LEVERAGING ON ARTIFICIAL INTELLIGENCE TECHNOLOGIES FOR IMPLEMENTATION OF SENIOR SECONDARY SCHOOL AGRICULTURAL SCIENCE CURRICULUM IN RIVERS STATE

BY

Victor Ojorka AKOR, PhD[1], Joseph Ojoniko AMEH[2], Umor Augustine OKONNY, PhD[3]

[1,2]Department of Educational Foundations, Faculty of Education, Prince Abubakar Audu University, Anyigba, Kogi State
[3]Department of Curriculum and Instructional Technology, Federal College of Education (Technical), Omoku, Rivers State

Abstract

This paper investigated leveraging on artificial intelligence technologies fo implementation of senior secondary school agricultural science curriculum in Rivers State. The research work used descriptive survey design with a population of 82 teachers and a sample size of 40 derived by stratified disproportionate sampling technique. The study was guided by two research questions. The instrument for data collection was a structured questionnaire by the researchers with 14 items measured on a modified 4-point Likert scale. The instrument was validated by three experts. The reliability coefficient of the instrument 0.71 was calculated using Cronbach-alpha. Data analysis was done using mean and standard deviation. Findings showed that the teacher leveraged on artificial intelligence technology through computer-supported means and that private school teachers leveraged on artificial technologies more than their public school counterpart. It was recommended that agricultural science teachers should develop themselves further on how to leverage on emerging artificial intelligence technologies for better output in curriculum implementation, students of senior secondary school agricultural science should be oblige the opportunity for adequate practical sessions to consolidate capacity, education stakeholders should help to give schools support in the area of provision of artificial intelligence gadgets, etc.

Keywords: Artificial intelligence, technologies, curriculum implementation, agricultural science

Introduction

Artificial intelligence is the replicate of human intelligent tendencies observed from machines. Thus, it is the simulation of human intelligence using machines. Laskowski (n.d.) defined artificial intelligence as the simulation of human intelligence processes using aspects of artificial intelligence like expert systems, natural language processing, speech recognition and machine vision, etc. Scott (2023) says it is simulation of human intelligence using software coded ideas. Therefore, artificial intelligence deals with technologies that allows computations to reason, learn, and act in ways that previously required human intelligence. This means that artificial intelligence is the application of such technologies or the application of scientific knowledge towards solving human problems. Diaz (2024) mentioned some of the application of artificial intelligence in areas of learning, problem-solving, creativivty, forecasting and predictability, social intelligence facilcities data analysis automation of data, and the optimization of supply chain.

All these are pointing to the fact that artificial intelligence as obtainable from a machine only share some characteristics of human intelligence as shared or given, thus, the capacities of such as machine is limited to the extent they are empowered to act. This means that whatever one desires of artificial intelligence is possible based on what the need is. So, curriculum development or implementation is possible with artificial intelligence in the areas of the lesson implementation or development or even to save time in lesson delivery. Sharma (2023) asserted that artificial intelligence is changing the dynamics of curriculum development, particularly, in the creation of content and developing lesson programs etcntation as highlighted means execution, a step-by-step approach adopted for bringing about learning in the learner. It is ensuring that the content available for the learner to learn is actually learnt. According to Akor (2021), curriculum

implementation is the detailed approach adopted by the learner to assimilate the content of a material presented to him or her.Amadioha (2010) has said it is the step-by-step execution of a planned learning content. Therefore, it means that implementation process of the senior secondary school agricultural science curriculum would not just require a method of teaching but also strategies, approaches or even techniques, hence, the idea of usinf artificial intelligence technologies as an approach could enhance teaching and learning process. This was affirmed by the assertion of Dike (2018) who said that when curriculum implementation takes place, it is expected that the various sense organs in the human body or of the learner be fully engaged in order to achieve the desired change in the behaviour of the learner. So, the use of artificial intelligence technological approach to implementing the senior secondary school agriculutural science curriculum would facilitate trhese characteristcs below in the learner and even more (Akor, 2021):

1. Learning becomes natural to the learner
2. Learning takes place in among the students
3. Learning is approached in its active nature
4. Learning is perceived as straightforward or branched
5. Learning is comprehensive and not compartmentalized.

This is perhaps possible because of the natural and practical nature of senior secondary school agricultural science curriculum content which permits it to be amenable to technological alliance. This Okorie (2001) had said is encouraged by the vocational nature of the subject which allows individuals to develop themselves fully in different skills and abilities, thereby, giving equal opportunities to everyone. Therefore, agricultural science in secondary school does not just equip the learner in cognitive competencies but also in social skills, economic skills, vocational skills, leadership skills among others. However, it is vital to say that the technological acceptance in the field gives it the leeway to enhance people's personality to becoming full and functional members of the society.

The above proposition perhaps informed the goals of secondary school education in the national policy on education and the objectives of agricultural science curriculum for secondary school (FRN, 2016; Okorie, 2001). So, as the national goals says:

a. Offer diversified curriculum to cater for the differences in talents, opportunities and future roles
b. Provide trained manpower in applied sciences, technology and commerce at sub-professional grades. For the objectives of agricultural science, they:
a. To stimulate and sustain students interest in agriculture
b. To enable students integrate knowledge with skills in agriculture.

Considering these goals and objective, they are not conceptions that would be attained with ease, therefore, it is imperative that dimensions of methods, techniques, approaches, and strategies would be required for its attainment, particularly, because agricultural science has several branches, thus, one method would not fit for all. So, the method needed for implementing animal science content would be different from that needed for crop science, and even in crop science the technology needed for managing tree crops. However, the emphasis of this discourse would be more on the idea of pest control. This is because in time past whole farming season efforts have been lost to pest and even when they are adequately contain the pesticides leave traces which are dangerous and harmful to the consumer of such crops. The ones that experience damage the most are vegetable crops. If this continues over time, the debilitating effect this may produce on human health. The question at this juncture is how would the leveraging on artificial intelligence enhance production of vegetable crops in that when taught to secondary school students they would be able to benefit from it maximally. Thus, the need to conduct the study leveraging on artificial intelligence technologies for implementing senior secondary school agricultural science curriculum in Rivers State. Specifically, the study sought to achieve the following objectives:

1. Determine level of leveraging on artificial intelligence technologies for implementation of senior secondary school agricultural science curriculum on pest control in Rivers State
2. Determine level of leveraging on artificial intelligence technologies for implementation by public and private senior secondary school agricultural science curriculum on pest control in Rivers State

The following are the research questions guiding the study:
1. What is the level of leveraging on artificial intelligence technologies for implementation of senior secondary school agricultural science curriculum on pest control in Rivers State?
2. What is the level of leveraging on artificial intelligence technologies for implementation by public and private senior secondary school agricultural science curriculum on pest control in Rivers State?

This hypothesis guided this study (P=0.05)
1. There is no significant difference between public and private senior secondary school on leveraging on artificial intelligence for implementation agricultural science curriculum on pest control in Rivers State.

Research Method

The study was carried out in secondary schools in Rivers State, Nigeria, particularly, in ten (22) secondary schools in Etche, Rivers State. The study adopted descriptive survey design. The population for the study was made up of 82 secondary school teachers in Etche Local Government Area, Rivers State. The sample for the study is made up of 40 secondary school teachers in Etche drawn using the stratified

disproportionate sampling, yet bearing similar features from different school in the entire population. The instrument used by the researcher for data collection was a questionnaire titled: Questionnaire on Leveraging on Artificial Intelligence for the Implementation of Senior Secondary School Agricultural Science Curriculum in Rivers State (QLAIISSSASCRS) which was constructed by the researchers. It consist of 14 items which were arranged in two sections A and B. Section A contains the biodata, while section B consists of two subgroups on level of leverage on artificial intelligence on implementation of curriculum on pest control and the level to which public and private secondary school leverage on artificial intelligence technologies. The questionnaire was built on a modified four-point Likert Scale, namely: Very High Level (VHL), High Level (HL), Low Level (LL), and Very Low Level (VLL), and the levels of responses are weighted as 4, 3, 2, 1 respectively.

The instrument was face validated by three experts, one from Measurement and Evaluation Unit and one from Curriculum and Instruction unit of Educational Foundations Department of Rivers State University, Nkoplu-Port Harcourt while the third is from the Department of Science Education, Prince Abubakar Audu University, Anyigba. The suggestions given were used in producing the final copy of the instrument. Cronbach alpha was used in calculating the reliability to determine the internal consistency which gave an alpha value of 0.71 which was considered high after it was administered on ten secondary school teachers in Obio/Akpor Local Government Area. The instrument was administered and collected back by the researcher on the spot. The data obtained were analyzed using, mean and standard deviation for answering the research questions, and the hypothesis tested with t-test. Hence, 4+3+2+1= 10/4=2.5.Therefore, items whose mean were less than 2.5 were seen as Low Level (LL) responses while those whose mean were 2.5 and above were seen as high-level (HL) responses. The decision rule on the null hypotheses was to reject the hypothesis with calculated Z-value greater than the critical Z-value but otherwise accept.

Results

Research Question 1: What is the level of leveraging on artificial intelligence technologies for implementation of senior secondary school agricultural science curriculum on pest control in Rivers State?

Table 1: Mean and Standard deviation on level of leveraging on artificial intelligence technologies for implementation of senior secondary school agricultural science curriculum on Pest Control in Rivers State

S/N	Items	Mean	SD	N	Remark
1.	Leverage on slides to display pest control	1.4	0.17	40	LL
2.	Leverage on filmstrips to display pest control	2.1	0.30	40	LL
3.	Leverage on instructional television to display pest control	2.3	0.17	40	LL
4.	Leverage on computer display of pest control	2.5	0.17	40	HL
5.	Leverage on CD-ROM to display pest control	1.9	0.24	40	LL
6.	Leverage on internet to display pest control	3.8	0.14	40	HL
7.	Leverage on World Wide Web to display pest control	3.7	0.14	40	HL
	Grand Mean and SD	**2.52**	**0.19**		

Source: Field Survey, 2024

Table 1 results showed that the level of leverage on artificial intelligence being at low level. The result indicated that the level of leverage on artificial intelligence technologies by the teachers that implement senior secondary school agricultural science curriculum is not appreciable. Though the grand mean and standard deviation (2.52 and 0.19) represent an average level of leverage on artificial intelligence for implementation of curriculum but that is still at a very low level in an age where technologies are summersaulting over each to be the most effective and the most used, it quite weakening that even the pace of leverage of older technologies stands the level above. Perhaps, the result is showing that there are no enough novel technological equipment or that even the available ones do not have qualified hands to handle them. Hence, the Rivers State government has a lot to do in the provision of the equipment and the training and retraining of teachers to be able to use such technological tools efficiently.

Research Question 2: What is the level of leveraging on artificial intelligence technologies for implementation by public and private senior secondary school agricultural science curriculum on pest control in Rivers State

Table 2: Mean and Standard Deviation on the Level of Leverage on Artificial Intelligence Technologies for Implementation by Public and Private Secondary School Agricultural Science Curriculum on Pest Control in Rivers State

S/N	Items	Public Secondary School			Private Secondary School			
		Mean	SD	Remark	Mean	SD	Remark	N
1.	Leverage on slides to display pest control	1.6	0.17	**LL**	2.4	0.24	**LL**	40
2	Leverage on filmstrips to display pest control	1.8	0.14	**LL**	2.6	0.24	**HL**	40
3	Leverage on instructional television to display pest control	2.3	0.12	**LL**	2.7	0.24	**HL**	40
4	Leverage on computer display of pest control	2.6	0.17	**HL**	3.2	0.37	**HL**	40
5	Leverage on CD-ROM to display pest control	1.8	0.14	**LL**	3.0	0.01	**HL**	40
6	Leverage on internet to display pest control	2.8	0.24	**HL**	3.4	0.17	**HL**	40
7	Leverage on world wide web to display pest control	3.3	0.12	**HL**	3.7	0.17	**HL**	40
	Grand Mean and Standard Deviation	**1.62**	**0.12**		**2.1**	**0.14**		

Source: Field Survey, 2024

The result on table 2 indicates that the response of the teachers in private showed high level of leverage of artificial intelligences technologies than their public school counterpart. From the result, the level of leverage on internet and World Wide Web stand at higher mean than the rest of the items responded to with mean (2.8 and 3.3) for public senior secondary school and (3.4 and 3.7) for private senior secondary school in Rivers State. Generally, the result showed that private senior secondary displayed a higher level of leverage on artificial intelligence technologies based o the output of the analyzed result. Therefore, it is vital that education stakeholders who are responsible for school upgrade should do well to upgrade the artificial intelligence technologies tools in senior secondary schools in Rivers State.

Hypothesis

1. There is no significant difference between public and private senior secondary school on leveraging on artificial intelligence for implementation agricultural science curriculum on pest control in Rivers State.

Table 3: Z-test for Extent of Availability of Digital Equipment in Public and Private Primary Schools in Rivers State

Group	Mean	SD	N	df	$Z_{calculated}$	$Z_{critical}$	Decision
Public	**1.62**	**0.12**	**40**	**78**	**16.0**	**1.96**	**Rejected**
Private	**2.1**	**0.14**	**40**				

Source: Field data, 2024.

The result of table 3 shows that Z-calculated of 16.0 is greater than the Z-critical 1.96 at 0.05 level of significance at 78 degree of freedom indicating that there is significant difference in the level of leverage on artificial intelligence for implementation of agricultural science curriculum between public and private school in Rivers State. Therefore, the null hypothesis of no significant difference is rejected.

Discussion of the Findings

The result on table 1 above showed the response on teachers on the level of leverage on artificial intelligence technologies for implementation of senior secondary school agricultural science curriculum in Rivers State. Indicated on the result as enjoying high level of leverage on artificial intelligence are: computer display of pest control mechanism, internet display of pest control, and world wide web display of pest control mechanism. This is affirming that the teachers use the computer mode of reaching the intent of pest control while the

older versions of artificial intelligence technologies seemed to have been relegated to the background as the teacher did not favour in implementing the senior secondary school agricultural science curriculum. While the teachers and school are commended the leverage on newer artificial intelligence technologies, it is also vital the they teach the students with them so the sake of the future either for archival reasons or for the use of such tools in the absence of these latest artificial intelligence technologies for curriculum implementation particularly in agriculture that is as old as man. The role of artificial intelligence as shown on the table above are confirmed by the findings of (TC, 2023; Rhaman & Ravi, 2022 & Khan, n.d.) who all asserted based on findings that leveraging on artificial intelligence is helpful in reducing crop loss by pest and disease infestation, enables detection, monitoring, prediction and identification for timely intervention as well as helping in facilitating automated image recognition of pest based on deep learning for proper control.

Next, the result on table 2 above indicated the level of leverage on artificial intelligence that public school teachers and private school teachers do for implementation of senior secondary school agricultural science curriculum. The result as shown on the table speaks to the fact that while the public schools maximize only computer-associated means to leverage on artificial intelligence for implanting agricultural science curriculum, the private school teachers are up to date with both older technical media and the newer ones. Though, the grand mean of the result on table 2 lays the fact bare that there is need for improvement in the way public senior secondary school teachers implement the agricultural science curriculum while private school teachers should build further on what they are already doing. The result of the hypothesis also confirmed the table 2 results as it showed that there is significant difference between the level of leverage on artificial intelligence technologies used by public and private school teachers, hence, the null hypothesis was rejected. Therefore, it vital to say that regular improvement in the equipment available and even the level of use of them is what would set the products of both public and private schools apart in the society in Rivers State.

Conclusion

The conclusion that could be drawn from the discourse above based on the findings are that more work is expected so that the students exposed to artificial intelligence technologies through practical sessions in the course of implementation of agricultural science curriculum should be given opportunities of farm practice where they would fully leverage on the available technologies to boost their competence in the use of such equipment. Also, the government should make available more equipment and tools for artificial intelligence in schools and get the teachers trained on how to use such.

Recommendations

The following are the recommendations supporting the study based on the findings:

1. Agricultural science teachers should develop themselves further on how to leverage on emerging artificial intelligence technologies for better output in curriculum implementation.
2. Students of senior secondary school agricultural science should be oblige the opportunity for adequate practical sessions to consolidate capacity.
3. Education stakeholders should help to give schools support in the area of provision of artificial intelligence gadgets.
4. The government should organize training for teachers in secondary school such that would boost their capacity and competence.
5. School heads should create space to house older version of artificial technologies alongside information on how to use them for future reference.

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