

**ETHICAL IMPLICATIONS OF THE USE OF ARTIFICIAL
INTELLIGENCE IN EARLY CHILDHOOD EDUCATION IN
ONDO EAST LOCAL GOVERNMENT,
ONDO, ONDO STATE**

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Abstract

The study examined ethical implications of the use of Artificial Intelligence in early childhood education with emphasis on data privacy, security, algorithmic bias, equity, and the impact of AI on teachers' roles and children's social-emotional development. The study adopted descriptive research design of survey type. The population consisted of all teachers and parents of pupils in selected public and private nursery and primary schools in Ondo East Local Government. A sample of 100 participants was drawn through stratified random sampling technique. Two instruments titled “The Ethical Implications of Artificial Intelligence in Childhood Education Teacher Questionnaire (TEIAICE TQ)” and “The Ethical Implications of Artificial Intelligence in Childhood Education Parent Questionnaire (TEIAICE PQ)” were used for data collection. Validity of the instruments were ascertained using face and content validity. The reliability of the instrument was established through test-retest method and the reliability coefficient of 0.70 and 0.75 were obtained. Data collected was analysed using frequency, percentages, mean scores, and standard deviation. The findings showed that teachers agreed that AI learning systems sometimes favour pupils with stronger digital skills ($\bar{x} = 3.08$). Parents also reported that some AI learning apps appears to favour certain children over others ($\bar{x} = 3.16$). The results showed that children with limited access to digital devices may be disadvantaged ($\bar{x} = 3.12$). The findings further indicated that AI cannot replace the emotional

support ($\bar{x} = 2.64$). The results also showed that data privacy is a major concern ($\bar{x} = 3.83$) which indicated fear of data misuse and lack of consent and policy in schools. Based on these findings, recommendations were made.

Keywords: Artificial Intelligence (AI), Ethical implications, Childhood education, AI bias

Introduction

Childhood education, also known as early childhood education (ECE) is the first phase of learning from birth to approximately 8 years-of-age. It includes all formal and informal learning opportunities that influence a child's thinking, social and emotional growth and physical development. UNESCO (2022) equates early childhood education with more than just academic achievement; it is also a way of equipping children with the skills they need for them to cope in an ever-changing world. Children's brains grow most quickly in childhood, and the learning opportunities they have during this time have an impact on the outcomes they will have later in life (Schonkoff & Phillips, 2021). So, early childhood education is a foundation for holistic development that has an influence on the development of the child for the rest of his life. Early childhood education is a cornerstone to the education system, and very significant to it. Studies have found that children who have access to high-quality early learning programs are more successful in school, socially, and on educational outcomes than those without such early education (Heckman, 2011; OECD, 2023). Early education develops crucial 21st century skills, such as creativity, communication, empathy, and critical thinking, in addition to academic success. Indeed, there are long-term social returns, such as reduced inequality, increased productivity of the workforce, and lower rates of crime (World Bank, 2022), that come from investing in the early childhood education sector. This reinforces the view that early childhood education is an important strategy for personal empowerment and national development for policy makers, educators and stakeholders. Artificial Intelligence (AI) is the reproduction by computer systems

of human intelligence processes, which can execute tasks that normally involve human cognition: learning, reasoning, decision-making, natural language understanding, etc. Today's AI use cases use subsets like machine learning, deep learning, or natural language processing that enable the system to analyze large data sets, identify patterns, and make predictions and decisions with minimal human involvement (Russell & Norvig, 2021).

Over the last few years, AI has been reshaping education across the globe and improving the personalization of learning and providing automated grading. AI is changing the landscape of education globally in recent years by adding automated grading and increasing student support. AI tools (adaptive learning platforms) enhance engagement and outcomes in early childhood education. Artificial Intelligence is being incorporated in the teaching and learning of the pupils in the ECE curriculum, changing the way they learn and engage with learning content. Intelligent Tutoring Systems, adaptive learning platforms, speech recognition technologies and automated grading systems offer personalized pathways that adapt to the strengths and weaknesses of each learner and their pace (Luckin et. al., 2021). Introducing AI to the learning environment early on can benefit children by allowing them to learn at their own speed, and it can benefit the teacher by giving him or her immediate feedback on the strengths and weaknesses of learners. Therefore, the proliferation of AI in early childhood education is a redefining moment with significant implications for possible enhancements in educational outcomes and ethical considerations for young learners. For example, an adaptive system could recognise when a pupil is experiencing difficulty with a concept and offer alternative explanations or practice at it as soon as this has been detected to help to minimise learning gaps.

Individualized learning also has the advantage of increasing student motivation and engagement because students can learn at their own pace and in their preferred way, which makes them more likely to excel in their studies (Khalil & Err, 2023). Additionally, AI can

support teachers by automating repetitive tasks, like marking and creating reports on students' performance, which frees up time for them to engage more in interactive and creative teaching methods (Zhai et.al; 2021). The advantages are especially significant in early childhood education, where early interventions and personalized feedback contribute significantly to the cognitive and socio-emotional growth that lasts beyond the classroom. In conclusion, AI has the potential to transform ECE, fostering inclusion, effectiveness, and a focus on students. In recent years, there has been a significant increase in the use of Artificial Intelligence (AI) in early childhood education, with the development of digital technologies and the demand for personalized learning solutions.

There is a growing integration of AI-driven tools in early education classrooms, including adaptive learning platforms, speech recognition systems, and intelligent tutoring systems, which are enhancing the development of literacy, numeracy, and language skills (Khalil & Er, 2023). AI tools, for example, are popular to facilitate the early reading development using interactive and gamified methods, such as Duo lingo ABC and Google's Read Along (UNESCO, 2022). Furthermore, AI-powered robots are being tested in schools in technologically advanced areas as teaching assistants to promote engagement and collaborative learning (Zhai et. al, 2021). Nevertheless, while these advances are being made, the use of AI in ECE varies across the globe, with more countries using AI in ECE in developed countries than in low- and middle-income countries in part due to lack of infrastructure, financial capacity, and policies for its implementation (World Bank, 2022). This means that, although AI offers great potential to reshape early education, there remain issues of equity, access, and ethical oversight to be resolved across implementation.

While Nigeria's use of AI in schools is increasing, the ethical challenges are not widely discussed, especially at the local level, such as Ondo East local government area in Ondo State. These technologies have the potential to meet a range of learning needs,

help overcome barriers to access, and provide teachers with data to guide instruction. But with these opportunities come important ethical questions about the use of artificial intelligence in Early Childhood Education and Care. Such as problems with privacy and security of data, bias in algorithms and the risk of de-humanizing learning processes are recognized as significant challenges (Zawacki-Richter et. al., 2020; Williamson & Eynon, 2020). It is essential to reflect on these ethical issues before implementing AI to support children's growth and development in an ethical and rights-respecting manner. Hence, it is necessary to balance technological innovations with ethical responsibilities to address the issue of the future of childhood education. One of the ethical issues is the potential for bias in AI-driven learning materials. AI systems are designed from large amounts of data, and the data might have biases that relate to race, gender, or socioeconomic status (Baker & Hawn, 2022). If not designed with awareness of the potential for stereotype reinforcement or for harmful effects on certain groups of students, AI-powered learning platforms can lead to stereotype reinforcement or both. For example, an AI language learning platform could function better for a student whose linguistic heritage is one than for another, thus creating a learning gap (West et.al; 2021). To overcome this, the creators of AI must ensure that AI models are trained with a diverse set of data, and they should regularly test the AI models for bias. Moreover, the over-usage of AI in the education system for children has raised concerns about the role of teachers in the classroom and students' social and emotional development. However, the personalised learning experiences provided by AI are different to those provided by a human teacher who can offer empathy, encouragement, and emotional support (Luckin et. al., 2021). The importance of in-person learning with educators and peers for children's cognitive and emotional development is supported by research (Wang et. al., 2022). The potential for teachers to lose significant interactions with students should not be overlooked if AI tools take the place of or heavily diminish that interaction. So, AI should be utilized as an enhancement to the conventional pedagogy, not a replacement for it.

Moreover, the ethical issue with AI-based decision-making in education needs to be resolved. Assessment of learners and recommendations for placement, learning paths and disciplinary action using AI algorithms (Selwyn & Gasevic, 2022). But there is a danger that such systems are opaque and poorly accountable, and may make it difficult for students, parents and teachers to contest decisions that they may feel are unfair. Addressing algorithmic accountability should be part of the ethical design of AI in education, with human oversight and participation in decision-making processes. When it comes to education, the use of AI must also be accompanied by a clear algorithmic accountability model, with human involvement in decision-making processes remaining intact (Williamson & Eynon, 2023).

Statement of the Problem

From the perspective of children, the incorporation of Artificial intelligence (AI) in early childhood education has transformed learning, interaction and the acquisition of important cognitive skills. AI-powered educational tool, such as int

The use of intelligent tutoring systems, adaptive learning platforms, and interactive educational applications can provide customized learning experiences that can improve children's learning. While AI technologies are becoming increasingly popular in educational contexts, the ethical implications of their use in early childhood education, especially in developing countries where policy, ethical and regulatory frameworks might be underdeveloped, are not well understood. Therefore, this study aims to examine the need to examine the ethical challenges surrounding AI implementation in early childhood education with a focus identifying potential risks, on benefits and propose solutions to ensure responsible and equitable AI integration in learning environments.

Objectives of the Study

In line with aim of this study, the specific objectives are to:

- i. examine the ethical concern related to data privacy and

- ii. security in AI-powered educational tools for young learners.
- ii. analyse the impact of AI bias on educational equity and inclusivity in childhood learning environments.
- iii. investigate the effects of AI-driven learning on the role of teachers and the social-emotional development of children

Research Questions

Based on the research objectives, the study is to answer the following questions:

- i. What are the ethical concerns related to data privacy and security in AI-powered educational tools for young learners?
- ii. How does AI bias impact educational equity and inclusivity in childhood learning environments?
- iii. In what ways does AI-driven learning influence the role of teachers and the social-emotional development of children?

Methodology

The study adopted a descriptive survey research design. The population comprised 10,000 teachers and parents of nursery/primary pupils in selected public and private nursery/primary schools in Ondo East Local Government, Ondo, Ondo State, Nigeria. The sample for the study was 100 respondents (60 Teachers- they know how AI is used in class and 50 parents- they give consent and observe home impact) selected through stratified random sampling technique to ensure equal representation of respondents from teachers and parents, because these groups are likely to have different experiences and perceptions about AI-based educational technologies, increases the representativeness and accuracy of the study. Two instruments used to generate data for the study are “The Ethical Implications of Artificial Intelligence in Childhood Education Teacher Questionnaire” (TEIAICETQ) and “The Ethical Implications of Artificial Intelligence in Childhood Education Parent Questionnaire” (TEIAICEPQ). The instruments were validated by experts in the department of test and measurement.

The corrected version was used to determine the reliability of the instruments using test- retest method and the reliability coefficient of 0.70 and 0.75 were obtained. Data collected were analysed using frequency, percentages, mean scores, and standard deviation.

Results

Research Question One

Research Question 1: What are the ethical concern related to data privacy and security in AI-powered educational tools for young learners?

Scoring note: SA = Strongly Agree (4), A = Agree (3), D = Disagree (2), SD = Strongly Disagree (1). Decision rule: mean $\geq$ 2.50 = Accepted.

Table 2a Teachers — Data Privacy & Security.....

S/N	Item	SA	A	D	SD	Mean	Std Dev	Remark
1.	AI learning tools used in my school collect too much personal information from pupils.	30	12	6	2	3.40	0.85	Accepted
2.	I am aware of the types of data AI platforms collect from my pupils.	25	15	6	4	3.22	0.94	Accepted
3.	My school has clear rules on how children's data from AI tools should be stored.	20	18	8	4	3.08	0.93	Accepted

S/N	Item	SA	A	D	SD	Mean	Std Dev	Remark
4.	I am concerned that children's data may be shared with third parties without consent.	28	14	6	2	3.36	0.84	Accepted
5.	AI vendors do not explain clearly how pupils' information is used.	22	16	8	4	3.12	0.95	Accepted

Table 2a, the mean values for each of the above is between 3.08 and 3.40 and the standard deviation is between 0.84 and 0.95. The results showed that all the teachers found the mean scores to be above the 2.50 cutoff point, meaning that there was a consensus that there are ethical concerns with the use of AI-powered learning tools, especially in regards to data privacy and security. The findings revealed high agreement level among teachers on the amount of personal data that AI tools gather from pupils ($\bar{x}$ = 3.40). Children's data being shared with third parties without proper consent was also a concern of respondents ($\bar{x}$ = 3.36). Teachers also reported that it was unclear how pupil information is used with AI vendors ($\bar{x}$ = 3.12). Furthermore, many teachers indicated they do not have clear data-storage policies at their schools ($\bar{x}$ = 3.08), and are only somewhat aware of the type of data AI platforms gather ($\bar{x}$ = 3.22). Overall, these findings suggested that teachers were aware of significant shortcomings regarding transparency, parental notification, and data-protection procedures within institutions, reflecting a high level of concern about the potential risks to data privacy when teachers use AI in ECE.

Table 2b Parents — Data Privacy & Security

S/N	Item	SA	A	D	SD	Mean	Std Dev	Remark
1.	I understand the type of information AI apps collect from my child.	28	14	6	2	3.48	0.81	Accepted
2.	I am concerned about my child's personal data being collected by AI learning tools.	30	12	6	2	3.48	0.81	Accepted
3.	Schools do not always inform parents before using AI platforms with children.	24	16	6	4	3.20	0.92	Accepted
4.	I worry that my child's information may be shared without my permission.	26	14	6	4	3.16	0.92	Accepted
5.	I am unsure how secure my child's data is on AI apps.	20	18	8	4	3.08	0.92	Accepted

From Table 2b, the mean scores range from 3.08 to 3.48, with standard deviation values between 0.81 and 0.92. All the mean values are above the 2.50 decision benchmark, indicating that parents generally agreed that data privacy and security pose serious ethical issues in the use of AI learning tools for children. Findings showed that parents expressed strong concern about the collection of their children's personal data ($\bar{x}$ = 3.48). Parents also indicated uncertainty about the safety of their children's data on AI apps ($\bar{x}$ = **3.08**) and

worried that such information could be shared without permission ($\bar{x}$ = **3.16**). Respondents further agreed that schools do not always inform parents before introducing AI platforms to pupils ($\bar{x}$ = **3.20**). Moreover, parents reported limited understanding of the type of information AI tools collect ($\bar{x}$ = **3.48**), highlighting gaps in communication and awareness. These findings suggest that parents perceived significant risks related to transparency, consent, and data protection, reinforcing the view that data privacy is a major ethical concern regarding AI-support in early childhood education.

Research Question Two

Research Question 2: How does AI bias impact educational equity and inclusivity in childhood learning environments?

Table 3a Teachers — AI Bias, Equity & Inclusivity (Items T8–T14)

S/N	Item	SA	A	D	SD	Mean	Std Dev	Remark
6.	AI learning systems sometimes favour pupils with stronger digital skills.	20	18	8	4	3.08	0.93	Accepted
7.	Some AI tools do not recognize different accents, dialects, or language backgrounds of pupils.	18	20	8	4	3.04	0.92	Accepted
8.	AI recommendations sometimes disadvantage pupils who struggle academically.	22	16	8	4	3.12	0.95	Accepted

S/N	Item	SA	A	D	SD	Mean	Std Dev	Remark
9.	AI-based assessments do not treat all pupils fairly.	15	20	10	5	2.90	0.94	Accepted
10.	AI tools used in my school do not always represent our cultural and learning context.	12	22	10	6	2.80	0.94	Accepted

From Table 3a, mean values range from **2.80 to 3.12**, with standard deviations between **0.92 and 0.95**. Since all the mean scores exceed the **2.50 cut-off**, teachers generally agreed that AI systems exhibit forms of bias that can affect equity and inclusiveness in early childhood education. Teachers reported that AI learning systems sometimes favour pupils with stronger digital skills ($\bar{x} = 3.08$), and noted that some AI tools struggle with recognising different accents or language backgrounds ($\bar{x} = 3.04$). Respondents also indicated that AI recommendations may disadvantage pupils' who are struggling academically ($\bar{x} = 3.12$). Furthermore, teachers expressed concern that AI-based assessments do not always treat all pupils fairly ($\bar{x} = 2.90$) and that the cultural and contextual content of AI tools may not align well with their school environment ($\bar{x} = 2.80$).

Overall, these results showed that teachers perceive notable risks of bias in AI tools, especially in relation to language, cultural representation, academic ability, and digital access. This indicated that AI systems, if not properly monitored or contextualised, may unintentionally reinforce educational inequalities.

Table 3b Parents — AI Bias, Equity & Inclusivity (Items P8–P14)

S/N	Item	SA	A	D	SD	Mean	Std Dev	Remark
6.	Some AI learning apps seem to favour certain children over others.	22	18	6	4	3.16	0.92	Accepted
7.	AI tools may not work well for children who have limited access to devices at home.	20	20	6	4	3.12	0.91	Accepted
8.	My child's learning progress on AI apps depends on how strong their digital skills are.	18	20	8	4	3.04	0.92	Accepted
9.	Some AI tools do not consider children from different cultural or language backgrounds.	16	20	8	6	2.92	0.98	Accepted
10.	AI systems may treat children differently based on data they collect.	14	22	8	6	2.88	0.95	Accepted

From Table 3b, the mean values range from 2.88 to 3.16, while standard deviation fall between 0.91 and 0.98. All mean scores are above the 2.50 acceptance threshold, showing that parents also agreed that AI tools may introduce bias and inequality in children's

learning experiences. Parents reported that some AI learning apps appears to favour certain children over others ($\bar{x} = 3.16$), and also acknowledged that children with limited access to digital devices may be disadvantaged ($\bar{x} = 3.12$). Many agreed that children's progress on AI apps depends heavily on digital competence ($\bar{x} = 3.04$). Respondents further observed that AI tools do not always consider differences in cultural or language backgrounds ($\bar{x} = 2.92$), and that AI systems may treat children differently based on the type of data collected ($\bar{x} = 2.88$).

These findings indicated that parents recognised equity and access challenges associated with AI usage in education. They suggested that without careful implementation, AI may unintentionally reinforce socio-economic and cultural inequalities among young learners.

Research Question Three

Research Question 3: In what ways does AI-driven learning influence the role of teachers and the social-emotional development of children?

Table 4a Teachers - Teacher Role & Social-Emotional Development (Items T15-T20)

S/N Item	SA	A	D	SD	Mean	Std Dev	Remark
11. AI reduces my direct involvement in some classroom learning activities.	18	20	8	4	3.04	0.92	Accepted
12. AI helps me save time by handling routine tasks like marking or giving feedback.	26	16	6	2	3.32	0.83	Accepted

S/N Item	SA	A	D	SD	Mean	Std Dev	Remark
13. Over-reliance on AI reduces pupils' face-to-face classroom interaction.	12	18	12	8	2.64	1.01	Accepted
14. AI tools cannot replace teachers' emotional support for pupils.	10	20	12	8	2.64	0.97	Accepted
15. Some pupils become less attentive because they depend too much on digital devices.	14	18	10	8	2.88	0.98	Accepted

From Table 4a, mean values range from **2.64 to 3.32**, with standard deviations between **0.83 and 1.01**. All mean values exceed the **2.50 cut-off**, indicating that teachers agreed that AI affects both classroom roles and children's social-emotional development. Findings showed that teachers believed AI reduces their direct involvement in some classroom activities ($\bar{x} = 3.04$), while also helping them save time by handling tasks such as marking and feedback ($\bar{x} = 3.32$). Teachers further indicated that over-reliance on AI reduces face-to-face classroom interaction ($\bar{x} = 2.64$) and noted that AI tools cannot replace the emotional support they provided ($\bar{x} = 2.64$). Respondents also observed that some pupils become less attentive due to dependence on digital tools ($\bar{x} = 2.88$). These findings indicated that while teachers acknowledged the efficiency and instructional support AI provides, they emphasised that human interaction, emotional guidance, and social learning remain essential components of early childhood education.

Parents - Teacher Role & Social-Emotional Development (Items P15–P20)

S/N Item	SA	A	D	SD	Mean	Std Dev	Remark
13. Over-reliance on AI reduces pupils' face-to-face classroom interaction.	12	18	12	8	2.64	1.01	Accepted
14. AI tools cannot replace teachers' emotional support for pupils.	10	20	12	8	2.64	0.97	Accepted
15. Some pupils become less attentive because they depend too much on digital devices.	14	18	10	8	2.88	0.98	Accepted

From Table 4b, the mean scores range from **2.48 to 3.08**, with standard deviations between **0.92 and 1.01**. Four out of five items exceeded the **2.50 benchmark**, indicating that parents largely agreed that AI influences children's social-emotional development and the role of teachers. Parents reported that AI learning apps reduce children's socialization time ($\bar{x} = 3.08$), and agreed that AI cannot provide emotional support comparable to human teachers ($\bar{x} = 3.04$). They also noted that children may become easily distracted when using digital learning tools ($\bar{x} = 2.68$) and that AI systems do not strongly support the development of social skills ($\bar{x} = 2.64$). However, one item-excessive AI use affecting communication ($\bar{x} = 2.48$)-fell slightly below the cut-off, indicating mixed parental views on its impact on communication.

Overall, parents recognized that AI can reduce social interaction and cannot substitute the emotional and interpersonal support offered by teachers. The results suggest cautious acceptance of AI, with strong

emphasis on maintaining teacher involvement and ensuring children's social-emotional needs are not compromised.

Discussion of Findings

The results of research question one showed that teachers and parents are worried about privacy and security of data in AI learning tools for children. The respondents reported problems with too much personal data being collected, lack of clarity of explanation from AI vendors, and a lack of school policies regarding data storage and notification to parents. These concerns align with recent studies that demonstrate the significant role of transparency, consent and strong data protection in the context of educational AI (Viberg et. al., 2023; Akanzire, Nyaaba & Nabang, 2025). Overall, both teachers and parents identified high ethical risks regarding the data of children, which stress the importance of clear rules and ethical conduct in AI assisted learning. The results also showed the potential of AI systems to disadvantage certain students and favour others, such as those with fewer digital skills, or with a cultural background or a background language other than English. Both teachers and parents were worried about the potential for inequalities with the use of AI if it is not done right. This aligns with the recent research about the potential for bias that can be introduced into educational AI systems that is not designed and monitored inclusively (Holstein et. al., 2023; Luckin et. al., 2024). The results underscored the importance of fairness, access, and cultural sensitivity in the application of AI tools to ensure equitable learning opportunities for all children. The findings showed that AI can help teachers with automated tasks like marking, feedback, and so on, but cannot replace the emotional support and social interaction that teachers provide to students. Teachers and parents noted that extensive use of AI might diminish in-person connections and children's socialization experiences, which could impact their social-emotional development. This aligns with recent studies which have confirmed that teachers play a vital role in helping children to maintain their emotional health and to develop their social skills alongside the use of AI to improve efficiency and personalised learning (Zawacki-Richter et al., 2024; Holmes et al., 2023).

Conclusion

This study revealed that concerns about data privacy and security, algorithmic bias and algorithms' effects on children's social-emotional development are still highly salient. AI systems, if not designed and managed properly, can unwittingly contribute to inequities, to the exclusion of certain students and to less human contact in early education. Therefore, it is essential that AI tools are implemented within the ECE setting in a way that respects children's privacy, fairness and emotional and social development.

Recommendations

The following recommendations were suggested based on the results of this study:

1. There should be clear policies and procedures, both in schools and from the point of AI providers, regarding the collection, storage and use of child data. There should be parental consent and clear communication about use of data.
2. AI systems need to consider different learning needs, variations in language and culture. Continuous monitoring and evaluation should be conducted to ensure fairness and non-discrimination and disadvantage.
3. Teachers should be trained on the proper utilization of AI tools without compromising the social-emotional support. Professional development should emphasize AI literacy, considering ethical concerns, and inclusive teaching approaches.
4. AI should be a supplement to human interaction. A rich environment of opportunities for human-to-human collaboration, play and emotional involvement to facilitate whole child development.
5. The ethical principles, policies, and practices for implementing AI technologies in ECE should be developed collaboratively with parents, teachers, and technologists.
6. To mitigate the risks and ensure user trust in the platforms, it is crucial for educational AI developers to include ethical guidelines, transparency, and child-centered design.

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