



Available Online at EScience Press
International Journal of Education Foundations
ISSN: 3078-7866 (Online), 3078-7858 (Print)
<https://ijef.esciencepress.net>

RESEARCH ARTICLE

Artificial Intelligence in Early Childhood Curriculum in Tanzania: Do's, Don'ts, and the Debate between Cognitive Growth and Stagnation

Mariam J. Mwakabenga

Department of Teacher Education-Tanzania Institute of Education, Dar-es-Salaam-Tanzania

Corresponding Author

Mariam J. Mwakabenga, Email: mwakabenga3@gmail.com

Author's Contributions

All authors contributed equally to this research.

Article History

Received February 19, 2026; Accepted: April 27, 2026; Published: July 24, 2026.

ABSTRACT

The world has recently experienced rapid advancement of Artificial Intelligence (AI) which transforms educational systems worldwide, creating both opportunities and challenges for early childhood education. This paper examines the role of artificial intelligence (AI) in early childhood curriculum in Tanzania. Drawing on empirical literature review, policy documents, and emerging educational practices, the paper analyzes the “do’s” and “don’ts” of AI use in the Tanzanian early childhood curriculum. The paper focuses on the following question: Does AI support learning environment and enable young minds to grow? Does it risk stunting cognition, language, imagination, and social development when used incorrectly? The literature findings provide that AI is neither positive nor negative, it is only educationally helpful when it is integrated into a curriculum that is rights-based, teacher-mediated, play-appropriate, context-aware, and age-appropriate. Research shows that AI can be used to aid early learning by providing adaptive scaffolding, language supports, accessible materials, teacher planning, facilitating effective formative assessment. Carefully designed AI literacy experiences assist children in understanding intelligent systems at a basic level. At the same time, AI can undermine autonomy, distort attention, intensify investigation, commercialise children's data, amplify bias, and displace human relationships on which early childhood learning depends. Tanzania has issued a National Digital Education Strategy, National Digital Education Guidelines for Schools and Teacher Colleges, and National Guidelines for Artificial Intelligence in Education, all of which explicitly cover pre-primary education and emphasise ethical, secure, and responsible AI use. However, early childhood education system continue facing challenges of low enrolment, teacher shortage, inadequate infrastructure, and lack of preparedness for digitisation. The paper, suggests supportive curriculum ecological-capability framework of the do's and don'ts, that the use of AI in early childhood education should not be seen as independent innovation or a substitute for teachers' decision making, interactions, play, or care. Instead, AI needs to be prominently considered as a tool to be used by teachers to support child-facing system nurtured under comprehensive, developmental and ethical protections and child's positive intellectual and ethical growth, to balance technological innovation with the developmental needs of children.

Keywords: Artificial intelligence; AI literacy; digital education; child development; teacher mediation

INTRODUCTION

Artificial intelligence has quickly moved from the margins of educational debate to the centre of curriculum reform, policy design, and public anxiety. In early childhood education, this shift is especially consequential because the early years are not merely a

smaller, simplified version of later schooling, but they represent a unique developmental stage. They are a distinct developmental period in which learning is inseparable from play, movement, imitation, attachment, and social interaction. Therefore, any claim that AI can ‘improve’ early childhood curriculum requires

more attention than equivalent claims in higher education or adult training. The key question is not simply whether AI can make instruction faster, more personalised, or more efficient, but whether it can support the cognitive, social, emotional, and ethical purposes of early childhood education without replacing the human interactions essential for young children's learning (OECD, 2023; NAEYC & Fred Rogers Center, 2012; WHO, 2019).

This question is highly relevant in Tanzania. The recent education reform agenda emphasises competence-based approaches and digital integration. The Education and Training Policy 2014, 2023 Edition sets the formal structure of education at 1+6+4+2/3+3+, and emphasises prioritising 21st century skills such as communication, collaboration, creativity, critical thinking, problem-solving, digital literacy, and , ethics(United Republic of Tanzania [URT], 2023). The National Digital Education Strategy 2024/25–2029/30 and the National Digital Education Guidelines for Schools and Teacher Colleges aim to enhance technology integration. In addition, the National Guidelines for Artificial Intelligence in Education explicitly extend AI governance to pre-primary, primary, secondary, and teacher-college levels (MoEST, 2024, 2025b, 2025c). Tanzania Development Vision 2050 similarly highlights digital transformation and literacy as key components of the country's long-term development goals (National Planning Commission, 2025).

Policy commitment to AI or digital transformation does not equate to teachers' pedagogical readiness. The AI guidelines stress the goal of ensuring effective, ethical, secure, and responsible development and use of AI tools within the education sector, while the digital education guidelines underscore persistent challenges related to equitable ICT infrastructure and access (MoEST, 2024, p. 13; MoEST, 2025c, pp. 15–16). The Education Sector Development Plan (ESDP) 2025/26–2029/30 identifies broader challenges of quality, teacher supply, governance, infrastructure, and evaluation in pre-primary education. According to BEST 2025, the pre-primary subsector enrolled 1,656,726 pupils with 21,696 teaching staff in 2025, while the overall gross enrolment ratio was 84.46% and the net enrolment rate only 51.02% (MoEST, 2025a; PO-RALG, 2025). These data reflect that a system ensures basic access and quality. In this context, AI cannot be treated as merely the next educational tool. It enters a sector where basic conditions of inclusion, staffing,

language support, and infrastructure remain uneven. This paper, therefore, addresses four related questions. First, what does the international literature actually reveal about AI in early childhood curriculum? Second, what are the key arguments supporting children's cognitive growth and those indicating cognitive stagnation? Third, what does the Tanzanian policy and system context suggest about the feasibility and desirability of AI integration in pre-primary curriculum? Fourth, what principles should guide the do's and don'ts of AI in early childhood curriculum in Tanzania? The paper answers these questions through a critical literature review and concludes by proposing a contextualised ecological-capability framework for integrating thinking about AI in the Tanzanian early childhood curriculum.

LITERATURE REVIEW

The Case for Childhood Cognitive Growth

The key arguments supporting the integration of AI in early childhood curriculum revolve around scaffolding, personalisation, accessibility, and AI literacy. Su and Zhong (2022) noted that although research on AI in early childhood was once limited, it is now critical as future societies will require AI-literate citizens. They suggest that young children can start building a foundational understanding of AI through age-appropriate learning experiences rather than through abstract technical lessons. Their argument is not that pre-schoolers should become programmers, but that early childhood curricula can introduce concepts like recognition, decision-making, automation, and intelligent devices in developmentally appropriate ways. The educational value lies on teachers' capabilities in interpreting AI and helping children to become thoughtful users of emerging technologies rather than passive consumers.

Su and Yang (2024) found in an intervention study that an AI literacy curriculum was related to changes in children's insights of robots and their attitudes toward engineering and science. Su (2024) also developed and validated an AI literacy assessment for kindergarten children, showing that the field is moving beyond theoretical discussion toward concrete measurement of what young children can understand. These studies contribute to indicating that AI-related content can be made visible, measurable, and age-appropriate if carefully designed. Therefore, AI may contribute to cognitive growth by enhancing children's understanding of concepts about how the modern world works by

fostering curiosity, classification, prediction, and inquiry. Another pro-growth argument for AI highlights its potential for inclusion and accessibility. The Tanzanian AI guidelines emphasise that AI can foster inclusivity through speech-to-text tools, language translation, adaptive assessments, and personalised learning resources (MoEST, 2024). On a global scale, Yi et al. (2024) examine AI applications in early childhood education, noting its use in robotics, adaptive tutoring, language supports, autism-related detection and intervention, and interactive agents. Kewalramani et al. (2021) further advocate for AI-powered robotic toys as tools for inquiry literacy in early childhood settings, stating that these tools can stimulate questioning and knowledge-building when integrated into teacher-guided inquiry. In such a context, AI could support children facing challenges like disability, language barriers, or limited access to individualised attention.

A third pro-growth argument focuses on supporting teachers rather than children. Teachers in early childhood settings often face heavy workloads, including planning, documentation, parent communication, assessment, and resource preparation. Generative AI can assist early childhood learning by creating draft lesson prompts, story starters, visuals, translations, parent messages, and documentation templates. Su and Yang's (2024) study of kindergarten teachers' perceptions of ChatGPT found that while teachers acknowledged its potential value in lesson planning, pedagogical and content knowledge support, and twenty-first-century skills, they also expressed significant reservations. Nikolopoulou (2025) advocates for integrating generative AI in early learning with a child-centred approach, but stresses that the pedagogical responsibility lies with adults to manage both its benefits and challenges. In this support role, AI may indirectly foster cognitive development by freeing up teachers' time for interaction, observation, feedback, and play facilitation, rather than by directly teaching children.

Finally, some of the strongest growth-oriented arguments are institutional. When applied strategically, AI can help systems identify patterns in participation, needs, and support, facilitate multilingual content creation, and enhance administrative efficiency. Tanzania's policy reflects this reasoning. The AI guidelines suggest that AI can improve efficiency, reducing costs and supporting personalised learning in resource-limited settings. In contrast, the digital education guidelines link AI and other emerging

technologies to enhanced learning outcomes, innovation, and digital literacy (MoEST, 2024, 2025c). Given a challenge of managing scale, geographical diversity, and teacher shortages, these claims are understandably appealing.

The Case for Cognitive Stagnation

The argument against uncritical AI adoption in early childhood is equally compelling. A key concern is developmental displacement. Young children develop through active, embodied, language-rich, and relational experiences. When AI or AI-powered platforms replace activities like conversation, imaginative play, sensory exploration, storytelling, and peer interaction, they may not enhance cognition at all; they could diminish it. Holmes (2025) emphasises that there is insufficient large-scale evidence to support the claim that AI systems provide the high-quality education young children deserve. He also gives caution that it is too early to understand how current AI systems influence children's cognitive development, agency, and critical abilities. This caution is particularly important in early childhood because the skills most at risk—agency, symbolic play, self-regulation, oral language, empathy, and imagination are foundational rather than secondary.

A second concern is over-reliance. A report from UNICEF on AI and early childhood development highlights the risk of educators, caregivers, and children becoming too dependent on technology, which could reduce face-to-face interaction and hinder the development of social and emotional skills best learned through human interaction (UNICEF, 2024). Similarly, UNESCO's guidance on generative AI in education advocates for a human-centred approach, privacy protection, and age-appropriate pedagogical design instead of unregulated experimentation (UNESCO, 2023). This is not a minor issue because if teachers begin to outsource explanation, storytelling, questioning, feedback, or assessment judgment to AI tools, children may receive faster responses but poorer education. In early childhood, educational value often lies not in immediate answer generation but in waiting, wondering, negotiating meaning, and co-constructing understanding with other people.

Third, AI can undermine autonomy and voice. Holmes (2025) argues that AI-driven personalised learning paths often dictate the content, timing, and methods for children's education. Narrowing their agency instead of enhancing it. He also points out that AI systems can diminish children's voices by prioritising system-

generated data over their own expressions and experiences. In early childhood classrooms, where children's identities and confidence are shaped by adult attention, this displacement is significant. The concern is that AI may reduce the child to a set of data points to be optimised rather than recognising them as an individual capable of meaning-making and engagement.

Fourth, AI presents issues related to privacy, profiling, and commercialisation. UNICEF's 2025 guidance on AI and children emphasises that AI systems must enhance opportunities, reduce risks, and eliminate harms for children with a focus on entering them in AI policies and systems. Holmes (2025) goes further, arguing that children's data are often extracted by commercial AI providers and used to enhance systems for profit, effectively exploiting children into unpaid labour in the digital economy. In Tanzania, these concerns are intensified by limited regulatory capacity and infrastructure. If schools with inadequate technical oversight adopt proprietary AI systems, concerns arise regarding data storage, consent, language processing, commercial exploitation, and controls of educational data. The Tanzanian AI guidelines recognise bias, privacy, security, and the need for monitoring and auditing AI tools, indicating that these are not hypothetical worries but recognise governance problems (MoEST, 2024; UNICEF, 2025).

Fifth, there is a risk of cognitive shallowness. AI systems that provide quick answers, predictive suggestions, and automated completions can diminish the cognitive effort required for reasoning to develop. This concern is particularly relevant in early childhood, where the focus is not on speed or output, but on fostering attention, memory, language, and imagination. Research on excessive or poorly designed screen time highlights potential harms to cognitive, language, social, emotional, and physical development when technology use replaces more enriching forms of experience (Panjeti-Madan & Ranganathan, 2023; WHO, 2019). While AI is not the same as screen time, it often reaches children through digital devices, raising concerns about passivity, overstimulation, and decreased face-to-face interaction.

What the International Evidence Actually Shows

International evidence on AI in early childhood is more uncertain than both proponents and critics sometimes acknowledge. Reviews consistently conclude that AI in ECE is an emerging, rapidly evolving, and conceptually fragmented area. Yi et al. (2024) identify key

technologies and increasing experimentation, but also emphasise significant unanswered questions. Cai et al. (2025) argue that AI in ECE has often been too narrowly defined and advocate for a more critical approach, shifting from cognitive to developmental assumptions to situated and critical perspectives. Ljungcrantz's (2026) review shows growing activity but also underscores ongoing ethical concerns, limited frameworks for responsible use, and notable gaps in understanding the cognitive processes involved in young children's interactions with AI. Generally, the field has advanced faster than its conceptual and ethical basics.

Even the more optimistic studies emphasise certain conditions. Su and Ng's (2023) study identifies AI literacy's potential of in early childhood but also highlights significant challenges, including teachers' inadequate AI knowledge, limited integration of AI in curriculum, and the lack of clear teaching guidelines. Su (2024) finds that pre-primary teachers value AI literacy highly, but also point out key obstacles, such as insufficient school support, limited teachers' knowledge, children's restricted comprehension abilities, and unclear curriculum guidance. Yim and Wegerif (2024) demonstrate that teachers acknowledge the value of AI in educational learning tools but still struggle with gaps in content knowledge, TPACK-related challenges, infrastructure limitations, and the risk of distraction. Collectively, these studies suggest that AI's benefits depend on mediation, teacher development, and effective governance.

Another view is that, even though the strongest evidence in the use of AI still does not and cannot support replacing the teacher, it supports using AI designed human-led learning environments. UNESCO (2023) stresses on a human-centred, age-appropriate approach and later, UNICEF (2025) advocates for child-centred AI that supports rights and well-being. Holmes (2025) argues that human teachers must be central to education for all children. Thus, the most defensible reading of the literature, therefore, is not an abstract pro-AI or anti-AI position. It is pro-human-mediation, pro-child-rights, and context-sensitive about when AI helps and when it harms.

Tanzania-Specific Literature and the Evidence Gap

Currently, there is limited empirical research on AI in pre-primary classrooms based on Tanzania-specific literature. This gap is itself a significant discovery. It implies that what AI will do to the early childhood curriculum in Tanzania is still speculative. A strong literature exists on pre-primary quality, inequality, ICT

preparedness, and teacher education. That literature is a caution which requisite. Mtahabwa and Rao (2010) demonstrated that the Tanzanian pre-primary classrooms differ radically between urban and rural where there are differences in resources, class size, teacher qualification, and quality of interaction. According to Ndijuye and Rao (2018), in many situations, policy commitments to pre-primary education have been accompanied by lack of sufficiently specific implementation strategies. The same can be stated about AI and early childhood education in Tanzania, which is characterised by Ndijuye et al. (2020) as a sector that faces persistent quality and support issues.

The literature that is ICT-oriented indicates the same. Tandika and Ndijuye (2020) discovered that pre-primary teachers' readiness were quite limited to incorporate ICT in teaching and learning. The study had significant implications in the future adoption of AI since it assumes the presence of having more advanced technological background compared to using ICT. Lubuva et al. (2022) found unequal ICT competencies in teacher education among tutors. According to Kambona (2024), tutors working in early-grade teacher colleges reported similar barriers. As a lack of professional development, insufficient technological tools, unstable internet, lack of technical support, and low digital literacy. Kambona and Ndibalema (2025) subsequently generalise the wider disparities in Early Childhood Education (ECE) provision, pointing to shortages of teachers, material limitations, and inequitable quality. Collectively, this indicates that Tanzania literature is yet to consolidate the preconditions of digital integration much than AI-laden early childhood curriculum. This does not imply that Tanzania should not embrace AI. The absence of local evidence makes it more significant to use on rights-based protection, principles of developmental, and a solid understanding of constraints in the system. That is, the AI agenda of early childhood in Tanzania must begin with humility and not hype.

METHODOLOGY

This article is a critical literature review situated at the intersection of curriculum studies, educational technology, child development, and policy analysis. The review followed a PRISMA systematic review model by identifying, screening and excluding duplicates and ineligible articles, and lastly including potential articles for review (Page et al., 2020). This empirical review study examines three bodies of evidence. The first

evidence consists of policy, guidelines and curriculum documents, including the Education and Training Policy 2014, 2023 Edition; the National Digital Education Strategy 2024/25–2029/30; the National Digital Education Guidelines for Schools and Teacher Colleges; the National Guidelines for Artificial Intelligence in Education; Tanzania Development Vision 2050; BEST 2025; the Education Sector Development Plan 2025/26–2029/30; and the 2023 Diploma in Early Childhood Teacher Education curriculum (MoEST, 2024, 2025a, 2025b, 2025c; National Planning Commission, 2025; PMO-RALG, 2025; URT, 2023; Wizara ya Elimu, Sayansi na Teknolojia, 2023).

The second source of evidence is the Tanzanian research literature on early childhood education and digital readiness. While empirical research on AI in preschool classrooms in Tanzania remains extremely limited, there is a stronger literature on pre-primary quality, inequality, ICT preparedness, and teacher education. Studies by Mtahabwa and Rao (2010), Ndijuye and Rao (2018), Ndijuye et al. (2020), Tandika and Ndijuye (2020), Lubuva et al. (2022), Kambona (2024), and Kambona and Ndibalema (2025) are used as a shed light on the context into which any AI initiative would be introduced.

The third source of evidence encompasses international literature on AI in early childhood education and AI literacy for young children, including conceptual reviews, intervention studies, teacher-perception studies, and policy or rights-based analyses (Cai et al., 2025; Holmes, 2025; Ljungcrantz, 2026; Nikolopoulou, 2025; Su, 2024; Su & Ng, 2023; Su & Yang, 2024; Su & Zhong, 2022; UNICEF, 2024, 2025; UNESCO, 2023; Yi et al., 2024; Yim & Wegerif, 2024). The review is critical in two senses. First, it examines the claims made by the AI-in-ECE literature and the evidence supporting them. Second, it questions how those claims are adapted when applied to Tanzania, a low-resourced context. The question is important because most of the AI claims are presented in universal terms, such as personalisation, efficiency, and support for diverse learners. Still, their pedagogical implications depend on the material and institutional context. In a pre-primary classroom with limited electricity, high enrollment, uneven teacher preparation, and multiple language demands, the key question is not only whether AI 'works' in the abstract, but what it displaces, who it benefits, and new burdens it may create.

STUDY FINDINGS

The Object of Debate: AI in Early Childhood Curriculum

Public debate on AI in early childhood often becomes confused because the phrase 'AI in curriculum' is used to describe very different concepts. There are at least four distinct possibilities. The first is AI as curricular content, where children learn basic concepts such as smart machines, data, pattern recognition, or robots. Second, AI as a pedagogical tool, where AI-enabled apps, chatbots, robots, adaptive platforms, or recommendation engines are used by teachers or children during classroom activities. Third, AI as teacher support, where educators use generative AI for lesson planning, translation, worksheet creation, documentation, assessment, or reflective planning. Fourth, AI as institutional infrastructure, where it aids in tasks such as attendance, analytics, reporting, administrative tasks, or resource allocation. Confusing these uses leads to ineffective policy design as the ethical and developmental implications differ across them (Su & Zhong, 2022; UNESCO, 2023; Yi et al., 2024).

In early childhood, that distinction is crucial. AI as teacher support may pose minimal risks if properly managed. AI as a child-facing tutoring tool is more sensitive as it directly influences language, attention, imagination, and social interaction. Likewise, AI as a curricular content can be valuable when framed as age-appropriate AI literacy, helping children understand that some technologies respond, recommend, or 'learn' from data, but it can become developmentally misplaced if it introduces abstract concepts or instrumental skills before children have a strong base in oral language, play, and socio-emotional learning. This paper, therefore, treats AI integration as a layered curricular phenomenon, not a single intervention. That distinction becomes central to the do's and don'ts proposed later.

Tanzania's Policy and System Context for AI in Early Childhood Education

Tanzania has developed a formal policy framework for digital education and the use of AI in schools. The National Digital Education Guidelines for Schools and Teacher Colleges covers pre-primary, primary, and secondary schools as well as teacher colleges, and explicitly aligns those guidelines with both the National Digital Education Strategy 2024/25–2029/30 and the National Guidelines for Artificial Intelligence in Education 2024 (MoEST, 2025c). These guidelines include an AI component, highlighting AI's potential to

improve curriculum delivery, enhance personalised learning, increase administrative efficiency, and prepare both learners and educators for the evolving job market, while prioritising ethics and data privacy (MoEST, 2025c). The AI guidelines also emphasise the ethical, secure, and responsible use of AI, from pre-primary to higher education (MoEST, 2024).

This policy positions Tanzania alongside countries advancing from general digital reforms of specific AI governance in education. The AI guidelines instruct schools to incorporate AI tools at age-appropriate levels, offer training on responsible and ethical AI usage, promote digital literacy, critically evaluate information, recognise algorithmic bias, engage parents and communities, and establish monitoring mechanisms for the use of AI in education (MoEST, 2024). This is notable as it demonstrates that Tanzanian policy does not imagine AI as a free-for-all innovation. Official documents already define AI through ethics, privacy, accountability, and curriculum alignment.

The documents also recommend caution. The digital education guidelines recognise ongoing challenges in equitable ICT infrastructure and access, calling for annual determination of infrastructure status across schools and teacher colleges (MoEST, 2025c). BEST 2025 outlines the context for these concerns. In pre-primary education, national enrolment reached 1,656,726 children, with only 60.4% of them being of the official age of five. The gross enrolment ratio was 84.46%, while the net enrolment rate was only 51.02%, reflecting incomplete and uneven participation (PO-RALG, 2025). The ESDP points out that pre-primary education receives the smallest portion of the education budget despite gradual increases and highlights major significant needs in teacher development, quality improvement, school management, data systems, and the overall enabling environment (MoEST, 2025a). These issues are critical because AI adoption will compete with, and be influenced by, existing priorities in access, staffing, materials, and infrastructure.

Teacher education documents challenge a simplistic perspective. The Diploma in Early Childhood Teacher Education curriculum mandates the use of ICT and assistive technologies in teaching and learning, with an emphasis on classroom-action-based research, inclusive support, and early identification of learning needs, language development, and the creation of safe, stimulating, and inclusive classroom environments (WyEST, 2023). This indicates that Tanzania's official conception of early childhood pedagogy remains

interactional, inclusive, and competence-based. AI would need to align with this pedagogical vision, rather than displace it. While the curriculum allows for an AI supportive tool, it does not endorse replacing teacher judgement, minimising play, or introducing heavy AI-driven instruction for young children.

Do's for AI in Early Childhood Curriculum in Tanzania

The first curricular do is to ensure AI remains subordinate to the objectives of early childhood learning and not the other way around. In Tanzania, those objectives are based in competence development, inclusion, language, creativity, care, values, and general developmental growth, which are manifested in national policy and teacher education curriculum (URT, 2023; WyEST, 2023). The introduction of AI must then be made where it enhances such objectives. In case a tool can improve oral language, aid inclusion, enable teachers to differentiate, or release time for more human interactions, it might be worthwhile. However, when it provides a new element or a substitution of interactions, then it should not be prioritised.

The second do is to start with teacher-facing use instead of child-facing. In the context of Tanzania, the most secure uses of AI in early childhood are probably be in planning, translation, resource drafting, story adaptation, documentation support, low-stakes formative assessment support, and inclusive design support. This is in accordance with the international literature as well as the realities of the systems in Tanzania. Teacher shortages, unequal preparation, and excessive administration need to make teacher support a more viable initial step than heavy use of AI by children (Kambona, 2024; Tandika & Ndijuye, 2020).

The third do is to consider AI literacy as a curricular theme, though in a developmentally appropriate form. Young children do not require abstract lessons about machine learning, but they can start to learn about the concepts of smart tools, patterns, rules, voice recognition, recommendation, and fairness in stories, play, drawing, robots, and guided discussion (Su & Zhong, 2022; Su & Yang, 2024). In Tanzania, it has been associated with play-based pedagogy, local examples, and the development of language and inquisitiveness rather than technical formalism. This is not about a premature specialisation, but rather about careful early training towards a world where AI exists.

The fourth do is to demand an age-appropriate, rights-based, and ethically auditable design. Tanzania's AI guidelines already mandate the age-appropriate

integration, bias auditing, training on ethical use, and monitoring systems in schools (MoEST, 2024). These provisions are to be interpreted as curricular protections, not merely administrative clauses. In the case of early childhood specifically, this would entail no unmonitored conversational AI, no hidden data harvesting, no reward systems that are manipulative, no opaque profiling, and no replacement of teacher judgement with AI on a wellbeing or developmental issues.

The fifth do is to associate AI use with inclusion. The early childhood teacher education curriculum of Tanzania specifically appreciates ICT and assistive technologies, and the AI guidelines affirm that AI tools must be made accessible to all learners, including those with disabilities (MoEST, 2024; WyEST, 2023). This in practice, entails prioritising tools that are support speech, hearing, vision, translation, and differentiated access, without ensuring that the tools introduce new exclusions in terms of cost, language mismatch, or device dependence.

The sixth do is to ensure that Kiswahili and local curricular relevance non-negotiable. The AI tools are frequently trained on data and contexts that are distant in linguistic and cultural realms of Tanzanian children. If AI content is of English-dominance, alien to the culture, or has weak examples of local use, it may mislead instead of being constructive in learning. Tanzania must therefore choose AI tools and resource workflows that can be localised, translated, and reviewed by teachers. Human review should still be the key.

The seventh do is to develop iterative evidence prior to scale. Since, Tanzania has no evidence base on AI in pre-primary classrooms ready to mature, pilot projects should be small, well-documented, ethically reviewed, and explicitly assessed to be developmentally appropriate. Increase teacher workload, child interaction, language use, and equity impacts. The Tanzanian digital and AI policies already emphasise the importance of monitoring and evaluation. AI programmes in early childhood need to be structured as learning systems, rather than as a procurement process (MoEST, 2024, 2025c).

Don'ts for AI in Early Childhood Curriculum in Tanzania

The first and most significant don't is: do not allow AI to take the place of the teacher-child relationship. Holmes (2025) contends that human teachers should continue being at the centre of education among children, and this argument is even stronger in early childhood.

Preschool education is relational. Young children require sensitive adults who can interpret emotion, gesture, uncertainty, fear, curiosity, and play signals. AI systems cannot replace this work. When AI reduces teacher-child interaction, shared attention, or emotional presence, it can be said to be stagnant, as opposed to growing.

Second, do not assume that personalisation is a good beyond question. Much AI dialogue assumes that more personalised pathways are intrinsically better. But during early childhood, there are no inefficiencies in common experience, social negotiation, imitation, and collective play to be optimised away; rather, they are part of how children learn. Too personalised AI paths can divide shared activity, decrease peer learning, and reduce agency to children by continually steering them through pre-scripted micro-decisions (Holmes, 2025). Personalised support can be helpful in some cases, but it should not get to the level of the organising logic of the early childhood curriculum.

Third, do not normalise investigation. Monitoring attention, emotion, gaze, behaviour, or productivity with AI systems may appear appealing to policymakers who want to see measurable results, but they are highly problematic in the early years. These systems may stigmatise children, alter classroom climate, and convert variations in development into risk signals. The AI guideline in Tanzania rightfully focuses on privacy, ethics, and responsible use; the policy of early childhood should go further and set a high bar against behavioural observation tools in early childhood (MoEST, 2024; UNICEF, 2025).

Fourth, never think that an educational tool is academically valid because it is technically impressive. The products of AI are often promoted with statements of adaptivity, analytics, and innovation that are often well beyond the quality of evidence to support them. Holmes (2025) cautions that the alleged advantages of AI often rely on speculative or anecdotal claims rather than independent scale evidence. Tanzania must not thus engage in procurement based on marketing language alone. All AI tools suggested in early childhood must be evaluated based on developmental principles, child rights, linguistic appropriateness, infrastructural compatibility, and evidence of benefit.

Fifth, do not use AI to compensate for teachers' shortages or underinvestment politically. The main criticism of the analysis presented by Holmes (2025) is the fact that AI can also be a distraction to investing in teachers, schools, and human support. This caution is

important in Tanzania, where the ESDP projects significant demands in the development of teachers, quality of schools, and the initial investment (MoEST, 2025a). AI is not a technological temporary fix that enables policymakers to underinvest in human capacity at the expense of claiming innovation. Where there is an option between investing in high-quality pre-primary teachers and purchasing child-facing AI products, the literature strongly favours the former.

Sixth, do not expose young children to unsupervised generative AI. Generative systems may construct facts, produce improper content, recreate stereotypes, and imitate human knowledge, without necessarily having it. UNESCO (2023) requests regulations of privacy age-appropriate regarding generative AI. In pre-primary environments in Tanzania, this implies that direct child interaction with open-ended generative chatbots must be approached with extreme caution, and likely avoided, unless there are solid safeguards, human mediation, and a strict educational intent.

Seventh, do not allow AI to increase inequality. Digital innovation tends to seek more already privileged environments first. Unless this is carefully designed in its policy, urban and well-connected, better-resourced schools may benefit more. In contrast, rural and underserved schools are left with outdated devices, poor connectivity, weak support, and lower-quality implementation. BEST 2025 and the guidelines on digital education both demonstrate that Tanzania continues to struggle with uneven digital infrastructure and local inequalities (MoEST, 2025c; PO-RALG, 2025). Any AI policy of early childhood must therefore be explicitly equity-driven.

A Contextualised Conceptual Framework for Tanzania

In order to make sense of these do's and don'ts, the present paper proposes a contextualised framework of ecological capability for AI and don'ts of AI in the early childhood curriculum in Tanzania. The framework brings together three concepts. The former is sociocultural mediation: children acquire knowledge based on tools, symbols, and social interaction rather than by information delivery alone. The second is ecological thinking: classroom practice is influenced by nested systems such as policy, infrastructure, school leadership, teacher preparation, and home context. The third one is the capability approach: the fact that a technology is available does not equal the actual fact that one can convert it into valued educational results. Within this framework, AI does not directly impact young

children in some linear manner. The mediating effects of it are achieved through a chain of conversion. On the most general scale, the sequence can be expressed as follows: policy and infrastructure preparedness influence teacher digital and AI capability; teacher capability influences the quality of pedagogical mediation; pedagogical mediation influences the actual learning opportunities of children; and only in this case, developmental outcomes can be observed. Every stage is context-moderated, in terms of class size, language, disability inclusion, connectivity, parental support, school culture, cost, and teacher workload. This model can be used to explain why the same AI can be beneficial in one situation and detrimental in another.

There are four fundamental constructs of the framework. The first is system readiness, which encompasses electricity, connectivity, data protection, device reliability, language resources, technical support, financing, and governance. The digital education guideline of Tanzania and the BEST indicators ensure that this readiness is not assumed (MoEST, 2025c; PO-RALG, 2025). The second construct is the ability of teachers in using AI: not merely technical functioning, but judgment, prompting, review, classroom management, ethical awareness, inclusive adaptation, and the ability to reject unsuitable outputs. The third construct is the quality of pedagogical mediation: whether the use of AI will still be teacher-mediated, language-rich, play-compatible, and developmentally appropriate. Child developmental opportunity is the fourth construct: it is whether children are really gaining richer language, reasoning, imagination, inclusion, and social participation or merely spending more time interacting with screens or algorithmic systems.

This framework justifies a simple yet important conclusion: in Tanzania, AI must be considered not in terms of presence but in terms of the quality conversion. A preschool that possesses AI-enabled technologies, but has untrained teachers, unreliable electricity, age-inappropriate content, or unethical practices, has not implemented AI in the curriculum in any meaningful way. On the other hand, a classroom with a limited approach to AI strategically for teacher support, inclusive resource preparation, and carefully mediated literacy work may be using AI even with modest infrastructure. The policy implication is that AI measurements for success should be based on the quality of mediation and equity of benefit, rather than counts of devices or subscriptions.

DISCUSSION OF FINDINGS

The discussion between cognitive growth and stagnation must therefore be re-framed. The claim that AI is a growth-producing resource and the claim that AI is a corrosive resource are not supported by the literature. The argument that it validates is conditional: AI will contribute to growth only when it is strongly constrained by developmental principles, teacher mediation, ethical protections, and contextual fit. The main risk in early childhood is that AI offers efficiency and silently replaces precisely human processes of conversation, imitation, storytelling, negotiation, and sensory exploration, which build foundational cognition. In the case of Tanzania, there are four strategic implications. First, AI policy for early childhood should remain modest and staged. A nation that is still strengthening pre-primary provision, staffing, infrastructure, and teacher development should not hurry towards child-facing AI as a first-order reform. Second, the most productive immediate uses of AI are likely to be teacher-facing and system-facing rather than child-facing. Third, any initiative toward AI literacy among young children needs to be integrated into play-based, arts-based, language-rich curriculum as opposed to being taught as a narrow technical strand. Fourth, AI governance in education can be constructed as part of quality assurance, teacher support, and inclusion policy, rather than Edtech policy.

These implications are consistent with the official documents of Tanzania. Responsible, ethical, and age-appropriate use, bias auditing, community engagement, and monitoring are already mandated in the AI guidelines. The digital education guidelines emphasise infrastructure, capacity building, digital literacy, curriculum integration, professional development, and inclusive use of emerging technologies. The curriculum of teacher education values ICT, assistive technologies, classroom-action-based research, and inclusive pedagogies. The policy architecture is therefore more mature than the empirical classroom evidence. The pressing need is not an additional visionary document, but careful implementation, research and developmental discipline.

It would also be significant that the implementation of AI in education in Tanzania is going to happen within global disparities of language, data, and platform power. Most AI systems available commercially are designed and trained elsewhere, using data that overrepresent major languages and high-income

settings, and optimised to business models that may not be consistent with the rights of children or public education values. This provides Tanzania with strong reasons to insist on local oversight, compatibility of Kiswahili, teacher review, and procurement in the public interest. Without such protections, AI integration may import hidden cultural assumptions and shift authority away from teachers and national curriculum institutions toward opaque external platforms.

CONCLUSION

This paper has contended that the question ‘Are we making minds grow or stagnate?’ cannot be answered by considering AI only. In early childhood curriculum, AI is not merely a tool; it is a reshaping of roles, including who communicates, who makes decisions, who observes, who stores data, and what kinds of learning are prioritised. Some evidence on AI as a supportive tool in some types of early learning exists globally, though most are teacher-centred and not child-centred, and do not focus on foundational education such as literacy and numeracy skills. However, excessive reliance, surveillance, prejudice, commercialisation, reduced agency, and the displacement of human relationships are also cautioned by the same evidence. The policy framework is already well-developed in identifying these tensions. Still, there are significant underlying challenges with participation, teacher supply, infrastructure, and local capacity in the pre-primary system in Tanzania.

For that reason, the answer for Tanzania must be ethical rather than ideological. AI must be embraced where it can be proven to enhance teachers, inclusion, language, creativity, and age-appropriate learning. It must be limited or prohibited where it replaces human interaction, increases surveillance, promotes inequality, or treats children as data rather than persons. In practice, Tanzania should pursue a teacher-led, rights-based, low-risk, context-aware approach: AI as support, not substitute; AI as scaffold, not script. In that case, AI can assist in the development of minds. In their absence, the possibility of stagnation exists.

REFERENCES

- Cai, Z., Xing, G., Yamamoto, Y., & Wang, X. C. (2025). From Piaget to posthumanism: Critical review of conceptualisation of AI in early childhood education. *AI, Brain and Child*, 1, Article 14. <https://doi.org/10.1007/s44436-025-00012-4>
- Holmes, W. H. (2025). AI, education, and children's rights. *Frontiers in Education*, 10, Article 1656736. <https://doi.org/10.3389/feduc.2025.1656736>
- Kambona, W. (2024). Tutors' perspectives on the integration of information and communication technology in early-grade teacher colleges in Tanzania. *Educational Technology Quarterly*, 2024(4), 434–455. <https://doi.org/10.55056/etq.795>
- Kambona, W., & Ndibalema, P. M. (2025). Examining inequalities in provision of early childhood education in Tanzania: A systematic review. *Cogent Education*, 12(1), Article 2439161. <https://doi.org/10.1080/2331186X.2024.2439161>
- Kewalramani, S., Kidman, G., & Palaiologou, I. (2021). Using artificial intelligence (AI)-interfaced robotic toys in early childhood settings: A case for children's inquiry literacy. *European Early Childhood Education Research Journal*, 29(5), 652–668. <https://doi.org/10.1080/1350293X.2021.1968458>
- Kihoza, P., Zlotnikova, I., Bada, J., & Kalegele, K. (2016). Classroom ICT integration in Tanzania: Opportunities and challenges from the perspectives of TPACK and SAMR models. *International Journal of Education and Development Using ICT*, 12(1), 107–128.
- Ljungcrantz, L. (2026). The interaction of AI and early childhood education: A state-of-the-art review 2020–2024. *Early Childhood Education Journal*. <https://doi.org/10.1007/s10643-025-02079-3>
- Lubuwa, E. E., Ndibalema, P., & Mbwambo, E. (2022). Assessment of tutors' level of ICT competencies in teaching in teacher education in Tanzania. *Journal of Learning for Development*, 9(3), 436–454.
- Ministry of Education, Science and Technology. (2024). *National guidelines for artificial intelligence in education*. Government of the United Republic of Tanzania.
- Ministry of Education, Science and Technology. (2025a). *Education sector development plan 2025/26–2029/30*. Government of the United Republic of Tanzania.
- Ministry of Education, Science and Technology. (2025b). *National digital education strategy 2024/25–2029/30*. Government of the United Republic of Tanzania.
- Ministry of Education, Science and Technology. (2025c). *National digital education guidelines for*

- schools and teacher colleges*. Government of the United Republic of Tanzania.
- Ministry of Information, Communication and Information Technology. (2025). *Tanzania national artificial intelligence strategy framework*. Government of the United Republic of Tanzania.
- Mtahabwa, L., & Rao, N. (2010). Pre-primary education in Tanzania: Observations from urban and rural classrooms. *International Journal of Educational Development*, 30(3), 227–235. <https://doi.org/10.1016/j.ijedudev.2009.10.002>
- National Association for the Education of Young Children, & Fred Rogers Center. (2012). Technology and interactive media as tools in early childhood programs serving children from birth through age 8. http://www.naeyc.org/files/naeyc/file/positions/P_S_technology_WEB2.pdf
- National Planning Commission. (2025). *Tanzania development vision 2050*. Government of the United Republic of Tanzania.
- Ndijuye, L. G. (2023). School readiness and pre-primary learning experiences of children of refugee backgrounds in Tanzania: The mediating role of family socio-economic status. *European Early Childhood Education Research Journal*, 31(3), 454–469. <https://doi.org/10.1080/1350293X.2023.2197762>
- Ndijuye, L. G., & Rao, N. (2018). Pre-primary education policy in Tanzania: Does it meet the educational needs of newly naturalised refugee children? *Global Education Review*, 5(4), 36–54.
- Ndijuye, L. G., Mlilo, I. R., & Machumu, M. A. M. (2020). Early childhood education in Tanzania: Views and beliefs of stakeholders on its status and development. *Global Education Review*, 7(3), 22–39.
- Nikolopoulou, K. (2025). Child-centered integration of generative AI in early learning: Balancing promises and challenges. *AI, Brain and Child*, 1, Article 21. <https://doi.org/10.1007/s44436-025-00023-1>
- OECD. (2023). *Empowering young children in the digital age*. OECD Publishing.
- Panjeti-Madan, V. N., & Ranganathan, P. (2023). Impact of screen time on children's development: Cognitive, language, physical, and social and emotional domains. *Multimodal Technologies and Interaction*, 7(5), Article 52. <https://doi.org/10.3390/mti7050052>
- Page M.J., McKenzie J.E., Bossuyt P.M., Boutron I., Hoffmann T.C., Mulrow C.D. (2020). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* <https://doi.org/10.1136/bmj.n71>
- President's Office–Regional Administration and Local Government. (2025). *Basic education statistics in Tanzania 2025: Regional data (BEST 2025)*. Government of the United Republic of Tanzania.
- Su, J. (2024). Development and validation of an artificial intelligence literacy assessment for kindergarten children. *Education and Information Technologies*, 29(16), 21811–21831. <https://doi.org/10.1007/s10639-024-12611-4>
- Su, J. (2024). Kindergarten teachers' perceptions of AI literacy education for young children. *International Journal of Technology and Design Education*, 34(5), 1665–1685. <https://doi.org/10.1007/s10798-024-09876-8>
- Su, J., & Ng, D. T. K. (2023). Artificial intelligence (AI) literacy in early childhood education: The challenges and opportunities. *Computers and Education: Artificial Intelligence*, 4, Article 100124. <https://doi.org/10.1016/j.caeai.2023.100124>
- Su, J., & Yang, W. (2024). Artificial intelligence (AI) literacy in early childhood education: An intervention study in Hong Kong. *Interactive Learning Environments*, 32(9), 5494–5508. <https://doi.org/10.1080/10494820.2023.2217864>
- Su, J., & Yang, W. (2024). Powerful or mediocre? Kindergarten teachers' perspectives on using ChatGPT in early childhood education. *Interactive Learning Environments*, 32(10), 6496–6508. <https://doi.org/10.1080/10494820.2023.2266490>
- Su, J., & Zhong, Y. (2022). Artificial intelligence (AI) in early childhood education: Curriculum design and future directions. *Computers and Education: Artificial Intelligence*, 3, Article 100072. <https://doi.org/10.1016/j.caeai.2022.100072>
- Tandika, P. B., & Ndijuye, L. G. (2020). Pre-primary teachers' preparedness in integrating information and communication technology in teaching and learning in Tanzania. *Information and Learning Sciences*, 121(1/2), 79–94. <https://doi.org/10.1108/ILS-01-2019-0009>
- UNESCO. (2023). *Guidance for generative AI in education and research*. UNESCO.
- UNICEF. (2024). *How is artificial intelligence reshaping*

- early childhood development?* UNICEF.
- UNICEF. (2025). *Guidance on AI and children (3rd ed.)*. UNICEF Innocenti.
- United Republic of Tanzania. (2023). *Education and training policy 2014, 2023 edition*. Government of the United Republic of Tanzania.
- Wizara ya Elimu, Sayansi na Teknolojia. (2023). *Mtaala wa mafunzo ya stahada ya ualimu elimu ya awali*. Taasisi ya Elimu Tanzania.
- World Health Organization. (2019). *Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age*. World Health Organization.
- Yi, H., Liu, T., & Lan, G. (2024). The key artificial intelligence technologies in early childhood education: A review. *Artificial Intelligence Review*, 57, Article 12. <https://doi.org/10.1007/s10462-023-10637-7>
- Yim, I. H. Y., & Wegerif, R. (2024). Teachers' perceptions, attitudes, and acceptance of artificial intelligence (AI) educational learning tools: An exploratory study on AI literacy for young students. *Future in Educational Research*, 2(4), 318–345. <https://doi.org/10.1002/fer3.65>