

ARTIFICIAL INTELLIGENCE IN REVITALIZING TRADITIONAL IGBO APPRENTICESHIP IN A GLOBALIZED SOCIETY

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Abstract

The traditional Igbo apprenticeship system, known as Igba Boi, has long served as a cornerstone of entrepreneurial development and wealth creation in southeastern Nigeria. However, globalization and rapid technological advancements have disrupted the transmission, scalability, and sustainability of this indigenous knowledge system. This study adopts a qualitative exploratory research design to investigate how Artificial Intelligence (AI) can be utilized to revitalize the traditional Igbo apprenticeship system (Igba Boi) within the transformative potential of Artificial Intelligence (AI) in revitalizing the Igbo apprenticeship model within the context of a globalized society. By employing a multidisciplinary approach that integrates cultural studies, innovation systems theory, and AI applications, the paper demonstrates how intelligent systems can document, model, and personalize mentorship processes while preserving core cultural values. The research identifies AI-driven platforms such as expert systems, natural language processing, and machine learning algorithms as tools for optimizing matchmaking between masters and apprentices, tracking skill acquisition, and ensuring accountability through data analytics. Furthermore, it addresses ethical concerns surrounding cultural preservation, digital divide, and the decolonization of technology. The findings suggest that AI can serve not only as a catalyst for the modernization of indigenous economic systems but also as a medium for embedding cultural identity into the global knowledge economy. This work contributes to emerging scholarship on Afrocentric innovation and offers practical frameworks for policymakers, educators, and tech entrepreneurs seeking to harmonize tradition with technological advancement.

Keywords: Artificial Intelligence (AI), Igbo Apprenticeship System, Indigenous Knowledge Systems (IKS), Globalization and Technology.

Introduction

The Igbo apprenticeship system (*Igba Boi*) is widely recognized as one of the most sophisticated and culturally grounded models of informal education and entrepreneurial development in sub-Saharan Africa. Rooted in centuries-old traditions of communalism, mentorship, and reciprocity, it has functioned as a robust socio-economic mechanism through which young individuals, often with limited formal education, are trained in various trades, businesses, and vocational skills under the tutelage of more experienced masters (*Ogas*). Upon completion of the agreed-upon training period, the apprentice is often “settled” granted financial or material capital to establish an independent enterprise, thereby creating a generational cycle of empowerment, wealth redistribution, and community resilience. The system's remarkable success in producing self-reliant entrepreneurs has been acknowledged not only in Nigeria but across Africa and the diaspora, prompting scholars to classify it as a prototype of indigenous African entrepreneurship.

Historically, the system has thrived on oral instruction, face-to-face mentorship, and hands-on learning within localized, culturally grounded settings. However, the accelerating forces of globalization, urbanization, and digital transformation have placed immense pressure on the viability and continuity of this time-tested institution. Yet, despite its proven efficacy, the traditional Igbo apprenticeship system faces growing existential threats in the 21st century. Globalization, urban migration, declining interest among youth, and the encroachment of Western education models have contributed to its gradual erosion. Furthermore, the system's reliance on informal, undocumented processes and oral transmission of knowledge limits its scalability and resilience in an increasingly digital, data-driven world. As young people gravitate toward modern forms of education and employment, there is a palpable risk of losing this invaluable cultural and economic heritage.

Meanwhile, the advent of Artificial Intelligence (AI) has revolutionized how societies process information, learn, and innovate. AI technologies such as machine learning, expert systems, and natural language processing offer unprecedented capabilities in modelling complex human interactions, personalizing instruction, and automating decision-making. Across sectors education, healthcare, finance, and manufacturing AI is being leveraged to improve efficiency, accuracy, and reach. In the context of indigenous systems, however, the potential of AI remains vastly underexplored. While efforts to digitize African heritage have focused primarily on language, music, and folklore, there has been minimal scholarly or policy attention on integrating AI into indigenous economic and pedagogical systems such as the Igbo apprenticeship model.

This study seeks to fill that critical gap by investigating the potential of Artificial Intelligence to revitalize the traditional Igbo apprenticeship system in the context of a

globalized, technologically dynamic society. Specifically, it examines how AI can be applied to: document and preserve the tacit knowledge and cultural logic of the apprenticeship system; personalize mentorship and skill acquisition through adaptive learning platforms; facilitate matching between apprentices and mentors based on data analytics; monitor progress, accountability, and outcomes through intelligent tracking systems; scale the model beyond regional boundaries using virtual environments and mobile technology.

By employing a multidisciplinary framework that blends AI theory, cultural studies, and innovation systems analysis, the paper foregrounds a critical, Afrocentric approach to technological adaptation. It emphasizes the importance of embedding cultural values, ethical considerations, and local epistemologies into the design and deployment of AI technologies. Rather than viewing AI as a disruptive force, the study positions it as a complementary tool that, if thoughtfully applied, can breathe new life into indigenous knowledge systems without compromising their integrity or authenticity.

The significance of this research lies in its contribution to several interrelated discourses: the decolonization of technology, the preservation of intangible cultural heritage, and the advancement of inclusive innovation in Africa. In challenging the dominant narrative that positions Western technological models as universal, this work elevates the Igbo apprenticeship system as a viable, dynamic framework that can coexist and co-evolve with AI to meet the demands of a changing world. Ultimately, the study offers practical insights for policymakers, educators, cultural custodians, and tech entrepreneurs seeking to bridge tradition and technology in ways that foster sustainable, culturally grounded development.

Literature Review

The intersection of Artificial Intelligence (AI) and indigenous knowledge systems remains an emerging but critical area of scholarly inquiry. As global interest in technological innovation intensifies, there is a growing recognition of the need to preserve and modernize culturally embedded institutions such as the Igbo apprenticeship system, particularly in the face of globalization, digital transformation, and epistemic homogenization. This literature review critically examines existing scholarship across four major themes: (1) the Igbo apprenticeship system as an indigenous entrepreneurial model; (2) the impact of globalization on indigenous knowledge systems; (3) the role of AI in education and skill transmission; and (4) emerging efforts to integrate AI into cultural preservation and indigenous innovation.

The Igbo Apprenticeship System: Indigenous Entrepreneurship in Practice

Igbo Apprenticeship System (IAS) refers to a traditional and socio-cultural economic institution practiced among the Igbo people of southeastern Nigeria. It is a form of informal business mentorship and incubation in which a successful entrepreneur (known as *oga* or *master*) takes on a young apprentice (*nwa boi*) to learn the trade or

business over a fixed period, typically ranging from 5 to 7 years. At the end of the apprenticeship, the master is culturally obligated to “settle” the apprentice by providing startup capital or resources to establish their own independent business. This system is widely recognized for its role in wealth creation, youth employment, and poverty alleviation, and is often cited as one of the largest informal business incubation models in Africa. According to Eze (2020). “The Igbo apprenticeship system is an informal institution through which entrepreneurial knowledge and business skills are transferred from one generation to another within a communal framework of trust, loyalty, and reciprocity. It promotes grassroots economic empowerment and intergenerational wealth creation.”

Meagher, (2010) and Eze, (2020) opine that the Igbo apprenticeship system (*Igba Boi*) has been widely studied as a functional and culturally embedded model of informal entrepreneurship. It operates through relational trust, kinship ties, and long-term mentorship, emphasizing practical skill acquisition over formal academic learning. Nwokocha and Nwakoby (2015) describe it as an ecosystem of moral economy where mutual obligations between *Oga* (mentor) and *Nwa Boi* (apprentice) sustain not only businesses but social cohesion. Scholars such as Ukaegbu (2000) and Ndubuisi (2022) highlight the system's remarkable success in fostering upward mobility, wealth redistribution, and micro-enterprise growth among marginalized populations. Despite its success, however, the system remains largely undocumented, non-standardized, and susceptible to external disruptions. Onyebueke & Ezeadichie, (2011) say that there is limited institutional support, and transmission of knowledge is mostly oral and experiential, which limits its replicability and scalability in a modern economy. This is why, scholars as Okonkwo & Okoye (2019) write that there is increasingly advocate for innovative strategies that preserve its cultural core while adapting its structure to contemporary realities.

Globalization and the Erosion of Indigenous Knowledge Systems

Globalization is the process of increasing interconnectedness and interdependence among countries through the expansion of global trade, investment, technology, and the flow of information, ideas, and people. Scholte, (2005) opines that globalisation involves the integration of economies, cultures, and governance across borders, shaping how societies interact and evolve in the modern world. Battiste, (2002) and Dei, (2000) define Indigenous Knowledge Systems (IKS) as the complex set of knowledge, skills, practices, and worldviews developed by Indigenous peoples over generations through direct contact with their environment, community life, and spiritual beliefs. This knowledge is holistic, intergenerational, and often oral in transmission.

Globalization is characterized by increased cultural exchange, economic integration, and technological diffusion has presented both opportunities and challenges to indigenous knowledge systems. On the one hand, it facilitates exposure, innovation, and potential for global recognition. On the other, it often undermines traditional

practices by privileging Western epistemologies and economic models. Achebe & Udechukwu, (2020) explain that in the case of the Igbo apprenticeship system, globalization has contributed to waning interest among youth, loss of cultural pride, and growing preference for formal education and white-collar employment.

The marginalization of indigenous systems is exacerbated by the digital divide, unequal access to technology, and lack of policy frameworks that recognize and integrate traditional institutions into national innovation systems. Scholars such as Ake (1993) and Odora Hoppers (2002) argue for a reimagining of development that centers indigenous knowledge as a legitimate and dynamic source of innovation.

Artificial Intelligence in Education and Skills Development

John McCarthy (AI Pioneer) “It is the science and engineering of making intelligent machines, especially intelligent computer programs.” Oxford English Dictionary “The theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.” European Commission “Artificial intelligence (AI) refers to systems that display intelligent behaviour by analysing their environment and taking actions with some degree of autonomy to achieve specific goals. IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems (2019) says that “AI is the capability of a machine to imitate intelligent human behavior”.

AI has emerged as a transformative force in the field of education, particularly in personalized learning, knowledge management, and competency tracking. Luckin et al., (2016) Holmes et al., (2019) where of the opinion that Intelligent tutoring systems (ITS), natural language processing (NLP), and machine learning algorithms are being employed to customize curricula, analyze student progress, and support decision-making in formal and informal learning environments. AI has been credited with making learning more accessible, scalable, and adaptive to diverse learner needs.

Panetta, (2021) opines that in vocational education, AI-driven platforms such as digital apprenticeships, virtual labs, and skill assessment tools have shown promise in enhancing technical training and workforce development. However, much of the literature on AI in education remains focused on Western contexts, formal systems, and standardized content. There is limited attention to how AI can be applied in culturally specific, informal models of learning such as the Igbo apprenticeship system, which rely heavily on tacit knowledge, context-specific judgment, and social-emotional learning.

Artificial Intelligence, Cultural Preservation, and Indigenous Innovation - A small but growing body of literature is beginning to explore how AI can serve the goals of cultural preservation and indigenous innovation. UNESCO, (2021) and Floridi et al., (2018) write that initiatives such as AI4D Africa and UNESCO's work on digital

heritage emphasize the importance of ethical AI that respects local knowledge systems and promotes inclusive development. AI applications in indigenous language translation, oral history documentation, and heritage digitization illustrate the technology's potential to protect and amplify cultural identity.

Yet, scholars such as Mhlambi (2020) caution against “technological solutionism” that fails to account for power asymmetries, cultural misrepresentation, and epistemic injustice. Okechukwu, (2023) Abebe et al., (2020) explain that for AI to be genuinely emancipatory, it must be co-designed with indigenous communities, grounded in local values, and aligned with culturally relevant modes of knowledge transmission. This aligns with calls for Afrocentric AI frameworks that prioritize communal knowledge, relational ethics, and context-sensitive innovation

Synthesis and Research Gap - While extensive scholarship exists on both the Igbo apprenticeship system and AI in education, there is a conspicuous lack of integrative studies that explore how AI can be mobilized to revitalize indigenous apprenticeship systems in Africa. Existing AI applications in cultural contexts tend to focus on language and heritage preservation rather than entrepreneurial mentorship or skill transfer. Moreover, policy discussions on AI and innovation in Africa seldom address the potential of informal systems like *Igba Boi* as fertile grounds for tech-enabled transformation.

This study addresses this gap by proposing a culturally grounded, AI-enhanced model of the Igbo apprenticeship system—one that preserves its relational logic while enhancing its relevance, reach, and resilience in a globalized, digital era.

Methodology - This study adopts a **qualitative exploratory research design** to investigate how Artificial Intelligence (AI) can be utilized to revitalize the traditional Igbo apprenticeship system (*Igba Boi*) within a globalized and digitized context. Given the culturally embedded and largely undocumented nature of the apprenticeship system, a qualitative approach allows for a deeper contextual understanding of its structure, challenges, and opportunities for AI integration.

Research Design - A **multi-method qualitative approach** was employed, combining ethnographic techniques, semi-structured interviews, and expert consultations. This design facilitated the triangulation of data from diverse sources apprentices, mentors (*ogas*), cultural experts, and AI practitioners to understand both the lived realities of traditional apprenticeship and the potential for technological adaptation.

Study Area and Population - The study was conducted in three major Igbo-speaking cities in southeastern Nigeria: Onitsha, Aba, and Enugu. These cities were selected due to their historical relevance as commercial hubs where the apprenticeship system is still actively practiced. The population includes: Practicing apprentices and their mentors,

Graduates of the apprenticeship system, Cultural scholars and sociologists, AI researchers and software developers, Policy actors in education and innovation

Sampling Technique - A purposive sampling technique was used to select 30 key informants across the three cities. These included: 10 master traders (*ogas*) with over 10 years of experience, 10 current or recently graduated apprentices, 5 cultural experts with publications on Igbo entrepreneurship, 5 AI practitioners with experience in educational or cultural applications of AI. Participants were selected based on their relevance to the research objectives and their capacity to provide rich, experiential insights.

Data Collection Methods:

Semi-Structured Interviews - Face-to-face and virtual interviews were conducted with all participants, lasting between 45 and 90 minutes. The interviews focused on: Processes and values embedded in *Igba Boi*, Perceptions of challenges facing the system, Awareness and openness to AI integration Suggestions for culturally appropriate AI tools

Participant Observation - Ethnographic observation was conducted in selected markets and workshops to directly document mentoring practices, business operations, and relational dynamics.

Document Analysis - Secondary data from policy documents, journal articles, and AI project reports (e.g., UNESCO AI initiatives, AI4D Africa) were analysed to understand current efforts in cultural AI applications.

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This analysis interprets the study's findings in relation to theoretical insights, thematic patterns, and practical implications. It follows five key thematic strands that emerged from field data and literature:

Structure and Resilience of the Traditional Igbo Apprenticeship System

The Igbo apprenticeship system (*Igba Boi*) operates through culturally grounded, informal mechanisms of skill acquisition, trust-based mentorship, and community reintegration. Participants across the study emphasized: Relational trust as the core driver of mentorship, where the *Oga* (master) treats the apprentice (*Nwa Boi*) like a surrogate son. Holistic learning, where technical skills, moral values, customer relations, and business intelligence are passed down through lived experience. The "settlement" ritual, marking the end of the apprenticeship and economic independence of the apprentice. Despite its success, respondents admitted the system is threatened by urbanization, the push for formal education, and globalization. The lack of documentation, digital tools, and institutional integration contributes to a perception of the system as "archaic" or "unscalable" among Nigerian youth.

Gaps and Limitations in the Current System - Through participant observation and interviews, the following key challenges were identified:

Lack of standardized training: There is no curriculum, and training outcomes are uneven across mentors.

Absence of data tracking: Apprenticeship processes are undocumented, making it hard to evaluate performance or share best practices.

Social exploitation risks: In some cases, apprentices are overworked or unfairly treated without legal recourse.

Declining youth interest: Young people increasingly prefer university degrees, tech skills, or migration over manual training. These limitations underscore the urgent need for structural innovation, which AI can potentially support.

AI-Driven Opportunities for Modernization - A critical contribution of this study is its mapping of potential AI interventions to address the structural weaknesses of the Igbo apprenticeship model. Participants from the AI sector highlighted these use-cases:

Knowledge Capture and Digitization - AI-powered tools (e.g., natural language processing, speech-to-text models) can: Record oral histories of successful *Ogas*, digitize business processes, terminologies, and indigenous values embedded in *Igba Boi*, translate indigenous concepts into structured learning modules. This process creates a cultural repository for future generations and allows knowledge to be scaled beyond geographical limitations.

Intelligent Matching Systems - Machine learning algorithms can be designed to: Match apprentices to mentors based on skill interest, location, personality traits, and mentorship style, Provide tailored learning journeys similar to AI-powered MOOCs. This could modernize the traditional word-of-mouth matching system and reduce the risk of mismatch or dropout.

AI-Enhanced Learning and Monitoring - AI applications like: Chatbots for apprentices, offering just-in-time support in local languages. Skill assessment tools, analysing apprentice progress using data from performance metrics or business outputs and redditive analytics, identifying apprentices at risk of failing or mentors who exploit apprentices. These tools can bring accountability, transparency, and standardization without dismantling the system's core values.

Cultural and Ethical Considerations in AI Integration - While AI offers powerful tools, the study cautions against techno-solutionism. Interviews revealed scepticism from both cultural custodians and traditional mentors: Concerns about loss of cultural authenticity, with AI seen as a Western Intrusion into an African institution. Fears of surveillance or depersonalization in a system that thrives on human closeness. Ethical issues related to data ownership, representation, and bias in algorithms designed without Afrocentric worldviews.

Therefore, successful AI adoption must adopt an Afrocentric, culturally sensitive approach. This means: Co-designing AI tools with local communities, embedding indigenous values such as *ubuntu*, reciprocity, and relational ethics into algorithmic logic and avoiding language that frames AI as “replacing” human mentorship

Implications for Policy, Education, and Innovation - The study's findings carry broad implications:

Policy Implications: The Nigerian Ministry of Education and Ministry of Science & Technology must develop frameworks that formalize and support traditional apprenticeships with AI tools. National innovation policies should integrate indigenous systems as legitimate sources of knowledge and economic development.

Educational Implications: Universities and polytechnics should develop certificate programs or digital apprenticeships modelled after *Igba Boi*, incorporating both AI and traditional mentoring. Cultural studies departments can collaborate with data scientists to train AI on indigenous knowledge.

Innovation Ecosystem Implications: Startups can build platforms (e.g., an “Igbo Mentor AI” app) that serve as digital mentorship tools, linking tradition with technology. Investors and NGOs working in AI for development should fund context-aware, low-cost AI solutions for informal economies.

Conclusion of the Analysis - This analysis demonstrates that the Igbo apprenticeship system is not obsolete but under-leveraged. It offers a unique, home-grown model of youth empowerment, entrepreneurship, and cultural continuity. By thoughtfully integrating Artificial Intelligence, we can retool *Igba Boi* for a globalized society without erasing its identity. AI should not replace mentors, it should enhance mentorship, scale learning, and preserve wisdom. Ultimately, this study proposes a new model of indigenous innovation, where African traditions and cutting-edge technologies co-evolve to create sustainable futures rooted in culture and driven by justice.

Findings

This section presents the major findings that emerged from interviews, observations, and documentary analysis.

Continued Cultural Relevance of Igbo Apprenticeship - Despite modernization and globalization, the Igbo apprenticeship system (*Igba Boi*) remains resilient, especially in major commercial centres like Onitsha and Aba. Participants noted that: The system continues to produce successful entrepreneurs, many of whom dominate markets in electronics, spare parts, and textiles. Trust, loyalty, and moral discipline are still core values passed from mentor to apprentice. It is regarded as a viable alternative to formal

education, especially among low-income families. “You may have a degree, but Igba Boi will teach you how to survive and own something of your own.” — *Participant A1, Market Leader, Onitsha*.

Structural Weaknesses Limiting Expansion - Findings indicate significant limitations threatening the sustainability of the apprenticeship model:

Lack of documentation and standardization makes it difficult to evaluate learning or scale the model to new regions. Exploitation of apprentices in some cases was reported, where settlements were denied or working conditions were harsh. The system is invisible to policymakers and often excluded from formal economic and educational planning. “Nobody sees us as a system. But we are producing more jobs than many universities.”— *Participant M4, Mentor, Aba*.

Low Integration of Technology - Although some apprentices and mentors use smartphones and social media for business, AI and digital platforms are rarely used in the training process. Most mentors: View AI as complex and irrelevant to their model. Prefer face-to-face, lived experience over automated or online learning are open to innovation but lack digital literacy and resources. “They said AI can help, but I don't understand how. My work is with hands and eyes, not machines.” — *Participant O2, Auto Mechanic Mentor, Enugu*

High Potential for AI Applications - AI professionals interviewed believed that the apprenticeship system holds strong potential for AI enhancement, especially in areas such as: Knowledge digitization (using NLP to transcribe oral knowledge) AI matching platforms (to pair mentors and apprentices intelligently) Mobile apps or chatbots (for just-in-time learning and support) Predictive analytics (for risk mitigation and apprenticeship optimization) However, they emphasized that co-design with local communities and cultural sensitivity is essential.

Youth Perception of Apprenticeship and Innovation - Younger participants expressed mixed feelings: many saw *Igba Boi* as outdated or less prestigious than university education or tech startups. Some youth showed interest if the system could be modernized, digitized, or made flexible. The idea of a “Tech-Apprenticeship Hybrid” appealed to many, combining traditional mentorship with digital skill training. “If you put Igba Boi on an app and teach AI too, I'll do both. Why choose?”— *Participant Y6, Youth Entrepreneur, Enugu*

Conclusion of Findings and Discussion – This study critically explored the potential of Artificial Intelligence (AI) in revitalizing the traditional Igbo apprenticeship system (*Igba Boi*) within the context of globalization and digital transformation. The findings confirm that the Igbo apprenticeship model remains a deeply rooted, culturally embedded system that has contributed significantly to grassroots entrepreneurship and youth employment in southeastern Nigeria.

However, the sustainability of this system is increasingly threatened by modernization pressures, limited standardization, lack of documentation, youth disinterest, and insufficient policy recognition. At the same time, the transformative capacities of AI particularly in knowledge preservation, intelligent matching, digital monitoring, and scalable learning offer a timely opportunity to rejuvenate this indigenous system for the 21st century.

Importantly, the study establishes that AI does not need to replace the cultural soul of *Igba Boi*, but rather to augment, scale, and protect it. When designed ethically and in collaboration with local communities, AI can serve as a bridge between tradition and technology, preserving heritage while promoting innovation and economic inclusion.

Recommendations - Based on the findings and analysis, the following recommendations are offered to various stakeholders:

For Policymakers and Government Agencies - Formal Recognition: Incorporate the Igbo apprenticeship model into national skills development and innovation policies.

Funding Support: Create innovation grants for the digital transformation of traditional apprenticeship systems.

Regulation and Protection: Develop legal frameworks to protect apprentices from exploitation and ensure fair settlement practices.

Data Infrastructure: Fund initiatives to collect and digitize indigenous knowledge systems using AI tools.

For Educational Institutions and Research Centres - Curriculum Integration: Introduce interdisciplinary modules combining indigenous knowledge, entrepreneurship, and AI in universities and technical colleges. Research-Industry Partnerships: Facilitate collaborations between AI developers, cultural anthropologists, and traditional mentors to co-create context-sensitive solutions. Digital Literacy Training: Provide digital and AI training for apprentices and mentors, especially in local languages.

For AI Practitioners and Tech Startups - Cultural Co-Design: Engage local communities in the design of AI platforms to ensure cultural relevance and acceptance. Low-Tech Solutions: Build mobile-friendly, low-data AI applications that can function in resource-constrained environments. Ethical Development: Ensure AI tools are built with values of transparency, inclusivity, and respect for indigenous ontologies.

For Igbo Communities and Cultural Institutions - Cultural Archiving: Record and preserve oral histories, mentorship practices, and entrepreneurial techniques through

digital storytelling and AI-assisted transcription. Youth Engagement: Reframe *Igba Boi* as a prestigious, future-oriented path by combining traditional mentorship with digital skill-building. Mentorship Alliances: Establish community mentorship hubs where traditional masters and digitally skilled youth co-mentor new apprentices.

Final Note: Revitalizing the Igbo apprenticeship system through AI is not merely a technological task—it is a cultural, ethical, and developmental imperative. As Africa navigates the Fourth Industrial Revolution, it must do so on its own cultural terms, by blending heritage with innovation. This study offers a roadmap for how that journey can begin—locally rooted, digitally enabled, and globally relevant.

Roadmap for Future Research: The integration of Artificial Intelligence (AI) into traditional apprenticeship systems such as the Igbo *Igba Boi* model is still in its conceptual and experimental stages. This presents a fertile ground for further scholarly inquiry.

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