

# Parent-Child Interactions and the Development of Critical Thinking in Early Childhood: A Systematic Literature Review

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**Abstract.** In this systematic literature review, the role of parent-child interactions in supporting critical thinking development during early childhood was examined. The adoption of PRISMA framework in the review led to the identification of 500 articles from national and international scientific databases out of which 25 empirical studies satisfied the inclusion criteria. The results showed that responsive parent-child interactions including democratic parenting, inquiry-based communication, family literacy activities, and questioning strategies significantly supported the analytical reasoning, problem-solving, and evaluative thinking of children. A distinctive observation was that digitally mediated questioning strategies such as interactive storytelling tools enhanced deeper parent-child discussions and stimulated reflective reasoning. However, the methodological limitations identified include the dominance of cross-sectional designs, small or culturally specific samples, and inconsistent definitions of critical thinking in early childhood studies. The evidence suggested that structured parental participation meaningfully supported higher-order cognitive development despite the limitations. This review offers implications for parent education programs and emphasizes the need for robust longitudinal and cross-cultural studies.

**Keywords:** Early childhood, Parent-child interaction, Parenting practices, Critical thinking

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## Introduction

Critical thinking is widely recognized as part of the most important competencies required in the 21st century (Funke, 2025). Contemporary societies characterized by rapid technological advancement, global interconnectedness, and an unprecedented flow of information, require that individuals possess the ability to evaluate evidence, analyze arguments, and make reasoned decisions (Rusmin et al., 2024). Scholars further emphasize that critical thinking includes a set of higher-order cognitive processes such as analysis, interpretation, inference, evaluation, and problem solving accompanied by intellectual dispositions in the form of curiosity, open-mindedness, and reflective judgment (O'Reilly et al., 2025; Rothinam et al., 2025). The importance of these skills extends beyond academic contexts because critical thinking enables individuals to navigate complex information environments, distinguish facts from misinformation, and adapt to uncertain social and technological landscapes (Asrifan et al., 2025; Ruan, 2025). Therefore, the cultivation of critical thinking has

become a central objective in modern educational systems worldwide.

Critical thinking is frequently associated with formal education but a growing body of developmental studies shows that the foundations are often established earlier, particularly during early childhood (Taimur & Sattar, 2020). This is mainly because early childhood represents a critical developmental stage characterized by rapid neurological growth and high levels of neural plasticity which allow children to acquire cognitive and socio-emotional competencies efficiently (Huang et al., 2024; Ramesh, 2022). Children start to develop fundamental cognitive abilities such as reasoning, hypothesis formation, questioning, and problem-solving in this stage. Moreover, developmental psychologists have argued that early experiences have a decisive role in shaping the intellectual abilities subsequently developed by children including analytical and reflective thinking (Koops, 2023; Rahmaniar et al., 2021). Empirical studies also reported that children up to three years old possessed the capacity to participate in basic forms of reasoning and evaluation when provided with appropriate cognitive

stimulation (Valovičová et al., 2020). These results emphasized the importance of early intervention in fostering higher-order thinking skills.

Theoretical analysis shows that the development of critical thinking in early childhood is inseparable from the role of social interaction. Vygotsky's socio-cultural theory posits that cognitive development is identified through guided interactions with more knowledgeable others where children gradually internalize higher-order thinking processes through scaffolding and collaborative participation (Mirzaee & Maftoon, 2016). However, the cognitive mechanisms serving as the foundation for internalization can be further understood through cognitive information processing perspectives which emphasize how children attend to, encode, organize, and evaluate information during learning experiences. This perspective shows that parent-child interactions provide social support and also actively shape the development of cognitive schemas related to reasoning, inference, and decision making (Reiss et al., 2023).

Guided questioning, scaffolding, and collaborative problem-solving can function as repeated cognitive exercises for children to gradually acquire analytical strategies for evaluating evidence, comparing alternatives, and generating explanations (Alanazi et al., 2024). Therefore, the integration of socio-cultural and cognitive processing perspectives provides a stronger explanatory framework for understanding how socially mediated interactions are transformed into independent critical thinking structures in early childhood (Eun, 2019; Rigopouli et al., 2025). The central theory for the framework is the concept of the Zone of Proximal Development (ZPD) which refers to the distance between what a child can accomplish independently and through the guidance from more experienced individuals. This zone allows the adults to provide scaffolding which is explained as a form of temporary support enabling children to perform tasks beyond their current abilities (Lasmawan & Budiarta, 2020; Xi & Lantolf, 2021).

The support is expected to be systematically adjusted and progressively withdrawn as children gradually develop greater competence to promote autonomous task completion and independent problem-solving (Ness, 2022). The ZPD provides an important conceptual basis for parental and adult guidance in this context by showing how socially mediated learning experiences can foster cognitive independence and the development of higher-order thinking skills, including critical thinking (Raslan, 2024).

The process is capable of allowing the children to gradually internalize problem-solving strategies and develop independent reasoning abilities. For example, empirical studies consistently reported that scaffolded

interactions between caregivers and children contributed significantly to cognitive growth, language development, and problem-solving skills (Ningtyas et al., 2024). This process of scaffolding could be achieved by asking open-ended questions, providing explanations, or guiding children to evaluate alternative solutions, all of which stimulated reflective and analytical thinking (Jarvis & Baloyi, 2020).

The family environment is very important in shaping the cognitive development of children within the socio-cultural framework. This is because children spend a substantial portion of time in the home environment during early childhood and the phenomenon makes parents the primary agents of cognitive stimulation (Cahya & Siregar, 2024). Therefore, parental interactions with children through dialogue, questioning, storytelling, and collaborative activities provide opportunities for the development of reasoning and reflective thinking skills (Degotardi et al., 2019). Studies reported that children who experienced rich verbal interaction with parents reflected stronger language development, more complex reasoning abilities, and improved problem-solving skills compared to those with limited parental interactions (Nan & Tian, 2025). Furthermore, parental scaffolding, particularly through open-ended questioning and guided exploration can motivate children to analyze rather than simply accept information passively. These interactions enable children to develop the cognitive processes necessary for critical thinking (Carranza-Pinedo & Diprossimo, 2025).

A substantial body of empirical studies examined the relationship between parenting practices and the cognitive development of children. The framework widely used to understand the practices was Baumrind's parenting style theory which classified parenting based on dimensions of parental responsiveness and control (Baumrind, 1971; Fadlillah & Fauziah, 2022). The parenting styles characterized by warmth, responsiveness, and structured guidance commonly described as authoritative or democratic have consistently been associated with positive cognitive and socio-emotional outcomes (Kuppens & Ceulemans, 2019; Sadia et al., 2025). The type of parenting environment fosters psychological security which enables children to explore ideas, ask questions, and participate in independent reasoning identified as the basic foundations for critical thinking development. Meanwhile, practices characterized by excessive control or insufficient structure can restrict the opportunities of children to develop autonomy, problem-solving abilities, and adaptive cognitive skills (Lanjekar et al., 2022; Mugenyi et al., 2025). This perspective shows that specific parental behaviors within everyday interactions are also very important in

fostering the critical thinking development of children. The behaviors include motivation of children to ask questions, provision of explanations rather than directives, participation in collaborative problem solving, and support for exploratory learning activities (Yasira & Maksun, 2023).

The interactional practices are increasingly recognized as important contributors to the cognitive growth of children, but broader literature remains conceptually and methodologically fragmented. This is because the studies cover multiple disciplines including developmental psychology, early childhood education, family studies, and cognitive science with each informed by diverse theoretical perspectives and methodological preferences. However, a significant amount of available evidence is dominated by cross-sectional designs and short-term interventions which limit a robust understanding of the long-term developmental effect of parent-child interactions on critical thinking. The literature captured in this review also primarily consists of studies published in English and Indonesian which can introduce language bias and limit the representation of results from other linguistic and cultural contexts.

Important conceptual challenges are identified beyond these methodological limitations. The challenges are related to the inconsistencies in the definition and operationalization of critical thinking in early childhood which cause substantial barriers to systematic comparison across studies. Previous scholarship has also frequently examined parenting practices and cognitive outcomes as separate domains. Meanwhile, there is limited attention to the interactional mechanisms through which parent-child relationships, digital mediation, and socio-cultural contexts jointly affect critical thinking development. The tension between collectivist family communication norms and democratic parenting models commonly derived from Western frameworks is particularly underexplored despite the relevance for understanding parent-child interactions in culturally diverse settings. In response to the gaps identified, a Systematic Literature Review (SLR) is adopted to synthesize empirical evidence on how parent-child interactions contribute to critical thinking development in early childhood. The integration of socio-cultural, cognitive, and cross-cultural perspectives allows the review to inform the development of inquiry-based parent-child intervention frameworks for family and early childhood educational settings.

## Methods

### Study Design

A SLR was adopted to systematically identify, evaluate, and synthesize existing studies related to the role of parenting practices in fostering critical thinking

development in early childhood. This is a structured and transparent method for identifying, selecting, and critically evaluating relevant studies in order to answer specific questions through a comprehensive synthesis of existing evidence (Mengist et al., 2020; Snyder, 2019). The selection was based on the opportunities provided to collect and analyze empirical evidence rigorously and systematically in order to minimize bias and improve the reliability and validity of the study synthesis (Shaheen et al., 2023). Moreover, the studies examining parenting practices and critical thinking development of children are dispersed across different disciplines including early childhood education, developmental psychology, and family. This shows that a systematic review allows for the identification of consistent patterns, theoretical perspectives, and empirical results across different study contexts and methodological traditions. Furthermore, the study selection process was in line with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure transparency and methodological rigor in the identification, screening, eligibility assessment, and inclusion processes (Parums, 2021).

### Data Sources and Literature Search Strategy

The literature search was conducted using several national and international academic databases including Scopus, Web of Science, ERIC, ScienceDirect, Taylor & Francis, SINTA, and Garuda. The search strategy adopted was a combination of keywords with Boolean operators in the form of AND/OR to ensure comprehensive coverage of relevant studies. The primary keywords used were “parenting practices,” “parental involvement,” “parent-child interaction,” “critical thinking,” “analytical thinking,” “metacognitive thinking,” “metacognition,” “cognitive development,” and “early childhood.” The keywords were systematically combined using Boolean operators such as (“parenting practices” OR “parental involvement” OR “parent-child interaction”) AND (“critical thinking” OR “analytical thinking” OR “metacognitive thinking” OR “metacognition”) AND (“cognitive development”) AND (“early childhood”) to refine and expand the results comprehensively. The search process focused on peer-reviewed journal articles published in the fields of early childhood education, developmental psychology, and family studies. The database search initially identified 500 articles potentially relevant to the study topic but 28 duplicate articles were removed which led to a total of 472 for the screening stage. This included the review of the titles and abstracts of the identified articles to assess the relevance to the topic. The process led to the exclusion of 427 articles considered not to have focused on parenting practices, did not address critical thinking development, or included populations outside

the early childhood stage. This consequently led to the selection of 45 articles for full-text retrieval and further evaluation.

### Inclusion and Exclusion Criteria

The articles included in this review were selected in line with certain criteria. Some of the criteria are presented as follows:

1. Focused on critical or analytical thinking skills in children particularly within the early childhood stage.
2. Examined parents, parenting styles, or parent-child interactions as the primary or contextual variables.
3. Adopted empirical or evidence-based scholarly study designs including experimental, correlational, qualitative, mixed-methods, intervention studies, as well as systematic or literature reviews relevant to the study objectives.
4. Published in peer-reviewed scientific journals.
5. Published within the period of 2015 to 2025.

Some articles were excluded from the review based on the following criteria:

1. Opinion-based articles, essays, or non-academic reports.
2. Not directly related to parental roles or the development of critical thinking for children.
3. Lacked clear methodological descriptions or empirical evidence.

The study selection process was in line with the PRISMA framework which includes the four stages of identification, screening, eligibility, and inclusion. The screening of the title and abstract was followed by the assessment of 45 articles for full-text eligibility. The stage led to the exclusion of 20 articles for several reasons including populations outside early childhood ( $n = 8$ ), lack of focus on critical thinking ( $n = 7$ ), and methodological limitations or insufficient data ( $n = 5$ ).

The methodological rigor and quality of the selected studies were examined through a quality appraisal conducted using the Mixed Methods Appraisal Tool (MMAT). Each study was evaluated based on five core criteria appropriate to its design including the clarity of the questions, adequacy of sampling strategy, appropriateness of data collection methods, rigor of data analysis, and coherence between data and conclusions. The process required rating each criterion as “Yes,” “No,” or “Cannot tell.”

The overall quality score for each study was calculated as a percentage by dividing the number of “Yes” responses with the total number of criteria and multiplying by 100%. The studies with a score  $\geq 60\%$  were considered to have satisfied the minimum threshold for inclusion while those lower than the benchmark were excluded. The assurance of

methodological and interpretive rigor led to the retention of studies with moderate quality ratings and the ability to provide conceptually relevant insights that could be corroborated through triangulation with higher-quality evidence. The results from the studies were interpreted cautiously throughout the synthesis particularly where limitations such as unclear sampling procedures, limited methodological transparency, or insufficient validity reporting possibly affected the robustness, interpretability, and generalizability of the evidence. Therefore, 25 studies met the inclusion criteria and were used in the final review.

### Selection Process and Study Characteristics

The articles selected had a variety of methodologies which included experimental and quasi-experimental, correlational, qualitative, mixed-methods, and intervention-based studies. The participants were generally children aged three to six years who represented the early childhood developmental stage. This age range is theoretically supported by Piaget’s cognitive development theory which places children in the preoperational stage as a period characterized by rapid growth in symbolic thinking, language development, curiosity, and early reasoning abilities. Furthermore, early childhood is considered a sensitive developmental period where cognitive stimulation and social interaction significantly affect later development of higher-order thinking skills (Pakpahan & Saragih, 2022). The study contexts also varied geographically including those conducted in Indonesia, the United States, Denmark, China, South Korea, Thailand, Ecuador, and Ukraine. The data from the selected studies were analyzed using a thematic synthesis with a focus on several key aspects such as the design, sample characteristics, parenting variables, and major results related to the critical thinking development of children. This analytical process aimed to identify recurring patterns, parenting strategies, and interaction mechanisms that contributed to the development of critical thinking in early childhood across different cultural and educational contexts.

### Data Analysis and Synthesis Method

Data analysis was conducted using a thematic synthesis method to systematically organize and interpret results from the selected studies. The 25 studies selected through the PRISMA framework were subjected to detailed analysis. Relevant information from each was extracted and categorized into several analytical dimensions to facilitate systematic comparison across studies. The dimensions considered in the analysis are presented as follows:

1. Parenting styles and patterns including authoritative, authoritarian, permissive, and supportive methods.

2. Specific parental behaviors in daily parent-child interactions that stimulate questioning, reasoning, and problem-solving.
3. Educational and literacy-related activities conducted within the family environment such as shared reading, discussion, and inquiry-based learning.
4. Forms of parental intervention or training programs designed to enhance parental participation in the cognitive development of children.
5. Mechanisms through which parenting practices affect the critical thinking development of children including scaffolding, dialogic interaction, and guided problem-solving.

The extracted data were compared and synthesized to identify recurring themes, similarities, and differences across studies, as well as patterns in the relationship between parenting practices and the critical thinking development of children. The synthesis process focused on identifying conceptual relationships and explanatory mechanisms rather than calculating statistical effect sizes. This was because the included studies used diverse designs and methodologies. The analytical strategy allowed for a comprehensive understanding of how different parenting practices contributed to the development of critical thinking skills in early childhood.

### Validity of Synthesis

The credibility and rigor of the synthesis were enhanced through cross-study comparison across different methodologies, study contexts, and cultural settings represented in the selected articles. The specific attention was on the consistency of results related to parenting behaviors and cognitive development of children across quantitative, qualitative, and mixed-method studies. Moreover, the interpretation was connected to relevant theoretical perspectives in child development particularly socio-cultural theory and the concept of scaffolding, which emphasized the importance of guided interaction and supportive learning environments in the cognitive growth of children. The convergence of results across the reviewed studies served as the basis for developing conclusions and identifying practical implications regarding the role of parenting in fostering critical thinking in early childhood.

### Results and Discussion

This SLR included 25 studies conducted on the role of parents in fostering critical thinking during early childhood. The results showing the characteristics of the studies are presented in the following table.

The reviewed studies were observed to have used different methodologies including eight experimental

or quasi-experimental, five correlational, five literature reviews, four qualitative, one mixed-methods, one intervention, and one case study. This diversity reflected that the relationship between parenting practices and the critical thinking of children had been investigated using multiple perspectives. Experimental and intervention studies generally aimed to examine the causal effect of specific parental strategies or training programs on the cognitive development of students. Meanwhile, correlational studies focused on identifying statistical relationships between parenting styles and critical thinking abilities. The qualitative and mixed-method studies also provided deeper insights into parental behaviors, interactions, and family learning environments possibly supporting the reasoning processes of children.

The empirical studies reviewed were considerably different in terms of sample sizes and participant characteristics. The sizes ranged from small qualitative samples conducted using 16 participants to larger quantitative studies with 158 children as observed in [Hwang \(2024\)](#). Most studies focused on children in the preschool age range with approximately three to six years which was widely recognized as a critical developmental period for the development of higher-order thinking skills, including reasoning, questioning, and problem-solving abilities. However, some others included slightly older participants such as [Rahmawati \(2021\)](#) who examined children aged eight to nine years, and the focus of [Taibe and Muñoz \(2024\)](#) on 6 to 12 years. These variations suggested that the studies on parental effect on critical thinking extended beyond early childhood but remained strongly focused on the preschool stage.

The geographical analysis showed that the reviewed studies were conducted in a range of cultural contexts, including Indonesia, South Korea, China, Ecuador, and several other countries while some did not specify locations. The presence of studies from different cultural settings suggested that parental effect on the critical thinking of children was based on a global interest. The cultural differences could also affect parenting practices, communication styles, and family learning environments with subsequent effect on the development of critical thinking skills by the children.

The primary objective of this review was to understand how parents contributed to the development of critical thinking in early childhood. Therefore, the studies showed several consistent explanatory patterns rather than only isolated empirical results. An example of the most prominent was on the parenting style with a particular focus on the effectiveness of democratic or authoritative methods. [Yasira and Maksum \(2023\)](#) reported that children raised under democratic or authoritative parenting styles had stronger critical

thinking abilities compared to those subjected to authoritarian or permissive methods. This was further supported by the report of [Rahmawati \(2021\)](#) that there was a strong positive correlation between parenting style and critical thinking skills of children ( $r = 0.775$ ,  $p = 0.00$ ). The results were theoretically meaningful because the parenting styles produced psychologically safe interactional environments for children to ask questions, justify ideas, and participate in independent reasoning. The trend was not associated with a positive relationship between supportive parenting and cognitive outcomes. This showed the possibility of developmental mechanisms being less dependent on parenting style as a categorical construct and more on the communicative and cognitive opportunities integrated into the method adopted.

The review simultaneously showed that parental participation was not uniformly beneficial. Several studies suggested that excessive or highly controlling parental participation could inhibit the development of critical thinking. Highly directive or authoritarian parenting practices which emphasized obedience while limiting opportunities for independent questioning or exploration were also able to reduce the opportunities of children to develop autonomous reasoning and evaluative judgment. This contradiction showed that parental participation should not be interpreted as inherently advantageous, but the developmental effect rather depended on the cognitive quality of the interaction. The distinction between supportive scaffolding and controlling instruction could explain the reason some forms of parental participation promoted higher-order thinking while others constrained the developmental process.

The pattern is further interpreted through the lens of Self-Determination Theory (SDT) which emphasizes the importance of autonomy, competence, and relatedness in supporting intrinsic motivation and cognitive participation ([Ryan & Deci, 2000](#); [Sheldon et al., 2017](#)). This shows that the restriction of autonomy for children and emphasis on obedience over exploration through the authoritarian parenting practices can suppress epistemic curiosity and reduce opportunities for self-initiated reasoning. Meanwhile, autonomy-supportive parental interactions have a better tendency to foster intrinsic motivation, intellectual curiosity, and active cognitive exploration which are all considered important for the development of critical thinking ([Ryan et al., 2022](#)).

The evidence from intervention-based studies further strengthened the interpretation. For example, the experimental study conducted by [Shokoohi-Yekta et al. \(2016\)](#) reported statistically significant improvements ( $p < 0.01$ ) after nine parent training sessions focused on constructive problem-solving strategies rather than punitive disciplinary methods.

The parents reported a reduction in authoritarian and permissive tendencies alongside increased authoritative parenting practices after the intervention. These results suggested that parenting behaviors associated with critical thinking development were not fixed traits but modifiable interactional practices. The most important aspect was that the effectiveness of the interventions reflected the possibility of reasoning-oriented parent-child communication serving as a learnable developmental mechanism to systematically support the cognitive development of children.

Several studies emphasized the importance of broader family environmental conditions in shaping the critical thinking development of children in addition to parenting styles. For example, [Cahaya et al. \(2024\)](#) reported that parental education level significantly affected the critical thinking abilities of children aged five to six years. Parents with higher educational attainment had better tendencies of providing cognitively stimulating home environments, richer explanatory dialogue, and greater opportunities for exploratory learning. However, the study also reported that the gender of the children did not significantly affect critical thinking outcomes. There was also no interaction between parental education level and gender. These results suggested that the quality of environmental stimulation and parent-child interactions could have a stronger effect on critical thinking development than static demographic characteristics. Moreover, parental education functioned less as a direct causal determinant and more as a proxy indicator of broader socio-cognitive resources within the family context ([Ng et al., 2020](#)).

The perspective showed that the efforts to understand the cognitive development of children required attention to the cognitive frameworks shaping parental behavior. Parenting cognition was observed to be fundamentally affected by the goals of the parents regarding child-rearing. These further reflected parental expectations and desired developmental outcomes for the children which served as internal cognitive frameworks guiding caregiving decisions and interactional behaviors ([Lanjekar et al., 2022](#)). Parental values and child-rearing objectives were also very important in shaping parenting practices with subsequent effect on how parents structured the learning environments, regulated developmental experiences, and contributed to developmental outcomes for the children ([Octavia & Yuwantina, 2023](#)). The trend showed that the differences in the critical thinking development of the children could be understood both in terms of observable parenting practices as well as the foundational parental beliefs and cognitive orientations.

The development of the parental cognitions and practices was not in isolation but rather through an

integration within broader socio-cultural contexts. A culturally nuanced interpretation was particularly important in the Indonesian context where family interactions were often shaped by collectivist values emphasizing respect for elders, social harmony, and parental authority (Indah et al., 2024). At first glance, these cultural norms could appear inconsistent with inquiry-based learning methods that promote questioning, argumentation, and independent reasoning (Anugrah et al., 2025; Lanjekar et al., 2022). However, the collectivist cultural values did not necessarily inhibit critical thinking development but rather shaped the expression, negotiation, and support provided for the process within family interactions. The understanding of the cultural dynamic is very important for interpreting how parenting practices and parent-child interactions contribute to the critical thinking development of children across diverse social contexts.

The reviewed literature consistently emphasizes the positive role of parental participation, but the present synthesis generally suggests that developmental benefits depend less on the presence and more on the interactional mechanisms adopted for the cognitive stimulation. Parenting practices characterized by autonomy support, dialogic conversation, reflective questioning, and collaborative reasoning have more tendency to foster critical thinking. Meanwhile, restrictive or directive methods can suppress independent thought. This process-oriented interpretation assists in explaining the inconsistencies across studies and provides a stronger theoretical synthesis of how parent-child interactions contribute to critical thinking development.

Table 3 summarizes the specific parental behaviors and interaction strategies identified in the reviewed studies that contribute to the development of critical thinking skills for children. Several forms of parental participation are emphasized including questioning guidance, reasoning-based explanations, facilitation, co-learning, effective communication, dialogue and discussion, empathy building, and providing opportunities for exploration. The behaviors reflect different ways for parents to actively support the cognitive processes of children through daily interactions in the home environment. An example of the most frequently reported strategies is questioning and inquiry-based guidance. Studies by Vandermaas-Peeler et al. (2019) and Geurten & Léonard (2023) reported that children became more engaged in higher-order reasoning processes when motivated by the parents to observe, ask questions, make predictions, and evaluate outcomes. The inquiry-based interactions stimulate curiosity and promote analytical thinking which allows the children to construct an independent understanding of problems and possible solutions.

Another important strategy is informing and reasoning where parents emphasize explanations and logical reasoning rather than simply issuing commands. Stern and Hertel (2022) and Rahmah (2024) suggested that the children of parents who provided clear explanations and reasoning tended to perform better in critical thinking tasks. This method supported children in understanding causal relationships and promoted the evaluation of information more thoughtfully. In addition to verbal guidance, several studies emphasized the importance of facilitative parenting behaviors. The facilitation required providing support that assisted the children in overcoming challenges while promoting independent action. According to Ehsan et al. (2019) and Carson et al. (2019) facilitative parental participation was strongly correlated with the engagement of the children with computational thinking activities which subsequently supported the development of critical thinking. This method allowed children to experiment with ideas while receiving appropriate guidance when necessary.

A particularly effective interaction strategy identified in the reviewed studies was co-learning where parents participated in learning activities with the children rather than providing direction. Carson et al. (2019) reported that the method led to exceptionally high levels of participation in thinking-related activities. This context shows collaboration between parents and children to explore ideas, solve problems, and discuss different perspectives to develop a learning environment that naturally stimulates critical thinking. The importance of communication and dialogue was also identified as a consistent theme across the studies. For example, Itsna and Hariyanti (2022) and Rohmah et al. (2025) emphasized that effective communication promoted the expression of thoughts and exploration of new ideas for the children. Wang et al. (2025) and Pantin (2023) also showed that dialogue-based interactions, particularly during storytelling or shared reading activities could spark deeper discussions and promote reflective thinking. Moreover, the emotional aspects of parenting contributed to cognitive development. This was observed from the report of Rahmah (2024) that empathy-building interactions where parents actively listened and validated the perspectives of children improved their willingness to share ideas and participate in reasoning processes. Parents who provided an emotionally supportive environment motivated the children to think independently without fear of criticism or rejection.

The opportunities provided for exploration and discovery were another key factor supporting critical thinking development. Itsna and Hariyanti (2022) and Yanto and Cintya (2024) reported the increasing tendency of children to connect learning experiences

with practical situations when parents provided environments that promoted experimentation, observation, and real-world exploration. The process subsequently enhanced the analytical and problem-solving skills of the children. Additional evidence regarding the effect of parental participation levels was provided by Carson et al. (2019) who identified several distinct roles that affected the inclusion of children in thinking-related activities. The results showed that a direct supervisory role correlated with child participation at approximately 60% of the time, while a facilitative role increased the level to 75%. The highest was recorded when parents adopted a co-learning role which produced an estimated 80%. The study also identified the “Student of the Child” role where parents allow children to lead the learning process while asking open-ended questions. This method reflected a strong association with the development of critical thinking. Meanwhile, parental disengagement negatively affected the learning processes. The complete withdrawal of support often made the children struggle to solve problems effectively and could produce less optimal solutions. This emphasized the importance of maintaining active parental participation while gradually promoting independence for the children.

Ehsan et al. (2019) conducted a case study of homeschooling families and further showed the possibility of parental participation changing over time. This was because parents gradually reduced the frequency and intensity of guidance as children developed greater competence in a particular activity. The adaptive support allowed children to develop autonomy while benefiting from parental scaffolding during the learning process. The interaction strategies summarized in Table 3 collectively suggest that the effectiveness of parental participation in fostering critical thinking in children depends on both the presence and the cognitive demands integrated within the interaction (Carson et al., 2019; Ehsan et al., 2019; Vandermaas-Peeler et al., 2019; Wang et al., 2025). The behaviors such as open-ended questioning, inquiry guidance, collaborative discussion, and co-learning appear effective because children are required to actively interpret information, generate explanations, compare alternatives, and justify reasoning rather than passively receiving information (Geurten & Léonard, 2023; Itsna & Hariyanti, 2022; Rohmah et al., 2025). The trend shows that the functions of parent-child interactions extend beyond the relational or supportive process to serving as a cognitively structured learning environment for the repeated practice and gradual internalization of higher-order thinking skills. This perspective also assists in explaining the reason more directive or minimally engaged parental roles appear less effective because only social interaction is

insufficient unless the process stimulates meaningful cognitive participation.

Several studies emphasized the role of family-based learning activities particularly literacy-related activities in fostering critical thinking in addition to the interaction strategies. For example, Taïpe and Muñoz (2024) studied 84 parents in Ecuador and reported that active parental participation in educational activities significantly improved both the critical thinking and creativity skills of the children. Hwang (2024) also showed that mother-child literacy interactions indirectly affected critical thinking through a sequential mediation pathway related to the reading interest and empathy of the children. This result was supported by Lungoci and Nita (2024) who reported a significant positive correlation between the amount of time families spent on literacy activities and the critical thinking development of the children. Specifically, three out of the four types of literacy activities examined had a clear and significant relationship with higher critical thinking scores.

The results were further reinforced by Rohman (2022) who showed that literacy development was closely connected to critical thinking skills because higher levels of literacy proficiency were associated with stronger reasoning abilities. Prabowo et al. (2022) also emphasized that family literacy initiatives were very important in cognitive development. This was confirmed by the fact that literacy extended beyond only reading and writing skills to communication processes such as active listening, logical reasoning, and linguistic intelligence.

Technology-mediated interventions were further identified to have the potential to support parent-child interactions that fostered critical thinking in addition to traditional learning activities. For example, Wang et al. (2025) evaluated a digital tool called Character Critique which was designed to facilitate analytical discussions between parents, children, and story characters during shared storybook reading sessions. The results showed that the tool stimulated the participation of children in deeper discussions and provided additional opportunities for parent-child dialogue in order to support the development of critical thinking and problem-solving skills. However, this review suggests that digital mediation cannot be conceptualized as an independent determinant of critical thinking development but rather as a contextual moderating factor and the effectiveness depends substantially on the quality of parental scaffolding. This reflects that technology-supported environments become cognitively meaningful only when accompanied by active parental guidance, dialogic questioning, and reflective discussion motivating children to analyze information, justify interpretations, and evaluate alternatives. Meanwhile, passive exposure

to digital content without structured parent-child interactions has a lower tendency of fostering higher-order reasoning. This shows the need to understand technology less as a direct instructional agent and more as a cognitive bridge that amplifies the effect of high-quality parent-child inquiry within supportive interactional contexts.

Table 4 presents a summary of intervention and training programs designed to strengthen the ability of parents to support the development of critical thinking in early childhood. The reviewed studies implemented different forms of parental interventions including metacognitive training, inquiry-based guidance, questioning strategy training, experiential learning programs, and sustained shared thinking activities. These programs vary in duration, participant characteristics, and implementation strategies but share a common goal of enhancing the capacity of parents to stimulate the analytical and reasoning abilities of children through everyday interactions. The evidence generally shows that structured parental training programs can significantly improve parenting practices supporting the critical thinking development of children. This was confirmed from the results of several studies that parents became more effective in producing cognitively stimulating learning environments at home after receiving guidance on how to facilitate inquiry, reasoning, and collaborative problem-solving.

An example of the most significant results was the report of [Techapoonpon et al. \(2025\)](#) who implemented a sustained shared thinking program using activity books designed to support parent-child interactions. The results showed a substantial increase in parental empowerment scores by 30.79% after three weeks and reaching 115.36% after six weeks of program implementation. An important observation was the follow-up measurements conducted three months after the intervention which showed the empowerment score remained stable at 114.11%. This reflected that the program produced long-term improvements in parental participation. The results suggested that structured activities developed to guide parents in facilitating discussions and shared thinking could strengthen the confidence and effectiveness in supporting the cognitive development of children. Another important intervention was the metacognitive training program implemented by [Stern and Hertel \(2022\)](#) to address a specific cultural context where the curiosity and questioning behavior of children were sometimes viewed negatively by adults. The metacognitive training was used to motivate the mothers in the experimental group to pay greater attention to the exploratory behaviors of the children and actively support the investigative efforts. This led to the better performance of the children in learning tasks compared

to those whose mothers were in the control group. The results emphasized the importance of increasing parental awareness of the value of curiosity and exploration in children as fundamental components of critical thinking development.

Several studies further reported the effectiveness of inquiry-based parental guidance. For example, [Vandermaas-Peeler et al. \(2019\)](#) implemented a one-month intervention on 32 families with the parents trained to guide children through questioning and inquiry-based interactions. The results showed that parents who adopted inquiry-based strategies were able to facilitate more complex reasoning processes for the children. [Geurten and Léonard \(2023\)](#) also reported that providing parents with information and practice in questioning methods significantly affected both the frequency and quality of questions asked by the children. The results signaled that parental questioning strategies were important in motivating children to participate in deeper cognitive exploration. The evidence from structured parenting programs further supported the potential effect of parental training. This was observed from the “Raising a Thinking Child” program developed by [Shokoohi-Yekta et al. \(2016\)](#) which led to statistically significant improvements in parenting style and parent-child relationships ( $p < 0.01$ ) after a nine-week implementation on 40 children. Another study conducted by [Shokoohi-Yekta et al. \(2018\)](#) on 104 mothers also reported improvements in parental problem-solving methods and reductions in authoritarian and permissive parenting styles. These results suggested that training programs focusing on problem-solving and reflective parenting could shift parental behavior toward more supportive and cognitively stimulating interactions.

The MOPS-F experiential learning training program examined by [Maula and Salim \(2025\)](#) similarly showed significant improvements in the understanding of the parents on how to stimulate analytical thinking in children ( $W = 1275, p < .001$ ). Experiential learning methods allowed the parents to actively practice strategies that promote reasoning and inquiry with the process strengthening the ability for application in real-life family contexts. The studies summarized in Table 4 collectively reflected the capacity of parental intervention programs to effectively enhance the skills, awareness, and confidence of parents in supporting the critical thinking development of children. The programs were implemented by equipping parents with practical strategies such as questioning methods, inquiry-based guidance, and collaborative problem-solving activities. The interventions provided an environment that motivated children to explore ideas, ask questions, and participate in higher-level thinking processes by improving the ability of parents to facilitate meaningful

learning interactions at home. Furthermore, the variation across intervention models suggested that critical thinking development could be supported through multiple forms of parental training including metacognitive programs, inquiry-based instruction, and experiential learning activities. The majority of interventions reviewed reported positive outcomes despite differences in design and duration and this showed that parental education and training represented a promising method for strengthening early cognitive development.

Table 5 presents the conceptualization and measurement methods used by the reviewed studies to examine critical thinking in early childhood. The components of critical thinking identified in each study, the assessment methods, and the observable indicators used to identify critical thinking behaviors in young children are also presented. The studies generally showed substantial variation in how critical thinking was defined and operationalized as a reflection of the complex and multidimensional nature of the construct in early childhood. Critical thinking was generally conceptualized as a combination of cognitive skills, behavioral indicators, and dispositional attitudes. Moreover, the emphasis was mostly on cognitive processes such as analysis, evaluation, reasoning, synthesis, and problem-solving (Pantin, 2023; Putri et al., 2024; Wang et al., 2025). These processes required the ability to interpret information, compare ideas, evaluate alternatives, and draw logical conclusions. The other studies focused on questioning and inquiry behaviors as key components of critical thinking in young children. For example, Stern and Hertel (2022) and Vandermaas-Peeler et al. (2019) emphasized the ability of children to observe, ask questions, make predictions, and evaluate outcomes as important indicators of early critical thinking development.

Several studies recognized the importance of dispositional and affective dimensions of critical thinking in addition to cognitive skills. An example was Rahmah (2024) who identified behaviors such as finding information, forming opinions, and evaluating evidence as indicators of the development of critical thinking abilities in children. Similarly, Lungoci and Nita (2024) emphasized the concept of a critical dialogic attitude characterized by intellectual curiosity, creativity, and intellectual autonomy. These results suggested that critical thinking in early childhood extended beyond logical reasoning and included motivational and emotional aspects motivating children to participate in reflective and analytical thinking. The methods used to assess critical thinking also vary widely among the studies. Some adopted qualitative and observational assessments with a focus on the behavior of the children during problem-solving

activities or learning interactions. For example, Stern and Hertel (2022) used a qualitative dynamic assessment inspired by Piagetian methods to examine the investigative efforts of children. The other applied questionnaires, benchmark assessments, or standardized tests to evaluate the analytical abilities and reasoning processes (O'Reilly et al., 2022; Pantin, 2023). In several studies, critical thinking was identified through observable indicators such as the ability to ask questions, compare ideas, express opinions, or participate in deeper discussions.

The diversity of conceptualizations and measurement methods reflected the broader challenge of assessing critical thinking in young children. This was due to the fact that early childhood learners often expressed thinking through behavioral interactions, dialogue, and exploratory activities. The trend made observational and interaction-based assessments particularly relevant compared to the phenomenon in older students. Therefore, several studies emphasized the importance of examining critical thinking within natural learning contexts such as parent-child interactions, storytelling activities, and collaborative problem-solving situations. The analysis from the theoretical perspective showed the focus of most on the importance of parental interactions as a key mechanism supporting the development of critical thinking. Stern and Hertel (2022) reported a socio-cultural perspective by suggesting that maternal interaction strategies served as a primary pathway for children to develop higher-order thinking skills. The guided interaction and scaffolding implemented by parents assisted the children in interpreting information, reflecting on experiences, and constructing meaning from the environment.

Geurten and Léonard (2023) similarly showed that parents acted as role models for questioning behavior and affected the frequency and quality of inquiries made by the children. The observation reflected that children tended to imitate the questioning patterns observed in the parents. Therefore, this suggested that parental communication styles were very important in shaping the reasoning processes of children. Further evidence of the importance of parental interactions was provided by Hwang (2024) who proposed a sequential mediation model. The trend showed that mother-child literacy interactions affected the critical thinking of children indirectly through intermediate variables such as reading interest and empathy. This model signaled that parental participation in literacy activities improved language skills for children and also promoted reflective thinking and perspective-taking considered important components of critical thinking. Rohmah et al., (2025) similarly emphasized the role of responsive parenting practices such as open dialogue, strategic questioning methods, and positive

reinforcement in providing the environment to motivate the children to express ideas, explore alternative viewpoints, and participate in analytical thinking.

Several other studies identified factors capable of inhibiting or facilitating the role of parents in developing critical thinking for children. For example, cultural perceptions often acted as barriers, as reported by [Stern and Hertel \(2022\)](#) that the curiosity and frequent questioning of children were perceived by adults as disruptive behavior rather than an important part of learning in certain contexts. The cultural attitudes could demotivate parents from supporting exploratory and investigative behaviors in children. Restrictive or overly controlling parenting practices could also hinder the development of critical thinking. [Rahmah \(2024\)](#) reported that highly restrictive parenting styles suppressed creativity and limited opportunities for independent reasoning in children. [Carson et al. \(2019\)](#) similarly reported that low levels of parental participation led to children struggling with problem-solving tasks and producing fewer effective solutions as a reflection of the negative consequences. Meanwhile, several factors appeared to act as facilitators of critical thinking development in the family context. These included higher parental education levels, supportive home learning environments, and access to appropriate educational resources. The use of structured learning materials and interactive activities particularly assisted parents in supporting the cognitive development of children more effectively. An example was the intervention study by [Techapoonpon et al. \(2025\)](#) which showed the ability of the structured activity books designed to support sustained shared thinking to significantly increase parental empowerment in facilitating learning for children. The study reported that the improvements remained stable for a minimum of three months after the program. This suggested that structured educational resources could produce lasting improvements in the ability of parents to support cognitive development in children.

### **Socio-Cultural Perspective and Scaffolding Mechanisms**

The effectiveness of parental participation in fostering critical thinking in children can be theoretically understood through the socio-cultural perspective of learning particularly the framework proposed by Vygotsky. According to this perspective, cognitive development is not only an individual process but is fundamentally shaped through social interaction and collaborative learning experiences ([De Felice et al., 2023](#); [Lasmawan & Budiarta, 2020](#)). Parents are considered very important in early childhood due to the role as primary social partners who introduce children to ways of thinking, reasoning, and problem-solving

within daily contexts. This review shows that the nature and level of parental participation significantly affect cognitive development in children. The studies included consistently reported that the children became more actively included in reasoning processes when parents adopted interaction strategies associated with questioning, dialogue, and collaborative exploration. The gradual reduction of direct instruction by parents and a shift toward a more supportive and collaborative role such as acting as facilitators or co-learners increased the tendency of the children to have higher levels of independence in thinking and problem-solving. This adaptive interaction reflected the concept of scaffolding identified as a key mechanism in socio-cultural learning theory ([Lanjekar et al., 2022](#)).

Critical thinking should be understood operationally in accordance with the stage of cognitive development for children between the ages of four and six years. This is because critical thinking does not manifest as complex abstract analysis in early childhood but rather through simple behavioral indicators such as the ability to ask “why” questions, classify objects based on specific characteristics, make simple predictions, and start to understand the perspectives of others. The phenomenon is consistent with the cognitive development theory of Jean Piaget which identifies children between the ages of two and seven years to be in the preoperational stage. This is the stage where symbolic thinking starts to develop but is limited to concrete logic and egocentrism ([Pakpahan & Saragih, 2022](#)). Therefore, the stimulation of critical thinking at this age is expected to focus on activities that promote exploration, open-ended questioning, and meaningful social interaction.

Scaffolding is explained as the process where a more knowledgeable individual provides temporary and structured support to assist a learner in completing tasks that initially exceed independent capability ([Puntambekar, 2022](#)). The parents frequently act as the primary providers of support in the context of early childhood learning. This is often achieved through strategies such as asking guiding questions, motivating children to explain reasoning, or prompting the consideration of alternative perspectives in order to assist in navigating complex cognitive tasks. Another important observation is that scaffolding is not intended to replace independent thinking for children but rather to facilitate the gradual development of cognitive autonomy. This process occurs within what Vygotsky conceptualized as the ZPD ([Xi & Lantolf, 2021](#)) which represents the developmental space between what a child can accomplish independently and those achieved through the guidance of a more knowledgeable individual ([Vu, 2022](#)). Learning becomes most effective within this zone because children are challenged with tasks that slightly exceed

current level of competence but remain achievable with appropriate guidance. In the family context, parents often intuitively operate within the zone by adjusting the guidance provided to the level of understanding of the child and the complexity of the task.

Parental scaffolding within the ZPD is in multiple forms and a common strategy is the use of guided questioning. This focuses on parents motivating children to reflect on observations, make predictions, and evaluate possible solutions. Another strategy is modeling reasoning processes where parents show how to analyze information or solve problems in steps (Xi & Lantolf, 2021). Moreover, parents frequently participate in collaborative problem-solving activities such as discussing story characters, exploring natural phenomena, or solving puzzles together. These shared learning experiences provide children with opportunities to practice analytical thinking in supportive environments. A critical component of effective scaffolding is the process known as fading which refers to the gradual withdrawal of support as the learner becomes more competent (Kardoust, 2024). Parents can initially provide explicit guidance, explanations, or examples. However, the level of assistance is reduced when children start to understand the task and gain confidence in their abilities and is followed by the motivation to take greater responsibility for the learning process. This gradual reduction of support allows children to develop independence while benefiting from the structure provided by adult guidance. The concept of fading is particularly relevant for the development of critical thinking due to the motivation provided for the children to actively construct own understanding rather than depending only on adult instruction. The opportunities provided to articulate ideas, evaluate evidence, and reconsider assumptions allow the children to develop the intellectual flexibility and reflective thinking that characterize critical thinking skills (Oyeyemi et al., 2026).

Another important element of the socio-cultural perspective is guided participation which is explained as the process for children to acquire cultural knowledge and cognitive strategies by participating in shared activities with more experienced members of the community (Carranza-Pinedo & Diprossimo, 2025). Guided participation often occurs within the family environment during daily interactions such as storytelling, household tasks, or play-based learning activities. The parents introduce children to methods of interpreting information, asking questions, and solving problems through the interactions. This review suggests that parents who participate in guided participation through dialogue, inquiry-based discussions, and collaborative exploration provide rich learning environments to support the development of

critical thinking. The environments motivate the children to absorb information, analyze, question, and interpret experiences. This interactive learning process assists children in developing important cognitive skills such as reasoning, evaluation, and problem-solving.

Socio-cultural theory emphasizes the role of language and communication as key mediating tools in cognitive development (Beltrán-Sierra et al., 2024). The conversations with parents allow the children to learn the process of organizing thoughts, justifying opinions, and evaluating alternative viewpoints. The dialogic interactions such as discussing stories, debating ideas, or reflecting on daily experiences also provide opportunities for children to practice the cognitive processes in meaningful contexts (Yang & Shen-Tu, 2025). These external dialogues gradually become internalized over time and form the foundation of independent thinking processes for children. The trend shows that parental scaffolding extends beyond supporting immediate task performance for children to contributing to the long-term development of metacognitive awareness. The guidance provided to ensure children reflect on thinking, evaluate reasoning, and consider different points of view assists the parents in aiding the development of cognitive habits necessary for effective critical thinking.

The application of scaffolding and sociocultural interactions within Indonesian families is shaped by cultural values that emphasize respect for authority, collectivism, and norms of politeness in communication between children and parents (Diana et al., 2026). The parenting practices that tend to be hierarchical in several family settings can restrict opportunities for children to ask questions or express opinions freely. This is capable of potentially constraining the development of critical thinking when the process is not complemented by more dialogic forms of interaction. Collectivist cultural orientations simultaneously provide important affordances including strong family participation and frequent daily interactions which can serve as a natural context for scaffolding processes (Yasira & Maksum, 2023). These dual characteristics show a tension between control and support within parenting practices.

The application of democratic or authoritative parenting styles often established on Western perspectives presents both connection and tension with Indonesian cultural values. The democratic parenting characterized by open communication, mutual respect, and promotion of autonomy for children is in line to foster critical thinking and active cognitive engagement. Meanwhile, this style can be perceived as less compatible with cultural norms that emphasize hierarchy, obedience, and respect for elders particularly when autonomy is interpreted as reducing parental authority (Mu et al., 2024). The phenomenon shows the

need for cultural adaptation where dialogic interaction, reasoning, and open-ended questioning are integrated into existing value systems without undermining respect and social harmony rather than adopting Western parenting models in a direct or unmodified manner.

The implementation of parenting strategies that promote open-ended questioning, discussion, and exploratory learning needs to be culturally responsive in line with local norms while simultaneously fostering cognitive development for children (Rahmah, 2024). This perspective emphasizes that the effectiveness of scaffolding in promoting critical thinking is context-dependent due to the interplay between cultural values, communication patterns, and family dynamics within specific socio-cultural settings.

### **Social Modeling and the Pathways of Literacy Mediation**

Social learning processes were identified as a central mechanism for fostering cognitive development in early childhood beyond task-oriented scaffolding. Parents serve as primary role models because their behaviors and interaction patterns have a strong effect on the thinking and reasoning of the children. The studies showed that the frequency, depth, and quality of inquiries made by children were closely related to the questioning and reasoning behaviors observed in the parents. This reflected that the children often imitated the cognitive strategies and critical thinking patterns modeled by the parents and internalized the methods as part of problem-solving repertoire (Geurten & Léonard, 2023). The modeling effect emphasized extension of parental effect beyond direct instruction and covered subtle cues, habits of questioning, and methods for evaluating information that collectively shaped the analytical capacities of children. The observation of the methods used by the parents to analyze problems, justify decisions, and explore alternative solutions allowed the children to gradually learn to structure their thinking critically and reflectively.

Another interesting phenomenon was that the effect of social modeling is often not immediate or linear. The evidence from literacy-focused studies showed that reading activities mostly operated through a sequential mediation pathway rather than directly enhancing cognitive outcomes. For example, Hwang (2024) reported that parent-child literacy interactions initially increased the reading interest and empathy in children and subsequently served as the foundation for later critical analysis and reasoning. This affective participation where children became emotionally invested in stories and narratives enhanced the readiness to question, interpret, and evaluate information in more sophisticated ways. The results suggested that literacy activities functioned as a

mediated communication process where reasoning skills developed gradually through emotional and social participation rather than only content exposure. This shows that literacy serves not only as a source of information but also as a platform for parents to cultivate cognitive habits, reflective thinking, and the disposition to critically analyze ideas. The combination of modeling, guided interaction, and emotionally rich literacy experiences allows parents to provide the children with both the tools and motivation necessary for the development of critical thinking during early childhood.

The processes of social modeling and literacy mediation within the Indonesian family are strongly affected by reading habits at home and the patterns of communication between parents and children (Sandra, 2025). Family literacy levels vary in the country but practices such as reading stories aloud, discussing the content, and connecting daily experiences with the narratives can serve as effective methods of stimulating critical thinking skills in children (Wuri et al., 2025). However, reading activities tend to be one-sided in some contexts where children are only passive listeners with few opportunities to ask questions or express opinions. This situation has the potential to limit the internalization of critical thinking strategies.

The conditions further reflect a broader tension between Western democratic parenting models emphasizing open dialogue, child autonomy, and bidirectional communication and Indonesian cultural values that prioritize respect for authority, harmony, and hierarchical relationships within the family (Zhussipbek & Nagayeva, 2022). The democratic parenting is in line with efforts to foster critical thinking through questioning and discussion but full implementation is often not culturally congruent in contexts where children are expected to show obedience and restraint in communication. However, the elements such as supportive communication, guided questioning, and responsive interaction can be adapted to fit local cultural norms (Yastutik et al., 2024). This suggests the need for a culturally responsive method where dialogic literacy practices are integrated into values of respect and social harmony rather than adopting Western models in a rigid manner. The process is important to allow children to develop critical thinking without disrupting culturally integrated patterns of interaction (Caingcoy, 2023).

### **Technology as a Cognitive Bridge and Continuous Intervention**

The integration of technology and structured learning media has increasingly been recognized as an effective method to support parental participation in stimulating critical thinking in early childhood. For example, the implementation of specialized media such as Character Critique applications or structured activity books has

been reported to function as a powerful cognitive bridge connecting the curiosity of the children with guided parental facilitation (Wang et al., 2025). These tools serve both as sources of information and interactive learning environments that promote dialogue, reflection, and inquiry between parents and children. Moreover, properly designed media can transform daily storytelling or play activities into opportunities for higher-order thinking which enables children to question, analyze, and evaluate situations presented within the narrative. The effectiveness of technology-based or media-assisted interventions is primarily based on the capacity to shift learning from passive content consumption to active cognitive participation. Structured media motivate parents to ask open-ended questions, invite predictions, and facilitate discussions on possible explanations or alternative solutions rather than allowing children to simply receive information (Pantin, 2023; Putri et al., 2024). The dialogical interaction exposes the children to reasoning processes that support the development of analytical thinking, interpretation, and evaluation which are widely recognized as fundamental components of critical thinking in early childhood. This shows that technology does not replace parental participation but rather functions as a mediating tool to enhance the quality of parent-child cognitive interactions and promote a more inquiry-oriented home learning environment.

The studies reviewed further showed a digital divide in parent-child interactions in the modern era with most identified to be occurring through screen-based media. In some cases, the use of technology not actively mediated by parents had the potential to reduce the quality of dialogic interactions and limit the opportunities for the children to conduct reflective and critical thinking processes (Syahril et al., 2024). The trend led to the importance of digital mediation specifically in how parents actively guided, directed, and supported interactive usage of technology by children and fostered cognitive development. The perspective emphasized the effectiveness of technology as a tool for developing critical thinking when accompanied by active, reflective, and dialogic parental participation.

Technology-assisted programs can significantly strengthen the role of parents as learning partners within the family context. Several parents were initially uncertain about how to stimulate critical thinking effectively particularly in early childhood when learning processes were closely connected to play and daily interactions. Therefore, structured media such as guided activity books or digital learning platforms providing prompts, examples of questioning strategies, and problem-solving tasks assisted the parents in facilitating meaningful conversations with the children

(Vandermaas-Peeler et al., 2019; Wang et al., 2025). The repeated participation of the parents in the guided activities led to the gradual adoption of a more facilitative role by shifting from direct instruction toward collaborative exploration with the children. This transformation fostered a learning environment characterized by dialogue, reflection, and shared reasoning which were very important for the development of critical thinking skills.

The integration of technology into parent-child interactions cannot be understood neutrally but rather requires analysis as a process that depends on the quality of parental mediation. Recent studies have started to shift focus from only the usage of technology to the method of application within the context of meaningful social interactions (Hanandini, 2024). This reflects the importance and more focus on the parental digital mediation area in studies related to early childhood cognitive development.

The sustainability of the interventions was supported by empirical results showing the persistence of parental empowerment after the completion period. For example, Techapoonpon et al. (2025) reported that parental empowerment scores remained stable at 114.11% three months after the program was completed. This suggested that the improvements had been internalized and integrated into daily parenting practices. The stability further confirmed that well-designed technology-supported interventions could generate long-term effects by integrating reflective communication patterns and inquiry-based interactions into routine family activities in order to continuously support the cognitive development of children and the cultivation of critical thinking skills.

The integration of technology into parent-child interactions in Indonesia reflects complex dynamics as the penetration of digital devices in family settings increases. The technology provides broad access to several digital learning resources that have the potential to support the cognitive development of children including the critical thinking skills (Karimullah, 2023). However, the use of digital devices without adequate parental guidance often positions children as passive recipients of content which diminishes the quality of dialogic interactions between parents and children (Syahril et al., 2024). Digital devices are frequently used in practice as tools for distraction or substitutes for parenting and this is capable of limiting the active cognitive development of the children.

The Indonesian context often reflects a more pragmatic use of technology as a method of managing the behavior of children or occupying their time compared to the Western world where parental digital mediation tends to be more structured and oriented toward guided interaction, co-use, and critical engagement with digital content (Istenič et al., 2023).

Several Western families frequently integrate technology into intentional learning activities with parents actively relating with children through questioning, discussion, and joint exploration. Meanwhile, the variations in digital literacy, parenting knowledge, and socio-economic factors in Indonesia can contribute to less optimal mediation practices where technology use is often not accompanied by reflective or dialogic interactions (Putri & Saharudin, 2025).

The trend shows the need for a contextual method for parental digital mediation where parents have a role in regulating the duration of technology use and actively facilitate reflective, dialogic, and exploration-oriented interactions. This method enables the optimization of the function of technology as a learning medium while maintaining the quality of social interactions considered important for the development of critical thinking in young children.

### Overcoming Cultural Barriers and Parenting Paradigms

Several parent-child interaction strategies have shown efficacy in enhancing cognitive development and creative capacities for children (Clemente-Suárez et al., 2024). This review identifies significant cultural barriers that persist particularly in environments where the curiosity of children is traditionally perceived as a nuisance. The contexts show the ability of overly restrictive or authoritarian parenting styles to directly stifle the creative and analytical capacities of children and subsequently limit the opportunities for critical thinking and autonomous problem-solving skills (Rothenberg et al., 2021). These cultural perceptions show the need for metacognitive interventions explicitly designed to deconstruct entrenched traditional paradigms and reshape parental beliefs about the value of curiosity-driven learning and cognitive exploration. The advantages of authoritative or democratic parenting styles consistently outweigh those of authoritarian methods due to the ability to balance autonomy with structured guidance.

Moreover, authoritative parenting fosters a supportive psychological climate for children to feel safe in taking intellectual risks without the fear of making mistakes which is a condition considered conducive to the development of higher-order thinking and creativity (Fitrianto et al., 2025). The trend shows the importance of the psychological presence and emotional support provided by parents as critical prerequisites for children to explore innovative solutions with confidence (Ryan & Deci, 2000). Furthermore, the report that the support is gender-independent has profound implications. These include the possibility of applying cognitive stimulation strategies inclusively to all children regardless of gender (Cahaya et al., 2024). The results

generally emphasize the importance of combining metacognitive methods with responsive and democratic parenting strategies to overcome cultural barriers restricting the cognitive potential of children. The implications also support the formulation of educational and parenting programs that foster safe and stimulating environments capable of affirming the inquisitiveness of children as a fundamental component of the learning process.

A comparison between parenting practices in Indonesia and Western settings becomes important in this context to better understand how cultural values affect the effectiveness in fostering critical thinking (Riany et al., 2017). The differences in cultural orientations toward authority, autonomy, and child-rearing practices become particularly salient in the comparison. Western parenting frameworks particularly those grounded in authoritative methods tend to emphasize individual autonomy, open expression, and the promotion of questioning as important components of cognitive and socio-emotional development (Ahmed, 2025). Meanwhile, parenting practices in Indonesia are often affected by collectivist values and hierarchical social structures that prioritize respect, obedience, and social harmony.

The values provide important social and moral foundations but have the capacity to limit opportunities for children to participate in critical inquiry particularly when curiosity is perceived as inappropriate or disruptive (Menning, 2019). However, the differences do not necessarily reflect incompatibility but rather emphasize the need for contextual adaptation. The integration of the principles of authoritative parenting into the Indonesian cultural context requires a balanced method that maintains respect for social norms while gradually fostering dialogic interaction, reflective thinking, and autonomy support (Diana et al., 2026). This culturally responsive method can bridge global parenting models and local practices to enable the development of critical thinking without undermining cultural identity.

### Conclusion

In conclusion, this systematic review showed an important role of parental participation in fostering critical thinking during early childhood. The results showed that parenting styles, specific behaviors, and interaction strategies significantly affected the cognitive development of children across diverse cultural and geographical contexts. Authoritative or democratic parenting characterized by balanced guidance, open communication, and support for autonomy consistently promoted higher levels of analytical reasoning, problem-solving, and inquiry skills compared to authoritarian or permissive methods. Moreover, behaviors such as questioning and inquiry

guidance, reasoning-based explanations, facilitation, co-learning, dialogue, empathy building, and providing opportunities for exploration served as key mechanisms to stimulate critical thinking. The intervention and training programs including metacognitive training, experiential learning, inquiry-based guidance, and technology-assisted tools also enhanced parental practices and produced lasting improvements in both participation for the parents and cognitive outcomes of the children. Meanwhile, literacy-related family activities mediated reflective thinking, curiosity, and reasoning skills.

The results theoretically supported socio-cultural and scaffolding frameworks with an emphasis on guided participation, modeling, and the ZPD as critical mechanisms for parents to facilitate cognitive autonomy while gradually reducing direct instruction. Furthermore, technology-mediated interventions provided more support by offering structured interactive environments that promoted dialogue, reasoning, and inquiry as a complement to parental scaffolding. The cultural and contextual factors such as traditional perceptions of curiosity in children and restrictive parenting practices remained potential barriers capable of inhibiting cognitive growth. The phenomenon showed the need for metacognitive interventions to increase parental awareness of the value of exploration and inquiry. Another important observation was that the effects appeared to be gender-independent and reflected the potential for inclusive strategies across all children. Future studies should explore longitudinal effects of parental participation and intervention programs, investigate cross-cultural differences in the effectiveness of specific strategies, examine the integration of technology-mediated scaffolding in diverse home environments, and assess the development of critical thinking in children beyond early childhood, including middle childhood and adolescence. This would be necessary to better understand the long-term effect of parenting practices on higher-order cognitive skills as well as the potential mediating roles of socio-emotional development, literacy engagement, and family learning environments.

### Declaration

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### Author Contributions

Conceptualization: I.A.O., W.S.A., and R.P.P.; Methodology: I.A.O., R.P.P., and M.T.H.; Literature Search and Investigation: I.A.O., W.S.A., and M.; Study Screening and Selection: I.A.O., W.S.A., R.P.P., and M.; Quality Assessment and Data Synthesis: I.A.O., R.P.P., and M.T.H.; Writing-Original Draft Preparation: I.A.O. and R.P.P.; Writing-Review & Editing: I.A.O., and R.P.P.

### Conflict of Interest

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### Use of Artificial Intelligence

The authors used Artificial Intelligence (AI)-assisted technology only for limited supportive purposes specifically to assist in the preliminary identification of potentially relevant academic sources during the literature search process and in the preparation of conceptual diagrams for illustrative purposes. AI technology was not used for data extraction, data analysis, interpretation of results, critical appraisal of the included studies, or the drafting of the core scientific content of this manuscript. All intellectual content, methodological decisions, interpretation of results, and final manuscript preparation remain entirely the responsibility of the authors.

### Ethical Clearance

Ethical review and approval were not required for this study because it is a systematic literature review based exclusively on previously published studies. The study did not involve direct interaction with human participants, collection of primary data, or the use of identifiable personal information.

### Data Availability

All data analyzed in this study are derived from published and publicly available literature. A comprehensive list of the reviewed articles is provided in the references section.

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