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Artificial Intelligence as a New Doctrine in Early Childhood: A Critical Analysis

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Abstract: *The inclusion of Artificial Intelligence (AI) into the field of early childhood education has led to the shift in the paradigm of great proportions. Thus, compelling to re-evaluate the role of an adult in the regulation of technologies. The paper aims to perform a critical examination of adult management and ethical mediation in terms of children using AI, placing the theory of Vygotsky and his Zone of Proximal Development (ZPD) as the main theoretical perspective. The employed methodology was a Systematic Literature Review (SLR) that uses the PRISMA protocol; therefore, eleven articles published since 2024-2025 were identified and underwent qualitative analysis. The research findings denote that the roles played by adults have changed to dynamic mediators of ethics and scaffolds as opposed to the traditional supervisory roles. The discussion shows that successful cognitive management requires the high procedural control, including limiting the screen time to less than fifteen minutes and using the data-driven content customization to reduce the cognitive load. The research also found out that the effectiveness of AI interventions largely depends on the level of self-efficacy of teachers and AI-TPACK literacy. The results led to the development of an Adaptive Mediated Scaffolding (AMS) Model, which has highlighted the necessity to balance digital automation and human intervention in order to prevent social isolation. The research provides important policy implications to policymakers and educators to create the guidelines that facilitate ethical and safe use of AI in enhancing the holistic growth of children during the digital age.*

Keywords: Artificial Intelligence (AI), Early Childhood Education, Ethical Mediation, Management, SLR PRISMA, Zone of Proximal Development (ZPD)

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1. Introduction

The introduction of AI into the ecosystem of early childhood does not just represent a technological development but is viewed as an emerging doctrine that transforms the paradigm of cognitive and social development of the younger generation (Wilson et al., 2025; Xu et al., 2022; Xu et al., 2025). The convergence of AI (Almulla, 2024; Amini et al., 2025; Munawwaroh et al., 2024) that is gradually becoming ubiquitous in the form of smart devices (Dennen et al., 2022; Haleem et al., 2022) and adaptive learning algorithms (Hajj, 2023; Won et al., 2023) has led to the transformation of traditional pedagogical practices to the systems involving automated; data-driven practices. However, the technology is often introduced without a strict assessment of the degree in which the agency of children is diluted in case all the contacts are tracked, and quantified and controlled by obscure algorithms. Consequently,

this emergent doctrine is not only a challenge to the autonomy of children (Rath -Boșca, 2025; UNICEF, 2025), but also the question of whether to allow machines to have a significant impact on the early formation of human imagination and moral growth is a matter of existential concern.

In spite of technological advancement, there still seems to be a significant discrepancy in the ways adults use early-child AI implementations (Lauricella et al., 2015; Livingstone & Helsper, 2008; Nikken and Schols, 2015). Ethical mediation is very reactive but not proactive (Stith and Roth, 2010). The use of digital tools may be rather comfortable, but due to teachers and parents being torn apart between the privacy, mental, and holistic development of children and the ethical obligation to perform their task (Livingstone et al., 2016; Livingstone and Third, 2017; Staksrud et al., 2013). The continued absence of active ethical control exposes children to the risks of management approaches that focus on the procedural effectiveness or technological comfortability instead of the wider human values (Benlian et al., 2022). Ue to lack of thorough ethical mediation framework, adults will not be able to critically assess the effects of AI tools on the social, emotional, and cognitive development of children. Hence, it may result in reinforcement of inequities and power disparities within the early education environment.

Within this perspective, the critical analysis from this paper is fundamental in revealing the power relations that determine AI in early childhood education. Through the analysis of the intersection of adult management with the ethical role, this paper presents the necessity of parents, teachers, and caregivers to assume an active role of ethical mediators. They have to protect the fundamental rights and well-being of children, who have to live in more complex digital environment (Lauricella et al., 2015; Livingstone and Helsper, 2008; Nikken and Schols, 2015; Stith and Roth, 2010; Livingstone et al., 2016; Livingstone and Third, 2017; Staksrud et al., 2013; Benlian et al., 2022). In this way, while adults are perceived as tech facilitators, they also the strategic ethical agents who effectively implement AI with the aim of enhancing learning outcomes, encouraging social-emotional development, and becoming responsible digital citizens.

2. Literature Review

Transition from Human Pedagogy to Algorithmic Management

The implementation of AI in early childhood education is above the simple development of teaching methods (Cimino et al., 2025; Garcia Peinado, 2025; Holmes et al., 2019; Kucirkova and Sakr, 2018; Zawacki et al., 2019). Instead, it is an ontological change that restructures the teaching to be more of a strictly-algorithms style of governance (Livingstone, 2019; Wang, 2024). Since adaptive learning systems are intended to replace human teachers in their task to map the path of cognitive development in children, several drawbacks become apparent. The concept of character building is mislaid and reconstructed as a sequence of data-driven optimizations (Williamson, 2017). The algorithmic management as defined by Benlian et al. (2022) works based on automated governance that eliminates the affective dimensions and contextual affordances that are peculiar to human teachers. This culminates in a loss of professional autonomy in teachers (Bit et al., 2024) as they succumb to the standard of black-box-algorithms, where pedagogical decisions are based on opaque code. Therefore, leaving the developmental paths of children in the hands of a corporate technocratic approach that values efficiency over the overall well-being.

Of greater concern, the datafication of children's play has undermined the imagination into a violent data gathering that constitutes surveillance as a normal practice since early childhood. The increasing number of children using smart toys and interactive technologies are alarming with regard to children's privacy and development, since they may be subjected to the revelation of personal information without the relevant restrictions (Sylla et al., 2021). This change leads to a large asymmetry of power by which adults (be it a teacher or a parent) frequently lose the ability to question the algorithmic results; since they are mesmerized by the alleged objectivity provided by big data. Opposition to this change is not simply related to the loss of the human touch, but the fact that this AI doctrine quietly prepares children to fit the demands of the algorithms (Regehr et al., 2025; Ungruh and Pera, 2024; Wood, 2024). This eventually results in a generation which grows up in a system of digital control that never sleeps and the ethical correctness of which can hardly be challenged.

Children's Agency Ethics and Crisis Mediation

When autonomy of children is subjugated to constant algorithmic monitoring, a crisis of agency arises in early education, which undermines one of the basic rights of children to self-development (Fosch-Villaronga et al., 2023; Rath-Boșca, 2025) without being digitally manipulated. In the new doctrine, ethical mediation is a necessity that adults have to offset the encroachment of AI into the personal space of children. Based on the theoretical framework of mediation presented by Stith and Roth (2010) (see Figure 1), the involvement of adults, especially the teachers and parents; must be the active co-genetic discourse. Adults are not the guardians of the tools but the ethical fortifications that take children through the algorithmic reasoning. Without critical mediation, children may be at a risk of forgoing their agency. Their wishes, and choices are quietly influenced by AI recommendation systems that are concentrated on conforming rather than on being creative.

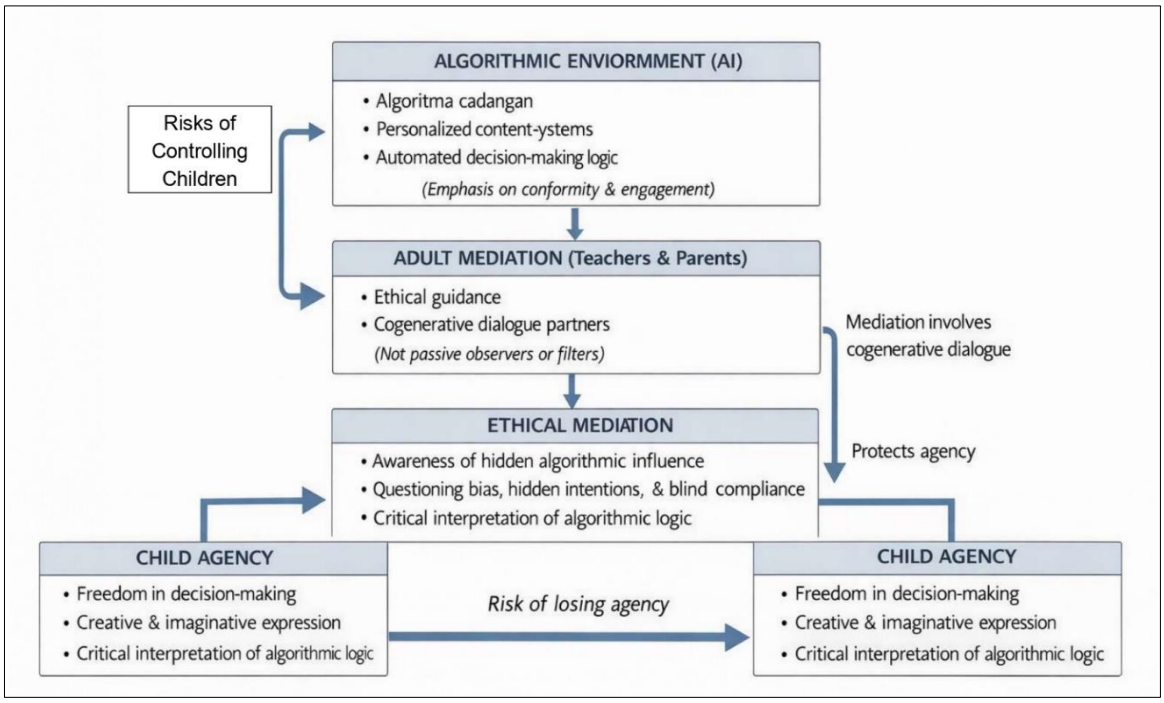

Figure 1: Conceptual Framework of Ethical Mediation Through Cogenetic Dialogue in Children's Engagement with Algorithmic (AI) Environments

Moreover, as demonstrated by Figure 1, it shows how ethical mediation occurs when a joint dialogue takes place between children and algorithmic (AI) settings. With the concepts of Fam

et al. (2025) and Stith and Roth (2010) regarding education as mediation, teachers and parents can assume the role of ethical mediators that can make children cognitively understand and navigate power within the AI systems. This mediation allows them to remain agency and creative while maintaining the freedom of choice, minimizing the probability of blindly following algorithmically dictated processes. Rath -Boșca (2025) cautions that AI is indeed a tangible threat to the rights of children including privacy and cognitive autonomy. With adult moral education, children may turn out to be merely data points as opposed to being learners who are able to experiment, make mistakes, and learn on their own in a natural learning situation. These concepts define adults as the facilitators as well as the indispensable ethical custodians whose presence mediates the circumstances of cognitive and moral growth of children in the AI-mediated environments.

This absence of ethical mediation will result in an accountability crisis in a systemic sense as AI performs more moral and regulatory functions within the educational domain. When algorithms take over supervision duties, emotional and pedagogical distance increases, disrupting the comforting connection between teachers and children (Alghamdi and Alghizzi, 2025). Predictive analytics-based disciplinary tools; which are usually biased, propel students towards complying, as opposed to making independent decisions, so they can be rewarded with digital items. The patterns promote agency to cause emotional detachment and discourage the ability to form moral judgment. So, it is time to reconsider the role of the educator either to empower students or just a machine controller. Hence, ethical mediation should not be disregarded too long because the behavior management will turn into a technocratic system that might deny future generations the opportunity to think, make decision, and react ethically beyond the algorithmic boundaries.

3. Methodology

The present paper used the systematic literature review method and followed the Preferred Reporting Items of a Systematic Review and Meta-Analysis (PRISMA) guidelines identified by Moher et al. (2009). The Scopus bibliographic database was searched and thus data was retrieved to include high-quality and peer-reviewed publications. The search strategy entailed the use of the following terms Artificial Intelligence AND Preschool AND Education; and a series of inclusion and exclusion criteria were implemented to increase the validity and reliability of the chosen literature. The inclusion criteria included being related to early childhood education, publication in the last ten years, and methodological rigor. Finally, 11 articles were chosen for extensive comparative analysis. The process of filtering is described in Figure 2. The information extracted was further analysed with categorization of studies based on research paradigms, methodologies, and thematic scope; thus ensuring uniformity and transparency of the review process. Such approach supports the validity of the results and provides a systematic, repeatable framework of literature synthesis in this growing area.

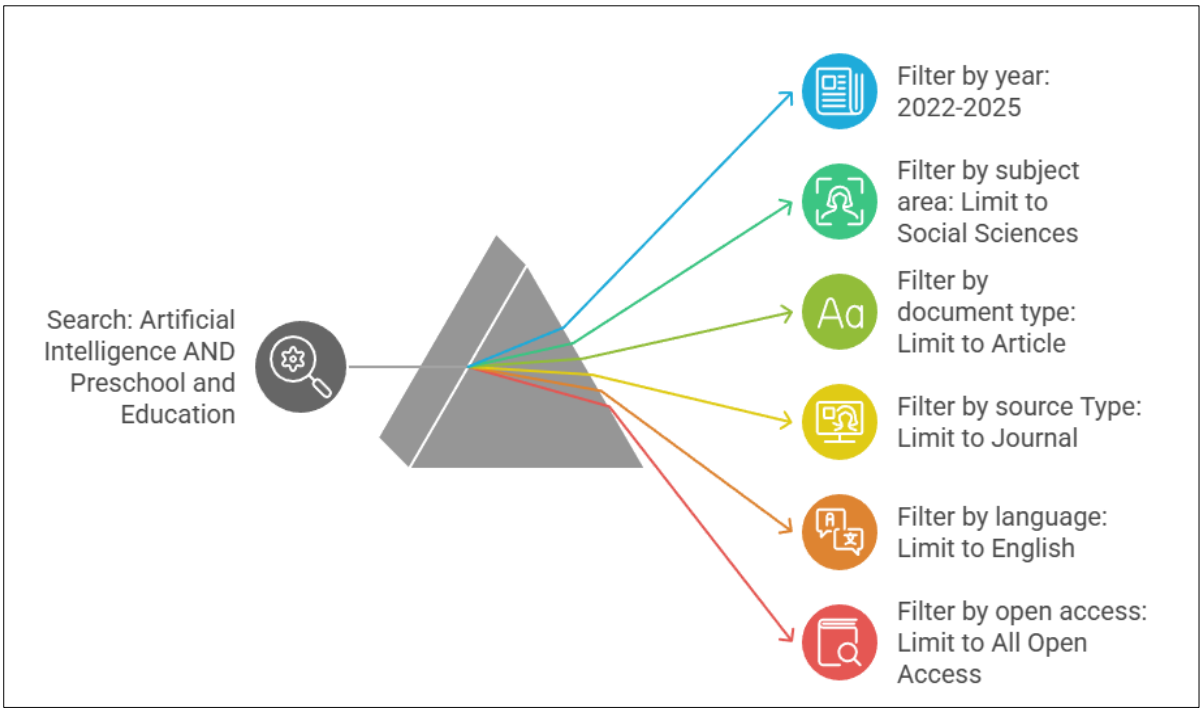

Figure 2: Using Prisma Guidelines in Scopus Database Searches

The steps are taken to make sure that the literature received is recent yet applicable in the context of preschool education and available to everyone. The analysis of the literature was performed according to the PRISMA requirements; a preliminary screening according to the title, abstract, full-texts, and the extraction of the primary data to be used as a synthesis. It is also worth mentioning that despite following the PRISMA, the use of a single database (Scopus), makes this research more qualitatively a PRISMA-informed literature review as opposed to a systematic review (Shaffril et al., 2021). Strong systematic reviews will normally involve searching in various databases in order to reduce chances of bias.

The search conducted based on the filters indicated in Figure 2 allowed identifying a final corpus consisting of 11 journal articles that were selected as the major sample to discuss the results concerning the best practices that adults can implement to manage children and AI.

4. Analysis

As it can be seen in Table 1, the emergence of AI in the modern online educational environment implies a shift towards an active use of technology to a carefully planned; individualized pedagogy. Article 1 (A1) emphasizes the importance of pedagogical designs that can incorporate the use of Augmented Reality (AR) and gamified experience, as in MeTycoon, to provide the preschoolers with a comprehensive knowledge of industry practices. Nevertheless, the effectiveness of this innovation depends on the readiness of teachers. Then, A2 and A7 show that such psychological constructs as self-efficacy, emotional intelligence, and technical competence are the essential factors that define the uptake of adaptive learning applications and virtual simulations. Devoid of structural procedures developed to enhance AI-TPACK as elaborated in A5. AI tools can turn out to be technological encumbrances, and not effective cognitive drivers. Therefore, any adult management must be carried out through cognitive and technical training of the educators before introducing the technology to children.

Table 1: Adult Management and Ethical Mediation in Controlling the Use of AI by Children

Code	Title/ Author(s) /Year	Research Problem	Research Method	Type of Study	Best Practices: Suggestion to manage children with AI
A1	Pedagogical design of early career guidance in the play activities of older preschool children (Khassanova et al., 2024)	There is a need to investigate pedagogical design in gaming activities for early career guidance due to digitalization challenges in preschool education.	Qualitative (Analysis, comparison, and generalization)	Analysis	Use personalized pedagogical design combined with augmented reality (AR) and games like MeTycoon to help children gain a profound understanding of industries.
A2	Integrating AI in Preschool Teacher Education: The Mediating Role of Self-efficacy in Health Education and the Moderating Effect of Technological Proficiency (Wang et al., 2025)	The effective integration of AI into preschool teacher training remains underexplored, particularly regarding how psychological and technical factors influence adoption.	Mixed Method (Surveys and semi-structured interviews)	Empirical	Utilize adaptive learning apps for personalized content delivery and virtual simulations to create dynamic, scenario-driven educational experiences.
A3	A new era in early childhood education (ECE): Teachers' opinions on the application of artificial intelligence (Kölemen et al., 2025)	There is a lack of research exploring how preschool teachers perceive the ease of use, benefits, and ethical concerns regarding AI literacy in their classrooms.	Qualitative (Phenomenology using semi-structured interviews)	Empirical	Maintain constant supervision by teachers or parents to ensure privacy, and use AI-supported robots (NAO, KASPAR) to support social communication skills.
A4	Analysis of Chinese College Students' Learning Experience in a Blended-Flipped Classroom: Based on the Belief-Action-Outcome (BAO) Model (Nong et al., 2025)	There is a significant lack of qualitative research providing an in-depth understanding of how preschool education majors experience blended-flipped classroom models.	Qualitative (Thematic analysis and interviews)	Empirical	Control the length of pre-class videos (under 15 minutes) to capture attention and prevent cognitive overload during self-directed learning.
A5	Analyzing the Foundations of Social Sustainability in Teacher Education: A Study of Self-Regulation, Social-Emotional Expertise, and AI-TPACK (Şahin, 2025)	The psychological foundations and internal cognitive attributes that predict preschool teacher readiness for integrating AI have not received sufficient research attention.	Quantitative (Correlational research with self-report questionnaires)	Empirical	Prioritize AI literacy for young children, which involves teaching the limitations and ethical implications of AI tools alongside their usage.
A6	Artificial Intelligence Applications	It is necessary to investigate the impact of AI-based	Mixed Method (Experimental study and focus	Empirical	Integrate gamified AI apps as supplementary resources that

	(Fluency SIS, Articulation Station Pro, and Apraxia Farm) in the Psycholinguistic Development of Preschool Children with Speech Disorders (Utepbayeva et al., 2024)	interventions on the psycholinguistic development of preschool children with diagnosed speech disorders.	group interviews)		complement in-person therapy and provide data tracking to monitor individual progress.
A7	Assessing structural relationships in pre-service preschool teachers' perceived AI readiness: Do emotional and psychological aspects matter? (Hsu et al., 2025)	Further research is needed to model the structural relationships between cognitive factors and emotional barriers that influence pre-service preschool teachers' AI readiness.	Quantitative (Partial least squares structural equation modelling)	Empirical	Foster emotional engagement by demonstrating the tangible utility (relevance) of AI and educating users about what AI can and cannot do.
A8	Effectiveness of Artificial Intelligence Practices in the Teaching of Social Sciences: A Multi-Complementary Research Approach on Pre-School Education (Doğan et al., 2025)	There is a significant gap in studies holistically evaluating the effectiveness of AI applications specifically within the context of early childhood social science education.	Mixed Method (Meta-analysis, meta-thematic analysis, and experiment)	Empirical	Position AI as an assistant rather than a replacement and use background music to manage attention and interest during technological activities.
A9	Predicting teachers' intentions for AIGC integration in preschool education: A hybrid SEM-ANN approach (Zhang, 2025)	Research has yet to fully identify the specific cognitive, affective, and experiential factors that influence preschool teachers' sustained intention to use AIGC technology.	Mixed Method (Survey data analyzed via PLS-SEM and ANN modeling)	Empirical	Incorporate customization features allowing educators to tailor content and use gamification elements to sustain user interest and intrinsic motivation.
A10	Psychological impacts of AI use on school students: a systematic scoping review of the empirical literature (Kundu & Bej, 2025)	A comprehensive understanding of the multifaceted cognitive, emotional, and behavioural impacts of AI use on students across school levels is missing.	Qualitative (Systematic scoping review using PRISMA and SWOT)	Analysis	Promote a healthy balance between technology use and human interaction to mitigate risks like social isolation and technology addiction.
A11	The Relationship Between Computational and Creative Thinking in Preschool	Traditional early education often overlooks how higher-order cognitive skills like	Mixed Method (Assessments, protocol interviews, and observations)	Empirical	Use AI for adaptive task sequencing within the child's ZPD and provide badges

	Children: An Application Through Gamification and AI-Supported Constructivist Personalized Learning Environment (Junruang & Kanjug, 2025)	computational and creative thinking interact within technology-enhanced environments.			for milestones to enhance engagement.

With regard to the ethical mediation and protection, empirical evidence shows that active supervision and instillation of ethical literacy at a tender age is an important defence mechanism. A3 and A5 points out that educators and parents should maintain constant monitoring the social support robots like NAO and KASPAR; which will ensure privacy and spread ethical behaviour. Significantly, AI literacy goes beyond technical competence by giving awareness of AI capabilities that avoid misunderstanding of technological outputs by children. The warning of A10 is on the risks of the psyche, such as social loneliness, addiction to technology; which require a balance between two dimensions; the use of devices and genuine human communication. Accordingly, the role of adults shifts from the gatekeepers to a more mediatorial one by helping to develop emotional interest in demonstrating the practical implementation of AI in response to the concerns of users.

Analytically, the data suggest that AI applications have the potential of transforming cognitive interventions and psycholinguistic development, in particular when applied in the context of constructivist learning. As it could be seen in A6, tools such as Fluency SIS and Articulation Station Pro allow the children with speech disorders to develop through the utilization of systematic tracking of data. On the other hand, reference A11 suggests that AI could be used to organize the adaptive tasks in accordance with the ZPD to teach creative and computational thinking through gamification. Close attention management is required with such approach. An example is A4, it recommends that background music is limited to less than fifteen minutes in order to reduce cases of cognitive overload. However, A8 suggests the background music keeps children interested while engaging in social science activities. These results indicate that AI application and use in cognitive development require careful procedural control by adults.

Conclusively, the eleven studies (A1–A11) collectively emphasize that technology and human interaction are the key to sustainable digital education. Study A9, in particular, indicates that customization and gamification are the main aspect of keeping the users intrinsically motivated, and AI needs to be the assistant to the role of human beings. In the literature, it has been evident that the success of AI in education does not solely depend on technology. On top of that, it encourages continuous participation of educators and caregivers to direct learning; maintain the ethical standards and values of education while retaining the relational and emotional attributes of education. A10 and A11 studies refute the idea that despite the fact that AI could be used to develop higher-order cognitive skills, there was still unnecessarily to pay attention to the social and affective needs of children. As a result, effective adult supervision should have a holistic orientation, including technical controls (A4, A6), emotional support (A7, A9), and ethical guidance (A3, A5) in protecting the development of a safe, purposeful, and sustainable digital learning environment.

5. Discussion

A Suggested Framework Based on Analysis to Guide Adults in Managing Children and AI

According to Figure 3, adults, in particular, teachers and parents are considered the Primary Mediator or More Knowledgeable Other (MKO) (Mclod, 2025, n.d; Niepel et al., 2025, n.d; Vygotsky, 1978; Teachers College, Columbia University, n.d.), whereas AI is not regarded as the MKO which is articulated by Stojanov (2023) who defines AI as an important filter functioning by the principle of Ethical. During this early stage, the role of adults extends beyond the observation (Merlin et al., 2013; Pomerant et al., 2012) to include the role of moral watchdogs, where the privacy of data and the emotional well-being of children are taken care of before the activation of interactions mediated by AI (cf. A3, A5). The effectiveness of this gatekeeping of ethics depends on self-efficacy and AI-TPACK literacy of the participating adults as discussed under A2 and A7. When there is lack of psychological and technical readiness in the MKO cohort, AI technology like NAO or KASPAR robots can become an issue of alienation of children to humane moral values (Berson et al., 2025; Turkle, 2011; UNICEF Innocenti Office of Research, 2025). As such, this ethical mediation is the initial measure that should be taken to ensure that AI does not cross the line of children's autonomy.

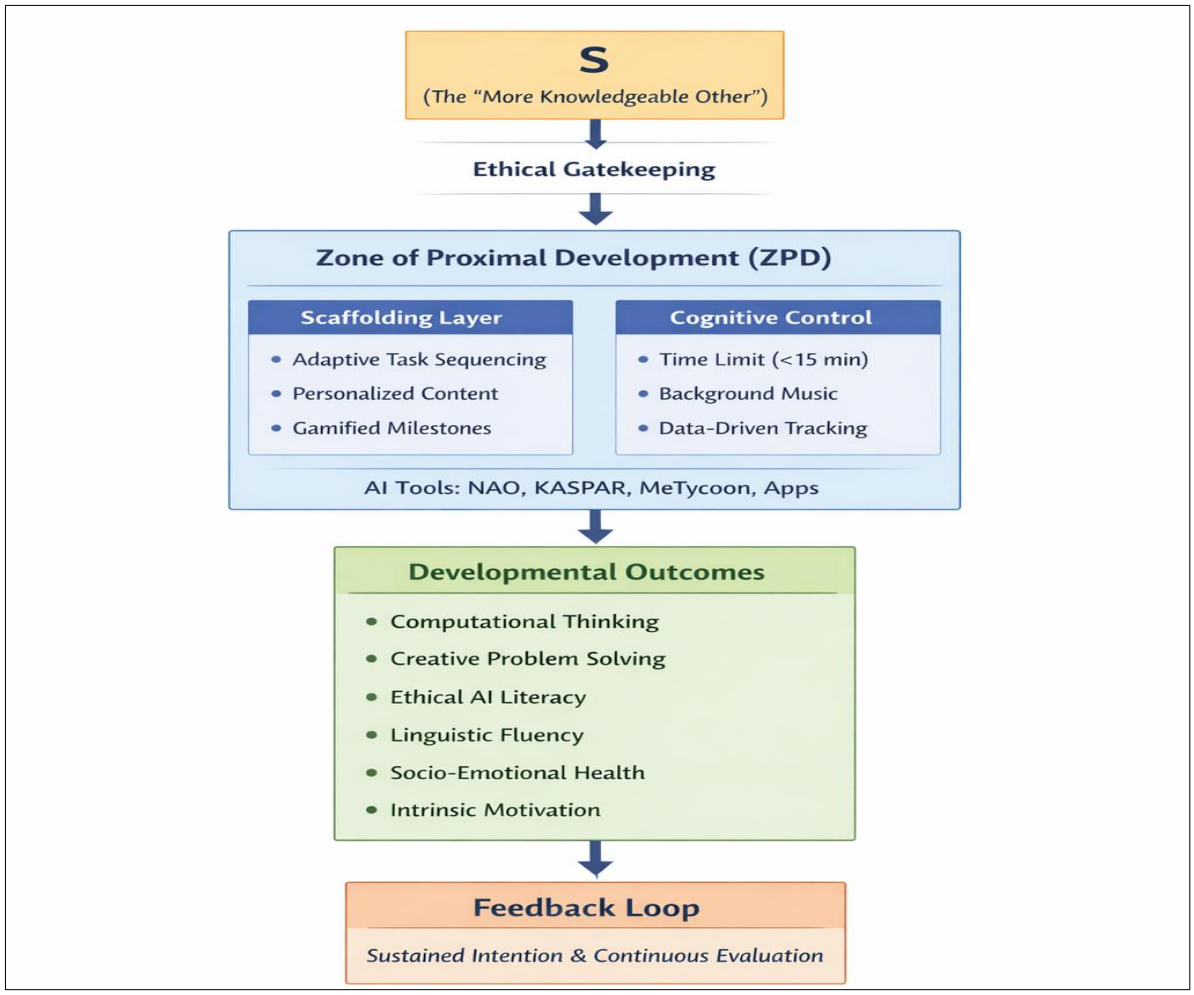

Figure 3: AI-Mediated Zone of Proximal Development Framework

The core of this framework highlights the fact that scaffolding is provided within the concept of the ZPD (Esteban-Guitart, 2018; American Psychological Association, 2023; Shabani et al., 2010; Vygotsky, 1978). In this case, AI is an adaptive tool (Ilias, 2025; Purnomo et al., 2025;

Tan et al., 2025) that organizes the sequence of the tasks in an individual cognitive level of the children (as discussed in A1, A11). The use of customized content and gamified features to create badges and achievements are aimed at evoking intrinsic motivation without adding a cognitive load to them (as explained in A9). However, a critical review shows that such digital scaffolding should be dynamic and gradually eliminated as the child proves to have mastered the desired skills. Long-term and permanent scaffolding may lead to the development of technological dependency culture thus preventing the creative thinking and problem-solving skills.

Next, the feature of cognitive control based on time restrictions and environmental control is also an important balancing tool to reduce the effects of digital fatigue. The empirical evidence shows that there is a time constraint of less than fifteen minutes (Institute of Digital Media and Child Development, 2021; Xiao et al., 2025) and background music (as explained in A4, A8) to maintain attention. Academically, this approach is a critical type of attention control that aims at averting the cognitive overload that is often experienced in the learning screen-based settings. Data-based tracking draws the adults will be able to evaluate the fact that artificial-intelligence tools such as the Fluency SIS app or the MeTycoon simulation can produce either actual learning value or rather become a distraction (as elaborated in A6). This kind of supervision would make technology a complement rather than a replacement of the deep thought processes.

In the end, the framework leads to the overall developmental results, which is attained by a balance dimensions between human contact and technological integration. In the Human-Centric Balance, the practitioners are to make sure that AI literacy, linguistic proficiency, and computational thinking improvements do not undermine the socio-emotional well-being as outlined in A10 and A11. An ongoing “Feedback Loop” as reported by Carless (2019) and Weiss et al. (2024) can support the re-evaluation of the intentions of AI usage by ensuring that they are aligned with the developmental requirements of children. Analytically, the success of the framework can be considered successful when children, are emotionally and ethically strong to operate in the digital environment. Therefore, successful AI implementation requires a continuous review process that moderates technical achievement and human well-being.

In summary of the discussion, the findings are much aligned with the framework depicted in Figure 1. They emphasize the primary importance of adult mediation in keeping children agency prominent in AI-driven learning environments. As moral compasses, teachers and parents can guide children to think critically of algorithmic reasoning, challenge latent biases, and remain free of choice by establishing the reflective interaction to avoid conformity and complacency. This framework highlights that AI systems may impede the independence and originality of children unless there is active intervention of adults. It supports the relevance of introducing ethical mediation into teaching activities (Stith & Roth, 2010; Rath-Boșca, 2025). In practice, the findings imply that the administrators, educators, and policymakers must develop professional development initiatives and institutional policies that enhance adult skills in moral control to make sure that AI complements human advice in early childhood education.

6. Conclusion

To sum up, this study confirms that the integration of AI into early childhood education settings is more than a technological shift but also a paradigm shift that requires the re-occupation of the adult as an Ethical Mediator and a guide in the ZPD. Critical analysis suggests that AI

effectiveness as a scaffolding tool depends on a fragile balance between digital innovation and human interaction, which is necessary to prevent the reduction of risks of social isolation and cognitive overload. In its turn, strategic adult management; the improvement of teacher self-efficacy, strict ethical control, and procedural governance, becomes an essential requirement to ensure that AI functions as a safe cognitive catalyst. In the end, AI has the power to change the direction of early childhood education in both sophistication of algorithms and through human intelligence in finding a path in technology to secure the sustainable development of children in a holistic way. Moreover, the research can be expanded in the future by implementing alternative strategies, including qualitative or mixed-methods research designs, to understand the nature of interactions between AI, children, and adult mediators. It would broaden the context to diverse cultural or institutional for better understanding of how ethical mediation and child agency evolve in various educational situations, as this could provide more generalizable for subtle policy and practice.

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Conflict of Interest Statement
This study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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