

ARTIFICIAL INTELLIGENCE VS EMOTIONAL INTELLIGENCE: SHAPING THE FUTURE OF SOCIAL EMOTIONAL LEARNING IN TODDLERS

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Abstract. The increasing integration of Artificial Intelligence (AI) into the daily lives of Generation Alpha toddlers has sparked debate about its implications for Social-Emotional Learning (SEL) and the development of Emotional Intelligence in early childhood. This study aims to identify current trends in AI technologies that interact with toddlers, examine the positive and negative effects of AI on children's SEL, and formulate pedagogical recommendations for early childhood education teachers in balancing the use of AI with the development of children's emotional competencies. This study employed a Systematic Literature Review (SLR) approach, drawing on peer-reviewed journal articles and other relevant academic literature concerning AI, Emotional Intelligence, and SEL in early childhood education. The collected data were analyzed using content analysis techniques. The findings indicate that AI has considerable potential to enhance social-emotional learning by providing personalized and interactive learning experiences. However, AI cannot replace the essential role of authentic human interaction in fostering children's emotional intelligence. Therefore, the integration of AI into early childhood education should be balanced, prioritizing meaningful social relationships and emotional development as the foundation for children's holistic growth.

Keywords: artificial intelligence; emotional intelligence; social-emotional learning; toddlers; early childhood education.

INTRODUCTION

The rapid advancement of digital technologies during the Fourth Industrial Revolution (Industry 4.0) has fundamentally transformed the developmental environment of young children, particularly toddlers belonging to Generation Alpha, a generation that has been surrounded by Artificial Intelligence (AI)-powered technologies since birth, including smart toys, virtual assistants, social robots, adaptive learning applications, and touchscreen devices capable of delivering personalized responses to users' behaviors. This transformation has shifted children's interactions with technology from passive engagement, as observed with conventional digital media, to dynamic, interactive experiences in which AI serves as a play companion, learning partner, and even a communication facilitator in young children's everyday activities (Berrezueta-Guzman et al., 2025). Previous studies have demonstrated that AI-based technologies in early childhood education can enhance children's learning engagement, provide personalized play experiences, and support the development of various developmental competencies (Gao, 2026). Nevertheless, the increasing intensity of toddlers' interactions with AI technologies has also raised global concerns regarding the potential reduction of opportunities for authentic social experiences through direct interactions with parents, teachers, and peers (Raave et al., 2026). These concerns are particularly significant because toddlerhood represents a critical developmental period during

which empathy, emotional recognition, self-regulation, and healthy social relationship skills are established as essential foundations for later development (Wu, 2026). Therefore, the growing presence of AI in toddlers' everyday lives presents an emerging challenge that warrants comprehensive investigation within the context of Social-Emotional Learning (SEL).

Recent literature indicates that the relationship between the use of Artificial Intelligence (AI) and the development of Social-Emotional Learning (SEL) in early childhood remains an ongoing academic debate, with no consensus yet emerging. On the one hand, several studies have reported that AI-powered technologies can facilitate children's recognition of emotions, foster empathy, promote prosocial behaviors, and strengthen emotional regulation through pedagogically designed interactive activities (Berrezueta-Guzman et al., 2025). Other studies further suggest that AI systems are increasingly capable of identifying learners' emotional states and delivering personalized learning experiences tailored to their affective states, thereby offering considerable potential to enhance the implementation of SEL in contemporary educational settings (Gao, 2026). On the other hand, a growing body of research argues that AI's capacity to recognize or simulate emotions should not be equated with its ability to establish authentic emotional relationships comparable to those developed through human-to-human interactions (Raave et al., 2026). Existing studies have also focused predominantly on the application of AI to improve cognitive development, personalize learning, and support children with diverse educational needs. At the same time, comparatively limited attention has been devoted to its comprehensive influence on toddlers' social-emotional development (Li et al., 2025). Consequently, a significant research gap remains regarding how Artificial Intelligence and Emotional Intelligence interact, compete, or complement one another in shaping the future of Social-Emotional Learning (SEL) among toddlers. This gap highlights the necessity of a systematic review to provide a more comprehensive understanding of AI's role in supporting—or potentially challenging—the social-emotional development of young children.

Artificial Intelligence (AI) refers to the capability of computer systems to perform functions traditionally associated with human intelligence, including learning from experience, recognizing patterns, making predictions, solving problems, understanding language, and making decisions based on available data (Tao & Nasri, 2025). In recent years, AI has evolved beyond being perceived merely as a computational technology that imitates human thinking processes; instead, it is increasingly recognized as an algorithmic ecosystem capable of interacting with its environment, adapting to new information, and generating responses that progressively resemble human cognitive behavior. In education, AI is regarded as a collection of intelligent technologies that support teaching and learning by personalizing instructional content, analyzing learners' individual needs, automating assessment processes, and providing adaptive learning experiences tailored to students' unique characteristics (Tao & Nasri, 2025). In the context of Early Childhood Education, AI has evolved into an interactive technology that enables young children to engage directly with educational robots, conversational AI systems, and other intelligent devices designed to facilitate learning through play and developmentally appropriate activities (Neumann & Barry, 2025). Moreover, recent studies indicate that the conceptualization of AI in contemporary education has shifted from the traditional paradigm of replacing human roles to hybrid intelligence, which emphasizes collaborative partnerships between human intelligence and computational capabilities to create more effective and meaningful learning experiences (Fang et al., 2026). Therefore, in the context of this study, Artificial Intelligence (AI) is defined as an intelligent technology capable of processing information, learning from data, and interacting with users to support learning processes and promote the holistic development of young children.

The implementation of Artificial Intelligence (AI) in Early Childhood Education can be classified into several major categories based on the types of technology employed and their pedagogical functions in the teaching and learning process (Tao & Nasri, 2025). The first category comprises Intelligent Tutoring Systems (ITS), which are AI-driven instructional systems capable of adapting learning content, difficulty levels, and feedback according to learners' individual performance and educational needs (Aldhilan & Rafiq, 2025). The second category consists of social robots, which are specifically designed to interact directly with young children through conversations, educational games, and collaborative activities to facilitate both learning and social development (Neumann & Barry, 2025). The third category includes learning analytics and adaptive learning technologies, which utilize learners' behavioral data to identify educational needs and deliver personalized learning experiences (Aldhilan & Rafiq, 2025; Gao, 2026). Recent technological developments have also introduced conversational AI, including chatbots and virtual assistants, enabling children to communicate in natural language and creating interactive experiences that closely resemble human communication (Özdemir Beceren & Baydemir, 2026). In addition, affective AI has emerged as an important technological innovation that detects users' facial expressions, vocal intonations, and behavioral patterns to generate adaptive responses based on children's emotional states (Ali-Ahmad, 2025). These diverse manifestations demonstrate that AI in Early Childhood Education has evolved beyond supporting cognitive development alone and is increasingly extending into the social and emotional domains that have traditionally been shaped through human interaction.

METHODS

Research Object

This study examines the increasing interaction between toddlers and Artificial Intelligence (AI)-based technologies and their implications for the development of Social-Emotional Learning (SEL) in early childhood. This phenomenon has emerged from the widespread adoption of intelligent technologies, including smart toys, social robots, virtual assistants, adaptive learning applications, and AI-powered conversational systems, which have become integral to the daily lives of Generation Alpha children (Wu, 2026). These technological innovations serve not only as entertainment media but are increasingly functioning as educational tools and platforms for social interaction among young children (Neumann & Barry, 2025). At the same time, this rapid technological advancement has generated considerable academic debate regarding the extent to which AI can either support or hinder the development of children's Emotional Intelligence, including empathy, self-awareness, emotional regulation, and the ability to establish healthy social relationships (Li et al., 2025). This issue is particularly significant because toddlerhood represents a critical developmental stage during which fundamental social-emotional competencies are established (Neumann & Barry, 2025). Therefore, this study identifies the relationship between advances in AI technologies and the development of toddlers' social-emotional competencies as its primary focus to provide a comprehensive understanding of the opportunities, challenges, and implications of AI for the future of Early Childhood Education.

Research Design and Data Sources

This study employed a library research approach using the Systematic Literature Review (SLR) method, a structured, transparent, and reproducible review methodology designed to identify, critically evaluate, and synthesize research findings relevant to a specific research question. The SLR approach was selected because this study aims to provide a comprehensive understanding of current research on Artificial Intelligence (AI), Emotional Intelligence, and

Social-Emotional Learning (SEL) among toddlers, based on empirical evidence published in peer-reviewed academic journals. The primary data consisted of scientific articles that directly investigated the application of AI technologies in Early Childhood Education, the development of children's Emotional Intelligence, and the implementation of Social-Emotional Learning (SEL) for toddlers, retrieved from relevant electronic academic databases. Meanwhile, the secondary data included supporting literature on AI, Emotional Intelligence, SEL, Early Childhood Education, child development theories, and methodological studies on systematic literature reviews, obtained from peer-reviewed journals, academic books, research reports, and other scholarly publications. By integrating both primary and secondary sources, this study seeks to produce a more comprehensive synthesis of existing knowledge on the roles of AI and Emotional Intelligence in shaping the future of Social-Emotional Learning (SEL) among toddlers.

The inclusion and exclusion criteria applied in this Systematic Literature Review (SLR) are presented in Table 1.

Table 1. Inclusion and Exclusion Criteria for Article Selection

Inclusion Criteria	Exclusion Criteria
Articles published between 2021 and 2026	Articles published before 2021
Open-access publications	Articles with restricted full-text access
Studies investigating Artificial Intelligence (AI) in Early Childhood Education	Studies that do not address Artificial Intelligence (AI)
Studies examining Social-Emotional Learning (SEL) or Emotional Intelligence	Studies unrelated to Social-Emotional Learning (SEL) or Emotional Intelligence
Peer-reviewed journal articles indexed in Scopus and identified through Google Scholar.	Editorials, opinion papers, news articles, Systematic Literature Reviews (SLRs), and scoping reviews

Theoretical Framework

This study is grounded in the Emotional Intelligence Theory proposed by Peter Salovey and John D. Mayer in 1990, which serves as the primary theoretical framework for understanding the social-emotional development of young children (Özdemir Beceren & Baydemir, 2026). This theory conceptualizes Emotional Intelligence as an individual's ability to perceive and recognize emotions in oneself and others, utilize emotions to facilitate cognitive processes, understand the meanings and implications of emotions, and regulate emotional responses effectively across diverse social contexts. Over time, this theoretical perspective has become a foundational element of Social-Emotional Learning (SEL), emphasizing emotional competencies as critical determinants of individuals' capacity to interact effectively with their social environment and cope successfully with various life challenges. In addition to Emotional Intelligence Theory, this study also adopts the Social-Emotional Learning (SEL) framework developed by the Collaborative for Academic, Social, and Emotional Learning (CASEL), which identifies five core competencies: self-awareness, self-management, social awareness, relationship skills, and responsible decision-making (Ali-Ahmad, 2025). These complementary theoretical perspectives provide the analytical foundation for examining how Artificial Intelligence (AI) may influence the development of toddlers' social-emotional competencies, both as an educational resource that supports learning and as a factor that may potentially diminish the quality of authentic human interactions, which remain the cornerstone of children's emotional intelligence development.

Data Collection Procedure

The study was conducted following the Systematic Literature Review (SLR) methodology, which emphasizes a systematic, transparent, and well-documented process to minimize potential research bias. The first stage involved formulating the research question, focusing on the relationship between the use of Artificial Intelligence (AI) technologies and the development of Social-Emotional Learning (SEL) among toddlers. The second stage involved developing the review protocol, including the literature search strategy, keywords, electronic databases, inclusion and exclusion criteria, and data analysis procedures. Subsequently, relevant studies were systematically identified through comprehensive searches of the selected academic databases using keyword combinations aligned with the study's objectives. The retrieved articles were then screened for topical relevance, publication quality, full-text availability, and consistency with the research objectives. The final stages comprised the critical appraisal of the selected studies, the extraction of essential information from each article, and the organization of the extracted data into thematic categories aligned with the review's focus. Through this rigorous methodology, the present study aims to produce a comprehensive, transparent, and academically reliable synthesis of the existing evidence. The overall article selection process is illustrated in the PRISMA flow diagram (Figure 1). At the same time, the characteristics of the included studies and the results of the data extraction are presented in Tables 1 and 2, respectively.

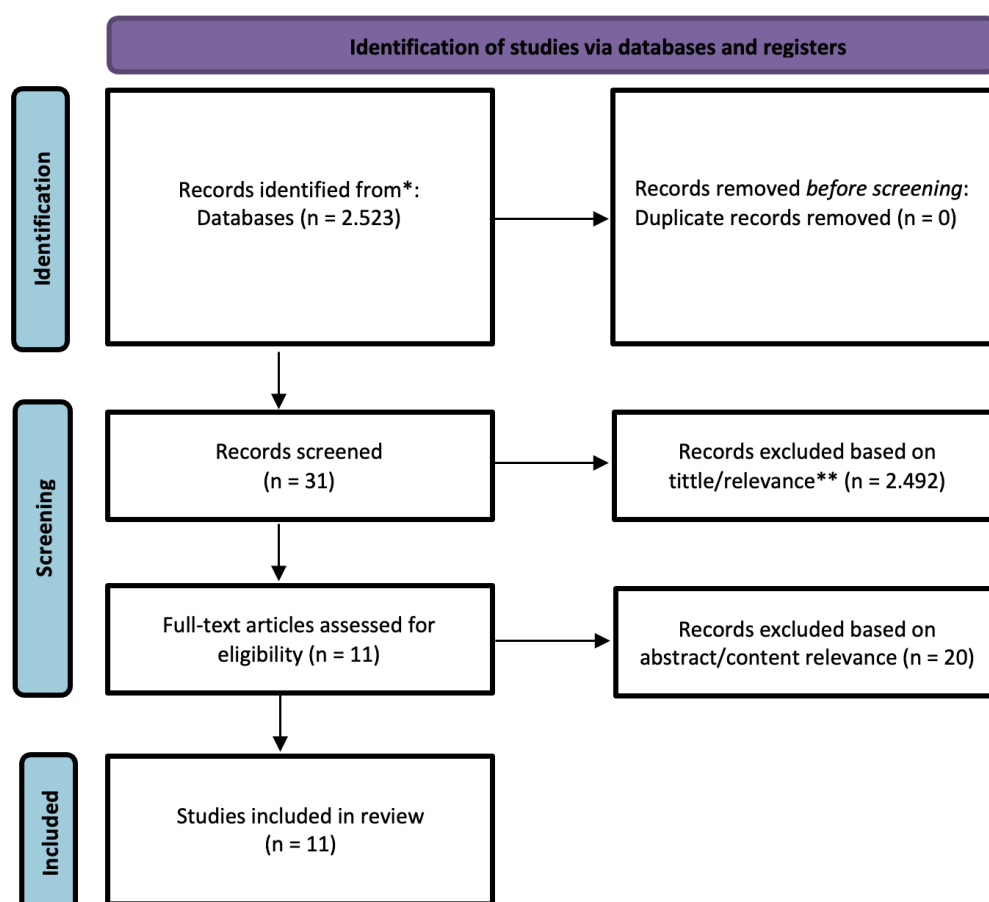


Figure 1. PRISMA Flow Diagram

Table 1. Characteristics of the Included Studies (Article Information)

No.	Title	Author (year)
1.	Artificial Intelligence in Childhood and Its Implications for Mental Health Prevention	Wu, S. L. (2026)
2.	AI-Driven Social-Emotional Learning: Enhancing Perspective-Taking Skills Through Scenario-Based Chatbot Dialogues in Early Childhood	Özdemir Beceren, B., Sarıtaş, S., & Baydemir, C. (2026)
3.	Emotional Interaction Mechanism of Intelligent Educational Robots in Assisting Language Acquisition	Gao, Y. (2026)
4.	AI & Social Learning? An Examination of Preservice Teachers' Perspectives	Li, Q., Bailey, E. J., Wadadekar, R., & Levi, M. C. (2025)
5.	Using Artificial Intelligence to Enhance Social-Emotional Learning in Kindergarten	Ali-Ahmad, N. A. (2025)
6.	Artificial Intelligence in Early Childhood Education: Transforming Kindergarten Teaching Practices	Tao, G., & Nasri, N. B. M. (2025)
7.	An Experimental Study Exploring Human-AI Complementarity in Early Social-Emotional Learning	Raave, D. K., Colasante, T., Roldan Roa, E., Ramos Martinez, J. C., Li, H., Mukherjee, S., & Malti, T. (2026)
8.	Effects of a Human-Robot Collaborative Teaching Approach on Preschoolers' Social-Emotional Competence and Learning Behaviors	Fang, J.-W., Ji, T.-T., Tu, Y.-F., Hwang, G.-J., Zou, D., & Chen, J. (2026)
9.	Supporting Preschool Emotional Development with AI-Powered Robots	Berrezueta-Guzmán, S., Dolon-Poza, M., & Wagner, S. (2026)
10.	Preschool Children's Engagement with a Social Robot During Early Literacy and Language Activities	Neumann, M. M., & Barry, R.-J. (2025)
11.	Transforming Early Childhood Education in Saudi Arabia: AI's Impact on Emotional Recognition and Personalized Learning	Aldhilan, D., & Rafiq, S. (2025)

Table 2. Data Extraction of the Included Studies (Article Extraction)

No.	Publication	Context	Explanatory Variable (Artificial Intelligence)	Explanatory Variable (Parenting/ Teacher Role)	Dependent Variable (Social Emotional Learning)	Finding
1.	Wu (2026)	MYS	1. Generative AI (Chatbot) 2. Adaptive Learning Platform 3. Predictive/Triage System 4. Digital Mental Health Tool	1. Parental/Caregiver Oversight 2. Teacher as Mediator 3. Ethical Safeguards	1. Empathy Development 2. Resilience 3. Critical Thinking 4. Social Interaction	AI offers potential benefits but risks to empathy, resilience, and social interaction; it requires human oversight and ethical implementation.
2.	Özdemir Beceren et al. (2026)	TUR	1. AI-Mediated Chatbot 2. Scenario-Based Dialogue 3. Voice-Activated Generative AI	1. Adult Scaffolding 2. Facilitator Guidance 3. Social Mediation	1. Cognitive Perspective-Taking 2. Emotional Perspective-Taking 3. Empathy	AI chatbot significantly improved perspective-taking; adult mediation was crucial for engagement; children showed anthropomorphic interpretations of AI.
3.	Gao (2026)	CHN	1. Intelligent Educational Robot 2. Emotional Interaction Mechanism 3. Multimodal Data Fusion (Speech, Visual, Physiological)	1. Teacher Facilitation 2. Parental Involvement 3. Classroom Management	1. Oral Fluency 2. Grammatical Accuracy 3. Emotional Engagement	Emotional interaction significantly enhances language acquisition; younger learners are more sensitive to anthropomorphic interactions; urban-rural differences affect effectiveness.
4.	Li et al. (2025)	USA	1. Generative AI Tools 2. AI-Enhanced Virtual Environment 3. AR/VR Technology	1. Preservice Teacher Training 2. Teacher Familiarity with AI 3. Teacher Self-Efficacy	1. Communication Skills 2. Confidence Building 3. Relationship Building 4. Personal	PTs are skeptical about AI for social learning; familiarity with AI correlates with perceived usefulness; AI is seen as more beneficial for

No.	Publication	Context	Explanatory Variable (Artificial Intelligence)	Explanatory Variable (Parenting/ Teacher Role)	Dependent Variable (Social Emotional Learning)	Finding
					Development	teacher design than student social learning.
5.	Ali-Ahmad (2025)	PSE	1. Emotion Recognition Software 2. AI-Powered Chatbots 3. Social Robots 4. Virtual Assistants	1. Teacher Training 2. Parental Engagement 3. Cultural Adaptation 4. Community Involvement	1. Emotional Regulation 2. Empathy 3. Social Interaction 4. Self-Awareness	AI has the potential to enhance SEL in kindergartens; it requires teacher training, cultural adaptation, and balanced human-AI interaction.
6.	Tao & Nasri (2025)	MYS	1. AI-Enhanced Early Learning (AI-EL) Model 2. Adaptive Learning Platform 3. Interactive Storytelling AI 4. Gamified Assessment	1. Teacher as "Learning Orchestrator" 2. Human-AI Co-Orchestration 3. Ethical Mediation	1. Metacognitive Skills 2. Critical Thinking 3. Social-Emotional Competence	AI can foster metacognitive skills through interactive storytelling; redefine teacher roles; raise ethical considerations; and emphasize culturally responsive design.
7.	Raave et al. (2026)	DEU	1. Pedagogical Conversational Agent (PCA) 2. Generative AI-Powered Virtual Character 3. LLM-Based Dialogue System	1. Human Educators 2. Pedagogical Support Techniques 3. Cognitive-Conceptual Scaffolding	1. Cognitive-Conceptual Support 2. Procedural Support 3. Emotional Support 4. Pedagogical Quality	PCA showed strengths in procedural and emotional support; educators excelled in cognitive-conceptual support; human-AI complementarity is key
8.	Fang et al. (2026)	CHN	1. Humanoid Intelligent Robot (Pepper) 2. Human-Robot Collaborative Teaching (HRCT)	1. Teacher Collaboration with Robot 2. Personalized Guidance 3. Emotional Support 4. Classroom Management	1. Social Interaction Skills 2. Emotion Comprehension Skills 3. Interpersonal	HRCT significantly improved all three SEL competencies; the robot's anthropomorphic

No.	Publication	Context	Explanatory Variable (Artificial Intelligence)	Explanatory Variable (Parenting/ Teacher Role)	Dependent Variable (Social Emotional Learning)	Finding
			3. Experiential Learning Scenarios		Problem-Solving Skills	features increased engagement; teacher reflections highlighted benefits and limitations
9.	Berrezueta-Guzmán et al. (2026)	DEU/ESP	1. AI-Powered Robot (GPT-4V) 2. Emotional Recognition System 3. Real-Time Emotional Analytics 4. Adaptive Feedback	1. Teacher Integration 2. Parental Acceptance 3. Educator Training	1. Emotional Recognition 2. Emotional Self-Regulation 3. Collaborative Skills 4. Classroom Engagement	Early exposure to AI robots enhances emotional recognition; sustained interaction improves collaboration; and high acceptance from parents and teachers.
10.	Neumann & Barry (2025)	AUS	1. Social Robot (NAO) 2. Humanoid Robot Instructor 3. Voice Recognition Technology	1. Teacher Role 2. Parental Involvement 3. Adult Facilitation	1. Child Engagement 2. Positive/Negative Emotions 3. Verbal Utterances 4. Letter Writing 5. Drawing	Most children engaged positively with the robot; engagement correlated with fewer negative emotions; social robots can support early literacy and language activities.
11.	Aldhilan & Rafiq (2025)	SAU	1. AI-Powered Personalized Learning 2. Emotion Recognition Technology 3. Adaptive Learning Systems 4. Intelligent Tutoring Systems	1. Teacher Training 2. Cultural Sensitivity 3. Parental Involvement 4. Professional Development	1. Emotional Recognition 2. Empathy 3. Social Interaction 4. Personalized Learning Outcomes	AI effectively personalizes learning and enhances emotional recognition; challenges include data privacy, cultural adaptation, and equitable access.

Data Analysis

Data were analyzed using content analysis, a qualitative analytical technique employed to identify, organize, and interpret recurring patterns of information derived from the selected body of literature (Özdemir Beceren & Baydemir, 2026). Content analysis was chosen because it enables an in-depth exploration of key concepts, emerging themes, research trends, relationships among variables, and scholarly arguments concerning Artificial Intelligence (AI), Emotional Intelligence, and Social-Emotional Learning (SEL) in toddlers. The analytical process began with a comprehensive reading of all studies that satisfied the predefined inclusion criteria to gain a thorough understanding of each study's context, objectives, methodology, and principal findings. Subsequently, a systematic coding process was conducted to classify relevant information into thematic categories, including the types of AI technologies implemented, their positive contributions to Social-Emotional Learning (SEL), potential adverse effects on children's emotional development, and the pedagogical recommendations proposed by the respective studies. Following the categorization process, the extracted data were systematically compared and interpreted to identify recurring patterns, global research trends, and existing research gaps that warrant further investigation. This analytical approach enabled the study to produce a comprehensive conceptual synthesis that not only summarizes prior findings but also offers a deeper understanding of how Artificial Intelligence (AI) and Emotional Intelligence interact to shape the future of Social-Emotional Learning (SEL) in Early Childhood Education.

RESULTS AND DISCUSSION

Results

Trends and Types of Artificial Intelligence Technologies in Early Childhood Education

The findings of the literature search indicate that the use of Artificial Intelligence (AI) in Early Childhood Education has increased substantially in recent years and has become a major driver of educational transformation in the digital era. The studies identified through the Systematic Literature Review (SLR) reveal that AI has been implemented in various technological forms designed to support children's learning, play, communication, and developmental activities. The review further demonstrates that the most frequently reported AI technologies in Early Childhood Education include social robots, Intelligent Tutoring Systems (ITS), learning analytics, conversational AI, and affective AI technologies that enable intelligent systems to generate adaptive responses based on users' behaviors and emotional conditions (Aldhilan & Rafiq, 2025). The findings also indicate that most of the selected studies were conducted within both formal and informal educational settings, with the primary objective of enhancing children's learning experiences through more interactive and personalized approaches. Furthermore, the reviewed publications suggest that the role of AI in Early Childhood Education has expanded beyond supporting academic development alone and is increasingly directed toward fostering children's social competencies, communication skills, and emotional interactions through technologies that are progressively more responsive to users' behaviors (Berrezueta-Guzman et al., 2025). Overall, the reviewed literature demonstrates that Artificial Intelligence (AI) has become an increasingly integrated component of the Early Childhood Education ecosystem across various countries.

The evidence synthesized from the reviewed literature indicates that the evolution of Artificial Intelligence (AI) in Early Childhood Education has been characterized by a progressive expansion of its functions, evolving from a conventional instructional support tool into a more sophisticated medium for interactive engagement. Numerous studies report that social robots are among the most widely adopted AI technologies because they can interact directly with young children through

verbal communication, educational games, collaborative activities, and personalized feedback tailored to children's responses (Fang et al., 2026). In addition to social robots, the use of conversational AI, including chatbots and virtual assistants, has increased substantially in early childhood educational settings, as these technologies enable children to engage in natural language conversations that closely resemble human communication (Berrezueta-Guzman et al., 2025). The reviewed literature also highlights the emergence of affective AI, which is designed to recognize users' facial expressions, vocal intonation, and behavioral cues to generate adaptive responses based on children's emotional states (Gao, 2026). Furthermore, several studies indicate that AI technologies are increasingly used to support personalized learning by analyzing children's behavioral data, thereby allowing instructional content, learning activities, and levels of difficulty to be adjusted to individual learning needs. The findings further demonstrate that the advancement of AI in Early Childhood Education has paralleled the growing demand for flexible, interactive, learner-centered learning environments. Overall, the evidence suggests that Artificial Intelligence (AI) has evolved into a multifaceted technology with diverse applications and pedagogical functions in Early Childhood Education.

The findings on the advancement of Artificial Intelligence (AI) in Early Childhood Education are closely related to the central phenomenon addressed in this study, namely, the increasing intensity of toddlers' interactions with intelligent technologies in their daily lives. The reviewed literature indicates that social robots, chatbots, virtual assistants, and other AI-powered technologies have become integrated into children's learning, play, and communication, thereby creating new forms of interaction that were previously dominated by direct human-to-human engagement. This trend is consistent with the characteristics of Generation Alpha, whose members are growing up in environments saturated with intelligent digital technologies and are exposed to substantially higher levels of technological interaction than previous generations. The literature further reveals that AI technologies are increasingly being developed to support children's social and emotional development through affective AI, companion robots, and conversational systems designed to simulate human communication. At the same time, the reviewed studies consistently report growing academic concern regarding the implications of these digital interactions for the social-emotional development of young children. The findings suggest that the presence of AI in toddlers' lives is no longer merely a projection of future technological advancement but has already become an integral component of educational practices and everyday experiences across diverse contexts. Therefore, the evidence synthesized from the reviewed literature confirms that advances in Artificial Intelligence (AI) are directly associated with the phenomenon investigated in this study regarding the future of Social-Emotional Learning (SEL) among toddlers.

Emotional Intelligence and Social-Emotional Learning in Toddlers

The findings of the literature review indicate that Emotional Intelligence (EI) is one of the most widely adopted theoretical constructs for explaining individuals' ability to perceive, understand, express, and regulate emotions in themselves and others. The studies identified through the Systematic Literature Review (SLR) consistently position Emotional Intelligence in early childhood as a fundamental foundation for the development of social competence, adaptive capacity, interpersonal communication, and prosocial behavior in everyday life. Recent meta-analytic evidence on the development of emotional intelligence in young children further suggests that Emotional Intelligence is influenced by multiple factors originating from the family environment, educational settings, and the social interactions experienced during early childhood. The reviewed literature also demonstrates that, within the context of Early Childhood Education, Emotional Intelligence is frequently associated with children's ability to recognize emotions,

understand others' perspectives, manage social conflicts, and establish positive interpersonal relationships (Fang et al., 2026). Furthermore, numerous studies indicate that the development of Emotional Intelligence has become an essential component of early childhood educational programs because it contributes to children's psychological well-being and school readiness. The findings also reveal a growing body of research on Emotional Intelligence among toddlers and young children, reflecting increasing academic recognition of the importance of social-emotional competencies in responding to the challenges of an increasingly digitalized environment. Overall, the reviewed literature demonstrates that Emotional Intelligence (EI) represents one of the principal theoretical constructs for understanding the quality of young children's social and emotional development.

The evidence synthesized from the reviewed literature indicates that the development of Emotional Intelligence (EI) in early childhood is shaped through a dynamic process involving interactions among individual, familial, educational, and broader social environmental factors. The reviewed studies consistently demonstrate that parents' emotional expressions, the quality of parent-child relationships, teachers' professional competencies, and supportive learning environments are key factors in the development of Emotional Intelligence during early childhood. Furthermore, several studies indicate that children's ability to recognize emotions develops through social interactions that allow them to observe facial expressions, body language, vocal intonation, and the emotional responses of those around them (Fang et al., 2026). Other empirical studies indicate that educational programs designed to enhance emotional awareness, empathy, and communication skills contribute positively to the development of Emotional Intelligence among young children. The analyzed literature also demonstrates that Emotional Intelligence extends beyond the ability to understand emotions, encompassing the capacity to regulate emotional responses and establish healthy interpersonal relationships. In addition, numerous studies have found that close and supportive relationships between children and their parents or teachers make a substantial contribution to the development of social-emotional competencies during the early years of life. Overall, the reviewed evidence suggests that the development of Emotional Intelligence in early childhood is a complex social process that evolves through continuous emotional interactions across multiple developmental contexts.

The findings on Emotional Intelligence (EI) in the reviewed literature demonstrate a strong connection to the central phenomenon examined in this study, namely, the increasing integration of Artificial Intelligence (AI) technologies into toddlers' everyday lives. The reviewed studies consistently indicate that the development of Emotional Intelligence during early childhood is closely associated with the quality of interpersonal relationships, emotionally supportive interactions with parents and teachers, and authentic social experiences acquired through direct human interaction. Furthermore, the literature emphasizes that children's abilities to recognize emotions, understand others' perspectives, and develop empathy are cultivated through continuous exposure to genuine emotional expressions encountered within their social environments. At the same time, the findings on Artificial Intelligence reveal that toddlers are increasingly interacting with intelligent technologies designed to provide automated responses to users' behaviors, including systems capable of simulating emotional expressions and affective responses. This development has occurred alongside growing academic concern regarding the importance of social-emotional competencies as a fundamental component of early childhood development. The reviewed literature also demonstrates that educational programs designed to strengthen Emotional Intelligence continue to regard authentic social interaction and emotionally meaningful relationships as essential components of the learning process. Therefore, the evidence synthesized

from the reviewed studies indicates that the development of Emotional Intelligence is directly related to the growing presence of Artificial Intelligence in toddlers' lives, as both are intrinsically connected to the formation of social and emotional competencies during the earliest stages of child development.

Synthesis of Research Findings

To provide a comprehensive synthesis of the reviewed evidence, the findings were organized according to the three research objectives established in this study. Rather than presenting the findings of individual studies separately, this synthesis integrates the key themes identified across the selected literature, highlights the supporting evidence, and summarizes their implications for Early Childhood Education. This approach offers a more holistic understanding of how Artificial Intelligence (AI), Emotional Intelligence (EI), and Social-Emotional Learning (SEL) interact in the context of early childhood development, while demonstrating how each research objective was systematically addressed throughout the review process. The synthesized findings are presented in Table 4.

Table 4. Synthesis of Research Findings Based on the Research Objectives

No	Research Objective	Key Findings	Evidence from the Literature Review	Implications
1.	To identify the trends and types of Artificial Intelligence (AI) technologies most frequently interacting with toddlers.	Artificial Intelligence (AI) has become an integral part of Generation Alpha's developmental environment through a wide range of interactive technologies used in learning, play, and everyday communication.	The reviewed literature demonstrates the widespread use of social robots, smart toys, conversational AI (chatbots and virtual assistants), Intelligent Tutoring Systems (ITS), adaptive learning systems, and affective AI technologies that recognize users' emotional expressions and behavioral responses.	Early Childhood Education should promote AI literacy from an early age to ensure that intelligent technologies are used safely, purposefully, and in ways appropriate to children's developmental needs.
2.	To analyze the positive and negative impacts of AI on Social-Emotional Learning (SEL) among toddlers based on leading international studies.	AI presents both opportunities and challenges for the social-emotional development of young children.	The literature indicates that AI contributes positively by enhancing learning engagement, enabling personalized learning, supporting emotion recognition, and providing opportunities to practice communication through adaptive interactions. Conversely, potential risks include reduced opportunities for	The use of AI among toddlers should be accompanied by appropriate guidance from parents and teachers to maximize its educational benefits while minimizing potential adverse effects on children's

				authentic interaction, dependence on digital technologies, and fewer experiences that foster empathy through direct human relationships.	social increased digital technologies, and fewer experiences that foster empathy through direct human relationships.	social-emotional development.
3.	To formulate pedagogical recommendations for Early Childhood Education teachers in balancing the use of AI with the development of children's Emotional Intelligence (EI).	AI should complement, rather than replace, human interaction in supporting Social-Emotional Learning (SEL).		The literature consistently demonstrates that the development of Emotional Intelligence (EI) continues to depend primarily on children's relationships with parents, teachers, and peers. Accordingly, effective pedagogical strategies integrate AI with activities that promote empathy, communication, collaboration, emotional reflection, and authentic face-to-face social interaction.		Early Childhood Education teachers should adopt a human-centered AI approach, using intelligent technologies to enrich learning while ensuring that authentic social and emotional experiences remain the foundation of early childhood education.

Overall, the synthesized findings indicate that the three research objectives were successfully achieved. The reviewed literature consistently demonstrates that AI has become increasingly integrated into toddlers' learning environments, creating both opportunities and challenges for the development of Social-Emotional Learning (SEL) and Emotional Intelligence (EI). While AI can support personalized and interactive learning experiences, the findings also emphasize that authentic human interaction remains fundamental to children's social-emotional development. These findings provide the basis for the discussion presented in the following section.

Discussion

Artificial Intelligence as an Emerging Partner in Social-Emotional Learning

The findings of this Systematic Literature Review (SLR) demonstrate that advances in Artificial Intelligence (AI) have expanded the forms of interaction toddlers experience through a wide range of intelligent technologies increasingly integrated into both educational settings and everyday life (Berrezueta-Guzman et al., 2025). The synthesized evidence indicates that AI no longer functions solely as a tool for cognitive learning but has increasingly extended into the social and emotional domains through social robots, educational chatbots, affective AI systems, and adaptive conversational technologies designed to interact directly with young children. At the same time, the review also reveals that the development of Emotional Intelligence (EI) in toddlers continues to rely heavily on the quality of interpersonal relationships, authentic social experiences, and meaningful emotional engagement established through interactions with parents, teachers, and

the broader social environment. Another important finding suggests that the implementation of Social-Emotional Learning (SEL) in Early Childhood Education is increasingly moving toward technology-enhanced learning while preserving the essential role of humanistic values within educational practice. Furthermore, the synthesized literature demonstrates that although AI has considerable potential to support the development of emotional awareness, self-reflection, and selected social-emotional learning activities, its capabilities remain insufficient to replace the authentic human relationships that form the foundation of children's social-emotional development. Therefore, the findings of this study underscore the importance of positioning Artificial Intelligence (AI) as a complementary educational tool that supports Social-Emotional Learning (SEL), rather than as a substitute for the human interactions indispensable to fostering toddlers' Emotional Intelligence.

Comparison with Previous Studies

When compared with previous research, the findings of the present study offer a broader contribution by examining not only the effectiveness of Artificial Intelligence (AI) technologies or the benefits of Social-Emotional Learning (SEL) independently, but also the dynamic relationship between these two domains within the context of toddler development, a developmental period widely recognized as a critical stage for the acquisition of social-emotional competencies. Previous studies have generally concentrated either on the effectiveness of social robots in enhancing children's learning engagement or specific emotional skills, or on the implementation of Social-Emotional Learning (SEL) within conventional educational settings. In contrast, the present study demonstrates that these two perspectives should be understood as complementary components of a unified framework aimed at fostering children's social and emotional competencies in increasingly digitalized educational environments. A major contribution of this study lies in its systematic mapping of the diverse forms of AI technologies that interact with toddlers while simultaneously integrating these technological developments with the concepts of Emotional Intelligence (EI) and Social-Emotional Learning (SEL) within a coherent conceptual framework. Furthermore, this review reveals that the ongoing debate regarding AI as either a threat or an opportunity for children's social-emotional development should not be interpreted as a simple dichotomy. Rather, the educational value of AI depends on a complex interplay of factors, including pedagogical design, the quality of adult guidance, and the educational context in which these technologies are implemented. This integrative perspective provides a meaningful contribution to the existing literature by extending beyond studies that have traditionally examined AI primarily from a technological perspective or, conversely, from the standpoint of developmental psychology alone.

Interpretation of the Findings

The findings of this study provide an important reflection that the growing presence of Artificial Intelligence (AI) in toddlers' daily lives is no longer a phenomenon that can be separated from Early Childhood Education, making a deeper understanding of its implications for Social-Emotional Learning (SEL) increasingly essential. The findings demonstrate that the study successfully achieved its objective of mapping the AI technologies most frequently interacting with toddlers, revealing a significant transformation of learning environments from traditional human-centered interactions toward educational settings increasingly shaped by adaptive and interactive technologies. Furthermore, the study's objective of analyzing both the positive and negative impacts of AI on Social-Emotional Learning (SEL) indicates that the benefits and potential risks associated with AI emerge simultaneously. It should therefore be understood as interconnected rather than as isolated phenomena. Another important reflection arising from this

review is that Emotional Intelligence (EI) remains an indispensable competency despite the rapid advancement of AI technologies. Indeed, as AI becomes increasingly capable of simulating social and emotional behaviors, it becomes even more important for children to develop empathy, social awareness, self-regulation, and the capacity to establish authentic interpersonal relationships. Therefore, the findings suggest that the future of Early Childhood Education will be determined not only by the sophistication of emerging technologies but also by educators' and parents' ability to ensure that technological innovations continue to support children's social and emotional development in a balanced and developmentally appropriate manner.

Educational Implications

The principal implication of this study lies in the need for a paradigm shift in understanding the relationship between Artificial Intelligence (AI) and Early Childhood Education. The findings indicate that AI should not be perceived as a technology intended to replace the roles of teachers or parents; rather, it should be regarded as an educational tool that can enhance learning when implemented appropriately. Within the context of Early Childhood Education, the findings suggest that future curriculum development should integrate technological literacy while simultaneously strengthening children's social-emotional competencies. Another important implication is the need to develop pedagogical guidelines specifically designed to regulate the use of AI technologies among toddlers, ensuring that digital interactions do not diminish children's opportunities to engage in authentic social experiences. At the policy level, the findings provide a valuable foundation for formulating regulatory frameworks governing the use of AI in Early Childhood Education, taking into account children's psychological development, ethical considerations surrounding AI technologies, and users' emotional well-being. Furthermore, for educational institutions, the findings provide an empirical basis for developing instructional models that position AI as a complementary tool to support Social-Emotional Learning (SEL) activities, including emotional reflection, enhanced interpersonal communication, and collaborative learning experiences that continue to emphasize active human interaction. Therefore, the primary contribution of this study lies in providing a conceptual foundation for the development of Early Childhood Education that is responsive to technological advancement while remaining firmly grounded in humanistic values.

Explaining the AI-Emotional Intelligence Paradox

The findings of this study can be explained by the distinctive developmental characteristics of toddlers, whose responses to technology and social environments differ fundamentally from those of older children and adults (Wu, 2026). During early childhood, social and emotional development primarily occurs through observation, imitation, communication, and relational experiences that arise from direct interactions with others. Consequently, although Artificial Intelligence (AI) technologies are becoming increasingly capable of simulating certain social behaviors through adaptive responses, synthetic emotional expressions, and natural language communication, they remain limited in their ability to provide genuinely authentic emotional relationships (Raave et al., 2026). At the same time, the findings also highlight the educational benefits of AI, as these technologies can deliver consistent feedback, personalized learning experiences, and broader opportunities for exploration than many conventional instructional approaches. This duality helps explain why some studies report positive effects of AI on children's social-emotional development. In contrast, others express concerns regarding the potential decline in the quality of human social relationships. In other words, the findings suggest that the dual nature of AI—as both an educational support tool and a potential source of developmental risk—is a logical consequence of its position at the intersection between the demand for educational

innovation and young children's developmental need for authentic human interaction. Therefore, the findings of this study reflect the real-world dynamics currently shaping the transformation of Early Childhood Education in the digital era.

Practical Recommendations

Based on the findings of this study, several strategic actions should be undertaken by key stakeholders involved in Early Childhood Education. Early Childhood Education teachers should adopt pedagogical approaches that use Artificial Intelligence (AI) as a complementary educational resource while maintaining the frequency and quality of direct social interactions among children, teachers, and peers. Likewise, parents should be equipped with adequate digital literacy to guide their children's use of AI technologies in a balanced manner appropriate to their developmental needs. Furthermore, AI developers should incorporate child-centered design principles when developing intelligent technologies, ensuring that these systems are designed not only to enhance learning efficiency but also to foster empathy, effective communication, and healthy social relationships. At the institutional level, educational institutions should establish policies governing the responsible use of AI by integrating Social-Emotional Learning (SEL) objectives into technology-supported learning environments. Moreover, governments and educational policymakers should develop comprehensive national guidelines for implementing AI in Early Childhood Education to ensure that technological innovation remains aligned with broader human capital development goals. Therefore, the most important priority is neither to restrict the advancement of Artificial Intelligence (AI) nor to replace conventional educational practices entirely, but rather to establish a balanced integration between technological innovation and the cultivation of Emotional Intelligence (EI) so that toddlers can develop as individuals who are not only digitally competent but also socially and emotionally mature (Raave et al., 2026).

To summarize the principal outcomes of this study, Table 5 presents a synthesis of the main findings derived from the literature review. The table highlights the relationships among Artificial Intelligence, Emotional Intelligence, and Social-Emotional Learning, as well as the study's primary contribution and practical recommendations.

Table 5. Synthesis of the Main Findings

Aspect	Key Findings
Artificial Intelligence (AI)	AI is increasingly integrated into Early Childhood Education, evolving from a learning support tool into a technology that facilitates social and emotional interactions.
Emotional Intelligence (EI)	Emotional Intelligence remains the fundamental foundation of children's social-emotional development and cannot be fully replaced by technological systems.
Social-Emotional Learning (SEL)	Social-Emotional Learning is most effective when supported by an appropriate combination of AI technologies and authentic human interaction.
Research Contribution	This study demonstrates that the future of SEL in toddlers is determined not by choosing between AI and EI, but by the ability to integrate both in a balanced and complementary manner.
Main Recommendation	Develop a Human-Centered AI for Social-Emotional Learning model that utilizes AI to enhance learning while ensuring that authentic human relationships remain the foundation of early childhood development.

Overall, the synthesized findings reinforce the central argument of this study that AI and Emotional Intelligence should be viewed as complementary rather than competing elements in Early Childhood Education. The evidence consistently suggests that a balanced integration of intelligent technologies and authentic human interaction provides the most promising approach for supporting toddlers' Social-Emotional Learning in the digital era.

CONCLUSION

The most significant and perhaps most unexpected finding of this study is that the longstanding debate that positions Artificial Intelligence (AI) and Emotional Intelligence (EI) as two opposing forces in early childhood development is not fully supported by the synthesized evidence identified through this Systematic Literature Review (SLR). The findings demonstrate that AI has not emerged as a replacement for human emotional intelligence, as is frequently suggested in public discourse. Instead, AI has increasingly evolved into an educational technology designed to engage with the social and emotional dimensions of children's development, domains that have traditionally been regarded as uniquely human. At the same time, the findings reveal that as AI becomes more sophisticated at simulating social behaviors, recognizing emotions, and generating adaptive responses for young children, toddlers' social-emotional development continues to depend fundamentally on the quality of authentic interpersonal relationships. Consequently, this study identifies an important paradox: rather than diminishing the importance of Emotional Intelligence (EI), the rapid advancement of AI further reinforces the need to cultivate emotional competencies from the earliest stages of child development. These findings suggest that the future of Social-Emotional Learning (SEL) for toddlers will not be determined by choosing between technological innovation and human relationships, but rather by the capacity of educational systems to integrate both in a balanced and complementary manner. Therefore, this study concludes that Artificial Intelligence (AI) and Emotional Intelligence (EI) should not be viewed as competing entities; rather, they should be managed synergistically to prepare future generations capable of adapting to technological advances without compromising their essential human capacities.

Theoretical and Practical Contributions

This study makes a significant theoretical contribution by synthesizing Artificial Intelligence (AI), Emotional Intelligence (EI), and Social-Emotional Learning (SEL) into a comprehensive framework for understanding early childhood development in the digital era. Existing research has generally examined these three concepts independently across different academic disciplines. In contrast, this study offers a more integrative perspective by demonstrating how technological advancement and emotional development interact and mutually influence one another within the context of Early Childhood Education. Furthermore, this study extends the scholarly discourse on the relationship between technology and human development by demonstrating that the successful implementation of AI in education depends not only on technological sophistication but also on its capacity to support learners' social and emotional development.

From a practical perspective, this study provides a conceptual foundation for Early Childhood Education teachers, parents, educational technology developers, and policymakers to design educational strategies that effectively balance the use of digital technologies with the cultivation of children's Emotional Intelligence. The findings may also serve as a valuable reference for curriculum development, the design of AI-supported educational media, and the formulation of educational policies that are more responsive to the developmental challenges faced by Generation

Alpha. Therefore, the principal contribution of this study lies in its ability to bridge the growing demand for technology-driven educational transformation with the equally important need to preserve and strengthen children's social and emotional development as the foundation for developing future human capital.

Limitations and Future Research Directions

This study is limited to the synthesis of scholarly literature examining the relationship among Artificial Intelligence (AI), Emotional Intelligence (EI), and Social-Emotional Learning (SEL) in toddlers. Consequently, the findings represent the current body of knowledge reported in published academic sources rather than direct empirical evidence from educational practice. While this scope provides a comprehensive overview of global research trends, it also creates opportunities for future studies to deepen the understanding of the practical implementation of AI across diverse social, cultural, and educational contexts. Moreover, the rapid pace of AI development continues to generate new forms of interaction between children and intelligent technologies, many of which may not yet be adequately represented in the literature available at the time of this review. Therefore, future research should prioritize empirical investigations that explore the lived experiences of toddlers, teachers, and parents in using AI technologies within Early Childhood Education settings. Subsequent studies may also develop more specialized evaluation frameworks to assess the effects of AI on children's empathy, emotional regulation, social skills, and other Social-Emotional Learning (SEL) competencies. Furthermore, cross-national and cross-cultural comparative studies would provide valuable insights into the contextual factors that shape the relationship between technological innovation and children's social-emotional development. Therefore, rather than concluding the discussion on the future role of AI in Early Childhood Education, this study opens new avenues for research to further advance scholarship in education and teacher education amid ongoing digital transformation.

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