

UTILIZATION OF ARTIFICIAL INTELLIGENCE AS A MODERN PEDAGOGY IN AGRICULTURAL EDUCATION IN COLLEGES OF EDUCATION IN ANAMBRA STATE

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Abstract

The study focused on utilization of artificial intelligence as a modern pedagogy in Agricultural education in Colleges of Education in Anambra State. Three research questions guided the study and the study was a survey research. The study was conducted in two public colleges of education in Anambra State that offer Agricultural Education. The population of the study comprised of 28 Agricultural education lecturers in these two colleges of education namely Federal College of Education (Technical), Umunze and NwaforOrizu College of Education Nsugbe. Structured questionnaire which was duly validated by three experts in Agricultural Education and Measurement and Evaluation was used for data collection. The reliability coefficient of the instrument was obtained using Cronbach Alpha which yielded a reliability coefficient of 0.85. Data collected was analyzed using mean and standard deviations. Results of the study revealed that the following A₁ Forms are available: Deep learning, Natural language processing, robotics, supervised learning, generative A₁, chatbot etc. The challenges of A₁ in teaching Agricultural education includes fear of reinforcing bias, dehumanization, widespread of adoption of A₁ could lead to technological unemployment. There may be a period automation shock, A₁ may be vulnerable to hacking etc. The strategies for improving the utilization of A₁ in Agricultural education includes retraining of lecturers on the use of A₁, students should be sensitized on A₁, adopting human centred A₁ design etc. The study recommends amongst others that capacity building workshops should be organized for lecturers by the colleges, proper funding of Agricultural education to enable them purchase technological tools, sensitizing students on how A₁ should be used.

Key words: Artificial intelligence, Agricultural education, Colleges of Education, Utilization, Pedagogy

Introduction

Education is a useful tool for individual and social empowerment. The goal of any educational system is to provide or develop a balanced individual capable of surviving in his environment and contributing meaningfully towards the survival of the society. There are different levels of education such as primary, secondary and tertiary levels including colleges of education.

Colleges of education is one of the tripods of tertiary education in Nigeria which are established to train and equip teachers for their esteemed function. Njuku (2020) stated that these institutions serve as centre for research into the various areas of education. Many courses are offered in these institutions like Business education, Computer education, Biology, Chemistry, Physics, Adult education, Agricultural education e.t.c.

Agricultural education is the process of imparting knowledge, skills and attitudes in Agriculture to the learner at any level. Osinem (2018) opined that Agricultural education emphasizes skill development in all aspects of agribusiness such as planning, safety, management, finances and leadership. To acquire skills in Agriculture, many methods are used in teaching Agriculture but the most common method in tertiary institutions is the lecture method. In this era of development, there has been an evolution of technologies. These emerging technologies in their

diverse areas require special skills to utilize them. The world is changing technologically through information and communication technology which has revolutionized the whole world into global village. The role of technology in teaching and learning is rapidly becoming the most important and discussed issues in contemporary education policy. Hence the introduction and use of light technology like computer has simplified complex tasks and processes. The application of computer technology has permeated virtually every aspect of human endeavor especially the artificial intelligent aspect. Artificial intelligence refers to the simulation of human intelligence by machines often in the form of computer systems. It is a broad field that covers many aspects of technology like natural language processing (NLP), computer vision and machine learning. According to Njuku (2020) A_1 is playing a role in education for example, there is A_1 powered learning software that can adapt to students learning style and pace, personalizing the educational experience. Long and Mageko (2020) opined that the use of A_1 improves experiences like digital simulation, manipulation and interactivity. Hwang, XieWah and Gasevic (2020) stated that A_1 enables new forms of interaction that students and lecturers can speak, gesture, sketch and use other natural human modes of communication to interact with a computational resource. Russel (2022) opined that A_1 can be used for scientific research and discoveries in fields such as education, astronomy, medicine etc.

There are various forms of A_1 , these includes: Deep learning, a type of machine learning that uses neural networks inspired by the function and structure of human brain. Artificial general intelligence which can perform any task a human can, robotics which is the application of A_1 to physical robots allowing them to perform tasks. Natural language processing (NLP) which is a type of A_1 that allows computers to understand and generate human language. Supervised learning, a type of machine learning where the A_1 system is trained using labelled data so that it can learn to predict a specific output based on a given input, Hybrid A_1 which is a combination of A_1 like machine learning and rule based systems to create more flexible solutions. Swarm A_1 which is the type that involves co-ordination of multiple agents or devices, working together to solve problems or perform tasks. Chatbot is a computer aided virtual assistant that can understand and respond to written or spoken language. Despite the advantages of A_1 in education, there are also some disadvantages of A_1 and these include fear of bias, dehumanization, hacking and problem of integrating A_1 into existing educational framework.

Statement of the Problem

The ultimate goal of a quality education is to allow the students to leave with skills and abilities that they did not have previously. The world is advancing at a rapid rate. The invention of computer has brought a lot of innovation and revolution into teaching and learning. Many traditional methods failed to meet up with the technological age. Educators seek technology-enhanced approaches that would meet up with the era. Utilization of artificial intelligent aided tool may be the answer. Despite its advantages in the field of education, the concern now is the challenges this new development will bring in our institutions, therefore the researcher deemed it necessary to look at the utilization of A_1 as a modern pedagogy in Agricultural education in colleges of education.

Purpose of the Study

The main aim of the study is to explore the utilization of Artificial intelligence as a modern pedagogy in Agricultural education in Colleges of Education in Anambra State. Specifically, the study intends to:

- (1) find out the various forms of artificial intelligence for teaching of Agricultural education.
- (2) find out the challenges facing the use of A_1 in teaching of Agricultural education in Colleges of Education.

- (3) determine the strategies for improving the use of A₁ in teaching Agricultural education in Colleges of Education.

Research Questions

The following research questions were posed to guide the study:

- (1) What are the various forms of A₁ in teaching and learning of Agricultural education in Colleges of Education?
- (2) What are the challenges facing the use of A₁ in teaching of Agricultural education in Colleges of Education?
- (3) What are the strategies for improving the use of A₁ in teaching of Agricultural education in Colleges of Education?

Methods

The researcher employed survey research design which make use of structured questionnaire. The study was conducted using two Colleges of Education in Anambra State that offer Agricultural education. The population of the study comprised of 28 Agricultural education lecturers from two colleges of education in Anambra State namely, Federal College of Education (Technical) Umuze and Nwafor Orizu College of Education, Nsugbe (Source: Statistics Units of two Colleges of Education, 2024). Structured questionnaire was the instrument used for data collection. The questionnaire was constructed using four point scale of Strongly Agreed, Agree, Strongly Disagreed and Disagreed. Draft copies of the questionnaire were given to three lecturers in the Department of Agricultural Education and Measurement and Evaluation, Federal College of Education (Technical), Umuze for validation. Their criticisms were used to effect the correction in the questionnaire. The reliability of the instrument was determined by administering the instrument to 10 lecturers from Federal College of Education (Technical), Asaba. Cronbach Alpha was used to analyze the data obtained. A reliability coefficient of 0.85 was obtained. The instrument was administered personally by the researcher. Mean and standard deviations was used to answer the research questions. The response for the questionnaire were categorized as follows:

Strongly Agree	(SA)	=	4
Agree	(A)	=	3
Strongly Disagree	(SD)	=	2
Disagree	(D)	=	1
$X = \frac{4+3+2+1}{4} = \frac{10}{4} = 2.50$			

Therefore the mean responses of 2.50 and above is accepted while the mean response below 2.50 indicate rejection.

Results

The following results were presented:

Research Question 1: What are the various forms of A₁ in teaching Agricultural Education in Colleges of Education.

Table 1: Means and Standard Deviations of Respondents on various Forms of A₁ in Teaching Agricultural Education in Colleges of Education.

S/N	Forms	$\bar{x}$	SD	Remark
1.	Deep learning.	3.04	0.55	Agreed
2.	N.L.P. (Natural Language Processing)	2.91	0.63	Agreed
3.	Robotics	2.99	0.78	Agreed
4.	Supervised learning.	3.11	0.58	Agreed
5.	Generative A ₁	3.55	0.89	Agreed
6.	Symbolic A ₁	3.61	0.77	Agreed
7.	Edge A ₁	2.71	0.46	Agreed
8.	Hybrid A ₁	3.51	0.80	Agreed
9.	Swarm A ₁	3.70	0.55	Agreed
10.	Chat GPT	2.80	0.74	Agreed
11.	Voice Assistants	2.77	0.58	Agreed
12.	GPT – 3	2.58	0.91	Agreed
13.	Analog A ₁	2.98	0.66	Agreed
14.	Chatbot	3.17	0.75	Agreed
15.	Artificial general intelligence	3.12	0.88	Agreed
Grand $\bar{x}$ and SD		3.10	0.70	Agreed

All the items above had mean values above the cut-off point of 2.50 and were all agreed by the respondents. The grand mean of 3.10 and standard deviation of 0.70 showed that the respondents have a consensus opinion on all the items.

Research Question 2: What are the challenges facing the use of A₁ in teaching Agricultural Education in Colleges of Education?

Table 2: Means and Standard Deviations of Respondents on Challenges facing the use of A₁ in Teaching Agricultural Education.

S/N	Challenges	$\bar{x}$	SD	Remark
1.	Fear of reinforcing bias.	2.53	0.48	Agreed
2.	Dehumanization.	3.59	0.55	Agreed
3.	Widespread of adoption of A ₁ could lead to technological unemployment.	2.67	0.61	Agreed
4.	A ₁ may lack the ability to innovate or create truly novel class.	2.66	0.85	Agreed
5.	There may be a period of automation shock.	2.91	0.99	Agreed
6.	A ₁ systems may be vulnerable to hacking.	3.18	0.46	Agreed
7.	It can be difficult to assign responsibility when A ₁ Systems make mistakes.	3.78	0.78	Agreed
8.	There are currently no comprehensive regulations for A ₁ systems.	3.52	0.49	Agreed
9.	As A ₁ systems becomes more complex, it becomes harder to understand and debug their behavior.	2.67	0.65	Agreed
10.	A ₁ surpasses human intelligence and autonomy.	2.88	0.71	Agreed
11.	The working of A ₁ systems can be difficult to understand and explain making it hard to identify and correct problems.	2.62	0.79	Agreed
12.	A ₁ systems may make decisions or take actions that conflict with human ethics.	3.33	0.51	Agreed

13.	A ₁ systems may gather and process sensitive personal data raising privacy concern.	2.99	0.73	Agreed
14.	There is the problem of digital divide among users.	2.77	0.51	Agreed
15.	Problem of integrating A ₁ into existing educational framework.	3.44	0.61	Agreed
Grand $\bar{x}$ and SD		2.92	0.64	Agreed

All the items had mean values above the cut-off point of 2.50 and were all agreed by the respondents. The grand $\bar{x}$ of 2.92 and standard deviation of 0.64 showed that the respondents have a consensus opinion in all the items.

Research Question 3: What are the strategies for improving the use of A₁ in teaching Agricultural Education in Colleges of Education?

Table 3: Means and Standard Deviations of Respondents on Strategies for Improving the Use of A₁ in Teaching Agricultural Education in Colleges of Education.

S/N	Strategies	$\bar{x}$	SD	Remark
1.	There is the need for retraining of lecturers on A ₁ .	3.15	0.65	Agreed
2.	Students should be sensitized on use of A ₁ .	3.74	0.73	Agreed
3.	Adopt human centred A ₁ design.	2.73	0.91	Agreed
4.	Improve data privacy by using technologies like differential privacy to protect user data.	2.80	0.58	Agreed
5.	Emphasizing interdisciplinary collaboration to address the social and ethical implications of A ₁ .	3.11	0.52	Agreed
6.	Developing standards and guidelines for A ₁ development and regulations.	3.52	0.85	Agreed
7.	Funding of A ₁ research by the government.	3.65	0.71	Agreed
8.	Developing robust security measures to protect A ₁ Systems from cyber attacks.	2.60	0.91	Agreed
9.	Promote A ₁ accessibility.	2.71	0.48	Agreed
10.	Developing rigorous safety measures for A ₁ systems like “off switches”.	2.51	0.73	Agreed
Grand $\bar{x}$ and SD		3.05	0.70	Agreed

All the items had mean values above the cut-off point of 2.50 and were all agreed by the respondents as the strategies for improving the use of A₁ in Colleges of Education. The grand $\bar{x}$ of 3.05 and standard deviation of 0.70 showed that the respondents have a consensus opinion in all the items.

Discussion of Findings

Research question 1 was designed to find out the various forms of A₁ in teaching Agricultural education in Colleges of Education.

The results of the study revealed various forms such as deep learning, NLP, robotics, supervised learning, generative A₁, symbolic A₁, Edge A₁, Hybrid A₁, Swarm A₁, Chat GPT, voice assistants, GPT-3, Analog A₁, chatbot. The results of the study were in line with the work of Forbes (2023) who stated that the forms of A₁ includes chatbot, Hybrid A₁, shortly A₁, voice assistants and problem solving.

Also Barrat (2022) opined that the following A₁ tools could be effectively used in teaching and learning: Edge A₁, artificial general intelligence, problem solving, chatbot, GPT-3 and chat-GPT.

Research question 2 seeks an answer to the challenges of A₁ in teaching Agricultural education in colleges of education. Results of the study revealed the following challenges: fear of reinforcing bias, dehumanization, widespread of adoption of A₁ could lead to technological unemployment, A₁ may lack the ability to innovate or create truly novel class, there may be a period of automation shock, A₁ system may be vulnerable to hacking, it can be difficult to assign responsibility when A₁ systems make mistakes, there are currently no comprehensive regulations for A₁ systems, As A₁ system becomes more complex, it becomes harder to understand and debug their behavior, A₁ surpasses human intelligence and autonomy, the working of A₁ systems can be difficult to understand and explain making it difficult to identify and correct problems, A₁ systems may make decisions that conflict human ethics, A₁ may gather and process sensitive personal data raising privacy, there is the problem of digital divide among users and problem of integrating A₁ into existing educational framework. The findings were in line with the work of Long and Mageko (2020) who postulated that the factors militating the use of A₁ includes fear of job displacement, security risk from hacking and privacy violation. Ikaifu (2021) stated that A₁ may gather and process sensitive personal data raising privacy concern and difficult to detect plagiarism.

Hwang, Xie, Wah and Gasevic (2020) opined that the problem of using A₁ is dehumanization and there may be a period of automation shock. Hovik (2021) in his view stated that the greatest challenge facing the use of A₁ is that there is currently no comprehensive regulations for A₁ systems and that the working of A₁ systems can be difficult to understand and explain. Gilbert (2022) was of the view that A₁ may have a lot of challenges, amongst which includes lack of creativity, security risk from hacking and privacy violations.

Research question 3 was designed to find out the strategies for improving the use of A₁ in teaching Agricultural education. Results of the study revealed such strategies as retraining of lecturers, sensitizing students on the use of A₁, adopting human centred A₁ design, improving data privacy, emphasizing interdisciplinary collaboration to address the social and ethical implications of A₁, developing standards and guidelines for A₁ development and regulations, funding of A₁ research by the government, developing robust security measures to protect A₁ systems from cyber attacks, promote A₁ accessibility, developing rigorous safety measures for A₁ systems like “off switches”. These findings were in line with the work of Russel (2022) who stated that data privacy of A₁ should be ensured by using technologies like differential privacy to protect user data.

Also, Ofodile (2023) opined that retraining of lecturers on the use of Artificial intelligence will motivate them to adopt it as a teaching tool. Gazzanigba (2022) stated that there is the need for different disciplines such as computer, industrial, technological, electrical education e.t.c. to collaborate to address the social and ethical implications of A₁. Bostrom (2021) stated that the use of A₁ can be improved by developing standards and guidelines for A₁ development and regulations, the government should fund A₁ research to enable the researchers come up with many guidelines for effective use of A₁ and to address the social and ethical implications of A₁.

Conclusion

The paper has identified the various forms of A₁, challenges and strategies for improving the use of A₁ in teaching Agricultural education. Lecturers should adopt this new innovative method so as to enable the students acquire skills in agriculture. Research in A₁ should explore issues such as data privacy, transparency, fairness and bias mitigation. By so doing all the challenges identified in this study will be tackled. This will help the lecturers to utilize A₁ and attain the aim

of Agricultural Education which is geared towards self employment and sustainable workforce development.

Recommendations

Based on the findings of the study, the following were recommended:

- (1) Capacity building workshops on A₁ should be organized for lecturers by the Colleges of Education to update their knowledge.
- (2) Adequate funding of Agricultural education to enable them purchase technological tools.
- (3) Stakeholders should improve data privacy by using technologies like differential privacy to protect user data.
- (4) Agricultural Education students should be sensitized on the use of A₁ to avoid digital divide amongst the students.
- (5) Stakeholders should enhance the A₁ centred instructional delivery to match the trends of 21st century skills.

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