The Future of Engineering Education
2024 Annual Conference & Exposition
Oregon Convention Center
Portland, OR . June 23 - 26, 2024
ASEE
Paper ID #44216

Application of African Indigenous Knowledge Systems to AI Ethics Research and Education: A Conceptual Overview

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Abstract

African Indigenous Knowledge Systems (IKS) holds an epistemology different from that of the Western world, and it has massive potential to add substantial value in various fields of applied ethics. One of the dominant fields of applied ethics studied today is artificial intelligence AI ethics. With the ever-evolving innovations associated with AI, especially on a global scale, the AI ethics field continues to grow and develop with far-reaching implications. This implies that people of multiple cultural backgrounds are potentially impacted. Notably, there has been an underrepresentation of non-Western ideologies in literature. Additionally, scholars expressed the need for alternative methods for studying and improving AI ethics research and education. Therefore, from a theoretical standpoint, how can African IKS be applied to AI ethics education and research community? Based on a 2019 publication by African scholars in the International Journal of Humanities Social Sciences and Education (IJHSSE), the authors highlight seven sub-theories of African IKS. The sub-theories are communalism, functionalism, holisticism, preparedness, perennialism, vitalism, and indigenous standpoint theory (relative to Africans). This paper discusses each of those theories and their relevant applications to current AI ethics education and research practices. The conceptual descriptions help to communicate the value of utilizing African IKS when practicing and researching AI ethics. One of the critical implications of this paper is to highlight the excellent work done by African scholars and support African representation in Western literature. Another goal is to highlight alternative theoretical foundations that can be used and included when conducting AI ethics research.

Keywords: AI Ethics, Epistemology, Theoretical Foundations, Research, Education

Introduction

This paper conceptualizes applying African Indigenous Knowledge Systems (IKS) theories to Artificial Intelligence [1] ethics research and education practices. The purpose is to acknowledge and highlight non-Western perspectives to expand and diversify knowledge on AI ethics. The primary goal is to be inclusive of different philosophies and ways of knowing, as this can significantly contribute to the development of ethical studies. Additionally, this study aims to validate different ways of knowing in Western literature by including research and voices from scholars with different epistemological views about the world. In this paper, seven African IKS theories often used in work cited by African scholars are discussed in terms of how their application can benefit contemporary AI ethics research and education practices. Definitions and summaries are provided to help explain the concepts and ways they can be applied to AI ethics.

AI and Ethics

AI ethics is a quickly developing field examining AI technologies' societal ramifications. It includes tenets, directives, and models to guarantee that AI systems are created and implemented ethically and responsibly. Concerns over bias, privacy, and accountability are growing as AI technologies increase in various industries, including healthcare, finance, and transportation. By encouraging openness, justice, and human-centered values in the creation, maintenance, and application of AI systems, AI ethics aims to alleviate these worries and maximize AI's positive effects on society while limiting any adverse effects.

In the academic, research, and policy arenas, efforts have been made globally to develop AI ethics and promote the responsibility of developing and deploying AI tools. With the international attention AI has gained, it is vital to assess and understand the cultural effects of AI and how it affects various groups of people, especially those from marginalized communities. Regarding indigenous communities, AI mustn't contribute to losing indigenous knowledge and ways of knowing worldwide. To expand our understanding of how AI can impact communities, we must consider indigenous perspectives and give ear and inclusiveness to learning from them from an asset-based standpoint.

African Indigenous Knowledge Systems

African communities have passed down various beliefs, customs, and wisdom through the generations, collectively called indigenous knowledge systems. These knowledge systems, which demonstrate the interdependence of people, the natural world, and the spiritual world, have their roots in Africa's cultural, spiritual, and ecological contexts. African indigenous knowledge systems provide essential insights into living sustainably, social organization, and moral decision-making. These insights range from communalism's focus on collective ownership and well-being to perennialism's emphasis on protecting cultural heritage.

African IKS span a broad range of fields, such as environmental management, governance, spirituality, medicine, and agriculture, and they represent the comprehensive worldview of African communities. The significance of AIKS in tackling urgent issues like climate change, biodiversity loss, and sustainable development is becoming more widely acknowledged in academia [2]. Academics agree that AIKS, especially in resource-constrained environments, offers distinctive insights and solutions that enhance Western scientific knowledge [3]. As a result of this acknowledgment, there is now a greater focus on the documentation, validation, and incorporation of AIKS within frameworks for academic research [4].

Moreover, there's a growing push to support indigenous research paradigms that put local people's viewpoints and voices front and center and decolonize research procedures [5]. This entails recognizing the role of colonialism in marginalizing African indigenous knowledge systems, promoting cooperative partnerships between researchers and indigenous knowledge holders, and honoring African indigenous intellectual property rights [6]. Institutional initiatives, such as

indigenous knowledge research institutes and transdisciplinary programs, have evolved to assist research and capacity-building around African [7]. These programs offer forums for information sharing, community involvement, and policy lobbying, which supports African IKS's resuscitation and empowerment in modern society.

To promote more inclusive and sustainable development throughout the African continent and worldwide, there has been an increasing awareness in recent years of the significance of integrating these indigenous perspectives into academia and research, as we mentioned above. From the literature of African scholars, we can learn how various African IKS theoretical viewpoints can shape the advancement of AI from an ethical standpoint. Seven African IKS theories highlighted by [8] are Communalism, Functionalism, Holism, Preparedness, Perennialism, Vitalism, and Indigenous Standpoint Theory. Each of these will now be discussed in relation to AI ethics research and education.

Theory	**Brief Description**
1. Communalism	Community ownership and togetherness
2. Functionalism	Ability to perform necessary duties
3. Holism	Expanding perspectives to broader interconnectedness
4. Preparedness	Having skills necessary for societal survival
5. Perennialism	Continuity of knowledge and cultural heritage
6. Vitalism	Spirituality aids in understanding life
7. Indigenous Standpoint	Respecting the cultural ethos of local communities

Table 1: Summary of Seven African Indigenous Knowledge Systems Theories (numbered in the order in which they are discussed).

1. Communalism

Communalism strongly emphasizes community ownership, interconnectedness, and a holistic worldview. In Africa, communalism promotes unity, togetherness, brotherliness, and cooperation, which are critical elements for advancing various facets of development [9]. Communalism suggests that Africans emphasize community living [10]. Within a communal framework, decision-making takes on a collective nature. Furthermore, reaching a consensus and using participatory procedures are hallmarks of decision-making in a communal framework, guaranteeing that each person's voice is heard and valued.

Application to AI Ethics Research and Education

Within AI ethics education and research, African indigenous communalism provides a rich framework for guiding ideas and methods. It promotes the participation of a wide range of stakeholders, encouraging an inclusive strategy that guarantees representation from different social, cultural, and professional backgrounds. This paradigm emphasizes interdisciplinary cooperation above all else, acknowledging the complexity of ethical issues related to artificial intelligence.

Furthermore, by highlighting the welfare of communities over private interests or business profits, the application of African communalism challenges academics and professionals to evaluate the broader societal impact of AI technologies. AI ethics research can become more culturally sensitive and responsive to the needs and values of various communities by respecting diverse cultures and knowledge systems. African communalism also strongly emphasizes the value of community involvement in research and education. It does this by encouraging participatory approaches that enable local communities to contribute to and benefit from AI technological advancements while guaranteeing that ethical considerations are grounded in shared values and viewpoints.

One real-life example provided in the paper by [1] is the concept of Ubuntu, which emphasizes relationality over individualism for more robust social cohesion toward sustainable communities. This principle of Ubuntu promotes values such as African-centricity, ownership of research processes, openness, kindness, responsibility, data sovereignty, reproducibility, and sustainability in AI ethics. Furthermore, the text suggests embedding African value systems and principles, such as Ubuntu and Ujamma, in the development of Responsible AI for Africa. This approach involves designing, implementing, and using AI that connects, respects, and works in solidarity with different stakeholders for the common good, addressing the unique challenges faced by Africa.

Some actionable points include Capacity building through training and education on AI ethics and responsible AI development tailored to local communities. This can consist of workshops, seminars, and online resources to enhance awareness and understanding of ethical considerations in AI. Establish community-based ethics committees or review boards to oversee AI research projects and ensure they align with communal values and principles. These committees can guide ethical dilemmas and ensure accountability in AI research.

2. **Functionalism**

Functionalism through the African IKS describes the necessity to be pragmatic through immediate induction into society. Functionalism is a sociocultural framework highlighting different components' contributions and functional roles within a community or society. It sees social structures, practices, and beliefs as fulfilling roles that support the upkeep and general well-being of the community [11]. From this vantage point, all facets of society, rituals, kinship networks, and economic activities, for example, contribute to the community's social cohesiveness, order, and resilience. This theory honors traditional African societies' pragmatic and adaptable aspects, where social structures and customs change to accommodate members' shifting needs and obstacles [12, 13].

Application to AI Ethics Research and Education

Functionalism provides a robust framework for directing ethical decisions and actions in AI ethics research and education. Functionalism emphasizes how technology is seamlessly incorporated into social structures and stresses how crucial it is to ensure AI systems contribute positively to social equilibrium. Education is essential to this process because it helps spread moral values and responsibly promotes AI development and application. Moreover, functionalism fosters the development of ethical frameworks and guidelines that support accountability, transparency, and fairness in AI technologies by prioritizing ethics for a stable AI ecosystem. This strategy aligns with the fundamental ideas of African indigenous functionalism, emphasizing the contributions and roles that different members of society play in preserving peace and balance.

Practical applications include collaborating with local communities to develop AI solutions that address societal challenges, such as healthcare access or environmental conservation, and integrating traditional knowledge systems and cultural practices to ensure relevance and acceptance [14]. Implement data governance frameworks that prioritize community data ownership and control, ensuring that AI research respects the privacy and consent of individuals and communities, aligning with the principles of social equilibrium and balance.

Furthermore, there is a need to establish community-led ethical review boards for AI research projects, composed of diverse community members and stakeholders, to evaluate the ethical implications of AI technologies based on functionalism principles and ensure alignment with societal values. It is necessary to provide training programs for AI researchers on cultural sensitivity and the importance of integrating traditional knowledge systems into AI development, fostering a deeper understanding of community needs and promoting ethical AI practices that contribute to social cohesion. In addition, there is a need to integrate ethics education into AI curricula at educational institutions, emphasizing the role of AI in supporting social equilibrium and community well-being and encouraging students to consider the ethical implications of AI technologies within the context of Functionalism theory. In addition, there is a need to organize workshops and forums that bring together AI researchers, community members, and traditional knowledge holders to exchange insights and co-create ethical guidelines for AI development that reflect the values of social balance and resilience inherent in Functionalism theory.

3. Holism

In the African context, holism refers to a way of thinking that highlights how everything in the natural and spiritual domains is interrelated and dependent on everything else. According to this perspective, all entities in reality, including humans, nature, spirits, and ancestors, are interconnected and form a single, cohesive whole [15]. African indigenous knowledge systems are informed by this holistic viewpoint, which directs actions that respect harmony and balance among people, communities, and the environment [16].

Application to AI Ethics Research and Education

Holism provides essential insights and direction for AI ethics research and education. Holism emphasizes the interdependence of all system components and pushes for the flexibility and adaptability of AI design. This viewpoint emphasizes how crucial it is to incorporate moral principles into AI systems, realizing that their value goes beyond their ability to perform tasks and includes their effects on the environment, society, and the larger ecosystem. Moreover, African indigenous holism theory emphasizes how humans are inextricably linked to the environment and the earth, implying that ethical concerns in AI development should consider human welfare and broader ecological implications. AI ethics initiatives embracing holism can work toward a more thorough comprehension of the intricate relationships between technology, society, and the natural world. This can lead to the development of ethical AI that aligns with the holistic values of indigenous African cultures.

Practical Application involves conducting comprehensive environmental impact assessments for AI systems throughout their lifecycle. This includes assessing AI technologies' energy consumption, resource depletion, and potential ecological consequences. For example, when developing autonomous vehicles, consider their efficiency and impact on air quality, wildlife habitats, and overall ecosystem health. Furthermore, there is a need to incorporate community perspectives and indigenous knowledge systems into AI ethics research and education. Holism emphasizes the interconnectedness between humans and their environment, so involving local communities in AI development ensures that diverse viewpoints are considered. For instance, before deploying AI-powered agricultural tools in rural communities, consult with local farmers to understand their needs, concerns, and traditional farming practices. In addition, there should be interdisciplinary collaboration between AI researchers, ethicists, social scientists, and environmentalists to address complex ethical challenges. Holism encourages the integration of diverse knowledge systems and disciplines to achieve a more holistic understanding of AI's impact. For example, collaborate with ecologists to assess the biodiversity implications of using AI algorithms for land management or conservation efforts.

4. Preparedness

From an African indigenous perspective, being prepared means tackling problems head-on by utilizing community resources, traditional knowledge, and skills. It entails proactive steps that people and communities take to foresee and lessen possible risks, like natural disasters or social unrest [17]. This strategy, informed by long-standing cultural customs and ideals of solidarity and mutual aid, strongly emphasizes collective responsibility and resilience, encouraging community members to work together and support one another through difficult times. Furthermore, from an African indigenous perspective, being prepared frequently means passing on knowledge and skills from elder to younger generations to promote continuity and sustainability in the face of unforeseen challenges [4].

Application to AI Ethics Research and Education

African indigenous preparedness theory offers valuable perspectives and methods in AI ethics research and education. The understanding of the critical role that AI ethics education plays in preparing people and communities for the ethical opportunities and challenges that artificial intelligence presents is at the heart of this theory. According to this viewpoint, developers and legislators are considered important in determining the ethical framework surrounding AI technologies, underscoring the significance of their proactive engagement in advancing moral values and conduct. Furthermore, African indigenous preparedness theory emphasizes how critical it is to avert possible drawbacks from adopting AI technologies, such as unemployment. Adopting this theory can help the AI community develop a culture of ethical responsibility and readiness by directing research and teaching toward proactive ways to foresee and resolve possible ethical problems.

Practical applications include a situation where stakeholders can foster a culture of ethical responsibility, community engagement, and proactive problem-solving in the rapidly evolving field of artificial intelligence. Furthermore, there is a need to advocate for including African indigenous perspectives in national and international AI ethics policies and guidelines. This involves engaging with policymakers and legislators to promote the integration of African indigenous ethical frameworks into AI governance structures, ensuring that ethical considerations are culturally relevant and inclusive. Furthermore, research studies are needed to explore proactive strategies for anticipating and mitigating ethical dilemmas in AI applications. In addition, there is a need to encourage research initiatives investigating how African indigenous preparedness theory can inform the development of ethical AI systems and practices, emphasizing the importance of foresight and risk mitigation.

5. Perennialism

From an African indigenous lens, perennialism represents the enduring beliefs, values, and customs passed down through the ages. It highlights the ageless knowledge ingrained in customs, ceremonies, and oral traditions that are thought to remain applicable despite shifting conditions [18]. This point of view respects the continuity of ancestors' knowledge as a guiding principle informing decisions and actions in the present while acknowledging the interconnection of the past, present, and future. To ensure that indigenous ways of knowing continue to be relevant and effective in navigating the challenges of contemporary life while upholding cultural identity and integrity, perennialism emphasizes the significance of conserving and reviving these ways of knowing [11].

Application to AI Ethics Research and Education

Perennialism theory has significant implications and suggests approaches for AI ethics research and education. The essential component of perennials is the requirement that AI incorporate culture, guaranteeing that technical developments honor and reflect the varied cultural legacies of communities. This viewpoint emphasizes how AI has the potential to be a tool for culture revitalization and preservation, helping to pass along traditional knowledge, stories, and practices to future generations. Perennialism also highlights education as a continuous process, arguing that ethics education in AI should be ongoing and flexible to meet the changing needs of communities and individuals. Perennialism can help advance a deeper understanding of ethical considerations in AI development and deployment while prioritizing preserving and celebrating cultural diversity in AI ethics research and education.

For instance, cultural nuances and context should be considered when developing AI algorithms for educational purposes. For example, an AI-powered language learning app should recognize and respect different dialects, idiomatic expressions, and cultural references. Preserving Indigenous knowledge is another crucial aspect of perennialism. AI can assist in maintaining indigenous knowledge by digitizing oral traditions, folklore, and historical narratives. For instance, an AI-driven platform could transcribe and translate indigenous stories into written form. Long-term ethical education can also serve as a perennial concept. Rather than a one-time ethics workshop, integrate ongoing ethics education into AI courses. For instance, students could explore case studies related to indigenous knowledge and AI.

Furthermore, collaboration should be achieved with local communities, linguists, and educators to ensure that AI systems are culturally sensitive. Regularly update algorithms to reflect evolving cultural norms. Moreover, AI tools that facilitate the documentation and dissemination of indigenous knowledge should be developed. In addition, involving community elders and storytellers is necessary to ensure accuracy and cultural authenticity. In addition, it is essential to create curricula that emphasize lifelong learning about AI ethics and encourage critical thinking, empathy, and cultural awareness among students and practitioners.

6. Vitalism

The African indigenous perspective of vitalism includes the belief in the innate life force or energy that permeates all living things and the natural world [19, 20]. It recognizes the interdependence of all living things, including plants, animals, spirits, and humans, giving each being life and agency. According to this viewpoint, life is infused with a spiritual essence, and vitality encompasses both the spiritual and metaphysical realms and the physical.

Application to AI Ethics Research and Education

Vitalism provides valuable insights and guiding principles for research and education in AI ethics. The theory of vitalism highlights the importance of considering humans' spiritual well-being during the AI development process, acknowledging the inextricable link between technological progress and human spirituality. This viewpoint emphasizes the moral interdependence of AI, people, and the larger ecosystem, and it calls for a comprehensive strategy that recognizes the connectivity of all components in the technological landscape. AI ethics initiatives can prioritize ethical considerations beyond functionality and include the spiritual aspects of human life and their implications for the welfare of individuals, communities, and the environment by adopting vitalism.

Practical considerations of this theory include holistic AI design. For example, when developing AI systems for education, the holistic well-being of learners should be considered, acknowledging their spiritual and emotional needs alongside academic progress. Another consideration includes eco-spiritual sustainability. AI technologies impact the environment. Vitalism emphasizes interconnectedness. Consider the ecological consequences of AI deployment. Examining the ethics of AI tutoring systems is another aspect that can be considered in the vitalism theory.

Furthermore, there should be Incorporating mindfulness practices, meditation, or culturally relevant rituals into educational AI platforms. Create an environment that nurtures both cognitive growth and spiritual vitality. Moreover, there is a need to develop AI systems that minimize energy consumption, reduce waste, and promote sustainable practices. There is also a need to align technological progress with nature's vitality. Designing AI tutoring systems that foster empathy, compassion, and positive emotional connections is vital to prioritizing learners' holistic growth over mere academic achievement.

7. Indigenous Standpoint Theory

From an African perspective, indigenous standpoint theory focuses on the distinctive experiences and epistemologies of indigenous communities across the African continent and respects the ethos of these communities [8]. This theory recognizes the diversity of cultural backgrounds and knowledge systems throughout Africa. It highlights the significance of giving voice and importance to indigenous perspectives in research, policy, and decision-making processes. The goal of indigenous standpoint theory is to subvert prevailing narratives and hierarchies of power while promoting the acceptance and validation of indigenous knowledge as authentic sources of insight and expertise.

Application to AI Ethics Research and Education

African indigenous standpoint theory provides critical insights and methods for AI ethics research and education. The idea that AI shouldn't hurt indigenous communities is fundamental to this theory, underscoring the significance of moral issues that put these communities' rights and well-

being first. Furthermore, it is crucial for AI research to incorporate lived experiences because this guarantees that indigenous peoples' varied viewpoints and needs are taken into account during the development and application of AI technologies. African indigenous standpoint theory fosters a more inclusive and equitable approach to technological innovation, which also promotes the creation of knowledge from AI ethics research that directly benefits indigenous communities. Adopting this standpoint theory, AI ethics initiatives can work to minimize possible harms, give voice to underrepresented groups, and make sure that technological advancements in AI benefit indigenous communities' empowerment and right to self-determination.

Some practical applications or examples serve the indigenous standpoint theory, such as developing community-driven AI for education where African indigenous communities are involved from the outset. In addition, there should be a collaboration with local education, elders, and students to co-create AI tools that address unique needs. Another instance is giving indigenous communities distinct data sovereignty rights by respecting their ownership and control over data related to their culture, language, and practices when collecting data for AI research. Another example is the reflection of indigenous knowledge epistemologies for culturally relevant AI curricula, which can explore how different cultures perceive fairness, bias, and accountability. Other examples include having indigenous ethics review boards, using AI for language revitalization, and promoting equitable access to AI education.

Furthermore, there should be Organizing workshops, focus groups, or participatory design sessions where community members actively contribute to defining AI requirements by prioritizing their perspectives over external experts. Develop data-sharing agreements that empower indigenous communities. Ensure informed consent, transparency, and mechanisms for community oversight in data governance. Moreover, there is a need to design curriculum modules that integrate indigenous knowledge systems, oral traditions, and ethical considerations. Encourage critical discussions about cultural biases in AI. Collaborate with indigenous organizations to create and institutionalize AI ethics review processes. Ensure that these boards have decision-making authority. Invest in AI research and development that supports language documentation, translation, and teaching. Engage language experts and native speakers in these efforts. Develop low-bandwidth AI learning platforms, mobile apps, or community centers where indigenous learners can access AI resources. Bridge the digital divide.

Concluding Thoughts

In summary, indigenous perspectives, which strongly emphasize inclusivity, sustainability, and cultural preservation, offer insightful information about AI ethics research and instruction. These viewpoints, which range from vitalism's consideration of human spiritual well-being to communalism's emphasis on community well-being, support ethical and comprehensive approaches to the development of AI. AI ethics initiatives can guarantee that technological

advancements benefit all members of society by incorporating indigenous standpoint theory, which prioritizes the protection and inclusion of indigenous communities. Acknowledging indigenous viewpoints enhances the conversation about AI ethics and promotes a more just and accountable method of technological advancement.

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