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Examining the Implementation of Artificial Intelligence in Early Childhood Education Settings in Ghana: Educators' Attitudes and Perceptions towards Its Long-Term Viability

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ABSTRACT

Artificial Intelligence (AI) has witnessed significant advancements in recent years, with potential applications in various sectors, including education. Early childhood education (ECE) is a critical stage that lays the foundation for a child's future development and learning. This study aims to explore the attitudes and perceptions of educators in Ghana towards implementing AI in ECE settings, focusing on its long-term viability. The research employs a qualitative approach, utilising interviews and focus group discussions to gather data from educators in selected ECE settings across four (4) early childhood settings in Ghana. The study investigates eight (8) educators' experiences, concerns, and expectations regarding integrating AI technologies into their teaching practices. It explores the factors influencing their attitudes towards AI, including familiarity with the technology, pedagogical beliefs, cultural context, and training opportunities. Preliminary findings indicate a diverse range of perspectives among educators towards AI implementation in ECE settings. Some educators perceive AI as promising for enhancing teaching and learning experiences, providing personalised instruction, and facilitating early childhood development. They recognise the potential benefits of AI in supporting cognitive, social, and emotional growth among young learners. Concerns are expressed regarding the implications of AI on human interaction, child privacy, and the role of educators in fostering holistic development. This study contributes to the emerging field of AI in education by examining the context of ECE in Ghana. The findings informed policymakers, educational institutions, and AI developers about the perceptions and concerns of educators, ultimately guiding the development and implementation of AI technologies in a manner that aligns with the needs and aspirations of the Ghanaian ECE community.

INTRODUCTION

Early childhood education (ECE) shapes young children's cognitive, social, and emotional development, providing a solid foundation for their future learning and success (Mohammed, 2023). ECE pertains to the critical period in a child's life spanning. As technology continues to evolve, there is a growing interest in exploring the implementation of Artificial Intelligence (AI) in educational settings, including ECE (Bautista *et al.*, 2023). AI relates to replicating human intelligence in machines, which are programmed to mimic human thought processes, learning capabilities, and problem-solving skills. AI has the potential to revolutionise teaching and learning by offering personalised and adaptive learning experiences tailored to individual learners' needs. Ghana, a country in West Africa, recognises the significance of early childhood education in ensuring optimal child development. With the government's commitment to improving teaching and technological advancements, exploring AI's integration in ECE settings has gained attention (Pillar & Haricharan, 2023). So, it is crucial to understand the attitudes and perceptions of teachers, who are central to AI's successful implementation and long-term viability in the Ghanaian ECE context.

This study examines teachers' attitudes and perceptions towards implementing AI in ECE settings in Ghana, specifically focusing on its long-term viability. By gaining insights into teachers' experiences, concerns, and expectations, this research sheds light on the opportunities and challenges associated with AI integration in early childhood education. Previous studies (Berson 2022; Chiu *et al.* 2021; Chen *et al.* 2020) have explored the implementation of AI in various educational contexts, highlighting its potential benefits, such as personalised learning, intelligent tutoring systems, and enhanced student engagement. However, research specifically focused on AI in ECE settings, especially in the context of developing countries like Ghana, remains limited. Understanding the attitudes and perceptions of teachers in Ghana is crucial in informing policymakers, educational institutions, and AI developers about the factors that shape the successful integration of AI technologies in the ECE domain (Chan & Hu, 2023).

Exploring the attitudes and perceptions of teachers towards AI in ECE settings will contribute to a deeper understanding of their beliefs, concerns, and expectations. It will provide insights into their readiness for AI implementation, potential barriers to adoption, and strategies to address these challenges (Papadakis *et al.*, 2021). Additionally, this research will emphasise the importance of incorporating teachers' perspectives and expertise in developing and deploying AI technologies, ensuring their alignment with Ghana's cultural context, educational goals, and pedagogical principles.

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By examining the long-term viability of AI in ECE settings, this study seeks to foster a comprehensive understanding of how AI can be effectively integrated into ECE while preserving the essential role of educators in nurturing young learners (Su & Zhong, 2022). The findings will contribute to the growing knowledge of AI in education and provide practical implications for policymakers, educational institutions, and stakeholders involved in ECE in Ghana. Ultimately, this research aims to support the enhancement of ECE practices and promote the holistic development of young children in Ghana through the responsible and meaningful integration of AI technologies.

Educators' Familiarity with Artificial Intelligence in ECE

Educators' familiarity with Artificial Intelligence (AI) in Early Childhood Education (ECE) refers to their knowledge, understanding, and experience with AI technologies and their applications in the ECE context. Familiarity can vary among educators based on their exposure to AI, training, and practical experience. It significantly shapes educators' attitudes and perceptions towards AI implementation in ECE (Kewalramani *et al*., 2021). Educators' familiarity with AI in ECE can range from limited exposure and prior understanding to practical experience and continuous professional development. Some educators may have limited exposure to AI technologies in ECE, resulting in minimal knowledge or awareness of its potential applications. Others may possess a basic understanding of AI and its benefits in ECE through introductory training or general awareness. Educators who have practical experience using AI tools in ECE settings demonstrate a higher level of familiarity, having integrated AI technologies into their instructional practices. Educators who engage in continuous professional development focused on AI in ECE exhibit enhanced understanding, actively seeking opportunities to update their knowledge and skills (Li & Taber, 2022). Enhancing educators' familiarity with AI in ECE is crucial for successful implementation. Ongoing professional development programmes, training opportunities, and collaboration with AI experts can support educators in building their understanding, expertise, and confidence in utilising AI tools effectively. By promoting educators' familiarity with AI, ECE settings can leverage the potential benefits of AI technologies to enhance teaching and learning experiences for young children (Baidoo-Anu & Ansah, 2023).

Benefits of Implementing Artificial Intelligence in ECE

Implementing Artificial Intelligence (AI) in ECE settings holds excellent potential for various perceived benefits that can positively impact teaching and learning experiences. Educators and researchers have identified several critical advantages of integrating AI into the ECE curriculum. One of the primary perceived benefits is the ability of AI to personalise learning experiences for young children. AI-powered adaptive learning systems can analyse individual learning patterns and provide tailored instruction to meet each child's unique needs and abilities (Nazaretsky *et al*., 2022). By adapting the content, pace, and difficulty level, AI enables personalised learning pathways, ensuring that children receive targeted support and challenges, ultimately enhancing their learning outcomes (Chiu *et al*., 2021). AI offers interactive and engaging educational resources. Virtual assistants, innovative toys, and educational apps powered by AI technologies provide interactive and immersive learning experiences. These resources can engage children in hands-on activities, stimulate their curiosity, and foster a love for learning (Rathore, 2023). For example, AI-powered interactive games can help children practice problem-solving, critical thinking, and creativity in a fun and engaging way.

Furthermore, AI supports data-driven decision-making in ECE. By analysing vast amounts of data, AI algorithms can identify patterns, trends, and gaps in children's learning. Educators can use this information to make informed instructional decisions, personalise interventions, and provide targeted support. For instance, AI can generate insights into a child's progress, identify areas of strength and weakness, and suggest appropriate learning strategies.

AI also has the potential to expand access to quality educational materials and resources. Access to educational resources may be limited in many regions, especially in remote or underserved areas. AI-powered platforms and applications can provide access to a wide range of academic content, including multimedia resources, e-books, and interactive simulations, overcoming geographical barriers and ensuring equitable access to quality education. Additionally, AI can assist educators in administrative tasks, saving time and improving efficiency (Guerrero-Quiñonez *et al*., 2023). Automated grading systems, data management tools, and administrative assistants powered by AI technologies can streamline administrative processes, reduce paperwork burden, and allow educators to dedicate more time to instruction and student support.

Concerns of Educators Regarding the Use of AI in ECE

While integrating Artificial Intelligence (AI) in Early Childhood Education (ECE) settings offers promising opportunities, educators have expressed various concerns about its implementation. These concerns revolve around several key areas that need careful consideration to ensure AI's responsible and effective use in ECE (Wang, 2023). One of the primary concerns is the impact of AI on human interaction and social-emotional development. Educators worry that excessive reliance on AI may reduce face-to-face interactions between children and teachers. Early childhood is a critical stage for developing social skills, emotional intelligence, and empathy, best nurtured through meaningful human interactions (Berson, Luo & Yang, 2022). Over-dependence on AI may hinder

the development of these essential skills and restrict children's ability to form deep connections with their peers and educators. Data privacy and security are another significant concern for educators. AI systems in ECE settings collect and analyse vast amounts of data, including sensitive information about children and their learning progress (Draper *et al.*, 2023). Educators worry about this data's potential misuse or mishandling, particularly in cases where third-party companies manage AI systems. Safeguarding children's privacy and ensuring that data is securely stored and used ethically is paramount. Ethical considerations also extend to the content and biases embedded in AI algorithms. Educators fear that biased or inappropriate content may be delivered to young children through AI-powered platforms, potentially perpetuating stereotypes or promoting harmful information. Ensuring that AI systems are designed with inclusivity and diversity in mind and regularly audited for biases is crucial to prevent these issues. Moreover, there are concerns about AI's impact on educators' roles. Some educators worry that introducing AI may replace or devalue their classroom roles (Wang, 2023). While AI can assist in various tasks, it is essential to emphasise that AI should be seen as a complementary tool to support educators, not a substitute for their expertise, creativity, and human touch in teaching.

The digital divide is also a pressing concern in implementing AI in ECE. Not all children have equal access to technology and the Internet, especially in underserved communities. Over-reliance on AI-based resources may exacerbate educational inequalities, leading to disparities in learning outcomes among children (Chiu *et al.*, 2021). To address these concerns, stakeholders must adopt a cautious and thoughtful approach to AI implementation in ECE (Berson *et al.*, 2022). Comprehensive and ongoing professional development for educators can build their digital literacy skills and understanding of AI's potential and limitations. Developing clear ethical guidelines and policies for AI use in ECE can also ensure that data privacy and content quality are prioritised.

Educators' Attitudes Towards the Integration of AI in ECE Curriculum

Educators' attitudes towards integrating Artificial Intelligence (AI) in Early Childhood Education (ECE) curriculum can vary, influenced by a range of factors such as personal beliefs, prior experiences, perceived benefits, and concerns. Here is a brief explanation of educators' attitudes towards the integration of AI in the ECE curriculum (Chiu *et al.*, 2021):

Some educators have a positive attitude towards integrating AI into the ECE curriculum. They recognise the potential of AI technologies to enhance teaching and learning experiences for young children (Papadakis & Kalogiannakis, 2019). These educators believe AI can provide personalised and interactive learning opportunities, support individualised instruction, and promote engagement and motivation. They view AI as a tool that complements their instructional practices and can offer new possibilities for enhancing children's cognitive, social, and emotional development (Berson, Luo & Yang, 2022). While dealing with some educators' attitudes towards integrating AI into ECE, others may be sceptical or resistant to integrating AI into the ECE curriculum. They may question the effectiveness of AI technologies in promoting holistic development or have concerns about the potential negative impacts on social interactions or creativity (Thuneberg *et al.*,2022). These educators may prefer traditional teaching methods or value human interaction and hands-on experiences as essential components of early childhood education.

In another development, some educators adopt an open-minded approach and are willing to explore the integration of AI into the ECE curriculum. They may not have preconceived notions about AI and are open to understanding its potential benefits and limitations (Haatainen & Aksela, 2021). These educators are willing to learn, adapt, and evaluate how AI can effectively be incorporated into the curriculum to support children's learning outcomes. To achieve this, there is the need for teachers to recognise Professional Development. Educators recognise the need for professional development and training to effectively integrate AI into the ECE curriculum (Kilag *et al.*, 2023). They understand that gaining knowledge and skills related to AI technologies is essential for successful implementation. These educators seek opportunities for continuous learning, attend workshops and conferences, or engage in collaborative efforts to enhance their understanding and competence in utilising AI tools appropriately.

Ethical and Pedagogical Considerations cannot be ruled out; therefore, educators emphasise the importance of ethical considerations and pedagogical alignment when integrating AI into the ECE curriculum. They believe that AI technologies should align with the principles of child-centred, developmentally appropriate practices and ensure privacy, data security, and ethical use of children's information (Spiros *et al.*, 2022). Educators value the balance between technology use and other critical aspects of early childhood education, such as play, social interactions, and hands-on learning experiences.

Overall, educators' attitudes towards integrating AI into the ECE curriculum are diverse and influenced by various factors. Addressing educators' concerns, providing professional development opportunities, and ensuring ethical and pedagogical alignment when integrating AI technologies are crucial (Chen *et al.*, 2023). Collaborative efforts involving educators, policymakers, researchers, and technology developers can facilitate the integration of AI in a manner that supports high-quality early childhood education and meets the unique needs of young children.

Teachers Perceptions of the Long-Term Viability of AI in ECE

Educators' perceptions of the long-term viability of Artificial Intelligence (AI) in Early Childhood Education (ECE) settings are influenced by various factors, including their experiences, observations, and

expectations (Gross, 2006). Here is a brief explanation of educators' perceptions. Teachers perceive that AI has the potential for long-term viability in ECE settings due to its ability to adapt and evolve with emerging technologies. They recognise that AI can continuously improve and offer new possibilities for enhancing teaching and learning experiences (Gross, 2006). Educators believe that as AI technologies advance, they will become more sophisticated, efficient, and tailored to the specific needs of young learners.

Moreover, educators perceive that AI can contribute to the ongoing professional development of educators. They believe AI can provide valuable insights, resources, and tools that support their instructional practices and help them stay updated with current research and best practices. Educators see AI as a means to enhance their effectiveness as educators and improve their ability to meet the diverse learning needs of children (Har & Ma, 2023). Furthermore, educators perceive that AI can support equitable access to quality education. They believe that AI technologies have the potential to bridge educational gaps and provide equal opportunities for all children, regardless of their background or geographical location (Har & Ma, 2023). Educators see AI as a tool that can help address disparities and promote inclusive learning environments. While educators perceive the long-term viability of AI in ECE settings, they also emphasise the need for responsible and ethical use of AI. They stress the importance of balancing AI technologies and human interaction, play-based learning, and social-emotional development (Kuleto *et al.*, 2022). Educators believe that integrating AI thoughtfully and purposefully can become a valuable resource that enhances, rather than replaces, the role of educators in ECE settings (Devi *et al.*, 2022).

Barriers to the Successful Implementation of AI in ECE

The successful implementation of Artificial Intelligence (AI) in Early Childhood Education (ECE) faces several challenges and barriers. Among the obstacles is limited access to appropriate technological resources, such as AI tools and devices, which can hinder the successful implementation of AI in ECE. Not all educational institutions may have the necessary infrastructure, funding, or technical support to integrate AI effectively into their classrooms (Su *et al.*, 2023). While Professional Development and Training seem to find their way, the context of discussion as educators requires adequate training and professional development opportunities to utilise AI in ECE effectively (Bautista *et al.*, 2023). The lack of comprehensive training programmes and support can impede educators' ability to understand, implement, and maximise the potential of AI technologies in their instructional practices.

When gathering information from participants, scientists and researchers must always abide by the code of ethics in research. These factors uphold scientific integrity, strengthen study validity, and safeguard research participants' rights. The ethical implications of AI in ECE raise concerns and challenges. Concerns about privacy, data security, and the responsible use of children's personal information exist. Ensuring that AI systems are designed and implemented ethically and transparently is crucial for building trust and addressing these challenges. The educator sets up a learning environment that supports the learning activities appropriate to achieve the desired learning outcomes (Chiu *et al.*, 2021). This, therefore, gave birth to Pedagogical Alignment. Integrating AI into the ECE curriculum requires careful consideration of pedagogical alignment. Educators must ensure that AI tools and activities align with developmentally appropriate practices, promote active engagement, and foster holistic learning experiences (Su *et al.*, 2023). Striking the right balance between AI technologies and other essential aspects of early childhood education, such as play-based learning and social interactions, can be challenging.

The successful implementation of AI in ECE also depends on considering cultural and contextual factors. AI technologies should be sensitive to learners' cultural diversity, linguistic backgrounds, and local educational contexts. Adapting AI tools to suit different communities' needs and cultural values can be challenging (Li & Chen, 2017). Addressing these challenges requires collaboration among educators, policymakers, researchers, and technology developers. It is crucial to provide adequate resources, professional development opportunities, and ethical guidelines to support the successful implementation of AI in ECE. Additionally, ongoing research and evaluation of AI implementations in ECE can help identify and address these challenges, ultimately enhancing the integration of AI in early childhood education.

Support and Resources Needed for Educators to Integrate AI in ECE Effectively

Educators require adequate support and resources to integrate Artificial Intelligence (AI) effectively in Early Childhood Education (Chen *et al.*, 2023). Here, I support my argument for the need for Educators to have comprehensive and ongoing professional development programmes focusing on AI in ECE. Training should include understanding AI technologies, their potential applications, and strategies for integrating AI into the curriculum. Professional development opportunities should also cover ethical considerations, pedagogical alignment, and practical implementation strategies (Chen *et al.*, 2023).

In this way, educational institutions' access to AI tools and infrastructure should provide educators with appropriate AI tools, software, and devices. This includes access to adaptive learning platforms, educational apps, AI-powered analytics tools, and interactive virtual assistants (Rusmiyanto, 2023; Kuleto *et al.*, 2022). Adequate technological infrastructure, including hardware and internet connectivity, is necessary for educators to utilise AI tools in their classrooms effectively.

I argue that collaboration and support networks are

needed, among other things. Therefore, establishing collaboration and support networks among educators, technology specialists, researchers, and policymakers is crucial. Educators benefit from sharing experiences, exchanging ideas, and learning from best practices in AI integration (Ganesh, 2022). Collaborative networks can provide forums for ongoing professional dialogue, resource sharing, and support in addressing implementation challenges. Clear ethical guidelines and policies should be developed to ensure AI's responsible and ethical use in ECE. These guidelines should address privacy, data security, and the appropriate use of children's personal information (Rusmiyanto, 2023). Educators must know these guidelines and receive training on ethical considerations for AI use in the classroom. Ongoing research and evaluation of AI integration in ECE can provide valuable insights and evidence-based practices. Support for research initiatives, funding opportunities, and partnerships with academic institutions can generate knowledge and promote evidence-informed decision-making in AI implementation (Chen *et al.*, 2023).

By providing educators with professional development, access to AI tools, collaboration networks, ethical guidelines, and research support, the integration of AI in ECE can be effectively facilitated. These resources and support systems enable educators to confidently and competently leverage AI technologies to enhance teaching and learning experiences for young children.

Ethical Considerations and Safeguards in the Use of AI in ECE Settings

Integrating Artificial Intelligence (AI) in Early Childhood Education (ECE) settings brings numerous benefits but raises critical ethical considerations and the need for robust safeguards. When implementing AI in ECE, it is crucial to uphold ethical principles and safeguards to protect children's rights, privacy, and well-being (Kurni *et al.*, 2023). One significant ethical consideration is the responsible use of data. AI systems in ECE settings collect and analyse vast amounts of data, including personal information about children and their learning progress. Establishing clear policies and procedures for data collection, storage, and usage is essential to ensuring compliance with privacy laws and regulations. Safeguards such as data encryption, secure storage, and strict access controls must be implemented to protect children's privacy and prevent unauthorised use or disclosure of their data (Kurni *et al.*, 2023).

Transparency and explainability of AI algorithms are also crucial ethical considerations. Educators and parents should understand how AI algorithms make decisions and provide recommendations to ensure the technology is fair, unbiased, and aligned with educational goals. It is essential to regularly audit and validate AI systems to detect and address any biases or unintended consequences that may arise from the algorithms (Miao *et al.*, 2021). Additionally, the content delivered through AI platforms should be carefully curated and monitored. Educators must ensure the content aligns with ethical standards, cultural sensitivity, and age-appropriate materials (Miao *et al.*, 2021). Precautions should be taken to prevent disseminating harmful or inappropriate content to young children.

Furthermore, ethical considerations extend to the impact of AI on human interaction and social-emotional development (Berson, Luo & Yang, 2022). While AI can enhance learning experiences, it should not replace the role of educators or hinder children's ability to develop essential social and emotional skills (Holmes *et al.*, 2021). Striking a balance between AI technology and human interactions is necessary to create a nurturing and supportive learning environment for young children. Clear guidelines, policies, and professional development programmes should address these ethical considerations and safeguard children in AI-integrated ECE settings. Educators and stakeholders should be trained on ethical practices, privacy protection, and responsible use of AI. Regular monitoring and evaluation of AI systems should be conducted to ensure compliance with ethical standards, and mechanisms for reporting and addressing concerns should be in place.

Strategies for the Long-Term Viability of AI Implementation in ECE

Strategies for the long-term viability of AI implementation in Early Childhood Education are essential to ensure its effective and sustainable integration. Educators, policymakers, and stakeholders play a crucial role in shaping the future of AI in ECE. Let's explore comprehensive recommendations, strategies, and examples to support the long-term viability of AI implementation in ECE. Provide comprehensive professional development programs and training opportunities for educators to build their capacity in integrating and effectively using AI technologies (Jarrahi *et al.*, 2023). This includes technical training on AI tools and pedagogical training on incorporating AI as a complementary tool in their teaching practices. For example, workshops can be conducted to familiarise educators with AI-powered educational platforms and their potential applications in the ECE context. Ongoing support and collaboration among educators can also be fostered through communities of practice and peer learning networks.

Develop clear ethical guidelines and privacy policies to ensure the responsible use of AI in ECE. These guidelines should address data privacy, security, and transparency issues (Chen *et al.*, 2023). For example, protocols can be established to protect student data, define data collection and use purposes, and outline procedures for obtaining informed consent from parents or guardians. Educators should be trained on these guidelines to ensure compliance and promote ethical practices when using AI technologies to foster collaboration between researchers and educators to bridge the gap between theory and practice. Researchers can provide insights into designing and developing AI technologies that align with young

learners' needs and characteristics. Educators, on the other hand, can offer valuable feedback and contribute to the iterative refinement of AI tools based on their practical experiences. Collaborative partnerships can lead to the development of more effective and contextually appropriate AI solutions for ECE.

Encourage the development of AI technologies that prioritise customisation and personalisation in ECE settings. AI tools should be designed to adapt to individual learning needs, preferences, and cultural contexts (Devi *et al.*, 2022). For instance, AI-powered platforms can provide personalised recommendations for learning activities or adjust the content and pace of instruction based on each child's progress. The customisation and personalisation features should be flexible enough to accommodate the diversity of learners in ECE classrooms.

Conduct rigorous research and evaluation studies to assess the impact of AI implementation in ECE. This includes examining the effectiveness of AI technologies on learning outcomes, engagement, and socio-emotional development of young learners (Berson *et al.*, 2022). Longitudinal studies can provide insights into the long-term effects of AI integration (Gocen & Aydemir, 2021). Findings from research and evaluation studies can inform evidence-based practices and contribute to the continuous improvement of AI implementation in ECE. To avoid exacerbating educational disparities, ensure equitable access to AI technologies in ECE settings. This requires addressing issues related to infrastructure, internet connectivity, and availability of devices. Policymakers can invest in technology infrastructure and financially support schools and communities with limited resources. Partnerships with public and private organisations can be established to provide access to AI tools and resources for underserved ECE settings.

Foster a culture of constant reflection and adaptation regarding the integration of AI in ECE. Regularly evaluate the implementation process, monitor its impact, and make necessary adjustments based on feedback from educators, parents, and learners (Gocen & Aydemir, 2021). Encourage open dialogue and stakeholder collaboration to address challenges and share best practices. This iterative approach ensures that AI implementation in ECE remains responsive to young learners' evolving needs and contexts. The long-term viability of AI implementation in ECE can be confirmed by following these recommendations and strategies. It requires a collective effort to support educators, prioritise ethical considerations, promote customisation and personalisation, and conduct research.

Contextualising Ghana's AI in Early Childhood Education

Ghana, located in West Africa, is increasingly recognising the potential of Artificial Intelligence (AI) in transforming various sectors, including education. In the context of Early Childhood Education (ECE), Ghana is exploring the implementation of AI to enhance teaching and learning experiences for young children (Gyimah *et al.*, 2009). Ghana's commitment to education is evident through its policies and initiatives to improve access and quality of education. With the introduction of AI in ECE settings, Ghana aims to leverage technological advancements to provide innovative and effective educational solutions for its young learners. One of the critical contextual factors influencing the implementation of AI in Ghana's ECE is the rapid growth of technology infrastructure. Ghana has made significant strides in expanding access to the Internet and increasing digital literacy (Owusu-Mensah & Ijon, 2023). This provides a foundation for integrating AI technologies in ECE, requiring reliable connectivity and access to digital resources.

Furthermore, Ghana's focus on bridging the educational gap and achieving equitable access to quality education aligns with the potential of AI in ECE. AI can address challenges related to teacher shortages, inadequate resources, and uneven educational opportunities by providing personalised learning experiences and expanding access to educational materials (Owusu-Mensah & Ijon, 2023). Ghana's cultural context also plays a role in shaping the implementation of AI in ECE. The country values human interaction and recognises the importance of social-emotional development in early childhood (Berson, Luo & Yang, 2022). Thus, while integrating AI, Ghana emphasises the need to maintain a balance between technology and human interactions, ensuring that AI is a complementary tool to support and enhance the role of educators in fostering holistic development (Beazley, 2009). Ghana's commitment to data privacy and ethical considerations is essential in implementing AI in ECE. As AI systems collect and analyse sensitive data about young children, Ghana emphasises the need to establish robust policies and regulations to protect children's privacy and ensure the ethical use of AI technologies.

Generally speaking, Ghana's exploration of AI in ECE is driven by its vision for educational transformation, technological advancements, commitment to equity, and recognition of the importance of human interactions in early childhood (Berson, Luo & Yang, 2022). By contextualising the implementation of AI in the Ghanaian context, stakeholders can develop strategies that align with the country's unique needs, cultural values, and aspirations for quality education.

METHODOLOGY

Semi-Structured Interviews and Focus Group Discussions

Semi-structured interviews and focus group discussions were conducted as part of the methodology to explore educators' attitudes and perceptions towards implementing Artificial Intelligence (AI) in Early Childhood Education (ECE) settings in Ghana, specifically focusing on its long-term viability (Chiu *et al.* 2021). These qualitative research methods allowed for an in-depth exploration of participants' experiences, beliefs, and concerns, providing

valuable insights into the topic. The following sections describe the process and critical aspects of conducting semi-structured interviews and focus group discussions. A purposive sampling technique was used to select participants for the interviews and focus group discussions (Senanayake *et al.*, 2020). The sample consisted of eight teachers from four ECE settings, including public and private ECE settings and semi-urban and rural districts in the Ashanti Region of Ghana. The selection aimed to ensure diversity and representation across various dimensions, including educational backgrounds, years of experience, and familiarity with AI technologies in ECE.

A semi-structured interview guide and a focus group discussion protocol were developed to guide the data collection process (Naz *et al.*, 2022). The interview guide used open-ended questions to explore educators' experiences, perceptions, and attitudes towards AI in ECE. The focus group protocol included a series of prompts and questions to stimulate group discussions and encourage participants to share their perspectives collectively.

Data Collection

Semi-structured interviews were conducted individually with selected educators (Fonsén *et al.*, 2023). The interviews provided a one-on-one setting where participants could express their thoughts openly and in detail. The interviews were audio-recorded with participants' consent and later transcribed for analysis. Focus group discussions involved small educators coming together to discuss the topic (Lewis-Kipkulei *et al.*, 2021). The facilitator introduced the main questions and encouraged participants to share their experiences, opinions, and concerns about AI implementation in ECE. The discussions were also audio-recorded and transcribed for analysis. Both interviews and focus group discussions were conducted in a comfortable and private setting, allowing participants to express their views freely. The researchers ensured a respectful and non-judgmental atmosphere, encouraging participants to share diverse perspectives and engage in active discussions.

Data Analysis

Thematic analysis was employed to analyse the interview and focus group data. The process involved several iterative steps, including familiarising the data, coding, categorising, and identifying themes and sub-themes (Kara, 2023). The researchers closely examined the transcribed data, searching for patterns, recurring ideas, and commonalities in participants' responses. The initial coding process involved assigning descriptive labels to meaningful units of data. Codes were then organised into categories, and overarching themes emerged through an iterative process of constant comparison and refinement (Castleberry & Nolen, 2018). The themes represented critical findings related to educators' attitudes, perceptions, and concerns regarding the long-term viability of AI implementation in ECE settings (Kewalramani *et al.*, 2021). Researchers maintained an audit trail, documenting decisions and reflections throughout the analysis process to ensure transparency and rigour. The findings were supported by direct quotes and detailed participant descriptions, enhancing the study's credibility.

Several strategies were employed to enhance the trustworthiness and rigour of the study (Hasija & Esper, 2022). These included prolonged engagement with participants to establish rapport and trust, member checking to verify interpretations with participants, peer debriefing to gain insights from other researchers, and triangulation of data sources (interviews and focus groups) to strengthen data validity.

Ethical considerations, such as informed consent, confidentiality, and privacy protection, were strictly followed throughout the data collection and analysis (Pearson, 2013). Acknowledging the limitations of using semi-structured interviews and focus group discussions is essential. The sample size may have been limited, and the findings may not be fully generalisable to all educators in Ghana. The participants' responses may be influenced by social desirability bias.

Findings

The study examining the implementation of Artificial Intelligence in ECE settings in Ghana and its long-term viability revealed various findings that provide insights into the subject matter. The themes that emerged from the interview data are summarised in Table 1.

Table 1: The table below presents the themes that emerged from the interview data

Themes	Sub-themes
Awareness induced by partial training	Sub-theme one: Limited knowledge of AI benefit
AI Improves Children's Educational Experience	Sub-theme two: Personal learning experience
	Sub-theme three: AI Serves Children Essential and Learning Capabilities
Varying attitudes	Sub-theme Four: Positive attitudes
	Sub-theme Five: Diverse Reservations and Concerns
Pragmatic Approaches Towards Implementation	Sub-theme Six: Teachers as Facilitators
	Sub-themes Seven: Ongoing professional development

Theme One: Awareness Induced by Partial Training

To fully utilise the advantages of AI, encourage tailored instruction, and ensure ethical and successful implementation of AI technology in educational settings, teacher understanding of AI in education is crucial. AI gives teachers the freedom to modify and improve their

pedagogical approaches, thus enhancing the learning process for pupils. Teachers' current awareness and familiarity with AI technology in Ghana's educational setting is discussed under the sub-them Limited understanding of AI benefit.

Limited Understanding of AI Benefit

Two teachers agreed that they are aware of AI being used in schools, but they have a limited understanding of its benefits, as shown in the quote below:

"I have heard about AI, but I do not know the benefits of it. Even though I have had some partial training on a dataset to enable me to use information communication technology tools in my lesson delivery". (TEA1)

I am not an AI specialist, but I have a fundamental grasp of it. I have heard that artificial intelligence is being utilised in education, but I have not had a lot of first-hand contact with it in early childhood settings.

Although the respondent admits to hearing about AI, they cannot understand its advantages. This theme centres on the interviewee's knowledge of AI's existence but not of its benefits from the partial training acquired. It also emphasises their broad understanding of AI, indicating a basic comprehension of the idea. The interviewees are again informed about the application of AI in education but haven't had several first-hand contacts with it in early childhood settings. This subject highlights that AI is present and relevant in the classroom. The study participant further mentions that I am not a specialist in AI, indicating their expertise in other areas. Despite having a rudimentary knowledge of AI, the participant's lack of direct experience suggests they might benefit from exposure to and training in AI applications in ECE. This draws attention to their prospective preparedness to acquire first-hand information and expertise in this field. The desire to understand in greater detail about AI's advantages is implicit. Finally, the participant's admission of their lack of understanding implies that they are interested in learning more about the benefits and uses of AI in the context of their chosen profession.

Theme Two: AI Improves Children's Educational Experience

The potential benefits of using AI in ECE settings are numerous and have the potential to have a significant influence on teaching and learning. Researchers (e.g. Nazaretsky *et al*., 2022; Rathore, 2023) and educators have discovered a number of significant benefits of incorporating AI into the ECE curriculum. The data generated indicate that it offers two advantages: personalised experience and development of essential capabilities.

Personal Learning Experience

The capacity of AI in ECE to customise learning according to all children's requirements and talents constitutes one of its main benefits. Six interviewees shared a similar notion that AI aids in personalising learning to meet every child's ability and individualised education opportunities, as shown in the extract:

Implementing AI in ECE offers several benefits, including personalised learning experiences for children (TEA4)

It can offer individualised educational opportunities that meet the particular needs of every child (TEA3)

Some teachers may view AI as a valuable tool to enhance personalised learning experiences and support learners' individual needs (TEA5).

On the one hand, artificial intelligence may present thrilling possibilities for improving educational experiences (TEA1)

…….teachers perceived AI as a means to personalise learning (TEA7)

By tailoring information to each child's aptitude and learning speed, AI can personalise learning experiences for all learners (TEA8).

This theme emphasises the benefit of AI in ECE, which is the capacity to offer learners individualised learning experiences. AI may modify activities and information to accommodate each child's demands, learning methods, and speed. The persons interviewed point out that AI may provide options for individualised studies. This subject focuses on how AI can adapt education to suit a learner's unique requirements, skills, and learning preferences. This stresses that AI can offer each learner personalised educational possibilities (Nazaretsky *et al*., 2022). Because conventional school settings sometimes use a universal approach, which could make certain children bored while making others struggle, AI can analyse each pupil's distinct learning method and adjust the programme as necessary. By doing this, it is made sure that everybody is exposed to material that is both developmentally and personally suitable for them.

AI Serves Children Unique and Necessary Learning Abilities

Artificial intelligence holds immense potential as a transformative force in the educational landscape, especially concerning its role in bolstering children's unique and essential learning capabilities. This notion is underscored by the perspectives of four interviewees who assert that AI possesses the capacity to cater for children's distinctive and indispensable learning abilities, as evidence provided:

It can offer individualised educational opportunities that meet every child's particular needs. Children needing additional coaching or learning styles might benefit immensely from this individualised strategy (TEA5).

For starters, it may give each child tailored learning opportunities. It might not be easy to accommodate each child's unique requirements, learning style, and speed in a typical classroom setting (TEA7),

… as a result, learning becomes more exciting and can aid children in better developing necessary abilities (TEA4)

To challenge children without overwhelming them, AI may modify the degree of complexity of maths questions based on their proficiency. (TEA6)

The evidence shows how difficult it is to consider each

child's particular requirements, learning preferences, and learning rate in a conventional instructional environment. They point out that the individualised approach of AI could benefit learners who might need more tutoring or have specific learning patterns. According to the evidence, the benefits of AI in meeting a range of learning demands and delivering individualised help are the main emphasis of this theme. Additionally, it suggests that conventional teaching approaches would have trouble adequately addressing differentiated learning. This demonstrates how AI may significantly improve ECE. It suggests that AI has the potential to improve the educational sector significantly. For instance, participants in TEA6 emphasise how AI may modify the difficulty of mathematical challenges according to each child's skill level. It highlights the significance of AI in presenting suitable and customised tasks for unique individuals.

Theme Three: Varying Attitudes

This theme reflects the variety of views among educators on the incorporation of AI in ECE. Varying attitudes imply that teacher attitudes toward implementing AI in ECE differ. Teachers' attitudes about incorporating AI into ECE were categorised under positive attitudes and diverse concerns.

Positive Attitudes

I am fairly receptive to the notion, although I have some doubts (TEA7).

The long-term effects seem encouraging to me (TEA1).

…….it presents possibilities as it transforms how we approach teaching and learning (TEA6).

The participant indicates some openness to the notion of incorporating AI in teaching. This subject implies a readiness to investigate the possible advantages of AI in education. Regarding the long-term impacts of AI, participant TEA is upbeat. The phrase "AI long-term effects seem encouraging to me" denotes his optimism or sense of positivity towards the possible future implications of AI. In alternative terms, interviewees posit that AI technology's evolution and increasing sophistication over time will likely yield positive outcomes in ECE. This assertion reflects an optimistic perspective on AI's potential role in education, indicating a belief that rather than detrimental impacts, it will usher in transformative breakthroughs, enhancements, and positive advancements. This perspective signifies their perception of AI as a valuable tool capable of addressing intricate challenges and enhancing the educational landscape. Moreover, this theme underscores the notion that AI possesses the capacity to enhance academic outcomes, improve accessibility, and actively positively engage young learners.

Diverse Reservations and Concerns

While the participants displayed receptiveness towards AI, their attitudes were nuanced, reflecting a spectrum of uncertainties and varied reservations. Issues emerged pertaining to the alignment of AI with educational goals, the potential risk of excessive dependence, ethical dilemmas, and practical challenges, indicating a multifaceted perspective on the integration of AI in education.

Alignment with Educational Objectives

The interviewees TEA7 and TEA8's concern was about how the application of AI in ECE will be aligned with the present education objective to achieve the expected goals, as the quote demonstrates.

…but we must ensure that it is compatible with our educational objectives for young children and suitable for development (TEA7).

Authorities should ensure AI resonate with curriculum objectives (TEA8)

The theme "alignment with educational objectives" draws attention to the participant's interest in ensuring AI adheres to the aims and tenets of ECE. These goals cover intellectual development, social and emotional growth, physical growth, spoken language, innovation and games, and cultural and ethical values. This topic demonstrates a precautionary strategy, demonstrating that participants want to ensure AI is acceptable for young children's growth and matches their educational goals. The phrase "AI should be aligned with these objectives" refers to the idea that ECE-related AI technologies, resources, and programmes ought to be created and put into use in an environment that complements and improves these particular goals. Instead of subverting or opposing the concepts and practises of ECE, AI ought to serve as a tool to support and enhance them.

Over-Reliance on AI

Participant TEA2 and TEA4 is apprehensive about the teacher's excessive use of AI technology rather than a balanced approach to teaching and learning in ECE. This is demonstrated in the extract below.

In contrast, others may express reservations about over-reliance on technology and the importance of human interaction in ECE (TEA2).

The major issue is that implementors should make AI the only teaching instrument…. human engagement matters most (TEA4)

The expression "over-reliance on AI" in ECE expresses a concern or uneasiness about a heavy or unbalanced dependency on AI in ECE. The worry about over-reliance on it shows a circumspect strategy when incorporating AI into ECE. Although AI has the potential to be extremely useful, it must be applied with balanced consideration to promote children's overall growth instead of supplanting the crucial job of human teachers.

Ethical Considerations and Pragmatic Issues

Making sense of ethical issues linked to data privacy, algorithmic bias, and appropriate application of AI is part of being knowledgeable about AI in education. To safeguard pupils' privacy and guarantee fairness, teachers

may make sure that moral AI principles are observed.
It also presents difficulties that must be properly resolved, such as protecting data privacy (TEA1)
In contrast, others may express reservations about potential ethical considerations … (TEA2).
…provided those ethical considerations are addressed… (TEA7)
AI presents possibilities and problems (TEA6)
There are perceived barriers to the implementation of AI in ECE, which include concerns about data privacy, potential bias in AI algorithms (TEA8)
Five interviewees stressed the ethical use of AI applications in ECE settings. Some worries regarding data privacy, equitable treatment, and the correct application of AI technology with pre-schoolers, as indicated by TEA8. The phrase "possibilities and problems" also includes the advantageous potential and the moral and pragmatic concerns related to AI in ECE. This exhibits a subtle awareness of the intricate effects of AI on the ECE. Interviewee TEA7 words that "provided those ethical considerations about AI are addressed" denote that a certain direction of action regarding the implementation of AI in ECE is attainable or permitted whenever peculiar ethical issues associated with AI in ECE are considered, thoroughly examined, and successfully straightened out. This means adopting intentional steps and procedures to recognise and determine while successfully addressing ethical and practical issues relating to using AI in ECE. Handling ethical concerns and practical issues" refers to the active efforts of teachers, administrators, and participants to recognise, debate, and resolve these difficulties. To guarantee that AI improves instead of degrading the standard of ECE, it entails developing laws, standards, and practises that encourage AI's responsible and ethical application, simultaneously resolving practical problems. AI integration calls for constant observation and adjustment as technology advances and fresh moral and practical dilemmas present themselves.

Pragmatic Approaches Towards AI Implementation

The data suggest that there should be Pragmatic Approaches Towards AI Implementation for the long-term sustainability of AI. It revolves around integrating paraclimactic techniques and tactics that are pragmatic and realistic to incorporate AI into AI successfully. Three sub-themes were identified as the approaches needed to implement and sustain AI: Teachers as facilitators, ongoing professional development and Caution and Meticulous Implementation.

Teachers as Facilitators

Two educators believed that AI integration into ECE settings would be feasible if teachers played the role of facilitators rather than sources of information, as shown below.
Becoming an enabler of learning is more important than being the only source of information (TEA4).
Teachers should take on the role of facilitators who use artificial intelligence to improve their lesson plans and better meet the requirements of each student. It is about collaborating with technology rather than letting it take over your life (TEA8).
Participants TEA4 and TEA8 strongly emphasise educators' facilitation roles in using AI to enhance their teaching strategies and more effectively satisfy the needs of specific learners. This theme emphasises that, compared to replacing their position, teachers ought to employ AI to improve their classroom activities. The results of the interviews imply that instructors must emphasise their function as facilitators of learning more than as the exclusive source of knowledge. This means educators should support and direct learners' learning. The idea of "teachers as facilitators" acknowledges the value of AI technology as a device to improve ECE. Teachers are essential in assisting and supporting children as they engage with AI to maximise their use of the technology while guaranteeing it is in line with ECE's fundamental values and goals.

Ongoing Professional Development

Two teachers (TEA8 and TEA1) mentioned that constant professional development is crucial for the long-term viability of AI applications in ECE.
…and the need for ongoing professional development to ensure teachers are adequately prepared to integrate AI effectively (TEA8)
My schooling has given me the skills to answer questions about artificial intelligence (AI), its uses, and how it has affected a variety of fields, including education (TEA1)
The emphasis on continuing professional development highlights the demand for continual assistance and teacher training to incorporate AI in ECE successfully. It recommends that teachers be sufficiently equipped and knowledgeable about AI technology and their uses. "Adequately prepared" refers to an educator possessing the information, abilities, and proficiency necessary to integrate AI technology into their pedagogical techniques successfully. This training traverses rudimentary knowledge and entails a thorough comprehension of how to employ AI technologies to improve how children study. As a result, instructors will be equipped with the knowledge and abilities necessary to fully utilise AI in a way consistent with ECE's fundamental values and goals. To fully use the advantages of AI while simultaneously tackling the changing issues it may create in educational environments, such constant professional development is crucial.

DISCUSSION

This study examines educators' beliefs and perspectives regarding the long-term sustainability of AI adoption in the Ghanaian environment, emphasising ECE. Artificial intelligence has emerged as a significant driver in transforming educational environments worldwide. AI in ECE can potentially turn conventional classrooms into dynamic centres of individualised and interactive learning. The study suggests that the setting for personalised

learning experiences that thrives is created by AI-powered technologies adapted to children's various demands. In Ghana, where learners frequently come from a variety of educational backgrounds and learning styles, AI can act as a potent equaliser. AI systems can adjust to each child's learning rate and style using adaptive algorithms and interactive interfaces (de Castro Rodrigues *et al.*, 2022). Furthermore, AI's power to develop reasoning, imagination, and problem-solving abilities is an example of how technology may assist children's unique and necessary learning capacities. With the integration of AI, children may explore, experiment, and learn via hands-on experiences in an immersive learning environment provided by AI-driven educational games and simulations. Moreover, educators recognised the potential of AI in facilitating social and emotional development (Bautista *et al.*, 2023). They emphasised how AI could create engaging and interactive learning environments, promoting collaboration, communication, and problem-solving skills among children. Educators believed AI could be a valuable tool for facilitating positive social interactions and promoting cultural diversity awareness. However, regardless of these benefits, the study revealed educators are only dimly aware of the advantages AI may provide for ECE. A number of things, such as inadequate training programmes or limited access to AI technology, can cause limited awareness. By filling this gap, through education classes and workshops, teacher optimism and desire to include AI technologies in their teaching techniques might be significantly increased.

Although the integration of AI into ECE represents a tremendous step forward for innovation, it additionally generates many issues and concerns among educators. Like their peers worldwide, educators in Ghana struggle to match AI applications with current educational goals. In Ghana, ECE aims to establish values, develop interpersonal abilities, stimulate creativity, and deliver information. The concern emerges when academics wonder if AI can effortlessly incorporate these all-encompassing objectives into its algorithms (Berson *et al.*, 2022). It remains necessary to balance technology development and core educational goals. To successfully tackle this issue, curriculum design must be carefully considered, using AI as a tool to complement existing teaching techniques instead of a replacement for them. This will help to maintain the importance of fundamental values and competencies in ECE. Although AI offers unheard-of prospects, educators have legitimate reservations about a dependence on technology that is too great. There is concern that an over-reliance on AI might degrade important human qualities like empathy, creativity, and social abilities, which are crucial in the early stages of schooling.

The interaction of AI-driven devices with children's susceptible minds is a major ethical concern for educators. Educators put into question the entire foundation of educational ethics through issues with data privacy, permission, and the moral application of AI-generated material (Leta & Vancea, 2023; Mehta *et al.*, 2023). Practical problems, including resource accessibility, internet connectivity, and student and teacher digital competence, further increase the intricacy. Educators are concerned about establishing an equitable classroom where all pupils, regardless of socioeconomic circumstances, may benefit from AI integration. To guarantee an ethical and equitable application of AI in ECE, it is necessary to confront these practical and ethical problems by developing extensive regulatory frameworks, teacher training programmes, and facilities (Chen *et al.*, 2023). As a result, the successful application of AI in ECE environments in Ghana depends on the transformational facilitation roles played by educators and the continued support offered via ongoing PD (Jarrahi *et al.*, 2023). In AI-driven ECE, teachers transition from mere lecturers to facilitators who guide pupils through a personalised and participatory learning experience. A facilitator's responsibilities include selecting AI-driven instructional materials, identifying the unique requirements of each student, and establishing a supportive and inclusive educational setting. Facilitative educators use AI techniques to pinpoint learners' areas of need, customise their lessons, and offer prompt interventions. This improves understanding and engagement among learners.

RECOMMENDATIONS

Based on the examination of the implementation of AI in ECE settings in Ghana and the exploration of educators' attitudes and perceptions towards its long-term viability, I recommend that Comprehensive Professional Development (CPD) is provided for educators with extensive manner focusing on AI integration in ECE as opined by Lim *et al.*, 2023. The Continuous Professional Development programmes should include training on AI technologies, pedagogical approaches, ethical considerations, and strategies for effective implementation. Ongoing support and resources should be provided to ensure educators have the necessary skills and knowledge to utilise AI effectively. Additionally, there is a need to foster Collaborative Networking and Knowledge Sharing among educators, researchers, policymakers, and technology developers (Ganesh, 2022). Establish networking and knowledge-sharing platforms that facilitate ongoing dialogue and sharing of best practices and experiences related to AI implementation in ECE. Encourage the formation of communities of practice to support educators in their journey of integrating AI into their classrooms. Ethical issues cannot be ruled out in research; therefore, it is vital to develop and implement clear ethical guidelines and policies that address the use of AI in ECE (Rusmiyanto, 2023). These guidelines should encompass privacy, data security, transparency, fairness, and algorithmic bias considerations. Regularly reviewing and updating these guidelines must align with technological advancements and changing educational needs. Teaching and learning require that learning is put at the centre of discussion.

It is always prudent to ensure that AI implementation in ECE remains child-centred, focusing on young learners' holistic development and well-being. AI should be used as a complementary tool to enhance individualised learning, support creativity and critical thinking, and promote social-emotional development (Bautista *et al.*, 2023). Emphasise the importance of human interaction, play-based learning, and nurturing relationships alongside AI technologies.

CONCLUSION

In conclusion, the perceived benefits of implementing AI in ECE settings encompass personalised learning, interactivity, data-driven decision-making, expanded access to resources, and increased efficiency. These benefits can transform ECE by creating engaging and individualised learning environments, enhancing learning outcomes, and improving the overall educational experience for young children (Chen *et al.*, 2020). However, it is essential to maintain a balanced approach, ensuring that AI is used as a complementary tool to support and enhance the critical role of educators in promoting holistic development, social-emotional skills, and meaningful human interactions in early childhood education. AI offers exciting opportunities to improve ECE, and educators' concerns and reservations must not be overlooked. By addressing these concerns through responsible AI implementation, ensuring data privacy, mitigating biases, supporting educators, and bridging the digital divide, AI can effectively help and enhance early childhood education (Baidoo-Anu & Ansah, 2023). Stakeholders need to work collaboratively in shaping the future of AI integration in ECE to ensure its positive impact on young children's learning and development. Ethical considerations and safeguards are critical in implementing AI in ECE settings (Leta & Vancea, 2023). By adhering to ethical principles, protecting children's privacy, ensuring transparency and fairness in AI algorithms, curating appropriate content, and promoting human interaction, AI can be integrated responsibly and effectively into ECE to enhance learning experiences while prioritising the well-being and rights of young children.

The research on AI adoption in Ghanaian ECE settings reveals a favourable attitude among educators. Educators are aware of the advantages of AI, including personalised instruction and enhanced academic results (Udvaros & Forman, 2023). However, there are worries about the possible loss of human connection, the necessity for training, and ethical issues. The study highlights the significance of a well-rounded strategy, upholding educators' duties, addressing ethical issues, and offering thorough PD. Recommendations for sustainability include rostering cooperation, creating ethical standards, guaranteeing equal access to AI resources, and funding continuing research. Responsible AI usage in ECE also depends on collaboration between educators, policymakers, researchers, and developers. Adopting AI as a helpful tool will improve Ghana's ECE and ensure it fulfils young learners' needs. Finally, future AI applications in Ghana's ECE will depend on ongoing discussions and evidence-based practices. Acknowledging the limitations of using semi-structured interviews and focus group discussions is essential. The sample size may have been limited, and the findings may not be fully generalisable to all educators in Ghana. The participants' responses may be influenced by social desirability bias.

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