

ICT Proficiency Needs of Agricultural Education Lecturers for Instructional Purposes in Tertiary Institutions in South Western Nigeria

Samuel Oluwole AJALA¹ & James Olanrewaju S. BANJO²

¹Department of Agricultural Science Education, College of Vocational and Entrepreneurship Education, Lagos State University of Education, Oto/Ijanikin (Epe Campus), Lagos State, Nigeria

²Department of Agricultural Science Education, College of Agriculture and Hospitality Management, Tai Solarin University of Education, Ijagun, Ogun State, Nigeria

Authors E-mail: ajalaos@lasued.edu.ng & banjojo@tasued.edu.ng

Abstract

This study assessed the information and communication technology (ICT) proficiency requirements of lecturers in agricultural education for instructional purposes in tertiary institutions in Southwest Nigeria. Descriptive survey research design was used. The study population consisted of 297 agricultural education lecturers and technologists in the six states in Southwest Nigeria. The method of sample selection involved multistage sampling technique where three out of the six states in the region – Lagos, Ondo and Oyo states were randomly selected. From each of the sampled states, the census/total population sampling technique was used to select 157 respondents which comprises of 92 lecturers and 65 technologists. The instrument used was a structured questionnaire (PSNBAEDQ), whose internal reliability yielded a Cronbach Alpha of 0.99. Percentage and Improvement Need Gap (ING) index were used for data analysis. Findings showed that 27 of the 30 listed ICT facilities and tools were considered needed. The overall ING value of 1.44 indicated that proficiency training was required in 89 of the 93 skill items examined across general ICT knowledge, word-processing and spreadsheet applications. It is recommended that tertiary institutions organise sustained in-service training on ICT integration, that governments and partners invest in relevant infrastructure, and that the agricultural education curriculum be reviewed to embed digital pedagogies systematically.

Keywords: ICT proficiency, agricultural education lecturers, instructional purposes, tertiary institutions, Southwestern Nigeria

1. Introduction

Agricultural education in tertiary institutions plays a pivotal role in equipping graduates with the knowledge and practical skills required to enhance food production, promote sustainable resource use and support national development. In an era of rapid technological change and rising global food demand, the quality of instructional delivery in agricultural education has

direct implications for agricultural productivity and the attractiveness of the sector to young people (FAO, 2021; Schneider, 2016).

Educational practices in the twenty-first century require approaches that encourage critical thinking, cooperation, problem-solving and continuous learning. However, teacher-centred practices are becoming less appropriate for preparing learners for work in the age of technologies. This is why teachers are supposed to utilise learner-centred approaches and incorporate ICT in order to make learning more interesting, interactive and practical (UNESCO, 2021; Anderson and Brown, 2019).

The role of Information and Communication Technologies in the above process is hard to underestimate. ICT incorporated into agricultural education will make it possible to gain access to the most recent information, simulate and visualise agricultural processes, collaborate and provide flexible educational methods. Learning management systems, multimedia sources, statistical software and mobile technologies can help to enrich learners' conceptual knowledge and prepare them for future use of digital skills (Krouska et al., 2019; Njura et al., 2020).

While all these advantages have been noted, many agricultural education lecturers in Nigeria's tertiary institutions still experience difficulties because of poor digital skills, lack of proper infrastructure, poor power supply and inadequate institutional support. Many lecturers were trained within the traditional educational systems, where little emphasis was put on ICT-based training and capacity building (Ajie-Uche et al., 2018; Oyefara et al., 2021). This is why the full potential of ICT in enriching agriculture education has not yet been realised.

Several scholars have looked into the ICT competencies of teachers in Nigeria but very few have looked into the competencies required by agricultural education lecturers and technologists in Southwestern Nigeria. It is only after pinpointing these exact facilities and competencies that one can begin working on capacity building of such lecturers. This is why this study endeavoured to find out the ICT facilities required by agricultural education lecturers and their proficiency skills for teaching purposes.

Objectives of the Study

The major objective of this study was to identify the proficiency skills needed by agricultural education lecturers' in the utilisation of information and communication technology for pedagogical effectiveness in tertiary institutions of south-west, Nigeria. Specifically, the study sought to identify;

- i. the ICT facilities and tools needed by Agricultural Education Lecturers' in the utilisation of information and communication technology for instructional purposes in tertiary institutions of south-west, Nigeria.
- ii. the proficiency skills needed by Agricultural Education Lecturers' in the utilisation of information and communication technology for instructional purposes in tertiary institutions of south-west, Nigeria.

Research Questions

The following research questions guided the study;

- i. What are the ICT facilities and tools needed by Agricultural Education Lecturers' in the utilisation of information and communication technology for instructional purposes in tertiary institutions of south-west, Nigeria?
- ii. What are the proficiency skills needed by Agricultural Education Lecturers' for instructional purposes in the utilisation of information and communication technology for instructional purposes in tertiary institutions of south-west, Nigeria?

Empirical Review of ICT Utilisation in Nigeria

Earlier studies done at Nigerian tertiary institutions show that the average ICT competence level among lecturers is moderately high but with deficiencies in higher-level applications that are necessary for effective integration of ICT in teaching. Alfred and Ekhovbiye (2021), for example, in evaluating the ICT competency level of vocational teacher educators at the South-South geopolitical zone of Nigeria, found out that the overall mean level of proficiency was moderately high at 3.11, while significant inadequacies existed in higher-level software and interactive ICT applications. In a general study in universities, ICT has been applied moderately for teaching and research purposes (Shiekuma et al., 2020).

Specific research conducted on the issue of technical competencies makes the point that productivity and presentation capabilities become even more important in this regard. According to Okoye and Ugwugwo (2021), productivity and presentation skills are critical to the successful implementation of business education programmes, while Ajie-Uche et al. (2018) found a considerable need for training business education lecturers in multimedia and spreadsheet applications in the South-South region.

Bakare et al. (2019) proved that there are nine important proficiencies related to the Internet among vocational and technology teachers. Overall, these studies show that the set of applications like word processing, spreadsheets, graphics and internet capabilities continues to remain fundamental but unmet among a considerable number of tertiary level educators. There is empirical proof that the availability and usage of particular hardware and peripheral equipment contributes to the increase in instructional quality.

According to Oyefara et al. (2021), among 1,325 middle-level academics surveyed, those who used tablets performed 1.5 times better, and those using multimedia projectors were 2.7 times better trainers. It is from the same context that Michika and Manabete (2019) found the critical skills required in the use of digital cameras, scanners, and LCD projectors by lecturers in the North-East polytechnics. From these findings, it is evident that ICT competence entails the use of software skills and manipulation of teaching equipment.

The importance of capacity building through professional development is emphasised in the literature. Nwabueze et al. (2018) observed the need for urgent capacity building in data storage, applications and presentation among education lecturers, while Igbongidi (2018) established that even basic word processing and data processing knowledge are still important fundamentals at the lower levels of education. All in all, from the literature, it can be seen that there is a pattern in the country that access to ICT resources does not necessarily mean proper pedagogical use of those ICTs. It should be noted that there is a lack of research on agricultural education lecturers and technologists in Southwestern Nigeria.

Theoretical Framework

The study draws upon the theoretical framework of Technological Pedagogical Content Knowledge (TPACK) (Mishra and Koehler, 2006). According to TPACK theory, the successful integration of technologies in education presupposes the interaction between three major types of knowledge, namely content knowledge (knowledge about a subject matter), pedagogical knowledge (methods of teaching), and technological knowledge (understanding digital tools and their capabilities). Moreover, the framework stresses the intersection between these types of knowledge – technological pedagogical knowledge, technological content knowledge, and pedagogical content knowledge.

Within the realm of agriculture education, teachers should have not only comprehensive knowledge in agricultural science and pedagogical knowledge but also technological knowledge for choosing, adapting and using ICTs to facilitate the process of teaching agricultural concepts and skills. The competencies studied in this paper relate mostly to the technological knowledge and technological pedagogical knowledge of TPACK.

Methodology

A descriptive survey design was used in this study, and it was carried out in Southwest Nigeria. The sample population was made up of 297 agricultural education lecturers and technologists from the six states that make up Southwestern Nigeria. A multistage sampling technique was used. First, three states were randomly selected (Lagos, Ondo and Oyo). The census/total population sampling technique was then used to select the respondents in the selected states, leading to 157 participants (92 lecturers and 65 technologists).

The research instrument used was a structured questionnaire entitled “Proficiency Skills Needed by Agricultural Education Lecturers Questionnaire” (PSNBAEDQ). It had three parts: (a) demographic data, (b) list of 30 ICT facilities and tools that required either “Needed” or “Not Needed” answers, and (c) 93 proficiency skills grouped into three clusters (general ICT knowledge, word-processing skills and spreadsheet skills). Proficiency skills were measured on a four-point scale of need and a four-point scale of performance. This instrument was face-

validated by two agricultural education and one educational technology experts. Its reliability was 0.99, as calculated using the Cronbach alpha technique. Even though this reliability coefficient is high, it is partly due to the large number of closely related items in each cluster of skills. The analysis of data was done using SPSS software version 26. Percentages provided answers to research question 1. For research question 2, the Improvement Need Gap (ING) was determined by subtracting the mean rating of need (X_n) from the mean rating of performance (X_p). If the gap was positive, then additional training was needed. If the gap was negative or equal to zero, then performance met or surpassed need.

Results

Research Question 1: What are the ICT facilities and tools needed by Agricultural Education Lecturers' in the utilisation of information and communication technology for instructional purposes in tertiary institutions of south-west, Nigeria?

Table 1

Percentage Responses of Agricultural Education Lecturers and Technologists on the ICT Facilities and Tools Needed for Instructional Purposes

S/N	ICT FACILITIES AND TOOLS	NEEDED	NOT NEEDED	% NEEDED	% NOT NEEDED
1	Desktops and Laptops	131	26	83.4	16.5
2	LED Television	136	21	86.6	13.3
3	Radio	107	50	68.1	31.8
4	Audiotape players	129	28	82.1	17.8
5	Video player/Recorder	148	9	94.2	5.7
6	Fax machine	26	131	16.5	83.4
7	Printers	148	9	94.2	5.7
8	Photocopiers	148	9	94.2	5.7
9	Scanners	132	25	84.0	15.9
10	Floppy diskettes	114	43	72.6	27.4
11	Multimedia Projector	118	39	75.1	24.8
12	Interactive white board/ Smart Board (Triumph Board, Genec touch etc.)	148	9	94.2	5.7
13	Projector screen	118	39	75.1	24.8
14	Megaphone/microphone	133	24	84.7	15.3
15	Speakers	121	36	77.0	22.9
16	Websites of Institutions	134	23	85.4	14.6
17	Internet	114	43	72.6	27.4
18	e-book	133	24	84.7	15.3
19	Digital camera (webcam)	122	35	77.7	22.3

S/N	ICT FACILITIES AND TOOLS	NEEDED	NOT NEEDED	% NEEDED	% NOT NEEDED
20	Fingerprint reader	127	30	80.9	19.1
21	Flash Drive	148	9	94.3	5.7
22	External drive	153	4	97.5	2.5
23	Graphic Packages (e.g. Adobe Photoshop, Corel Draw, AutoCAD, Adobe framework, 3D movie maker, PC paintbrush est.)	122	32	79.2	20.8
24	E-mail (Gmail, Yahoo Mail etc.)	144	13	91.7	8.3
25	Handhelds/Tables computers (iPad)/other mobile devices (smart Phones)	145	12	92.4	7.6
26	Satellite systems	50	107	31.8	68.2
27	Joystick	76	81	48.4	51.6
28	Statistical Packages (SPSS, R, Python, Minitab etc.)	127	30	80.9	19.1
29	Learning Management Systems (e.g. Google Classroom, Moodle etc.)	109	48	69.4	30.6
30	Electronic Bulletin board	137	20	87.3	12.7

Note. Source: Field Survey, 2022

Table 1 revealed that twenty-seven of the thirty ICT facilities were considered necessary by respondents. The most highly rated facilities included external drives (97.5%), video players (94.2%), printers (94.2%), smart boards (94.2%), and flash drives (94.3%). Fax machines, satellite systems, and joysticks were considered less relevant.

Research question 2: What are the proficiency skills needed by Agricultural Education Lecturers' for instructional purposes in the utilisation of information and communication technology for instructional purposes in tertiary institutions of south-west, Nigeria?

Table 2

Means and Standard Deviations of Responses on Proficiency Skills Needed for Instructional Purposes: General ICT Knowledge

Cluster 1: General knowledge	Cluster 1: General knowledge		Level of Need	Level of Need	Level of performanc e	Level of performanc e
S/N	ITEM STATEMENTS	N	XN	Deviation		
1	Ability to operate the different computer operating systems.	157	3.6369	.54482	2.2038	1.07857
2	Ability to use e-mail for instructional purposes	157	3.5860	.78483	2.8153	.96624
3	Ability to use multimedia facilities to deliver instructions in the classroom.	157	3.8471	.36101	2.1338	1.05670
4	Ability to use ICT-friendly learning tools which are beneficial to learners in finding and processing information.	157	3.0637	.91063	2.2102	.92703
5	Ability to use ICT-friendly learning tools which are beneficial to learners in collaborating with peers.	157	3.1911	.66152	1.9172	.97377
6	Ability to use varieties of software like- word processing, database, spreadsheet and statistical software.	157	3.8344	.37292	1.6752	.87864
7	Ability to use ICT knowledge in writing general computer programs for delivering instructions.	157	3.7452	.57629	1.6561	.72247
8	Ability to use ICT-friendly learning tools in evaluating learning effects in concrete ways.	157	3.7389	.57897	1.6561	.72247
9	Ability to use ICT skills in developing and presenting information to learners.	157	3.7134	.48106	2.0000	1.15470
10	Ability to use ICT knowledge to utilize the learning management system,	157	3.0191	.56012	2.5287	.99073
11	Ability to use the computer for power point presentation during lectures	157	3.5860	.63088	3.8471	.36101
12	Ability to use drill-and-practice software to support pervasive learning.	157	3.7707	.56469	2.0573	.76159
13	Ability to use ICT knowledge in delivering lectures with different instructional packages.	157	3.0892	.90848	2.1911	1.08683
14	Ability to use ICT to monitor and evaluate the teaching-learning process.	157	3.8726	.33447	2.0000	1.01274

Cluster 1: General knowledge	Cluster 1: General knowledge		Level of Need	Level of Need	Level of performanc e	Level of performanc e
15	Ability to use the internet to download educational materials to enrich learning.	157	3.8599	.34823	2.0510	1.04879
16	Ability to use ICT to Select and evaluate subject-specific educational software.	157	3.7070	.63307	1.8854	.96721
17	Ability to use ICT knowledge to Develop and maintain educational websites.	157	3.5032	.90316	2.1783	1.05917
18	Ability to Prepare ICT-based learning environment.	157	2.1529	1.11036	2.1592	1.00963
19	Ability to use ICT knowledge to develop educational programs with the help of programming languages.	156	2.2179	1.10304	1.8790	.85747
20	Ability to use spreadsheet for mathematical calculations during the teaching-learning process.	157	3.6624	.61555	1.8599	.88765
21	Ability to use ICT Application to support strategies to manage students' learning.	157	3.3949	.93204	1.8153	.86840
22	Ability to design effective learning experiences and creating rich learning environments with the support of ICT.	157	3.5924	.73341	1.8344	.90474
23	Ability to use ICT in locating useful information from the internet for the development of lesson plans.	157	3.5223	.87403	1.8535	.90451
24	Ability to use ICT to integrate different subjects fields across the curriculum.	157	2.3503	.97314	1.7962	.86779
25	Ability to use ICT to Prepare instructional notes to be delivered to learners.	157	3.4204	.95493	2.1592	1.19029
26	Ability to explore and apply to suitability of ICT for cooperative learning and for peer interaction.	157	3.6561	.64761	1.7643	.81760
27	Ability to use ICT tools to create and facilitate a community of learning.	157	3.4459	.85781	1.9936	.99677
28	Ability to use Microsoft Excel for data analysis during instructional delivery.	157	3.6497	.66858	1.9618	1.02460
29	Ability to use ICT knowledge to format tables using special software packages.	157	3.5924	.77588	1.8217	.92337
30	Ability to use ICT to give assignment/wrap assessments on topics taught.	157	3.7834	.54677	1.7898	.86995

Cluster 1: General knowledge	Cluster 1: General knowledge		Level of Need	Level of Need	Level of performance	Level of performance
31	Ability to use ICT live streaming tools to support specific online teaching/remote learning	157	3.4522	.90897	1.8471	.89275
32	Ability to use ICT knowledge to make decisions about different learning methodologies appropriate to knowledge and experience of learners.	157	3.5159	.84433	1.6815	.85514
33	Ability to use ICT to design the feedback and evaluation for the taught concept.	157	3.5096	.84442	1.9236	.93741
34	Ability to use ICT to create activities related to specific aims/objectives.	157	3.4841	.88871	1.8599	.90198

Source: Field Survey, 2022

Note. Cumulative mean: need = 3.44; performance = 2.02.

Table 3

Mean and Standard Deviations of Responses on Proficiency Skills Needed for Instructional Purposes: Word-Processing Skills

Cluster 2: Word Processing Skills			Level of Need	Level of Need		Level of performance	Level of performance
S/N	ITEM STATEMENTS	N	XN	Std. Deviation		XP	Std. Deviation
35	Ability to add text to documents	157	3.7452	.54189	3.7580		.52381
36	Ability to enter text	157	3.7962	.40413	3.5732		.67181
37	Ability to format text: font, style, size, and color	157	3.6688	.57052	2.5350		.86624
38	Ability to adjust line spacing	157	3.6688	.57052	2.1911		.97490
39	Ability to insert and format WordArt	157	3.6561	.59607	1.7898		.89178
40	Ability to insert and format clip art or picture file	157	3.6433	.62031	1.8025		.90893
41	Ability to modify the text wrap of an object	157	3.6306	.64337	1.7898		.91309
42	Ability to draw and format shapes	157	3.6752	.56859	1.7771		.86676
43	Ability to scale, move, and rotate objects	157	3.7389	.50822	1.7834		.89384
44	Ability to insert a simple page border	157	3.6433	.59928	1.7707		.88341

Cluster 2: Word Processing Skills			Level of Need	Level of Need	Level of performance	Level of performance
45	Ability to spell check a document	157	3.6624	.63603	2.3057	1.17486
46	Ability to print preview	157	3.9682	.17615	2.5732	1.09897
47	Ability to print a document	157	3.9554	.20705	2.2293	1.06140
48	Ability to cut, copy, and paste a selection	157	3.9236	.31094	3.7325	.66393
49	Ability to copy formatting from a selection	157	3.6752	.59070	2.1720	1.06926
50	Ability to create graphic organizer	157	3.7197	.55278	2.4076	.77588
51	Ability to bookmark a location in a document	157	3.9618	.19233	1.9363	.98503
52	Ability to insert headers and footers	157	3.9618	.19233	1.8535	.93243
53	Ability to insert date and page numbers	157	3.9618	.19233	1.7771	.86676
54	Ability to adjust character and paragraph spacing	157	3.9682	.17615	1.9682	1.02795
55	Ability to select desired cells to be printed	157	3.9490	.27260	1.8854	.89849
56	Ability to create hyperlink to bookmarked location	157	3.9490	.24797	1.8471	.86355
57	Ability to group and align objects	157	3.8408	.48714	1.7707	.89781
58	Ability to adjust page setup: margins, section breaks	157	3.7516	.60612	1.8025	.87295
59	Ability to use, modify, and create styles	157	3.6433	.74259	1.8089	.84074
60	Ability to use mail merge to create a form or letter	157	3.8089	.52052	1.8790	.87230
61	Ability to import chart data into Microsoft Word	157	3.7452	.61919	1.7834	.82678
62	Ability to create a table of contents	157	3.6943	.71309	1.8089	.90677
63	Ability to format text into columns	157	3.6688	.70154	1.7834	.87938
64	Ability to insert and format tables	157	3.6115	.82158	2.1847	1.00525
65	Ability to insert pictures data into Microsoft Word	157	3.6051	.76592	2.1783	1.05310
66	Ability to insert clip Arts into Microsoft Word	157	3.6051	.76592	2.1783	1.05310
67	Ability to take and insert Screenshots into Microsoft Word	157	3.6242	.67381	2.1783	1.05310
Table 2.c: Mean and standard deviation of responses of Agricultural education Lecturers and Technologist on the proficiency skills needed by Agricultural Education Lecturers' for instructional purposes (Application of spreadsheet skills)						

Source: Field Survey, 2022 ; Note. Cumulative mean: need = 3.76; performance = 2.14.

Table 4

Means and Standard Deviations of Responses on Proficiency Skills Needed for Instructional Purposes: Spreadsheet Skills

Cluster 3: Spreadsheet processing skills			Level of Need	Level of Need	Level of performance	Level of performance
S/N	ITEM STATEMENTS	N	XN	Std. Deviation	XP	Std. Deviation
68	Ability to define basic spread sheet terminology	157	3.6752	.69075	1.7516	.83709
69	Ability to identify a cell reference	157	3.6815	.67973	1.7516	.83709
70	Ability to enter, edit, or delete data into a cell	157	3.6624	.71211	2.2484	1.05403
71	Ability to select a cell or a range of cells	157	3.6497	.72383	2.2293	1.07341
72	Ability to modify column width and row height	157	3.6688	.66399	2.1019	1.07527
73	Ability to merge and center data	157	3.7134	.71657	2.6688	1.05847
74	Ability to apply borderlines	157	3.7134	.71657	2.6943	1.04183
75	Ability to apply number formats to data	157	3.7070	.73608	2.6943	1.04183
76	Ability to alter the number of decimal places	157	3.7389	.63191	1.8089	.87804
77	Ability to calculate the total number using AutoSum	157	3.5860	.77662	2.1911	1.17197
78	Ability to sort data alphabetically or numerically graph data	157	3.5860	.77662	2.1911	1.17197
79	Ability to format a graph to alter its appearance	157	3.7134	.55529	1.6815	.86260
80	Ability to scale, move, and rotate objects	156	3.5705	.68262	2.2102	1.17141
81	Ability to insert and delete columns or rows	157	3.9554	.20705	3.5159	.82123
82	Ability to view a worksheet using the sheet tabs	157	3.9618	.19233	3.6561	.59607
83	Ability to print a workbook or worksheet	157	3.9618	.19233	3.6561	.59607
84	Ability to copy formatting from a cell to another	157	3.7070	.49693	1.8790	.81138
85	Ability to cut, copy and paste a selection of cells	157	3.7070	.49693	3.8471	.37835
86	Ability to calculate data using formulas	157	3.9554	.20705	1.8471	.87827
87	Ability to use statistical functions	157	3.9554	.20705	1.8471	.87827
88	Ability to format a cell using conditional formatting	157	3.9490	.22061	1.8280	.95527
89	Ability to apply an auto format to a selection of cells	157	3.5796	.72614	2.3376	.91675
90	Ability to insert or delete worksheets	157	3.9618	.19233	3.8471	.41084
91	Ability to copy a worksheet	157	3.9682	.17615	3.8471	.41084
92	Ability to rename or color a sheet tab	157	3.9682	.17615	2.2166	1.15647

	Cluster 3: Spreadsheet processing skills		Level of Need	Level of Need	Level of performance	Level of performance
93	Ability to customize print settings	157	3.9682	.17615	1.8790	.94970

Source: Field Survey, 2022

Note. Cumulative mean: need = 3.77; performance = 2.47. N = 157.

Table 5

Summary Need-Gap Analysis of Mean Ratings on Proficiency Skills Needed for Instructional Purposes

S/N	CLUSTERS	ITEMS	Xn	Xp	NG Xn-Xp	Decision
1.	A1	General knowledge in ICT	3.44	2.02	1.41	Needed
2.	A2	Application of Word processing skills	3.76	2.14	1.61	Needed
3.	A3	Application of spreadsheet skills	3.77	2.47	1.30	Needed
	Grand Mean		3.66	2.21	1.44	Needed

Note. Xn = mean rating of need; Xp = mean rating of performance. Source: Field Survey, 2022.

As shown in Table 5, the need-gap values for the three clusters ranged from 1.30 to 1.61 and were all positive. This indicates that agricultural education lecturers in tertiary institutions needed proficiency skills for instructional purposes across all three clusters in the utilisation of information and communication technology for pedagogical effectiveness in tertiary institutions of South-West, Nigeria

The three clusters comprised 93 elements. Eighty-nine of the 93 elements recorded positive need-gap values ranging from 0.11 to 2.20, indicating that agricultural education lecturers in tertiary institutions in South-West Nigeria required proficiency training in those elements. Four elements – items 11 (−0.26), 18 (−0.00), 35 (−0.01) and 48 (−0.01) – recorded negative need-gap values, indicating that training was not required for those items.

Discussion of Findings

The high share of the ICT facilities deemed necessary speaks of the practicality of agricultural education. In particular, external storage devices, interactive boards, multimedia projectors and statistical software become very relevant in laboratories, data analysis from field work, description of agricultural processes and providing visual material. The findings are consistent with those of related studies that identified the use of ICT tools in the instructional process. One notable study conducted by Yushau & Nannim in 2020 revealed that lecturers utilize electronic whiteboards/Smart Boards (including the Triumph Board and Genee Touch), as well as Microsoft Word, PowerPoint, Excel, external devices, the internet, PDFs, and graphic software for teaching purposes in the classroom. The low rating of fax machines, satellite technology and joysticks reflects the obsolescence of the former and the inefficiency of the latter in terms of teaching in the modern tertiary classroom. This finding is consistent with the lists of necessary ICTs for educational purposes compiled earlier (Akachukwu and Edikpa, 2018; Onugha, 2009).

Consistently positive gaps in general knowledge, as well as in word processing and spreadsheets skill clusters, indicate that the lecturers in the field of agricultural education need competencies that go beyond computer literacy. Contemporary lecturing includes such tasks as creating digital content, working with data from students, creating interactive presentations and digital assessment of the progress of learning process. The finding suggests that agricultural education lectures require competences beyond basic computer literacy. Similar observations indicate that productivity and presentation skills are essential, because modern teaching requires lecturers to design, analyse and present digital learning materials (Ajie-Uche et al., 2018; Okoye and Ugwugwo, 2021). The findings are in conformity with some of the general teachers' competencies and skills required in the use of ICT facilities and tools as outlined by the UNESCO (2018). The results are consistent with a study by Igbongidi (2018) that revealed that all the identified fifty three skills (53) on computer appreciation, word processing, internet and data processing are needed by business studies teachers in Bayelsa State.

The results of this study were also in agreement with Akinnagbe and Baiyeri's (2011) analysis of the training needs of lecturers for improving their ICT skills in the Faculty of Agriculture at the University of Nigeria, Nsukka, where the authors discovered that the lecturers lacked proficiency in the creation of spreadsheets, data analysis using software, and slide preparation and presentations

TPACK framework can provide an explanation of the significance of the mentioned gaps: without sufficient technological knowledge (TK) and technological pedagogical knowledge (TPK), the lecturers would not be able to utilise all opportunities provided by modern technologies. Mishra and Koehler (2006) asserted that TPACK is a crucial framework for understanding how pedagogy, technology, and content interact to enhance the efficacy,

efficiency, and engagement of learning. They emphasized the need to explore design-based approaches for integrating ICT into African classrooms. For this integration to be successful, teachers must be adaptable and able to acquire knowledge about the school, students, and local context, in addition to utilizing available resources and tools.

Nonetheless, the few areas where training was not required (especially basic knowledge about PowerPoint and basic manipulation of text) indicate that most of the lecturers are well versed in basic presentation techniques and text manipulation, probably due to the needs arising from daily work in administration and instruction. In light of this, professional development programmes may consider developing the skills in more complex areas like administration of the learning management system, complex spreadsheet modelling, multimedia production, and design of collaborative ICT activities.

Conclusion

From the results of the study, it has been revealed that a very large number of ICT facilities are considered necessary for the instructional process of agricultural education. In addition, there are some proficiency deficiencies in terms of general ICT knowledge, word processing and spreadsheets. These deficiencies clearly indicate the need for further training in order to enable lecturers to use technology in teaching and learning process effectively. This will improve the preparedness of tertiary agricultural education programmes in preparing graduates for technological agriculture.

Recommendations

Based on the research findings, the following recommendations were made:

- i. Continuous professional development programmes, which are to be designed and developed by tertiary institutions in conjunction with relevant professional bodies, are needed to cater to the ICT competence deficiency highlighted by this study.
- ii. Procurement, maintenance and equal allocation of the ICT facilities perceived as necessary for respondents by the government at federal and state levels as well as institution management are important.
- iii. The agriculture education syllabus should be revised to incorporate the use of ICT in such a way that ICT literacy skills of both lecturers and learners can be developed.

Further studies using mixed methods and samples drawn from multiple regions should be conducted.

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