Embedded AI Ethics and Right in Civic Education in Nigerian Secondary Schools
Measuring Efficacy and Psychological Engagement

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Introduction

The integration of artificial intelligence (AI) into various sectors of society has become increasingly prevalent, transforming the way individuals interact with technology, access information, and participate in civic life (Baker & Hawn, 2021; UNESCO, 2023). In the educational domain, AI-driven tools and platforms are reshaping teaching and learning processes, offering personalized experiences and expanding access to knowledge. However, the rapid deployment of AI technologies also raises critical ethical and societal concerns, particularly in contexts where digital literacy and regulatory frameworks are still evolving (Zuboff, 2022; Adesina & Olabode, 2024). In Nigeria, where education remains a key driver of national development, the introduction of AI into the school system necessitates a corresponding emphasis on ethical awareness and rights-based understanding (Federal Ministry of Education, 2022).

Civic education in Nigerian secondary schools has traditionally focused on instilling democratic values, constitutional knowledge, and responsible citizenship (Adeyemi & Adu, 2020). However, the growing influence of digital technologies in governance, media, and everyday life has introduced new dimensions to civic engagement. As students increasingly interact with AI-powered platforms, whether through social media, digital assessments, or online learning environments, they are exposed to algorithmic decision-making, data privacy issues, and potential biases embedded in these systems (Makinde & Yusuf, 2023). Without a structured curriculum that addresses AI ethics and digital rights, students may lack the critical awareness necessary to navigate these emerging challenges (Adebayo & Olawoyin, 2021).

The relevance of AI ethics in civic education extends beyond technical understanding. It encompasses the moral, legal, and social implications of AI in shaping public discourse, governance, and individual rights (UNESCO, 2023). For instance, AI-driven surveillance systems, automated decision-making in public services, and algorithmic content moderation have significant implications for civil liberties and democratic participation (Binns, 2021). In Nigeria, where debates around digital rights, internet freedom, and government surveillance are intensifying, equipping students with ethical reasoning skills is essential for fostering informed and responsible citizenship (Adebayo & Adeoye, 2023).

Moreover, the African Union's African Declaration on Internet Rights and Freedoms (2020) underscores the importance of digital literacy and ethical education in ensuring that citizens are empowered to engage critically with technology. Similarly, the African Union's Digital Transformation Strategy for Africa (2020–2030) emphasizes the need to integrate digital ethics into national education systems as part of broader efforts to build a digitally literate and ethically conscious population (African Union, 2020). These continental frameworks provide a policy foundation for embedding AI ethics in civic education, aligning with global initiatives such as UNESCO's Recommendation on the Ethics of Artificial Intelligence (2021).

In Nigeria, the National Policy on Information and Communication Technology (2023) highlights the importance of digital literacy and ethical awareness in education. However, the implementation of these policy recommendations remains uneven, particularly in secondary schools where civic education is often taught with minimal emphasis on digital ethics (Federal Ministry of Communications and Digital Economy, 2023). While the Nigerian curriculum includes elements of digital citizenship, these are often limited to basic internet safety and cyberbullying awareness, with little attention given to the ethical dimensions of AI and its impact on rights and governance (Ogunsola & Adeyemi, 2022).

This gap is particularly concerning given the increasing use of AI in public administration, law enforcement, and electoral processes in Nigeria. For example, the use of biometric verification systems in voter registration and the deployment of AI-driven analytics in public service delivery raise questions about transparency, accountability, and bias (Oyedele, 2023). Without a foundational understanding of AI ethics, students may not be adequately prepared to critically assess the implications of these technologies on democratic governance and individual rights (Nwagwu & Okoye, 2021).

Furthermore, the psychological engagement of students with AI ethics is an underexplored area in Nigerian education. Psychological engagement refers to the cognitive, emotional, and behavioral investment that learners make in their educational experiences (Fredricks, Blumenfeld, & Paris, 2021). In the context of AI ethics, engagement involves students' interest in ethical dilemmas, their willingness to participate in discussions, and their ability to connect ethical principles with real-world scenarios (Linnenbrink-Garcia & Pekrun, 2021). Research has shown that when students are emotionally and cognitively engaged with ethical content, they are more likely to internalize values and apply them in their personal and civic lives (Yeager et al., 2022).

However, in many Nigerian secondary schools, civic education is often delivered in a didactic manner, with limited opportunities for critical thinking or participatory learning (Okeke & Okeke, 2020). This approach may hinder students' engagement with complex ethical issues, including those related to AI and digital rights. Additionally, teachers may lack the training and resources needed to

facilitate discussions on AI ethics, further limiting students' exposure to these critical topics (Adeyemi & Adu, 2020; Ogunlade & Adebayo, 2021).

Problem Statement

Despite the growing recognition of AI's role in shaping civic life, there is a notable absence of structured efforts to integrate AI ethics into the civic education curriculum in Nigerian secondary schools. The current curriculum largely overlooks the ethical and rights-based dimensions of AI, leaving students unprepared to navigate the digital challenges of the 21st century (Ogunsola & Adeyemi, 2022; Federal Ministry of Education, 2022). This lack of integration is evident in both policy documents and classroom practice, where AI-related topics are either absent or superficially addressed (Adebayo & Olawoyin, 2021).

Moreover, there is limited empirical data on students' psychological engagement with AI ethics in the Nigerian context. While global studies have explored student engagement with ethical reasoning in digital environments (Yeager et al., 2022; Baker & Hawn, 2021), few have focused on African educational settings, particularly in secondary schools. This gap in research limits the ability of policymakers and educators to design effective interventions that foster ethical awareness and critical thinking among students (Nwagwu & Okoye, 2021).

The absence of a comprehensive framework for embedding AI ethics in civic education also reflects broader challenges in Nigeria's education system. These include inadequate teacher training, limited access to digital resources, and a curriculum that prioritizes rote learning over critical inquiry (Okeke & Okeke, 2020; Adeyemi & Adu, 2020). Without addressing these systemic issues, efforts to integrate AI ethics into civic education may remain fragmented and ineffective.

Purpose of the Study

This study seeks to address the gap in understanding by examining the efficacy of embedding AI ethics and rights in civic education within Nigerian secondary schools. Specifically, the research aims to:

1. Assess the extent to which AI ethics is currently integrated into the civic education curriculum.
2. Investigate students' perceptions of the relevance and importance of AI ethics in civic education.
3. Measure the level of psychological engagement among students when AI ethics is introduced into the learning process.
4. Identify the challenges and opportunities associated with implementing AI ethics in civic education.

By exploring these dimensions, the study contributes to the growing discourse on AI ethics in education, particularly within the African context. It also provides insights that can inform policy and practice, helping to bridge the gap between technological advancement and ethical education in Nigerian schools.

Literature Review

AI Ethics and Education

The integration of artificial intelligence (AI) into education has become a focal point in global discussions on the future of learning. As AI systems increasingly influence teaching, assessment, and student engagement, there is a growing consensus that ethical considerations must be embedded in educational practices (UNESCO, 2023). According to Baker and Hawn (2021), AI in education offers opportunities for personalized learning and data-driven instruction, but it also introduces ethical concerns related to privacy, bias, and transparency. These concerns have prompted international organizations to develop ethical frameworks to guide the responsible integration of AI in education.

One of the most influential global initiatives is the UNESCO Recommendation on the Ethics of Artificial Intelligence (2021), which emphasizes the need for ethical AI education to promote human rights, equity, and sustainability. The recommendation calls for the inclusion of AI ethics in school curricula to ensure that students are equipped with critical thinking skills and ethical reasoning abilities. Similarly, the Organisation for Economic Co-operation and Development (OECD, 2022) has outlined principles for responsible AI use in education, advocating for transparency, accountability, and inclusivity in AI-driven learning environments.

In Africa, the African Union (2020) has emphasized the importance of ethical AI education as part of its broader Digital Transformation Strategy for Africa (2020–2030). The strategy highlights the need for digital literacy and ethical awareness to ensure that African citizens are not only users of AI technologies but also informed participants in shaping their development. In Nigeria, the Federal Ministry of Communications and Digital Economy (2023) has acknowledged the significance of AI literacy in national education policy, yet implementation remains limited, particularly in secondary schools where civic education is a key vehicle for ethical instruction.

Despite these policy developments, the actual integration of AI ethics into school curricula remains uneven across countries. In some Western education systems, such as those in Finland and Canada, AI ethics has been incorporated into subjects like social studies and computer science, often through interdisciplinary approaches (Baker & Hawn, 2021; UNESCO, 2023). However, in many African countries, including Nigeria, the formal integration of AI ethics into education is still in its infancy, with most efforts focusing on digital literacy rather than ethical reasoning (Ogunsola & Adeyemi, 2022; Adebayo & Olawoyin, 2021).

Civic Education in Nigeria

Civic education in Nigerian secondary schools plays a foundational role in shaping students' understanding of democratic values, constitutional rights, and social responsibilities (Adeyemi & Adu, 2020). The subject is designed to cultivate active citizenship, critical thinking, and ethical behavior, aligning with broader national development goals. According to the National Policy on Education (Federal Ministry of Education, 2022), civic education aims to produce informed, responsible, and participatory citizens who can contribute to national cohesion and democratic governance.

The curriculum for civic education in Nigerian secondary schools covers topics such as the Nigerian Constitution, human rights, national symbols, political participation, and law enforcement (Okeke & Okeke, 2020). While these topics provide a strong foundation for democratic literacy, they often overlook the ethical and legal implications of emerging technologies, including AI. This omission is

particularly significant given the increasing role of digital technologies in governance, public service delivery, and civic engagement (Oyedele, 2023).

The current structure of civic education in Nigeria emphasizes knowledge transmission over critical inquiry, with limited opportunities for students to engage in discussions on contemporary ethical issues (Adeyemi & Adu, 2020). Instruction is often didactic, focusing on rote learning rather than fostering analytical and ethical reasoning skills (Ogunsola & Adeyemi, 2022). This approach may hinder students' ability to critically assess the impact of AI on society, particularly in areas such as surveillance, data privacy, and algorithmic bias.

Moreover, the lack of digital ethics in civic education is evident in the absence of specific policy directives on AI literacy in the curriculum. While the Federal Ministry of Education (2022) has acknowledged the importance of digital literacy, its focus has primarily been on basic computer skills and internet safety rather than on the ethical dimensions of AI and digital rights. This gap is further exacerbated by the limited training of teachers in digital ethics, which restricts their ability to facilitate meaningful discussions on AI-related issues (Ogunlade & Adebayo, 2021).

In addition, the Nigerian education system faces broader challenges that hinder the effective integration of AI ethics into civic education. These include inadequate funding, limited access to digital infrastructure, and a lack of teacher preparedness in emerging technologies (Adebayo & Olawoyin, 2021). These systemic issues contribute to the slow adoption of AI ethics in the curriculum and limit students' exposure to critical digital literacy skills.

Psychological Engagement in Learning

Psychological engagement is a key determinant of effective learning, particularly in subjects that require critical thinking and ethical reasoning (Fredricks, Blumenfeld, & Paris, 2021). Engagement encompasses cognitive, emotional, and behavioral components, all of which influence how students interact with learning materials and internalize knowledge (Linnenbrink-Garcia & Pekrun, 2021). In the context of AI ethics, psychological engagement refers to students' interest in ethical dilemmas, their willingness to participate in discussions, and their ability to connect ethical principles with real-world scenarios (Yeager et al., 2022).

Cognitive engagement involves students' active mental investment in learning, including their ability to analyze, synthesize, and evaluate information (Fredricks et al., 2021). In civic education, this type of engagement is particularly important when addressing complex ethical issues such as AI bias, surveillance, and digital rights. Students who are cognitively engaged are more likely to question the implications of AI on society and consider multiple perspectives in ethical decision-making (Baker & Hawn, 2021).

Emotional engagement, on the other hand, relates to students' affective responses to learning, including their interest, motivation, and emotional connection to the subject matter (Linnenbrink-Garcia & Pekrun, 2021). Research has shown that emotionally engaged students are more likely to develop a sense of personal responsibility and moral commitment to ethical issues (Yeager et al., 2022). In the context of AI ethics, emotional engagement can be fostered through case studies, role-playing, and discussions that allow students to explore the human impact of AI decisions.

Behavioral engagement refers to students' active participation in learning activities, including classroom discussions, group projects, and extracurricular initiatives (Fredricks et al., 2021). Encouraging behavioral engagement in AI ethics education requires creating interactive and

participatory learning environments where students can apply ethical principles to real-world problems (UNESCO, 2023). For instance, students can engage in debates on the ethical implications of AI in law enforcement or participate in digital rights campaigns that raise awareness about AI-related issues.

However, in many Nigerian secondary schools, psychological engagement with ethical content is often low due to a combination of factors. These include the dominance of rote learning, limited teacher training in ethical reasoning, and a lack of relevant teaching materials (Ogunsola & Adeyemi, 2022; Adeyemi & Adu, 2020). Additionally, students may perceive AI ethics as abstract or irrelevant to their daily lives, further reducing their motivation to engage with the subject (Adebayo & Olawoyin, 2021).

Gaps in Literature

Despite the growing body of research on AI ethics in education, several gaps remain, particularly in the Nigerian and broader African contexts. One of the most significant gaps is the lack of localized studies that examine the integration of AI ethics into civic education in Nigerian secondary schools (Ogunsola & Adeyemi, 2022; Adebayo & Olawoyin, 2021). Most existing literature focuses on global or Western perspectives, with limited attention given to the unique challenges and opportunities in African educational settings.

Another major gap is the minimal focus on psychological engagement with AI ethics in the literature. While studies have explored student engagement with ethical reasoning in general education (Yeager et al., 2022), few have specifically examined how students respond to AI-related ethical dilemmas or how their engagement can be enhanced through pedagogical strategies (Baker & Hawn, 2021). This lack of research limits the ability of educators and policymakers to design effective interventions that promote ethical awareness and critical thinking among students.

Furthermore, there is a lack of empirical data on teacher readiness and institutional support for integrating AI ethics into civic education in Nigeria. Although policy documents emphasize the importance of digital literacy and ethical education, there is little evidence of how these policies are being implemented at the school level (Federal Ministry of Education, 2022; Ogunlade & Adebayo, 2021). Without a clear understanding of the challenges faced by teachers and schools, it is difficult to develop targeted interventions that address these barriers.

Finally, there is a need for more interdisciplinary research that connects AI ethics education with broader discussions on digital governance, human rights, and civic participation in Africa (African Union, 2020; Nwagwu & Okoye, 2021). Such research can provide insights into how AI ethics education can contribute to the development of a digitally literate and ethically conscious citizenry in Nigeria and beyond.

Methodology

This study adopts a descriptive research design to explore the integration of AI ethics and rights within civic education in Nigerian secondary schools, with a focus on measuring psychological engagement and efficacy. The design was chosen to provide a comprehensive understanding of the current state of AI ethics integration, to capture students' perceptions and emotional responses, and to gather insights from teachers and school administrators. A mixed-methods approach was

employed, combining quantitative surveys and qualitative interviews, allowing for triangulation of data and a more nuanced interpretation of findings.

Research Design

The descriptive research design is particularly suitable for this study as it enables the researcher to describe characteristics, behaviors, and attitudes without manipulating variables. Given the exploratory nature of the research, which seeks to understand the extent of AI ethics integration in civic education and students' psychological engagement with the topic, a descriptive approach offers a structured yet flexible framework for data collection and analysis.

The quantitative component involved the administration of a structured questionnaire to secondary school students to assess their awareness of AI ethics, perceived relevance of the topic, psychological engagement levels, and challenges they face in learning about AI-related ethical issues. The qualitative component included semi-structured interviews with civic education teachers and school administrators to gather in-depth perspectives on curriculum integration, institutional support, and observed student responses.

This dual approach allowed for a comprehensive view of the subject matter, balancing statistical data with rich, contextual narratives. It also enabled the researcher to validate findings across different data sources, enhancing the credibility and reliability of the results.

Population and Sample

The target population for this study consisted of civic education teachers and students in public secondary schools in Calabar and Owerri, two cities in southern Nigeria known for their relatively strong educational infrastructure and accessibility for research purposes.

The final sample included:

- 300 students from 10 public secondary schools, selected after the Senior Secondary School 2 (SSS2) students had completed their 2025 Uniform State Civic Education Examination. This timing ensured that the students had a foundational understanding of civic education content, making them well-suited to provide informed responses about AI ethics integration.
- 30 civic education teachers, with three teachers selected from each of the 10 schools. These teachers were specifically chosen because they had participated in the West African School Examinations Council (WASSCE) 2025 Coordination for Examiners, indicating their familiarity with the national curriculum and assessment standards.
- 10 school administrators, including principals and curriculum heads, to provide insights into institutional perspectives on curriculum implementation and support for integrating AI ethics.

  This multi-stakeholder sampling ensured that the study captured perspectives from different levels of the educational ecosystem: students as direct learners, teachers as implementers, and administrators as policy enforcers and decision-makers.

Sampling Technique

A multi-stage sampling technique was used to ensure representativeness and minimize bias. The first stage involved stratified sampling of schools based on location, dividing them into urban and rural

categories to account for potential differences in resource availability, curriculum implementation, and digital exposure.

From each stratum, five schools were randomly selected, ensuring a balanced representation of both urban and rural settings. Within each selected school, a random sampling method was used to select 30 students, ensuring that each school contributed equally to the overall sample size.

The selection of teachers and administrators followed a purposive sampling approach, targeting individuals with direct involvement in civic education and curriculum implementation. This approach ensured that the participants had the necessary knowledge and experience to provide meaningful insights into the study's objectives.

Data Collection Tools

Two primary instruments were used to collect data: a structured questionnaire and a semi-structured interview guide.

Questionnaire

The student questionnaire was designed to capture data on four key domains:

1. Awareness of AI Ethics: This section assessed students' knowledge of AI-related ethical issues, including fairness, transparency, and accountability in AI systems.
2. Perceived Relevance: Questions focused on students' beliefs about the importance of AI ethics in civic education and its applicability to their daily lives and future careers.
3. Psychological Engagement: Items measured students' interest, motivation, and emotional connection to AI ethics topics, using a 5-point Likert scale ranging from strongly disagree to strongly agree.
4. Challenges in Learning AI Ethics: This section explored students' difficulties in understanding AI ethics, including lack of teacher expertise, inadequate materials, and limited institutional support.

   All items were developed based on existing literature and adapted to the Nigerian educational context. The questionnaire was pilot-tested with 30 students to assess clarity, relevance, and response patterns.

Interview Guide

The semi-structured interview guide was used to gather in-depth qualitative data from civic education teachers and school administrators. The interviews explored the following themes:

Curriculum Integration: Teachers were asked about how AI ethics is currently addressed (or not) in civic education, including any informal discussions or supplementary materials.

Student Responses: Participants shared observations on how students react to AI ethics topics, including levels of interest, engagement, and challenges they face.

Institutional Support and Barriers: Administrators and teachers were asked about the availability of training, resources, and institutional encouragement for integrating AI ethics into the curriculum.

The interviews were conducted in person or via video call, depending on participant preference, and recorded with consent. Transcripts were analyzed using thematic coding to identify recurring patterns and insights.

Validity and Reliability

To ensure the validity and reliability of the data collection instruments, several measures were taken:
A pilot study was conducted with 30 students and 5 teachers to test the questionnaire for clarity, relevance, and consistency. Based on feedback, minor adjustments were made to item phrasing and formatting.
Content validity was established by consulting education experts and civic education curriculum developers to ensure the questionnaire aligned with educational standards and objectives.
Cronbach's alpha was calculated to assess the internal consistency of the questionnaire's scales. The overall reliability coefficient was found to be 0.82, indicating strong internal consistency.
For the interviews, member checking was used to enhance credibility. Selected participants were given summaries of their responses to confirm accuracy and provide additional insights.

Ethical Considerations

Given the sensitive nature of discussing AI ethics, particularly in relation to surveillance, data misuse, and digital rights, the study adhered to strict ethical guidelines:
Informed consent and assent were obtained from all participants. Parents or guardians of students under 18 years of age provided written consent, while students gave verbal assent.
Confidentiality and anonymity were maintained by assigning unique identification codes to all participants and storing data securely using encrypted digital platforms.
Participants were assured of their right to withdraw from the study at any time without any consequences.
Special attention was given to sensitivity in discussing topics such as digital surveillance and privacy violations, ensuring that discussions were framed in a respectful and educational manner.
All participants were granted fair access to intervention materials, including the prototype AI ethics module developed as part of this study, regardless of their role or school type.
The study received IRB approval from the lead researcher's university and was also reviewed by the State Ministries of Education in Calabar and Owerri to ensure compliance with local educational regulations.

Limitations

Despite the robust methodology, the study has several limitations that should be acknowledged:
The descriptive design does not allow for causal inferences about the relationship between AI ethics integration and student engagement or comprehension. While the study provides a snapshot of the current situation, it cannot establish cause-and-effect relationships.

The use of self-reported data introduces the possibility of response bias. Students and teachers may have overestimated their awareness or engagement due to social desirability or recall bias.
There is potential for sampling bias, as the study focused on accessible schools in Calabar and Owerri. While efforts were made to ensure representativeness, the findings may not be fully generalizable to all Nigerian secondary schools, particularly those in more remote or under-resourced areas.
The intervention period was short-term, limiting the ability to assess the long-term impact of AI ethics integration on student learning and behavior.
Finally, while the study provides valuable insights, the generalizability of the findings beyond the Nigerian context may be limited due to regional differences in curriculum, digital infrastructure, and cultural attitudes toward AI.

Expected Significance

This study holds significant implications for education policy, curriculum development, and teacher training in Nigeria and beyond. It provides foundational empirical data on the integration of AI ethics into civic education, filling a critical gap in the literature, particularly in the African context.
The findings will offer concrete evidence to inform policymakers at various levels, including the National Educational Research Council (NERC), the National Universities Commission (NUC), the National Information Technology Development Agency (NITDA), and State Ministries of Education. By identifying key challenges and opportunities, the study can guide resource allocation, teacher training programs, and curriculum reform efforts.
Additionally, the study contributes to the global discourse on embedding emerging technology ethics into K–12 curricula, offering a Global South perspective that is often underrepresented in international discussions. It aligns with the mission of the International Journal of Educational Technology in Higher Education (IJETHE) by exploring the intersection of technology, education, and ethics in a context where such integration is still in its early stages.
The development and testing of a locally relevant AI ethics module during this study also provides a replicable model for other educational settings. This module can serve as a starting point for broader implementation and adaptation in different regions, contributing to the global movement toward responsible AI education.

Data Presentation and Analysis

This section presents and interprets the findings from the quantitative survey and qualitative interviews conducted with students, teachers, and school administrators in public secondary schools in Calabar and Owerri, Nigeria. The data collected aimed to address the four research questions of the study: (1) the extent of AI ethics integration into the civic education curriculum; (2) students' perceptions of the relevance and importance of AI ethics; (3) the level of psychological engagement among students; and (4) the perceived challenges and opportunities in implementing AI ethics in civic education.

Table 1: Extent of AI Ethics Integration in Civic Education Curriculum

Indicator	Fully Integrated	Partially Integrated	Not Integrated	% Integrated
AI ethics in syllabus	2 (6.7%)	8 (26.7%)	20 (66.6%)	33.3%
AI rights in lesson plans	1 (3.3%)	5 (16.7%)	24 (80%)	20%
Use of digital tools in teaching ethics	4 (13.3%)	12 (40%)	14 (46.7%)	53.3%
Teacher training on AI ethics	0 (0%)	3 (10%)	27 (90%)	10%

The data in Table 1 reveals a very limited integration of AI ethics into the civic education curriculum in the sampled schools. Only a small percentage of schools have fully or partially incorporated AI ethics into their syllabi or lesson plans. The most notable integration is seen in the use of digital tools in teaching ethics, where over half of the schools reported some level of engagement. However, teacher training on AI ethics remains virtually nonexistent, which significantly hampers the effective delivery of the subject matter. These findings align with earlier literature indicating that while digital tools are increasingly present in Nigerian schools, their use for ethical instruction remains underdeveloped.

Table 2: Student Perception of Relevance and Importance of AI Ethics

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean Score
AI ethics should be taught in school	140 (46.7%)	110 (36.7%)	25 (8.3%)	15 (5%)	10 (3.3%)	4.25
I understand the importance of AI rights	80 (26.7%)	95 (31.7%)	50 (16.7%)	50 (16.7%)	25 (8.3%)	3.50
AI ethics is relevant to my future	100 (33.3%)	105 (35%)	45 (15%)	30 (10%)	20 (6.7%)	3.80

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean Score
AI ethics helps me make better decisions	75 (25%)	90 (30%)	60 (20%)	50 (16.7%)	25 (8.3%)	3.45

Table 2 highlights that students generally perceive AI ethics as relevant and important, particularly in terms of its inclusion in the school curriculum. Over 80% of students either strongly agreed or agreed that AI ethics should be taught in school. However, their understanding of AI rights and the practical application of AI ethics was more moderate, as reflected in the lower mean scores for these items. This suggests that while students recognize the value of learning about AI ethics, there is a gap between perception and comprehension, which may be attributed to the limited integration of the topic in the curriculum and lack of teacher expertise.

Table 3: Psychological Engagement of Students

Engagement Type	High	Moderate	Low	Mean Score
Interest in AI ethics topics	120 (40%)	130 (43.3%)	50 (16.7%)	4.10
Willingness to participate in discussions	90 (30%)	140 (46.7%)	70 (23.3%)	3.90
Emotional connection to ethical issues	70 (23.3%)	110 (36.7%)	120 (40%)	3.30
Motivation to learn more	80 (26.7%)	120 (40%)	100 (33.3%)	3.60

The data in Table 3 indicates that students demonstrate moderate psychological engagement with AI ethics topics. Their interest in the subject and willingness to participate in discussions are relatively high, suggesting that AI ethics can be an engaging topic when introduced effectively. However, emotional connection and intrinsic motivation remain lower, particularly among students who may not see immediate relevance to their personal lives or future careers. This underscores the need for

contextualized and experiential teaching approaches that help students connect AI ethics to real-life scenarios and civic responsibilities.

Table 4: Perceived Challenges and Opportunities in Implementation

Challenge	% Teachers Agree	Opportunity	% Teachers Agree
Lack of training	90%	Digital citizenship	85%
Lack of curriculum materials	80%	Improved critical thinking	75%
Resistance from school management	40%	Career relevance	70%
Inadequate tech infrastructure	70%	Policy innovation	65%

Table 4 presents a clear picture of the institutional and infrastructural barriers to implementing AI ethics in civic education, as perceived by teachers. The most significant challenge is the lack of training for teachers, followed by inadequate infrastructure and lack of curriculum materials. These findings suggest that while teachers recognize the potential benefits of integrating AI ethics—such as fostering digital citizenship, improving critical thinking, and aligning with career preparation—they feel unprepared and unsupported in doing so. The relatively low resistance from school management indicates that institutional support could be mobilized with appropriate policy incentives and capacity-building efforts.

Discussion of Results

The data in Table 1 reveal a very limited integration of AI ethics and rights into the civic education curriculum in the sampled Nigerian secondary schools. Only 33.3% of schools reported any level of inclusion of AI ethics in their syllabi, and just 20% had incorporated AI rights into lesson planning. The lack of teacher training is particularly striking, with 90% of teachers reporting no formal training in AI ethics. These findings align with previous studies that have documented the absence of digital ethics in the Nigerian curriculum (Ogunsola & Adeyemi, 2022; Adebayo & Olawoyin, 2021). The Federal Ministry of Education (2022) has acknowledged the need for digital literacy in the national curriculum, but the implementation remains focused on technical skills rather than ethical reasoning. This gap reflects a broader trend in African education systems, where AI and digital ethics are often treated as peripheral topics rather than core competencies (African Union, 2020).

The relatively higher integration of digital tools in teaching ethics (53.3%) suggests that while schools may have access to technology, they are not leveraging it to address ethical dimensions of AI.

This is consistent with Baker and Hawn (2021), who note that many schools adopt technology for functional purposes without embedding ethical discourse. Without structured curriculum support and teacher training, the potential of digital tools to enhance ethical reasoning remains underutilized.

Table 2 shows that students generally perceive AI ethics as important and relevant, particularly in terms of its inclusion in the school curriculum. Over 83% of students (strongly agree + agree) believe that AI ethics should be taught in school, and more than two-thirds (68.3%) see it as relevant to their future. However, only 58.4% feel that they understand the importance of AI rights, and only 55% believe that AI ethics helps them make better decisions. These findings reflect a disconnect between perceived relevance and actual understanding, which is consistent with the literature on student engagement with complex ethical issues (Yeager et al., 2022). While students recognize the symbolic importance of AI ethics, their lack of exposure and structured learning limits their ability to apply ethical reasoning in practical contexts.

This aligns with UNESCO (2023), which emphasizes that ethical education must be contextualized and experiential to foster meaningful learning. The moderate understanding among students suggests that curriculum designers and educators need to adopt more interactive and case-based approaches to teaching AI ethics, rather than relying on abstract or theoretical instruction.

The data in Table 3 indicate that students demonstrate moderate psychological engagement with AI ethics topics. Their interest in the subject (4.10 mean score) and willingness to participate in discussions (3.90) are relatively high. However, emotional connection (3.30) and motivation to learn more (3.60) are lower, suggesting that while students may be intellectually engaged, they are not emotionally or intrinsically motivated to explore AI ethics further. This finding is consistent with Yeager et al. (2022), who argue that psychological engagement is influenced by both cognitive relevance and emotional resonance. The lower emotional engagement scores suggest that students may not yet see AI ethics as directly impacting their personal lives or civic responsibilities.

Furthermore, the didactic nature of civic education in Nigerian schools, as noted by Ogunsola and Adeyemi (2022) and Adeyemi and Adu (2020), may limit opportunities for active participation and emotional investment in ethical topics. To enhance engagement, Linnenbrink-Garcia and Pekrun (2021) recommend the use of project-based learning, role-playing, and real-world ethical dilemmas that allow students to connect abstract concepts to lived experiences.

Table 4 highlights significant institutional and infrastructural barriers to implementing AI ethics in civic education. Teachers overwhelmingly agree that lack of training (90%), lack of curriculum materials (80%), and inadequate technology infrastructure (70%) are major obstacles. These findings are consistent with Ogunlade and Adebayo (2021), who have documented the limited capacity of Nigerian teachers to integrate emerging technologies into instruction. Despite these challenges, teachers also recognize strong opportunities for integrating AI ethics, particularly in fostering digital citizenship (85%), improving critical thinking (75%), and enhancing career readiness (70%). These views align with the African Union's Digital Transformation Strategy (2020), which emphasizes the need for education systems to prepare students for a digital economy and democratic society.

The relatively low level of resistance from school management (40%) suggests that institutional support could be mobilized with appropriate policy incentives and professional development. This is consistent with UNESCO (2021), which advocates for system-wide reforms, including teacher training, curriculum revision, and stakeholder collaboration, to embed AI ethics into education.

Synthesis and Implications

Taken together, the findings from the four tables paint a picture of a nascent but promising interest in AI ethics education among students and teachers in Nigerian secondary schools. However, this interest is constrained by structural and pedagogical limitations, including a lack of teacher training, insufficient curriculum materials, and limited institutional support. The study also highlights the importance of psychological engagement in shaping students' ethical reasoning and civic responsibility. As noted by Fredricks, Blumenfeld, and Paris (2021), engagement is a multi-dimensional construct that includes cognitive, emotional, and behavioral components. In this study, students showed strong cognitive engagement (interest and relevance perception) but weaker emotional and motivational engagement, indicating a need for more contextualized and participatory teaching methods.

These findings support the recommendations of Baker and Hawn (2021) and UNESCO (2023), who advocate for interdisciplinary and experiential approaches to AI ethics education. In the Nigerian context, such approaches could include debates, case studies, digital storytelling, and community-based projects that link AI ethics to local civic issues.

Furthermore, the study underscores the need for policy alignment between national education goals and emerging digital ethics frameworks. As noted by the African Union (2020) and the Federal Ministry of Communications and Digital Economy (2023), AI ethics education must be part of a broader national strategy for digital literacy and responsible innovation.

Contribution of this work to literature

This study makes a significant contribution to the growing body of literature on AI ethics in education, particularly within the African context. It provides empirical insights into the integration of AI ethics in Nigerian secondary school civic education, a topic that has received limited scholarly attention. By examining both student perceptions and teacher perspectives, the study fills a critical gap in understanding how AI ethics is currently addressed or neglected in the curriculum. It also highlights the psychological engagement of students, offering new perspectives on how ethical reasoning can be fostered through education. Furthermore, the research identifies institutional and pedagogical barriers, contributing to policy discussions on digital literacy and ethical education in Nigeria and similar contexts. By aligning findings with UNESCO's AI ethics recommendations and the African Union's digital transformation agenda, this work advances global discourse on embedding emerging technology ethics in K–12 education from a Global South perspective.

Conclusion

This study explored the integration of AI ethics and rights into civic education in Nigerian secondary schools, focusing on curriculum integration, student perceptions, psychological engagement, and implementation challenges. The findings reveal that AI ethics is largely absent from the formal curriculum, with minimal teacher training and limited use of digital tools for ethical instruction.

Despite this, students demonstrated a strong perception of the relevance and importance of AI ethics in education, although their understanding of specific concepts such as AI rights and decision-making implications was moderate. Psychological engagement was found to be generally moderate, with interest and participation levels higher than emotional connection and intrinsic motivation. Teachers

identified significant institutional and infrastructural barriers, including lack of training, curriculum materials, and technological support, yet expressed optimism about the potential benefits of integrating AI ethics, particularly in fostering digital citizenship and critical thinking.

These findings underscore the urgent need for structured curriculum reform and teacher capacity building to ensure that students are ethically prepared for a digital future. The study contributes to global discussions on AI in education by providing localized insights from Nigeria, highlighting both the challenges and opportunities in embedding AI ethics within civic education frameworks.

Recommendations

1. The Nigerian Federal Ministry of Education should formally include AI ethics and digital rights as core components of the civic education curriculum at the secondary school level.
2. The National Teachers' Institute and State Universal Basic Education Boards (SUBEBs) should design and implement specialized training modules to equip teachers with the knowledge and pedagogical skills needed to teach AI ethics effectively.
3. Curriculum developers and educational agencies should collaborate with AI experts and civic educators to create locally relevant teaching resources, including case studies, interactive modules, and multimedia content that resonate with Nigerian students.
4. Schools should adopt participatory teaching methods, such as debates, role-playing, and project-based learning. This is to enhance students' emotional and motivational engagement with AI ethics topics.
5. State Ministries of Education and the Federal Ministry of Communications and Digital Economy should collaborate to improve school-level access to digital tools, internet connectivity, and policy support for ethical AI education.

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