations.

Ethical considerations guided the study design, including informed consent, confidentiality of informants' identities, and the right to withdraw at any time without consequence. All procedures were carried out with sensitivity to family dynamics and children's rights, ensuring that the research did not disrupt daily routines or children's activities. With this design, the study aims to provide a holistic and authentic account of digital-parenting practices in the context of young children's interactions with AI technologies, and to inform the development of early-childhood education policies and family digital-literacy programs.

Result/Findings

The findings indicate that young children's interactions with artificial-intelligence (AI)-based technologies in the home fall into three main forms: the use of AI-driven adaptive educational software (e.g., reading and numeracy apps with interactive voice features), interactions with smart toys (e.g., storytelling robots), and conversations with digital assistants (e.g., Google Assistant). Most children engage with these technologies routinely—at least 3–4 times per week—with session lengths ranging from 15 minutes to 1 hour, depending on the device type and parental rules. Use is most prevalent in the evening before bedtime, functioning as a substitute for bedtime stories or as light educational activity.

Table 1 presents a summary of the smart technologies accessed by the child informants in this study.

Table 1. Types of Smart Technologies Accessed by Young Children

No	Type of AI Technology	Product/Platform	Frequency per Week
1	Adaptive learning apps	Lingokids, Khan Academy Kids	5–7 kali
2	Interactive educational robots	Miko 3, Little Sophia	2–4 kali
3	AI-based voice assistant	Google Assistant, Alexa	3–5 kali
4	AI-based educational games	ABCmouse, Montessori Apps	4–6 kali
5	Video platform with AI features	YouTube Kids (Auto Play)	6–8 kali

Interview data show that most parents recognize the benefits of smart technologies for supporting children's language, cognitive, and fine-motor development. However, 70% of informants acknowledge not fully understanding how AI works; consequently, supervision mainly involves limiting screen time and selecting content deemed "safe," rather than applying AI-literacy principles. This suggests a knowledge gap between technology use and AI-informed oversight. As one parent remarked, "I know this app is good because it can adjust to my child's level, but I don't know whether it uses AI or not." This comment reflects many respondents who appreciate functional benefits without understanding the underlying technology.

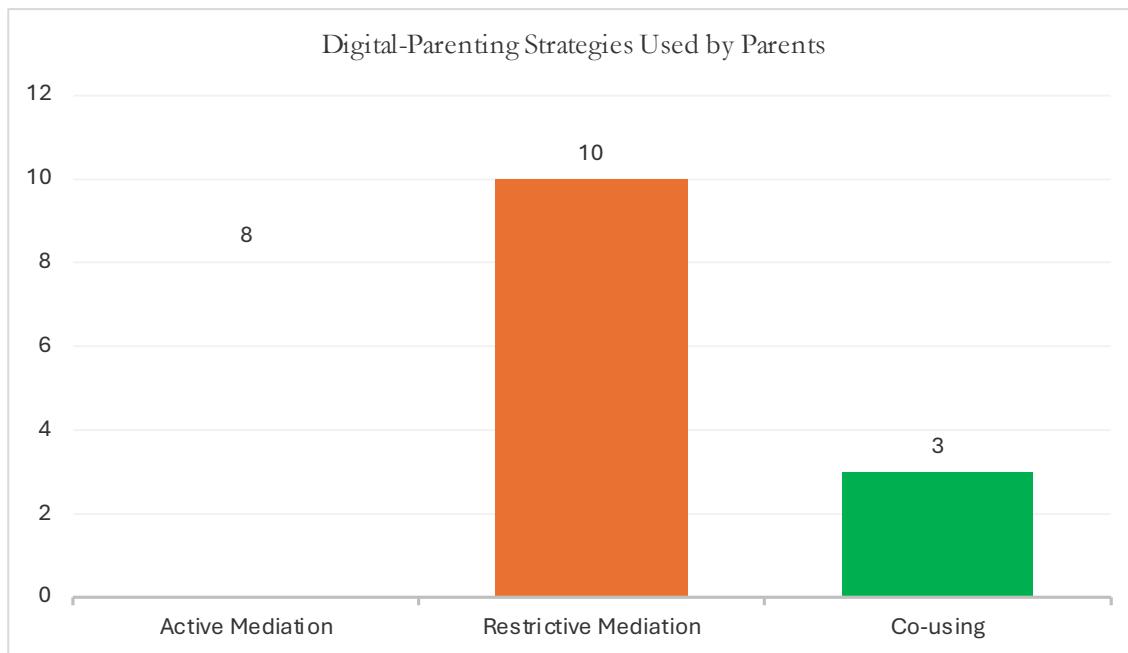


Figure 1. Digital-Parenting Strategies Used by Parents

Note: Data are based on in-depth interviews with 10 informants; a single parent may apply more than one strategy.

From the figure, most parents (8 out of 10) practice active mediation, offering explanations or discussing the content consumed. Nonetheless, restrictive mediation remains the dominant primary strategy to limit duration and access to certain content. Only 3 out of 10 parents consistently engage in co-using, largely due to time constraints and limited understanding of digital content.

Regarding challenges, most parents report difficulty balancing technological access with the prevention of dependency. Another challenge is the absence of official guidelines or practical instructions from early-childhood institutions or government agencies on accompanying young children who use AI-based technologies. In addition, some parents note social pressures such as peers who are already accustomed to digital technology that prompt earlier AI introduction in the home.

Indirect observation through documentation indicates that children using educational robots tend to be more communicative, imitate phrases from the device, and show increased learning interest especially among those aged 5–6. By contrast, among 4-year-olds, unsupervised AI use tends to narrow attention to the screen, with little reflection or healthy question-and-answer processes.

Overall, the study reveals that digital-parenting practices in the face of AI remain adaptive and reactive, and are not yet grounded in a comprehensive framework of technological literacy. Parents need stronger knowledge of AI principles, age-appropriate content, and collaborative parenting approaches that foster active, reflective engagement with children. With enhanced understanding and strategies, parents can more wisely and contextually guide children's interactions with smart technologies in line with their developmental stage.

Discussion

The findings show that interactions with AI technologies such as adaptive apps, educational robots, and voice assistants occur regularly, yet parents' grasp of AI principles is quite limited. This aligns with international studies indicating that many children attribute human-like intelligence and emotions to digital assistants (e.g., Alexa, Google Home), despite not accurately understanding AI agency or data privacy (Najmudin et al., 2023). The novelty of this study lies in its in-depth account of how parents adapt to smart technologies, rather than focusing solely on children's usage.

The distribution of digital-parenting strategies where active mediation outweighs co-using bridges to contemporary digital-parenting literature. Approaches such as StoryBuddy AI storytelling, designed to facilitate active collaboration between parents and children, suggest that systems enabling human–AI interaction with parental involvement can enhance children's engagement and family bonding (Zhang et al., 2022). These findings clarify that when parents actively accompany and discuss as children interact with AI, digital experiences become educational and reflective. Conversely, the relatively low rate of co-using reflects parents' limited time and knowledge, as well as the lack of AI-informed mediation guidelines.

The implications indicate that AI is not merely an entertainment tool; it has become integrated into family routines. The Toddlers, Tech and Talk study reveals that digital interaction can provide multisensory experiences that support language development, particularly when guided by parents. However, effectiveness depends heavily on parental mediation. Our results align with the parental mediation model developed by Nikken and Schols and its Indonesian adaptations active, restrictive, co-use, and technical mediation (Sitanggang et al., 2022) Showing that active mediation and co-use significantly improve the quality of children's interactions with AI.

Even so, parents' perceptions of AI largely focus on operational benefits such as AI's ability to tailor learning levels without deeper comprehension of underlying mechanisms. This points to an AI-literacy gap at the family level. In the scoping review by Solichah and Shofiah (Solichah & Shofiah, 2024), of 260 AI-literacy articles related to early childhood, only 10 were relevant, and most centered on learning media (robots, chatbots) rather than parents' active roles

in AI-informed digital parenting. Accordingly, this study contributes by foregrounding parental AI literacy as an essential component of digital-parenting strategy.

The dominance of restrictive mediation corroborates prior findings that limiting strategies are easier to implement than active mediation, which demands literacy and content reflection (Najmudin et al., 2023). However, our observations show that children adapt socio-cognitively when parents accompany AI use supporting literature on the positive educational impacts of balanced digital parenting (Sari & Syawaludin, 2025). This suggests that combining active mediation with co-use, though still rare in practice, can foster children's language, communication, and reflective skills.

Related work by Sari and Syawaludin (2025) indicates a dual impact of digital-parenting practices on young children's social behavior: positive when AI use is paired with real-world social activity, and negative when excessive screen time leads to social isolation and diminished interaction skills. This accords with our finding that parents who combine AI restrictions with increased offline social activities promote more adaptive social development. In short, balancing online and offline activity is key.

Furthermore, a meta-analysis by Qian et al. (2024) identifies two major risk factors in preschoolers' digital use: low parental digital literacy and technofeference arising from parents' unmindful device use. Both factors contribute to suboptimal cognitive and social outcomes. Our results reinforce that restrictive mediation, when not paired with active parental involvement, tends to be less effective at improving AI literacy or children's reflective capacity regarding technology use.

This study advances theoretical novelty by identifying parental AI-literacy gaps as a critical variable in digital-parenting effectiveness. While Bandura's social learning theory posits that children learn through imitation and observation, in AI contexts parents must be not only physically present but also digitally literate—modelling wise use and explaining boundaries and mechanisms of the tools at hand. We therefore propose a theoretical extension: integrating technology literacy as a mediating variable between digital-media exposure and developmental outcomes.

The study's contributions include: (1) underscoring parental AI literacy as a rarely examined variable in early-childhood contexts; (2) identifying relationships between the three mediation strategies and the quality of children's AI interactions, with active mediation most effective in cultivating reflection and participation; (3) integrating mediative parenting approaches with AI literacy as a new practice framework; and (4) proposing a modification of parental-mediation theory to encompass AI-literacy competencies and parents' reflective capacity toward smart technologies.

An applied illustration appears in systems like eaSEL, which integrate children's socio-emotional learning with parents' reflective engagement around digital video content (Shen et al., 2025). This research shows that when parents deploy active mediation through joint discussion and reflection during AI use, children tend to develop stronger emotional understanding, moral values, and communication skills. However, low parental AI literacy remains a primary barrier to optimizing technology's potential as a shared learning medium.

Integrating these findings with AI-literacy frameworks developed in primary education—such as unplugged approaches emphasizing conceptual understanding over automatic tool use—is highly relevant (Carrisi et al., 2025). In this study, because parents restrict content and duration without understanding how AI works, their strategies have not yet effectively built children's AI literacy. The complement is clear: equipping parents with AI-literacy tools and training would render active mediation more meaningful and effective.

From a contextual standpoint, the study also highlights local dynamics in which access to AI increases without parallel parental-literacy support. This calls for community-based or PAUD-level interventions to equip parents with practical AI literacy, echoing "Healthy Watching" initiatives in Pontianak that successfully improved parents' knowledge and behaviors in guiding children's media consumption (Ayun et al., 2022).

Theoretical implications reaffirm that digital parenting should move beyond restrictive mediation to encompass AI literacy, co-use, and critical parent-child dialogue (active mediation), thus extending traditional digital-parenting theory into AI parenting that requires technical and ethical digital competence. We propose an AI-literacy-based digital-parenting framework that integrates parental-mediation theory with AI-literacy principles, positioning AI literacy as a mediating variable shaping parenting effectiveness, screen-time balance, and the quality of parent-child interactions. Existing theories—such as technofeference and digital literacy—should be broadened to include ethical reflection and understanding of AI.

Practical implications point to the need for: (1) AI-literacy training programs for parents in PAUD communities; (2) AI-informed digital-parenting guidelines covering how to explain data privacy, acknowledge AI fallibility, and foster creative dialogue; (3) integrating AI-informed co-use into family activities (e.g., interactive storytelling, critical Q&A); and (4) PAUD policies that support active parental roles by providing AI digital-parenting modules, akin to AI-PEL training modules that have improved early-childhood teachers' digital competence (Purnama et al., 2022).

The study also cautions that without contextual accompaniment, AI interactions may pose risks such as reduced empathy, social isolation, and screen dependence, as highlighted in medical studies on technofeference in parental behavior (Grace, 2025) and concerns about AI bots' effects on children's trust and emotional bonds (Morrone, 2025). Thus, AI-informed digital supervision is vital to ensure that children's technological experiences support—rather than replace—normal socio-emotional growth.

In sum, digital parenting in the AI era should evolve from predominantly restrictive practices toward a literacy-based, actively engaged, and critically dialogic approach. We introduce AI-aware digital parenting, which combines parental AI literacy, active mediation, and co-use as synergistic strategies. This is not merely adaptation to technology but a contextual, reflective transformation of parenting. These significant findings can underpin future digital-parenting theory and drive programs to strengthen parents' digital-literacy competencies across Indonesia, particularly in locally contextualized early-childhood education.

Accordingly, this study addresses a gap in the literature that has largely overlooked the transformation of digital parenting in the AI era. Parenting can no longer rely solely on restricting

children's access to technology; it must foster an educational relationship among child, technology, and parent. The findings open substantial opportunities for developing new theories, practices, and policies attuned to today's adaptive, collaboratively learning, AI-mediated family life..

Conclusion

This study shows that the parental role within digital parenting in the AI era is multidimensional and significantly shapes the quality of young children's interactions with smart technologies. It reveals that active mediation and co-using are more effective than purely restrictive approaches in supporting children's reflective, emotional, and social development during AI-mediated interactions. Moreover, parents' AI literacy emerges as a key variable that directly influences the effectiveness of these mediation strategies. The findings also highlight a parental knowledge gap regarding AI principles, which constrains the use of smart technologies as participatory educational tools. Theoretically, the study proposes an AI-literacy-based digital-parenting framework that integrates parental-mediation theory with AI literacy for technology-mediated early childhood care. Practically, it recommends strengthening AI-literacy programs for parents, developing active-mediation guidelines within early-childhood settings, and innovating child-focused technologies that foster dialogue and family engagement. Consequently, in the AI era, digital parenting must move beyond screen restrictions toward an educational process that integrates reflection, safety, and meaningful interaction among children, technology, and the family.

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