ADOPTION LEVELS OF INFORMATION AND COMMUNICATION TECHNOLOGY FACILITIES IN TEACHING SECONDARY SCHOOLS AGRICULTURAL SCIENCE IN NORTHWEST NIGERIA

ZAJES 24(S)2024
p-ISSN:2795-3890
e-ISSN: 2805-3877

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This study was conducted to explore the adoption levels of Information and Communication Technology facilities in teaching and learning in Senior Secondary Schools Agricultural Science in Northwest, Nigeria. Four objectives and four hypotheses guided the study. Survey research design was adopted while the population of 7976, which comprised of all Agricultural Science teachers in the zone, from where 367 teachers were sampled for assessment. The instrument used to collect data was a closed structured questionnaire which was validated with reliability coefficient of 0.96. The researchers administered the instrument personally and collected back after two weeks. Of 367 administered, 326 (88.83 %) were recovered. A five-point rating scale was adopted to assess each item on the instrument. The mean of each item was calculated while benchmark of 3.00 determined decision of acceptable and rejection of the items. Data was subjected to Analysis of Variance ($p \leq 0.05$)and used to test the study hypotheses. The results showed that ICT facilities were available (3.440) and adequate (3.167) but were neither functional (2.760) nor utilized (2.846) for teaching and learning of Agricultural Science in Senior Secondary Schools in Northwest Nigeria. It was concluded that ICT facilities were not functional and utilized for teaching Agricultural Science in the study area. Hence the study recommended that provision of up-to-date ICT facilities, create enabling environment and training of the teachers by both government and non-governmental organization were imperative to improve the situation in the study area.

Article History
Received: Oct. 2024
Review processes
Oct - Nov 2024
Received in revised form: Nov 2024
Accepted: Dec 2024
Published online: Dec 2024

KEYWORDS
- Information and Communication Technology
- Agricultural Science
- Senior Secondary School
- Teaching and Learning

Introduction

Information and Communication Technology (ICT) is seen as the handling, processing and sharing of text, images, graphs and instruction information through electronic and communication devices such as computer, cameras, telephones, internet, software and hardware (Apagu and Wakili, 2015). Ejiofor, *et. al*. (2018) defined ICT as tools or resources that could be used to process, preserve, access, retrieve, manage, and disseminate information with relative ease. There are diverse set of technological tools and resources adopted to share, create, disseminate, preserve and manage information to both sharers and receivers (Hamisu, *et. al*., 2024). The application and expansion of ICT across wide areas of human endeavours including educational institutions came with the main intention of improving the teaching and learning environment (Omere, *et. al.,* 2020). The tools according to the authors are considered imperative in the quality of education for all because of its

unique ability to bring the world together easily.

Technology is rapidly emerging as an instrument of national stability and international harmony. The more technologically advanced a nation is the more stable her politics and social life become. ICT application in teaching and learning facilitated feedback between the teacher and the students (Bakare and Olaniyi, 2017). Omere, *et. al.,* (2020) opined that ICT adoption in teaching encouraged students' masteryof teaching materials independently, choice of the pace of work, repetition, not cleared materials and track their progress personally or individually. Such adoption also simplifies abstract concepts through relevant examples by using software, hardware and other facilities.

Integrating ICT into delivery process of Agricultural Science can increase the effectiveness of instruction, broaden knowledge and ensure retention of skill acquired (Omere*et. al.,* 2020). The teaching of this subject at secondary schools with ICT facilities will boost the interest of the pupils in their choice of this subject as a career in the future. Modern ICT can help increase communication, improve active participation, information dissemination and knowledge/skill sharing when properly applied in instruction (Chaudhuri and Kendall, 2021). Meanwhile, information and better communication are critical requirements for sustainable agricultural development. The ability to use these tools effectively has become an essential part of everybody's education.

ICT facilities used in the teaching and learning process in Vocational courses "Agricultural Science not exempted" include but not limited to computer, radio, television, mobile phone, overhead projector, optical fibres, fax machines, CD-Rom, VHF, internet, electronic notice board, smart board, slide and slides projectors, digital multimedia, Video/VCD machine, tablets among others (Khan, *et al.,* 2012; FRN, 2013; Apagu and Wakili, 2015; Sallau, 2022). The use of ICT in education is a recent trend for students to gain prior knowledge ahead of the classroom situation, which enhance teaching and learning. Knowing fully well that technology affects the way the entire world population reasons, associates, learns and communicates.

ICT put education at the finger tip of students but a lot of factors in Nigeria have affected the effective utilization of these resources in teaching Agricultural Science and related subjects in our secondary schools. Increasing trend of the utilization of ICT tools in classroom work across the globe has become the order of the day. The adoption of ICT devices in instruction makes information dissemination more efficient as well as boost productivity, makes both teachers and learners more active in instruction and improve competency acquisition in all aspect of learning.

Despite the positive influence of ICT facilities utilization in Education, it has not been embraced and integrated seriously in our education sector. The traditional approaches of chalkboard and textbook still prevail in Nigeria Senior Secondary Schools (Sallau, 2022). Also, observations of the researchers have shown that there are no functional ICT facilities in most secondary schools in Northwest Zone and this hampers the teachers' application of such devices in teaching and learning. Lack of adequate ICT facilities, technical know how, irregular power supply and inadequate funding are other set of obstacle hampering effective utilization of ICT facilities in teaching and learning of Agricultural Science in secondary schools (Onwunali *et al*., 2024). Hence the

need to establish the availability, adequacy, functionality and utilization of ICT facilities in teaching of Agricultural Science in public Senior Secondary Schools in Northwest Geo-political Zone of Nigeria.

Objectives of the Study

i. Ascertain the availability of ICT facilities for teaching Agricultural Science in Senior Secondary Schools in Northwest Nigeria,
ii. Determine the adequacy of ICT facilities for teaching Agricultural Science in Senior Secondary Schools in the study area,
iii. Assess the functionality of ICT facilities for teaching Agricultural Science in Senior Secondary Schools in the study area and
iv. Identify the utilization of ICT facilities for teaching Agricultural Science in Senior Secondary Schools in the study area.

Hypotheses of the Study

1. There are no significant mean differences in the availability of ICT facilities for teaching of Agricultural Science at Senior Secondary School in Northwest Nigeria.
2. There are no significant mean differences in the adequacy of ICT facilities for teaching of Agricultural Science at Senior Secondary School in the study area.
3. There are no significant mean differences in the functionality of ICT facilities for teaching of Agricultural Science at Senior Secondary School in the study area.
4. There are no significant mean differences in the utilization of ICT facilities for teaching of Agricultural Science at Senior Secondary School in the study area.

Methodology

Survey research design was adopted for the study because of its suitability in covering large group. This study was carried out in the Northwest geopolitical Zone of Nigeria where Kaduna, Kano and Katsina States were selected based on convenience due to insecurity at the time of collecting the data in three (Kebbi, Sokoto and Zamfara States) of the seven state within the zone. The States three senatorial districts formed the basis for selecting respondents who are Agricultural Science teachers of Senior Secondary Schools. Population of the study was 7976 which comprised of 319 School Principal, 631 Vice Principal, 631 and 7126 number of teachers based on the states Ministry of Education. A total of 367 teachers were sampled based on Krejcie and Morgan (1970) population sample table, as follows 130 from Kaduna State, 132 in Kano while 105 were from Katsina State.

The instrument used for data collection was questionnaire tagged Information and Communication Technology Teaching Facilities Questionnaire (ICTTFQ). The instrument was developed by the researchers and was validated by three experts in Agricultural Education with two from Federal University of Education, Zaria and one from Kaduna Polytechnic, Kaduna. The instrument was also pilot tested in Zamfara State (States within the same Ggeopolitical Zone) with 20 respondents, which yielded high reliability Coefficients of 0.96using Cronbach Alpha.However, the instrument was divided into five sections; section A-E with A dwelling on bio-data of the respondents, B to E on availability, adequacy, functionality and utilization, respectively. The sections B to E were design using five point rating scale as follows,

Strongly Agreed	=	SA (5 points)
Agreed	=	A (4 points)
Undecided	=	U (3 points)
Disagreed	=	D (2 points)
and		
Strongly Disagreed	=	SD (1 point)

for Sections B, and D, While

Highly Adequate	=	HA (5 points)
Adequate	=	A (4 points)
Moderately Adequate	=	MA (3 points)
Not Adequate	=	NA (2 points)
and		
Highly Not Adequate	=	HNA (1 point)
for section C and		
Highly Utilized	=	HU (5 points)
Utilized	=	U (4 points)
Moderately Utilized	=	MU (3 points)
Not Utilized	=	NU (2 points)
Highly Not Utilized	=	HNU (1 point)

for section E.

A total of 367 questionnaire were distributed while 326 were recovered having 88.83% rate of recovery. The instrument was administered by the researchers and coordinated research assistants in the selected areas. The mean of each items were calculated with a mean of 3.00 as acceptable benchmark. Data were also subjected to Analysis of Variance (ANOVA) at 5% level of significance while means were separated withTukey HSD.

Result Presentation

The results of the study were presented considering the five hypotheses formulated.

Hypothesis One: There are no significant mean differences in the availability of ICT facilities for teaching of Agricultural Science at Senior Secondary School in Northwest Nigeria.

Table 1: ANOVA on Availability of Information and Communication Technology Facilities

Sources of Variance	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	20.170	2	10.085	40.077	0.000
Within Groups	9.814	39	0.252		
Total	29.984	41			

Considering the three states under the study, the mean scores on availability of ICT facilities for teaching Agricultural Science at Senior Secondary Schools were 3.714, 2.487 and 4.118 for Kaduna, Kano and Katsina respectively. These indicated that Katsina State has more facilities than Kaduna and Kano States. The teachers in Kaduna and Katsina States agreed to the availability of ICT facilities for teaching Agricultural Science whereas those of Kano disagreed. However, the result on Table 1 showed F ratio of 40.077 with P value of 0.000. This implied that, there are significant differences in the level of availability of ICT facilities within the study area hence the hypothesis of no significant difference is therefore rejected. The differences were contributed mainly by Kano State because of her low level of availability. The result indicated ICT facilities are available within the study area with a grand mean of 3.440.

Hypothesis Two: There are no significant mean differences in the adequacy of ICT facilities for teaching of Agricultural Science at Senior Secondary School in the study area.

Table 2: ANOVA on Adequacy of Information and Communication Technology Facilities

Sources of Variance	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	26.577	2	13.251	96.261	0.000
Within Groups	4.556	33	0.138		
Total	31.133	35			

Results (Table 2) showed mean scores of 3.125, 2.136 and 4.241 for Kaduna, Kano and Katsina States, respectively. These means showed Kaduna and Katsina States teachers agreed to the adequacy of ICT facilities compared to Kano State teachers. The result in Table 2 showed F ratio of 96.261 with P value of 0.000. This implied that, there are significant differences in the level of adequacy of ICT facilities within the study area. Therefore, the hypothesis of no significant difference was therefore rejected. Meanwhile, the differences were contributed mainly by Kano State. The result implied that these facilities were adequate in the study area having a grand mean of 3.167.

Hypothesis Three: There are no significant mean differences in the functionality of ICT facilities for teaching of Agricultural Science at Senior Secondary School in the study area.

Table 3: ANOVA on Functionality of Information and Communication Technology Facilities

Sources of Variance	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	42.124	2	21.062	70.329	0.000
Within Groups	4.081	33	0.124		
Total	46.205	35			

The means of ICT facilities functionality in the three states were 1.708, 2.325 and 4.246 for Kaduna, Kano and Katsina States, respectively. The result showed that, functionality of ICT facilities in teaching of Agricultural Science in Katsina State is better than Kaduna and Kano States. The ANOVA output of F ratio 170.329 and P value of 0.000 showed that, there are significant differences in the functionality of ICT facilities, hence the hypothesis of no significant differences was rejected. Consequently, the levels of ICT facilities functionality in teaching Agricultural Science was better in Katsina State followed by Kano State. This result implied that ICT facilities in the study area are not functional with a grand mean of 2.760.

Hypothesis Four: There are no significant mean differences in the utilization of ICT facilities for teaching of Agricultural Science at Senior Secondary School within the study area.

Table 4: ANOVA on Utilization of Information and Communication Technology Facilities

Sources of Variance	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	40.332	2	20.166	78.608	0.000
Within Groups	10.005	39	0.257		
Total	50.338	41			

The study revealed mean utilization of 1.821, 2.558 and 4.158 for Kaduna, Kano and Katsina States, respectively. The result showed that teachers of Agricultural Science in Katsina State utilize ICT facilities better in teaching the subject compared to Kaduna and Kano States due to low or lack of functionality of the resources. The output of the ANOVA have F ratio of 78.608 with P value of 0.000, indicating significant differences between the levels of ICT facilities utilization among the teachers of Agricultural Science within the study area. Hence the hypothesis of no significant differences was rejected. The finding showed low level of resources utilization for teaching Agricultural Science in the study area having recorded a grand mean of 2.846.

Discussion of Findings

The result showed that teachers of Agricultural Science in Kaduna and Katsina States agreed that ICT facilities are available for teaching while those of Kano State disagreed to the availability. The finding of the ANOVA showed there is significant difference on the level of availability of ICT facilities for teaching Agricultural Science within the zone. This implied the level of availability varied across states with some being high and some low..The finding is in agreement with the findings of Apagu and Wakili (2015) and Sallau (2022) who agreed to availability of ICT facilities for teaching and learning in Technical Colleges of Yobe State and Colleges of Education in Northeast Nigeria respectively. However, the findings of this study disagreed with Ademiluyi (2019), Belay *et al*, (2020) and Omodara *et al,* (2021) who reported that ICT facilities were not available for teaching Business Subject in Osun State, teaching and learning of Biology in secondary schools in Southern Region of Eritrea and Vocational Courses in Kano State, respectively.

The result on adequacy of ICT facilities for teaching Agricultural Science via the means showed that the resources are adequate in both Kaduna and Katsina States whereas that of Kano State showed inadequacy. However, the overall result showed that ICT facilities are adequate in the study area. The output of the second hypothesis showed that there are significant differences in the level of adequacy of these resources within Northwest zone. This result indicated variation in the level of adequacy of ICT facilities for teaching Agricultural Science in the study area. This finding agreed with the stand of Sallau (2022) who confirmed that facilities were adequate for teaching and learning Agricultural Education in COEs in Northeast Nigeria. The result disagreed with Mavellas *et al.* (2015) who reported inadequate availability of ICT facilities in Secondary Schools in Kwekwe, Zimbabwe. Also, Dambo and Umar (2018) were of the opinion that ICT facilities are

insufficient in secondary schools for teaching and learning.

Considering the means Kaduna and Kano States have low scores compared with Katsina State. Katsina facilities are functional while those of Kaduna and Kano State were not functional. Result on the functionality of ICT facilities for teaching Agricultural Science showed that ICT facilities in the study area are not functional. Their functionality may be ascribed to lack of maintenance, shortage or lack of regular sources of power to support these facilities. This is in agreement with Sibanda and Ramrathan (2017) who established low level of ICT functionality. But the result is in disagreement with the stand of Apagu and Wakili (2015) who confirmed functionality of these resources in Technical Colleges in Yobe State.

The finding showed low level of resources utilization for teaching Agricultural Science in the study area. Lack of utilization may be as a result of non-functionality, in-competency of the teachers or poor motivation to adapt and adopt these facilities. This result agreed with the stands of Atsumbe, *et al*. (2012), Onwuagboke *et al*. (2014), Ayikoye (2017), Ademiluyi (2019) and Belay *et al.* (2020) who all confirmed either no or low level of resources utilization at various level of education. On the contrary, Onu and Ezhim (2019) were of the view that the resources were slightly utilized but not for instructional delivery in Agricultural Science rather for administrative purposes.

Conclusion

Based on the findings of the study, it is concluded that ICT facilities are available and adequate in the study area for teaching Agricultural Science. On the contrary, these facilities are not functional probably because of challenging environment and low level of competencies on the part of the teachers in the application of such facilities hence they are not being utilized for teaching Agricultural Science in Senior Secondary Schools in Northwest Nigeria.

Recommendations

The following recommendations were prescribed based on the findings of the study;

- Even though ICT facilities for teaching Agricultural Science at Senior Secondary Schools in the study area were available, there is still need for state governments to continue to make provision for up-to-date resources.
- Also, the adequacy of ICT facilities for teaching Agricultural Science were established, but the need to keep expanding the quantity of these resources by Ministry of Education in the various state exist because of the population explosion being experienced in the public Senior Secondary Schools in the study area.
- Supply of regular and stable sources of power is a major factor hindering functionality of these resources; hence exploration of alternative sources of power via Non-Governmental Organisation and Parent Teachers Association (PTA) will be a better option.
- The Ministry of Education of the states within the study area should encourage training and re-training of teachers of Agricultural Science on ICT facilities to boost utilization.

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