International Journal of Educational Studies (INJEDS)
Vol. 4 Is. 1 (August 2025)
EISSN: 3092-8990
Website: https://www.injeds.com

Artificial Intelligence Technologies Used in Teaching Agricultural Education in universities in Nigeria

By

Oketoobo Emmanuel Akintunde Ph.D

oketooboea@gmail.com

Umoh Iniobong Joseph

&

Nnadi Victor Maduka.

Department of Agricultural/Vocational Education

College of Education,

Michael Okpara University of Agriculture Umudike, Abia State

Abstract

The paper looked at the Artificial Intelligence technologies used in teaching Agricultural Education. Artificial intelligence (AI) is a computerized system that is able to carry out task like human. AI is broadly divided into Type 1 Capability Baser type of artificial intelligence with example artificial narrow intelligence (ANI), artificial general intelligence (AGI), Artificial super intelligence (ASI) and Type 2 functional base artificial intelligence with example like reactive machine (RM), Limited Memory (LM), theory of mind, software artificial intelligence, the study also looked at some gadgets or tools available in teaching agricultural education which includes Grading Automation tools, Paper work assistance, chatbot, Nuance Dragon Speech, Attitude Learning Knowji. Artificial Intelligence has many benefits in education which may include personalize learning, Task automation and other content creator. Due to the above benefits, the perceived constraints of artificial intelligence studied includes social influence, perceived risk theories, unemployment and communication difficulties. Artificial Intelligence can help in teaching agricultural education to improve students' academic performance. Moreover, it was recommended that both parents and teachers should embrace the use of artificial intelligence, curriculum developers should also be geared towards incorporating artificial intelligence, government and philanthropies should also assist in funding artificial intelligence programme

Key words: Artificial Intelligence, Technology, Teaching, Agricultural Education

The Meaning of Artificial Intelligences.

Many scholars have offered various definitions of artificial intelligence. Essentially, AI is a computerized system capable of performing tasks similarly to a human. It involves creating software programs embedded in a machine so that it behaves like a person. The term is used for man-made entities exhibiting human-like intellectual attributes such as problem-solving, critical thinking, and the capacity to identify issues. In essence, AI is a technique for enabling a computer, a computer-controlled robot, or a software application to process information intelligently, mimicking human thought processes.

According to TWI (2022), artificial intelligence is a branch of computer science focused on developing smart machines that perform tasks typically requiring human intellect. AI is ubiquitous today; we encounter it in our homes, offices, markets, and churches. Biswal (2022) asserts that AI is the intelligence demonstrated by machines that simulate human behavior or thought, and which can be trained to resolve particular problems. Biswal further explains that AI denotes a system's or program's capacity to learn and act based on prior experiences. Maria (2022) adds that AI software can perform tasks such as natural language processing, speech and image recognition, fraud detection, automated decision-making, and social-media monitoring. AI is already integrated into our smartphones, social media, email platforms, and search engines. Given the vast data available, AI systems execute tasks with remarkable accuracy, consistency, and speed (Betz & Uwani, 2023). Consequently, we should continue to integrate AI-powered systems in education to reduce the time spent on data-intensive tasks and enhance performance.

Naskowsk et al. (2022) define AI as the simulation of human intelligence processes by machines, particularly computer systems. AI necessitates specialized hardware and software to develop and train machine learning algorithms. In essence, AI encapsulates vast datasets within programs that learn, reason, and self-correct, and with the aid of chatbots, these programs can emulate human behavior. AI encompasses three cognitive abilities: learning, reasoning, and self-correction. It can reason and take actions that optimally achieve specific goals, exhibiting traits related to learning and problem solving akin to the human mind (Xue & Wang, 2022). Schroer et al. (2022) describe AI as machines that not only model but also enhance human cognitive capabilities.

There are two primary classifications of AI according to researchers: Capability-Based and Functionality-Based AI.

Capability-Based AI is defined by how machines learn and apply acquired knowledge. This type includes three subcategories:

- **Artificial Narrow Intelligence (ANI):** Also known as weak AI, ANI is designed to perform specific tasks autonomously using neural network algorithms and machine learning. It excels in one cognitive function but cannot extend beyond its programming. Kanade (2022) explains that ANI is a goal-oriented form of AI built to execute tasks like tracking weather updates or playing chess. ANI is the most common type of AI, seen in examples such as self-driving cars, Siri, Alpha-Go, and Alexa.
- **Artificial General Intelligence (AGI):** Also known as general or strong AI, AGI aims to learn, think, and function at human levels, capable of multifunctional tasks and

human-like decision-making. Heath (2018) notes that while AGI has been a popular subject in science fiction, it remains unrealized, yet in theory could surpass weak AI by performing creative tasks through self-awareness and consciousness (Betz & Urwin, 2023).

- **Artificial Super Intelligence (ASI):** ASI, or super AI, surpasses human intelligence. Once AI reaches the AGI stage, it could learn so rapidly that its capabilities exceed those of humans. Kanade (2022) defines ASI as an AI form that not only surpasses human cognitive abilities but also exhibits its own thinking and self-awareness. ASI is considered the most advanced and intelligent type of AI (Marr, 2021).

Functionality-Based AI focuses on a machine's ability to process data, respond to stimuli, and interact with its environment. This category includes:

1. **Reactive Machines (RM):** AI that responds to current stimuli without memory of past events; for example, IBM's chess program.
2. **Limited Memory (LM):** AI that can store information and learn from past data, used in applications like chatbots or self-driving cars.
3. **Theory of Mind:** AI that can sense and react to human emotions, borrowing the concept from psychology.
4. **Self-Aware:** The final stage of AI development, where machines develop a sense of self and human-level intelligence, capable of autonomous learning.

Meaning of Agricultural Education

Agricultural education is described as the training of individuals or groups in acquiring scientific knowledge, practical skills, and vocational training that fosters a positive attitude toward honest work (Ayodele et al., 2013). This training aims to develop self-reliance in one's area of specialization. According to the National Policy on Education (FRN, 2004), agricultural education's primary objective is to equip individuals with the necessary scientific and vocational skills to contribute to societal development. It is intended to produce graduates who possess the agricultural knowledge, skills, and practical abilities to meet market demands and stimulate interest in farming (Diise, Zakaria, & Mohammed, 2018). Danko (2006) describes vocational education as programs that prepare students for practical occupations in fields such as agriculture, business, and home economics, instilling confidence and experience. Notably, agricultural education should specifically focus on training future educators in the scientific study of agricultural teaching and learning principles.

Artificial Intelligence in Agricultural Education

AI has revolutionized lifestyles and perceptions globally (Garcia, 2016), opening new pathways for education by helping students acquire novel skills (Chatila et al., 2017). Its influence is seen from nursery schools to tertiary institutions. AI in education is a hot topic due to its rapid transformation of learning processes, fueled by increased availability of AI-based tools (Mohan, 2021). Examples include:

- **Grading Automation Tools:** Such as GradeScope, which streamline grading.
- **Paperwork Assistants:** Tools like iScanner and ABBYY FlexiCapture facilitate document management.
- **Chatbots:** Including Botsify, Juji, Woebot, and Ivy, which aid in answering questions, onboarding, and providing support.

- **Nuance Dragon Speech Recognition:** Transcribes speech quickly and supports navigation via voice.
- **Intelligent Robots:** Enhance teaching through interactive, sensor-based monitoring (Thakkar, 2022).
- **Altitude Learning:** An AI-driven platform promoting learner-centered education (Thakkar, 2022).
- **Knowji:** An audio-visual tool for rapid vocabulary acquisition (Thakkar, 2022).
- **Knewton's Alta:** Provides comprehensive instructional content (Thakkar, 2022; WALs, 2022).
- **Century Tech:** Tracks progress and personalizes learning pathways (Thakkar, 2022).
- **Carnegie Learning Platforms:** Offer innovative solutions in language and mathematics.
- **Cognii:** A cost-effective virtual learning assistant (Romanyuk, 2022).
- **Brainly:** Facilitates collaborative learning among students, parents, and experts.

Benefits of AI in Agricultural Education

AI has transformed traditional learning methods from mobile courses to virtual classrooms. Gupta (2022) projects that the eLearning market will exceed 243 billion USD by the end of 2022, driven by AI services. AI has revolutionized teaching, unlocking new potentials, challenges, and prospects (Hsieh & Tsai, 2017). Zhai et al. (2020) found AI to be an effective alternative for traditional assessments, and Yang (2021) highlighted its role in supporting complex STEM tasks such as scientific writing. The aim of AI in education is to enhance students' critical thinking, creativity, problem-solving, and collaboration by integrating STEM elements into all educational activities (Lin et al., 2021).

According to Xue (2022), this system alleviates teachers from the burden of marking exam papers and performing statistical tasks, while swiftly and accurately inputting answers for each test paper and recording them into a database that provides a rich information base. The application of artificial intelligence will revolutionize the dissemination, extraction, and impartation of knowledge, setting in motion a transformative shift in education. In contrast to conventional teaching methods, AI offers enhanced expressive forms that provide students with vivid visual experiences; it supplies effective, integrated resources that deliver multifaceted learning experiences; it ensures proper management of knowledge; it fosters self-directed inquiry-based learning, thereby cultivating autonomous learning abilities; and it supports guided learning, with courseware delivering substantial content rather than empty lectures.

Artificial Intelligence greatly benefits both learners and instructors by assuming time-consuming tasks such as handling paperwork, grading assignments, maintaining reports, and similar functions. AI can be effectively employed in teaching agricultural education courses, ensuring effective instruction and the proper teaching and learning of agricultural science. Specifically, AI is applicable to courses, lecturers, and students in several ways:

1. **Personalized Learning:** Careerera (2023) explains that AI has sparked a revolution in education by enabling personalized learning, developing courses and activities tailored to students' needs and interests based on data. Technology giants like Google now gather vast amounts of data on individual user preferences due to AI advancements, allowing them to deliver customized content that retains users on an app or website longer than previously possible. Romanyuk (2022) adds that personalization allows systems to select the most suitable comprehensive courses and reliable resources for

each individual, eliminating weaknesses by rapidly adapting to student peculiarities. Not all students learn at the same pace; some are above average, average, or below average. With AI, the need for repetition is guaranteed via uniform interaction. AI personalizes both student and educator learning processes, enabling instructors to identify lessons needing reinforcement and adjust their courses to address knowledge gaps or challenges. AI in education ensures that software is personalized for every learner, and with supporting technologies such as machine learning, it adapts to how a student perceives lessons, thereby minimizing the burden (Gupta 2022). AI can tailor content to students, creating a personalized learning experience rather than a one-size-fits-all approach (Hooper, 2023). Heath (205) states that AI-powered chatbots and virtual assistants can offer instant support and guidance to students, assisting with homework, answering queries, and providing feedback.

2. **Task Automation:** AI handles numerous tasks, including homework, test grading, report maintenance, and administrative duties. AI-driven task automation renders the learning environment more productive and efficient. A telegraph survey in Karandish (2021) revealed that teachers devote 31% of their time to lesson planning, grading, and administrative work. With automation tools, teachers can streamline manual processes, allowing more focus on core teaching competencies. Leewayhertz (2023) notes that AI can automate grading and assessments, reducing educators' workload and enabling them to offer more targeted support. This also facilitates digital lesson creation and frequent content updates.
3. **Smart Content Creation:** AI serves as a tool for information visualization by enabling the creation of teaching methods in 2D and 3D formats, allowing students to perceive information through multiple perspectives. AI and machine learning also aid teachers and researchers in developing innovative, convenient teaching content (Gupta 2022). The advent of technology makes students feel more connected and engaged with their learning experiences. AI in education has transformed learning by providing virtual reality lessons that immerse users in alternative environments or scenarios (Singh, 2023).
4. **Adaptable Access:** Information in the education market is now globally accessible through AI. A recent survey projects that over 60% of education businesses rely on AI and machine learning-based education app development supported by modern tools (Gupta 2022). AI plays a crucial role in instructing audiences with visual or hearing impairments.
5. **Classroom Vulnerabilities:** A major benefit of AI is preserving a positive learning environment. Although some believe AI will dominate the education market as it has in other sectors, in education it is designed to complement rather than replace traditional methods.
6. **Closing Skill Gaps:** AI and machine learning-powered software solutions, which are widely affordable, provide opportunities for students to upskill. Deep learning and machine learning in education impact learning and development by analyzing how individuals acquire skills.
7. **Customized Data-Based Feedback:** Feedback is essential in any organization, including education. Instructors and learners need performance feedback. Intelligent tutoring systems provide students with the correct answers and have proven more effective than traditional methods alone (Techbaji staff and Ullah 2023). AI in education determines and analyzes daily work reports, helping learners identify deficiencies, address them, and eliminate bias, which enhances satisfaction.
8. **Secure and Decentralized Learning Systems:** AI-based decentralized solutions can drive a technical revolution in education by addressing issues such as outdated

certification processes and data protection. For example, Nova, a blockchain-based learning management system developed by Appinventiv, tackles genuineness and authentication issues prevalent in education. This LMS is powered by AI and blockchain technology, offering data and information protection solutions to millions of teachers and students (Gupta 2022).

9. **AI in Examination:** AI systems can be utilized in interviews and examinations, proving to be one of the most effective online exam solutions. They use webcams, microphones, web browsers, and keystroke analysis to detect suspicious behavior. Leewayhertz (2023) states that AI can monitor online exams to prevent cheating and ensure fairness, thereby reducing teachers' workload while ensuring a secure testing environment.
10. **Effective Time Management:** In traditional classrooms, instructors struggle to manage time due to tasks such as note-taking, explanations, and Q&A sessions. With AI tools, instructors can better manage their time, reduce stress, and maintain effective teaching.
11. **Reduction of Errors:** AI assists in minimizing human errors. Robotic process automation manages data entry and processing more efficiently, reducing errors. Many tasks previously performed by humans are now automated, including grading tests and assignments, which has notably reduced human errors (Singh, 2023).
12. **Engaging Learners:** Gamification and virtual reality are advanced technologies that integrate learning processes by keeping students engaged. These platforms often feature vast databases with millions of questions, comprehensive idea coverage, animated content, gamified quizzes, and flashcards, providing engaging and fun learning opportunities (Loftus and Madden 2020). Intelligent systems can also offer information from varied perspectives, adapting to different learning styles and understanding levels (Singh, 2023).
13. **Intelligent Tutorial:** AI-powered tutorial systems provide real-time feedback and support based on student responses, improving understanding of complex concepts (Leewayhertz, 2023). Since teachers have limited time, AI in the form of chatbots or virtual tutors helps students enhance their skills and address weaknesses outside traditional classrooms (Romanyuk, 2022). Intelligent Tutoring Systems (ITSs) offer personalized feedback, comparing a student's performance with peers in virtual labs or simulations (Careerera, 2023; Singh, 2023).
14. **Predictive Analytics:** AI analyzes student performance data to identify potential problems and predict future outcomes, enabling early intervention and targeted support for struggling students (Leewayhertz, 2023). AI can integrate into modern education by facilitating dynamic scheduling and predictive analysis, helping teachers plan lessons better and reducing class scheduling conflicts (Singh, 2023).

Constraints of AI in Teaching Agricultural Education

AI in education may alter the dynamics of face-to-face interaction between learners and instructors. Previously, teacher-student interactions were frequent, but with AI, such meetings may become rare.

1. **Social Influence:** A study in India on college students' reception of social networking tools for learning showed that social influence shapes behavioral intentions (Hooper, 2023).
2. **Perceived Risk Theory:** Users may fear the outcomes of using AI.

3. **Functional Risk:** Concerns exist over the accuracy and quality of AI outcomes.
4. **Psychological Problems:** These involve the psychomotor effects on students.
5. **Decrease in Human Interaction:** A drawback is that, without human interaction, students may not develop essential social skills needed for future employment and social relationships (Careerera, 2023). Distraction by AI is also a concern.
6. **Emotional Intelligence Deficit:** AI lacks emotional intelligence, preventing it from teaching empathy and communication skills, which are vital for student success (Careerera, 2023; Singh, 2023).
7. **Technology Addiction:** With technology integrated into every class, students might become overly dependent on digital devices, potentially leading to future societal issues of technology addiction and poor social adaptation (Kandamby, 2021; Singh, 2023).
8. **High Cost and Scalability:** Implementing AI in schools involves significant budgeting challenges, such as powering AI assistants, which could lead to high operational costs and strain on resources (Kandamby, 2021).
9. **Unemployment:** AI might replace human teachers, leading to job losses as computers take over instructional and grading tasks, reducing the need for multiple educators (Careerera, 2023; Singh, 2023).
10. **Centralized Control of AI:** If AI systems are hacked, malicious actors could spread harmful information, denying students and teachers access to accurate data (Kandamby, 2021).
11. **Uncertainty with Virtual Assistants:** It remains unclear whether students will remain engaged and motivated when supervised by virtual assistants instead of human teachers, as the traditional excitement generated by a specific teacher may not be replicated by AI (Kandamby, 2021).
12. **Communication Difficulties:** The most significant drawback is a potential communication gap between teachers and students if robots replace human instructors, as machines lack the contextual understanding and social cues inherent in human interaction (Singh, 2023).

Conclusion

In conclusion, Artificial Intelligence (AI) can substantially aid in teaching Agricultural Education, enhancing student academic performance and alleviating teachers' workload. Recommendations include: (1) Parents and teachers should embrace AI in teaching and learning; (2) Curriculum developers should integrate AI studies into school curricula; and (3)

Governments and philanthropists should fund AI advancements to propel technological progress.

References

Ayodele, O. S, Obafemi, F. N and Ebong, F. S. (2013). Challenges facing the achievement of the Nigeria Vision20:2020. *Global Advanced Research Journal of Social Sciences (GARJSS)*, 2(7), 143-157.

Betz .S. & Urwin, M, (2023). What is artificial general Intelligence? Https;//builtin .com/artificial-intellegence/artificial general-intellegence

Biswas. A. (2022) AI applications to 14 artificial intelligence, Application 2023 https;//www.simplilearn.comtutorials-intellegence-tutorial artificial.

Danko .T. (2006). Vocational education and national development. *Journal of Technical and Vocational Education studies* 3 (2).

Duse ,A,I ,Zakarai .H &Mohammed A,A,.(2018) Effectiveness OF project method of teaching on agricultural knowledge and skill Acquisition among Agricultural Science student of Awe Senior High school in the Upper East region, Ghana World Journals of Educational Research and Review 4(1) 062-075 ISSN-0437-2611.

Gupta .D (2022). Ten ways Artificial intelligence is transforming the education industries.https;//appinventi,com/blog/10-ways-a-i-transforming-the-educational-industries-amp.s

Heath .N. (2018). What is Artificial General Intelligence? (AGI) https;/www.zdnet.com/artificial –intelligence

Hooper .H, (2023). Benefits of AI in education with examples https;//virtualspeech.com/blog/benefits-ai-education.

Hsieh .W.W & Tsai. C.C (2017). Taiwanese high school teacher's conception of mobile learning. Comp Education. 115(2017), 82-85, 10.1016.computer edu2017.

Kanade , V, (2022). What is super artificial intelligence (SAI)? Definition, threats and trends. https//www.spicework.com/techartificail intelligence/super-artificial-intelligence/amp

Karandish, D(2021). 7 Benefits of AI in education https;//thejournal.com/articles/2021/06/23/7-benefits-of-ai-in-education,Aspx?m=1.

Leewayhertz (2023). Building smarter classroom; the benefits and cases of AI in education https;//www.leewayhertz.com/ai-use-case-in-education/

Loftus .M & Madden .M.G. (2020). A Pedagogy of data and artificial intelligence for student subjectification. Teaching in higher education 2020;25 (4);456-475.DOI10,1080/135625,2020.1748593.

Maria. S. (2022). Artificial intelligence in education, https/www,unief.org/artificiallintellgence in education/

Marr. B. (2021). What is the four types of AI? *https//ibernardmarr.com/what-are-the-four-types-ai.*

Mohammed, P, S. &Watson E.M. (2019). Towards inclusive Education in the age of Artificial intelligence; Perspective and Opportunities. IN; Knor ,J. Nang, Y, Gallaghe M (eds)artificial intelligence and special education. Perspective on rethinking and reforming education,Singapore;springer;https//doi,org/10.1007/978-981-13-8161-42

Romanyuk .O (2022). AI in Education. Benefit, Example and future opportunities https//keenethics,com/blog/AI-education=benefit-example and future-opportunities

Singh .R. (2023). Advantages and Disadvantages of artificial intelligence in education. Https//teahbaji.com/education/advantages /disadvantages-artificial-intelligence-education/? amp 1

Singh (2022). Benefit of using AI Chabot in the educational sector,https/www.kaptureem.con/blog/11-benefit-of-using-chatbot-in-education

Techbaja staff & Ullah. R. (2023). Advantages and disadvantages of artificial intelligence in neducation https;/techbaja.co/education/advantages-disadvantages-artificial-intellegence-education/

Thakkar, R, (2022). Best 8 AI Gadget for education made learning simple and fun https//allgadgets/blog.com/ai-gadgats –for –education.

Xue .Y. and Wang .Y. (2022). Artificial intellegence for education and teaching, wireless communication and mobile computing 2022(10) 4750018,*https;//doi-org110.1155/2022/4750018*

Yang S .J (2021). Guest Editorial; Precision education, A New challenge for AI in education. Journal education technology vol 24,105-108