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Assessment of the Readiness to Adopt Technology Integration Approach for Teaching and Learning of Agricultural Science in Colleges of Education in North-West, Nigeria

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Abstract

The study examined the readiness to adopt technology integration approach for teaching and learning of Agricultural Science in Colleges of Education, in Northwest Nigeria. Three objectives were set for the study, among which were to: assess the availability and functionality of resources to adopt Technology Integration Approach for teaching and learning Agricultural Science in Federal and State Colleges of Education, Northwest Nigeria. Descriptive survey research design with a population of 945 and sample size of 428 were used for the study. Stratified random sampling technique was used to arrive at the sample for the study. Two instruments

namely checklist and questionnaire were used for data collection. The scores obtained from the pilot study were analysed using split half method of reliability and a reliability co-efficient of 0.83 was obtained. Data collected from the respondents were analyzed using frequency and mean to analyse the research questions and Mann-Whitney U test was used to test the null hypotheses at 0.05 level of significance. The results revealed among others that; Resources for adopting Technology Integration Approach in teaching and learning Agricultural Science were significantly more available and functional in Federal Colleges of Education than State Colleges in Northwest Nigeria (p-value = .000). The study concluded Federal Colleges of Education are more ready and prepared with resources to adopt Technology Integration Approach in teaching and learning Agricultural Science than State Colleges of Education in Northwest, Nigeria. The study recommended among others that State Colleges of Education should provide all resources needed by making them available and functional for the adoption of Technology Integration Approach in teaching and learning Agricultural Science in Northwest Nigeria.

Introduction

Globally in recent years, technological advancements have revolutionized various sectors, including education. Currently, many global education systems adopt e-learning, distance education, e-assessment, artificial intelligence, cloud computing, gamification, and many other digital technology-based techniques in instructional delivery and assessment (Aldosari, 2020; Holmes, Bialik and Fadel 2019). Information and Communication Technology (ICT) is one of the resources that when made

available, has a significant role to play on the outcome of educational programme in various institutions of learning especially in Colleges of Education (COEs) that are saddled with the responsibility of teacher training in Nigeria.

Agriculture is a deliberate effort made by man to till the soil, cultivate crops and rear animals for food and other purposes. It is a major sector of Nigerian economy which engages over 70% of the labour force and contributes about 40% of the Gross Domestic Product (GDP) (Adegoke, Ibe, and Araba, 2015). Agricultural education is a fundamental part of the competitiveness of farming systems worldwide. To maintain this competitiveness, agricultural education must integrate educational technologies into curriculum development and delivery (Xu, Adeyemi, Landaverde, Kogut and Baker, 2023). Integrating technology into Agricultural Education can enhance student engagement, improve learning outcomes, and better prepare graduates to address the evolving challenges facing the agricultural sector.

Technology in simple terms refers to the practical application of scientific knowledge to solve real-world problems and improve human welfare. Technology has inevitably become the most powerful tool in almost every aspect of human's daily life as is regarded as the precursor of major revolutions in various aspects of human endeavours, including education (Oluwasusi, Olagunju, Adeyose and Yekinni, 2021). Technology in Agriculture refers to the use of advanced tools and techniques to optimize crop yields and reduce inputs. These technologies include Internet of Things (IoT), smart sensors, wireless sensor networks (WSN), image processing, data analytics, artificial intelligence (AI), machine learning (ML), and precision agriculture. They enable farmers to monitor and manage various aspects of farming such as soil conditions, weather, crop health, and equipment performance (SCISPACE, 2024).

Colleges of Education in Northwest Nigeria play a pivotal role in training future educators, including those specializing in Agricultural Science. However, the integration of technology into teaching methodologies in these institutions remains relatively underexplored. Despite the potential benefits of technology integration, Colleges of Education in Northwest Nigeria encounter various challenges in adopting this approach. By examining the existing infrastructure, institutional support, and challenges, this research

sought to provide insights that can inform policy decisions and interventions aimed at fostering the effective use of technology in Agricultural Education in Colleges of Education in Northwest Nigeria.

Statement of the Problem

The integration of modern technological tools in education has made tremendous impact on the effective delivery of instruction in any academic environment. However, many developing and underdeveloped nations such as Nigeria do not really embrace the pragmatic adoption of technology integration in their education system. This is due to the fact that the Nigerian education system seems to be lagging behind among the League of Nations in terms of quality of education, resources and digital technology adoption for teacher education (Ridwan, Felix and Mohammed, 2019; Okolie, Nwosu, Eneje and Oluka, 2019; UNESCO, 2014). Colleges of Education in Northwest Nigeria play a pivotal role in training future educators, including those specializing in Agricultural Science. However, the integration of technology into teaching methodologies in these institutions remains relatively underexplored.

Over the past decade, several attempts have been made by the Federal Government of Nigeria to integrate information and communication technologies into education, especially with the provision of viable internet facilities and disbursement of Internet-ready gadgets. However, various research studies have highlighted the little impact these have made on the Nigerian school system. Similarly, it was noted by Adeoye and Nkang (2020); Lawal (2018); Ajayi and Ogunleye (2020), that not much of digital technologies are used in pedagogical practices by Agricultural Science Teachers in Nigerian Colleges of Education (COEs) and other institutions of higher learning in Nigeria. This therefore, prompted the researchers to assess the Readiness to Adopt Technology Integration Approach for Teaching and Learning of Agricultural Science in Colleges of Education in Northwest Nigeria.

Research Objectives

The specific objectives of the study were to:

1. assess the availability and functionality of resources to adopt Technology Integration Approach for teaching and learning

Agricultural Science in Federal and State Colleges of Education in Northwest, Nigeria;

2. determine whether lecturers possess relevant information and communication technology (ICT) skills for adopting Technology Integration Approach in teaching and learning Agricultural Science in Federal and State Colleges of Education in Northwest, Nigeria; and
3. ascertain the frequency of ICT usage for adopting Technology Integration Approach in teaching and learning Agricultural Science in Federal and State Colleges of Education in Northwest, Nigeria.

Research Questions

Based on the objectives, the following questions were formulated to guide the study;

1. What are the available and functional resources for adopting Technology Integration Approach in teaching and learning Agricultural Science in Federal and State Colleges of Education in Northwest, Nigeria?
2. What relevant ICT skills do lecturers possess for adopting Technology Integration Approach in teaching and learning Agricultural Science in Federal and State Colleges of Education in Northwest, Nigeria?
3. How frequent are Information and Communication Technology (ICT) resources used for adopting Technology Integration Approach in teaching and learning Agricultural Science in Federal and State Colleges of Education in Northwest, Nigeria?

Hypotheses

The following null hypotheses were tested in the study;

Ho_1 There is no significant difference between Federal and State Colleges of Education in the available and functional resources for adopting Technology Integration Approach in teaching and learning Agricultural Science in Northwest, Nigeria.

Ho_2 There is no significant difference between Federal and State Colleges of Education in the lecturers' possession of relevant information and communication technology (ICT) skills for

Adopting Technology Integration Approach in teaching and learning Agricultural Science in Northwest, Nigeria.

Ho_3 There is no significant difference between Federal and State Colleges of Education in the frequency of ICT usage for adopting Technology Integration Approach in teaching and learning Agricultural Science in Northwest, Nigeria.

Methodology

The study was conducted using descriptive survey research design. The population for the study comprised of all lecturers who taught Agricultural Science Education in all the Federal and State Colleges of Education in Northwest, Nigeria, Agricultural Science year two students, Academic secretaries, quality assurance officers, Directors academic planning, Heads of ICT, Heads of Departments of Agricultural Science Education spread across five (5) Federal and five (5) State Colleges of Education in Northwest, Nigeria.

The sample for this study was four hundred and twenty-eight (428) respondents spread across three (3) Federal and three (3) State Colleges of Education out of nine hundred and forty-five (945) lecturers and students of Agricultural Science Education in Northwest, Nigeria. The sample was arrived at using the Stratified Random sampling Technique.

Two instruments namely checklist and questionnaire were used for data collection. The first was checklist titled "Availability and Functionality of resources to adopt Technology Integration Approach" (AFRATIA). The second was structured Questionnaire titled "Readiness to Adopt Technology Integration Approach" (RATIA). The instrument was pilot tested in KSCOE, Gidan waya. The scores obtained from the pilot study were analysed using split half method of reliability on SPSS using Cronbach Alpha Formula Statistical tool and a reliability co-efficient of 0.83 was obtained.

Descriptive statistics of frequency and mean were used to analyse the research questions while inferential statistics of Mann-Whitney U test was used to test the null hypotheses at 0.05 level of significance.

Results and discussion

Research Question One:What are the available and functional resources for adopting Technology Integration Approach in teaching and learning Agricultural Science in Federal and State Colleges of Education, Northwest Nigeria?

Table 1: Frequency and Mean on the Available and Functional Resources for Adopting Technology Integration Approach in Teaching and Learning Agricultural Science in Federal and State Colleges of Education, Northwest Nigeria

S/N	Resources	State Colleges of Educ.			Fed. Coll. of Educ.		
	Infrastructural Resources	**Freq**	**Mean**	**Remark**	**Freq**	**Mean**	**Remark**
1	Computer/ Computer laboratory	147	2.3	AF	190	2.4	AF
2	Standby Generator	101	1.6	ANF	159	2.0	AF
3	Internet connectivity	133	2.1	AF	190	2.4	AF
4	Virtual Laboratory simulations	84	1.3	NA	167	2.1	AF
5	Laptops/Tablets/Smartphones	147	2.3	AF	206	2.6	AF
6	Public address system	133	2.1	AF	198	2.5	AF
7	Scanner	158	2.5	AF	206	2.6	AF
8	Printer	152	2.4	AF	214	2.7	AF
9	Hoes, sickles, spades, Rake, Shovel	146	2.3	AF	198	2.5	AF
10	Plows, carts, and harrow	114	1.8	ANF	167	2.1	AF
11	Tractors, planters and harvesters	108	1.7	ANF	159	2.0	AF
12	Water pumping machine	76	1.2	NA	103	1.3	NA
13	Projectors/audiovisual aids	152	2.4	AF	198	2.5	AF
14	Video conferencing media	76	1.2	NA	222	2.8	AF
15	e-learning/interacting platform	146	2.3	AF	198	2.5	AF
16	Drones	63	1.0	NA	119	1.5	NA
17	Geographic Information System (GIS) Software	70	1.1	NA	135	1.7	ANF
18	Smart Irrigation Systems	89	1.4	NA	143	1.8	ANF
19	Soil sensors	133	2.1	AF	167	2.1	AF
20	Livestock Management Software	70	1.1	NA	182	2.3	AF
	Grand Mean		**1.8**			**2.1**	

KEY: Available and Functional (AF) Available and Not Functional (ANF) Not Available (NA)

0-1.4 = Not Available, 1.5-1.9 = Available and Not Functional, 2.0-3.0 = Available and Functional

The analysis of data in Table 1 showed the available and functional resources for adopting Technology Integration Approach in teaching and learning Agricultural Science in Federal and State Colleges of Education in Northwest, Nigeria. The results revealed that 75% of the resources in State Colleges of Education were functional and available, 5% were available but not functional, and 19% were not available. In Federal Colleges of Education, there were 98% functionally and available resources, 1% available but not functional resources and 1% non-available resources. Therefore, it can be inferred that compared to State Colleges of Education, Federal Colleges of

Education had greater access to and capability with which to adopt a technology integration Approach for teaching and learning Agricultural Science in Northwest Nigeria.

Research Question Two:What relevant ICT skills do lecturers possess for adopting Technology Integration Approach in teaching and learning Agricultural Science in Federal and State Colleges of Education, Northwest Nigeria?

Table 2: Frequency and mean on relevant ICT skills that lecturers possess for adopting Technology Integration Approach in teaching and learning Agricultural Science in Federal and State Colleges of Education, Northwest Nigeria

		State Colleges				Federal Colleges			
S/N		HS	S	NS	Mean	HS	S	NS	Mean
21	Navigate computer operating systems such as Windows	51	129	10	2.2	47	174	17	2.9
22	Online research to find relevant agricultural science resources	53	128	9	2.2	37	185	16	2.9
23	Basic ICT security principles and practices to protect sensitive data	36	146	8	2.1	45	181	12	2.6
24	Committed to continuous learning to stay updated with new ICT tools and trends	50	127	13	2.4	67	155	17	2.1
25	Proficient in creating multimedia content (videos, presentations, etc.) to enhance agricultural science teaching.	52	127	11	2.3	46	173	19	2.8
26	Proficient in using ICT tools to facilitate collaborative learning activities and projects among students in agricultural science courses	52	126	12	2.3	65	153	20	2.7
27	Experience in using graphic design software to create visually appealing educational materials.	63	114	13	2.1	86	131	21	2.1
28	Integrate ICT tools into teaching pedagogy to enhance student engagement in agricultural science classes.	57	120	13	2.4	74	141	23	2.1
29	Skilled in designing ICT-based assessments (quizzes, online exams, etc.) to evaluate students' understanding of agricultural science concepts.	51	126	13	2.5	85	131	22	2.0
30	Utilize virtual learning environments to facilitate online interactions and collaboration among students in agricultural science courses	54	125	17	2.9	65	152	21	2.0
	Grand Mean				**2.3**				**2.4**

0-1.4 = Not Skilled; 1.5-1.9 = Skilled; 2.0-3.0 = Highly Skilled

The analysis of data in Table 2 shows the relevant ICT skills lecturers possess for adopting Technology Integration Approach in teaching and learning Agricultural Science in Federal and State Colleges of Education, Northwest Nigeria. The mean scores of items 21-30 were equal to or more than 2.0 benchmark. The grand mean for State Colleges of Education was 2.3 while the grand mean for Federal Colleges of Education was 2.4, which indicated that lecturers in State and Federal Colleges of Education possessed skills for adopting Technology Integration Approach in teaching and learning Agricultural Science in Federal and State Colleges of Education, Northwest Nigeria.

Hypotheses Testing

Hypothesis One: There is no significant difference between Federal and State Colleges of Education in the available and functional resources for adopting Technology Integration Approach in teaching and learning Agricultural Science in Northwest, Nigeria.

The summary of data collected and analyzed in respect of null hypothesis one is presented in Table 3

Table 3: Mann-Whitney test on difference between Federal and State Colleges of Education in the available and functional resources for adopting Technology Integration Approach in teaching and learning Agricultural Science in Northwest, Nigeria

Status	N	Mean	Std. Dev.	U-test	p-value
Federal Colleges	238	2.1	.98406	.412	.000
State Colleges	190	1.8	.98216		

The analysis of data in Table 4 shows difference between Federal and State Colleges of Education in the available and functional resources for adopting Technology Integration Approach in teaching and learning Agricultural Science in Northwest, Nigeria. The result reveals Mann-Whitney value of .412 with p-value of .000. The P-value is less than the critical value, therefore the null hypothesis is rejected which indicates that the difference between Federal and State Colleges of Education in the availability and functionality of resources for adopting Technology Integration Approach in teaching and learning Agricultural Science is significant in Northwest, Nigeria. The difference is negatively significant in favour of Federal Colleges of Education.

Hypothesis Two: There is no significant difference between Federal and State Colleges of Education in the lecturers' possession of relevant information and communication technology (ICT) skills for Adopting Technology Integration Approach in teaching and learning Agricultural Science.

The summary of data collected and analyzed in respect of null hypothesis two is presented in Table 4.

Table 4: Mann-Whitney test on difference between Federal and State Colleges of Education in the lecturers' relevant information and communication technology (ICT) skills for Adopting Technology Integration Approach in teaching and learning Agricultural Science

Status	N	Mean	Std. Dev.	U-test	p-value
Federal Colleges	238	2.4	.95346	1.002	.178
State Colleges	190	2.3	.89185		

The analysis of data in Table 5 shows difference between Federal and State Colleges of Education in the lecturers' possession of relevant information and communication technology (ICT) skills for Adopting Technology Integration Approach in teaching and learning Agricultural Science in Northwest, Nigeria. The result reveals Mann-Whitney value of 1.002 with p-value of .178. The P-value is greater than the critical value, therefore the null hypothesis is retained which indicates that the difference in the lecturers' possession of relevant information and communication technology (ICT) skills for Adopting Technology Integration Approach in teaching and learning Agricultural Science between Federal and State Colleges of Education in Northwest Nigeria, is not significant.

Hypothesis Three: There is no significant difference between Federal and State Colleges of Education in the frequency of ICT usage for adopting Technology Integration Approach in teaching and learning Agricultural Science in Northwest Nigeria.

The summary of data collected and analyzed in respect of null hypothesis four is presented in Table 5.

Table 5: Mann-Whitney test on difference between Federal and State Colleges of Education in the frequency of ICT usage for adopting Technology Integration Approach in teaching and learning Agricultural Science in Northwest Nigeria

Status	N	Mean	Std. Dev.	U-test	p-value
Federal Colleges	238	2.7	.92135	2.110	.301
State Colleges	190	2.5	.88675		

The analysis of data in Table 6 shows difference between Federal and State Colleges of Education in the frequency of information and communication technology (ICT) usage for Adopting Technology Integration Approach in teaching and learning Agricultural Science in Northwest, Nigeria. The result reveals Mann-Whitney value of 2.110 with p-value of .301. The P-value is greater than the critical value, therefore, the null hypothesis is retained which indicates that the frequency of information and communication technology (ICT) usage for Adopting Technology Integration Approach in teaching and learning Agricultural Science is the same between Federal and State Colleges of Education in Northwest, Nigeria.

Summary of Findings

The following are summary of findings for the study:

1. Resources for adopting Technology Integration Approach in teaching and learning Agricultural Science were significantly more available and functional in Federal Colleges of Education than State Colleges in Northwest Nigeria with (p-value .000 < 0.05)
2. Lecturers in State and Federal Colleges of Education possessed relevant ICT skills for adopting Technology Integration approach in teaching and learning Agricultural Science, with no significant difference with (p-value .178 > 0.05).
3. Information and Communication Technology (ICT) resources were frequently used for adopting Technology Integration Approach in teaching and learning Agricultural Science in Federal and State Colleges of Education, Northwest Nigeria with no significant difference (p-value .301 > 0.05).

Conclusion

The study concluded that Federal Colleges of Education were more ready and prepared with resources to adopt Technology Integration Approach in teaching and learning Agricultural Science than State Colleges of Education

in North-west, Nigeria. It is also concluded that lecturers have the required ICT skills to adopt Technology Integration Approach in teaching and learning Agricultural Science in Federal and State Colleges of Education in North-west, Nigeria.

Recommendations

Based on the findings and conclusion of the study, the following were recommended.

1. State Colleges of Education should provide all resources needed by collaborating with technology companies and organizations, meeting with state Governors and Mobilization of Philanthropists. These will facilitate access to affordable technology devices and software solutions for the Colleges of Education. Thus, ensuring available and functional resources for the adoption of Technology Integration Approach in teaching and learning Agricultural Science in Northwest, Nigeria.
2. State and Federal Colleges of Education should organize more ICT training to lecturers to enhance their skills and familiarize them in ICT for the adoption of Technology Integration Approach in teaching and learning Agricultural Science in Northwest, Nigeria.
3. Lecturers and students should be encouraged through seminars, conferences and workshops to intensify the frequent use of ICT resources for the adoption of Technology Integration Approach in teaching and learning Agricultural Science in Federal and State Colleges of Education in Northwest, Nigeria.

References

Adegoke, J., Ibe, C., & Araba, A. (2015). A report by the advisory committee on Agriculture Resilience in Nigeria. Federal Ministry of Agriculture and Rural Development. https://fmard.gov.ng/wp-content/uploads/2018/04/NARF-Main-document.pdf

Adeoye, F. A., & Nkang, N. U. (2020). Accessibility of e-learning facilities for students with disabilities in Nigerian universities: The roles of assistive technologies. *International Journal of Educational Technology in Higher Education.* 17(1), 1-18.

Aldosari S, (2020). The future of higher education in the light of artificial intelligence transformations. *International Journal of Higher Education.* 9(3):145–151.

Ajayi, A. O., & Ogunleye, O. O. (2020). Factors militating against the integration of ICT in teacher education programme in southwest Nigeria. *International Journal of Educational Technology in Higher Education,* 17(1), 1-19.

Holmes, W., Bialik, M., & Fadel, C. (2019). Artificial intelligence in education promises and implications for teaching and learning. The Center for Curriculum Redesign.

Lawal, M. (2018). Teachers' readiness for the integration of ICT in the teaching of agriculture in senior secondary schools in Lagos State, Nigeria. *Education and Information Technologies*, 23(5), 2163-2176.

Okolie, U.C., Nwosu, H.E., Eneje, B.C. & Oluka, B.N. (2019). Reclaiming education: Rising above examination malpractices, and its contextual factors on study progress in Nigeria. *International Journal of Educational Development*, *65*, pp.44-56.

Oluwasusi, S. J. Olagunju, O. Adeyose, E. A. & Yekinni, O. T. (2021). Utilization of E-learning by Agricultural Students of Public Higher Institutions in Southwest of Nigeria. *International Journal of Environment, Agriculture and Biotechnology. 6 (3)*.

Ridwan, S. M., Felix, T. S., & Mohammed, M. F. (2019). Assessment of ICT competencies and use of electronic information resources by lecturers in universities in Benue state, Nigeria. *International Journal of Information Management Sciences* (IJIMS), 1–20.

SCISPACE (2024). What is a Technology in Agriculture? Retrieved from https://typeset.io/questions/what-is-a-technology-in-agriculture-34a9uoiwz9on 09/01/2024.

Xu, Z., Adeyemi, A. E., Landaverde, R., Kogut, A. & Baker, M. (2023). A Scoping Review on the Impact of Educational Technology in Agricultural Education. *Advanced Journals Education Sciences.* Volume 13 Issue 9. 10.3390/educsci13090910