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Digital Literacy as A Predictors of Agricultural Educator's Effective Instructional Delivery in Colleges of Education in Northeast Nigeria

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Abstract: The study investigated digital literacy as predictors of agricultural educators' effective instructional delivery in Colleges of Education in Northeast Nigeria. The study was guided by two objectives and two null hypotheses. Correlation survey research design was used for this study. The target population for this study was 213 agricultural educators drawn from 12 Colleges of Education in Northeast. A census sampling technique was adopted for the study. The instruments for data collection were researcher-developed structured questionnaires. The instruments demonstrated strong content validity and high reliability, with Cronbach's Alpha coefficients of 0.853 and 0.758, respectively. The study revealed that photo-visual digital literacy and reproduction digital literacy are significantly determinants of Agricultural Educators instructional delivery. The study concludes that comprehensive digital literacy development across multiple dimensions is critical for enhancing agricultural educators' instructional delivery in Northeast Nigeria. The study concludes that comprehensive digital literacy development across multiple dimensions is critical for enhancing agricultural educators' instructional delivery in Northeast Nigeria. It was recommended that institutions implement targeted training programs prioritizing high-impact components like basic computer, reproduction, and socio-emotional literacy while providing technical support to address the low skill gap.

Key words: Digital Literacy, Agricultural Educators, Instructional Delivery

INTRODUCTION

Agricultural education is a field of study that promotes mastery of skills for graduates to prepare for the world of work in agriculture. Amadi and Adejoh (2020) stated that agricultural education as a field concerned with the development of skills, knowledge, and attitude in agriculture to enable the recipients to take up a career in it. The prospects of agricultural education in tertiary institutions facilitate students' entry into occupations and career paths in agriculture, home science, and technology (Ebere et al., 2022). Instructional delivery refers to methodologies educators use to promote and guide teaching and learning in a specific subject area. According to Adedoyin and Soykan (2023) opined that instructional delivery encompasses the responsibility of ensuring that structured teaching and learning are effective within the classroom. Instructional delivery within tertiary institutions can be epitomized as the application of professional knowledge, skills, attitudes, and value systems to enhance students' learning capabilities (Mohammed & Hassan, 2022). The instructional approaches utilized by the teacher play a crucial role in nurturing a positive mindset in students. The

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manner in which students interact, think, and perceive their surroundings significantly influences their interest in the subject matter. In pursuit of instructional efficacy, educators are expected to be innovative and possess appropriate pedagogical and digital literacy.

The term digital literacy was first coined by Gilster (1997), to describe "the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers. In more recent times, digital literacy is conceived as a combination of technical-procedural (e.g., handling files and editing visuals), cognitive (e.g., the ability to intuitively decipher or "read" visual messages embedded in graphic user interfaces, working with search engines, evaluating data, sorting out false and biased data, and distinguishing between relevant and irrelevant data) and emotional-social, online safety skills (e.g., ability to communicate online safely, being aware of the legal and ethical guidelines of using digital platforms). Digital Literacy refers to the skills, knowledge and understanding required to use new technology and media to create and share meaning (Lawal *et al.*, 2023).

The digital literacy framework created by Eshet-Alkalai (2004) comprised; Photo-visual digital literacy: the ability to comprehend instructions and intuitively read and understand communications, content, and directions that are graphically displayed. Reproduction digital literacy: the ability to use digital reproduction skills to edit pre-existing text, visuals and audio information to generate new materials and give already created digital content new meanings and interpretations. Online navigation digital literacy: known as hypermedia skills, include orientation skills to maintain focus while navigating intricate environments. It's also assist users with online navigation and the development of a sense of direction when utilizing a variety of platforms, tools, and interfaces to accomplish their goals. Socio-emotional digital literacy: the ability to recognize and utilize cyberspace norms in all digital communications. Information digital literacy: the capacity to assess information critically and determine its reliability and quality. Large amounts of actual data on internet user behavior served as the foundation for the development of this evaluative model. Real-time thinking digital literacy: are a new skill that has been incorporated into the paradigm for scholarly talks. It is the ability to process large volumes of information at the same time, as in video games or in online teaching. This talent refers to the ability to use advanced digital tools, multi-media games, and online courses. It implies that the user must have the capacity to quickly and concurrently grasp large volumes of information (Eshet-Alkalai, 2012).

However, Study by Karofi, (2025) indicated that the integration of digital technologies into pedagogical practices by educators in Nigerian tertiary institutions is limited due to insufficient ICT resources within these establishments. This reinforces the findings by Ogar, et al., (2024) that a substantial number of educators in Nigeria lack proficiency in utilizing Information and Communication Technology (ICT) for instructional purposes, and that the essential ICT facilities for effective teaching are deficient. Ata-Agboni, (2024) noted that the primary obstacle for educators lies not in merely covering course content, but in effectively accessing and utilizing ICT resources for instructional purposes due to lack of digital literacy. Given the significant role of digital literacy across various professions and the need for progress in both agriculture and instructional delivery, agricultural educators are expected to be proficient and well-informed in applying diverse digital literacy skills for teaching and learning, especially during national emergencies.

Statement of the Problem

Instructional delivery in agricultural education is a critical component in achieving the goals of producing competent, skilled, and innovative graduates capable of contributing meaningfully to agricultural development. Effective instructional delivery ensures that theoretical concepts—such as crop production, soil science, animal husbandry, agricultural

economics and agricultural mechanization—are clearly explained and well understood, forming a strong cognitive foundation for learners to academically, perform better and to be productive after graduation the college. One of the ways to determine the extent to which these educational objectives have been achieved is through academic performances of the agricultural education students.

However, over the years there has been record of poor academic performances of Agricultural Education Students in colleges of education in northeast, Nigeria (Amadi & Solomon, 2020; Ukah et al., 2021; NCCE, 2020). This has questioned the credibility of the Agricultural Education in producing the needed manpower for the needed agricultural revolution. This poor academic performance of agricultural education students could be attributed to a lot of factors such as lack of conducive learning environment, lack of instructional facilities, poor instructional delivery and lack of interest at the side of the students.

To this extent, notable works have been done to improve academic performances of students, yet no appreciable development has occurred. For instance, Babate and Jakwa, (2021) carried out a study to explore Strategies for Effective Integration of Information and Communication Technology for teaching in Colleges of Education in North-East, Nigeria. Babi (2023) also conducted a study on an appraisal of Availability and Adequacy of Information and Communication Technologies Facilities for Effective Learning in the Colleges of Education in North-East and Durojaye, et. al., (2026) ascertained the basic technological skills as a Panacea for effective agricultural Education Pre-Service Teacher's Instructional Delivery in Colleges of Education in Northeast, Nigeria. It was on this note that the present study seeks to investigate whether digital literacy is a determinant of agricultural educator's instructional delivery in colleges of education in Northeast, Nigeria. Therefore, the study seeks to ask the following questions: What is the level of photo-visual digital literacy of agricultural educators for effective instructional delivery in Colleges of Education in Northeast Nigeria? What is the level of reproduction digital literacy of agricultural educators for effective instructional delivery in Colleges of Education in Northeast Nigeria?

Hypotheses

The study hypothesized that:

Ho_1: Photo-visual digital literacy is not significant determinant of agricultural educators' instructional delivery in Colleges of Education in Northeast, Nigeria.

Ho_2: Reproduction digital literacy is not significant determinant of agricultural educators' instructional delivery in Colleges of Education in Northeast, Nigeria.

LITERATURE REVIEW

Theoretical Framework of the Study

This study is anchored on Learning theory of connectivism (LTC) and Technological Pedagogical and Content Knowledge theory (TPACK) model. Connectivism as an important construct in knowledge sharing while the model emphasizes the need for mastery of both subject matter and the use of technology for instructional delivery.

Learning theory of connectivism (LTC)

Connectivism theory is considered most appropriate to the present study as it involves the integration of digital technologies into educational pedagogy with a view to making teaching and learning more vibrant, accessible and cost-effective. Connectivism theory explains the use of technology in education. George Siemens proposed the theory known as a learning theory for the digital age (Siemen, 2005). It is a pedagogical approach that affords learners the opportunity to connect with one another throug technologies, internet networks

and teamwork tools. Connectivism is an epistemological approach grounded in the interactions within networks (Downes, 2012).

Thus, since connectivism theory sees learning as a process of connecting information sources or specialized nodes for knowledge acquisition and information sharing, it, therefore, has direct application to the present study. Downes studied connective knowledge and characterized it as interactive knowledge of a connection within a network (Downes, 2005). Connectivism, therefore, is seen as a network theory for teaching and learning in a connected world (Peter and Ogunlade, 2024). Siemens (2004) suggested connectivism as a learning theory for the digital age. Siemens further posited that connectivism is a theory that succeeds the earlier learning theories of behaviourism, cognitivism and constructivism.

The concept of network is prominent in the theory of connectivism which characterises knowledge as a flow through a network of humans and non-humans (artefacts). A network comprises connections between entities (nodes), where the nodes can be individuals, groups, systems, fields, ideas, resources or communities. Siemens (2005) and Downes (2005) further stated that connectivism holds that knowledge is distributed across a network of connections, and therefore learning consists of the ability to construct and traverse those networks. The attractiveness and accessibility of the theory of connectivism make it a good option for structuring innovation by educators in their practice. One implication of students evolving into connected learners is that learning will no longer be restricted to the physical classroom or the virtual classroom within the institutional virtual learning environment. (Ali, 2020).

This implies that students and teachers do not necessarily need to be in the same place for teaching and learning to take place. Concurrently, the integration of innovative digital tools fosters a dynamic learning atmosphere, promoting critical thinking and collaboration to prepare students for the complexities of the modern workforce (Johnson et al., 2021). Thus, for educators and students to actively apply digital technology instruction and learning interactions in colleges of education in Northeast Nigeria, the requisite digital gadgets must be made available in the classrooms

Technological Pedagogical and Content Knowledge Theory

Technological Pedagogical and Content Knowledge (TPACK) was formulated by Mishra and Koehler (2006) to elucidate the breadth of knowledge required by educators to effectively integrate technologies into their teaching practices. The academic community has devoted significant attention to TPACK since its inception (Yeh, et al., 2021). This framework is an expansion of Pedagogical Content Knowledge established by Schulman (1987), which emphasizes the importance of comprehending pedagogy alongside knowledge to ensure exceptional instruction. Schulman (1987) identified pedagogical content knowledge as the intersection of content knowledge and pedagogical knowledge, enabling teachers to make content knowledge more accessible for student learning (Mishra and Koehler, 2006).

TPACK advocates for professional development models structured around "integrated and design-based approaches" (Mishra and Koehler, 2006). Factors such as the subject matter being taught, students' age and experience, and the available technology all influence the effectiveness of technology integration (Mishra and Koehler, 2006). A deep understanding of successful technology integration in classroom instruction often goes beyond traditional forms of teacher professional development, such as conferences and context-neutral classes (Mishra & Koehler, 2006). Effective professional development in technology is an ongoing and evolving process (Ukpe, 2023), focusing on enhancing teachers' TPACK (Harris, 2016). This framework aids agricultural educators in creating hands-on learning experiences in their instruction.

Concept of Instructional Delivery

Instructional delivery is a process of applying methodological strategies to deliver academic content to learners. It enables the students to interact with the teacher in order to acquire knowledge and skills. Instructional delivery of course content may not be effectively achieved without the application of needed digital skills by the lecturers. According to Nwokedi *et al.* (2018), knowledge of digital devices (such as computers, laptops, smartphones, and internet connections) and the use of that knowledge by education lecturers might increase their productivity in the teaching-learning process and research development. Agricultural Education instructors may need to prepare themselves for the rapid advancements in technology by pursuing informal education in their respective fields of expertise (Tijani, (2022). Lecturers' digital literacy skills are fundamental to their instructional delivery in an academic environment.

Concept of Digital Instruction

Digital technologies in education or E-learning solutions are forms of ICT resources. The term Information and Communication Technology (ICT) encompasses a wide array of concepts, serving as a tool, a facility, and a diverse range of goods, services, and applications utilized for generating, disseminating, processing, and transforming information. This includes telecommunications, broadcasting (such as television and radio), hardware and software, computer services, and electronic media (Khademi-Vidra and Bakos, (2024).

In a specific context, ICT for instructional delivery is the application of a high-speed digital communication network, giving required information in education and services to schools, homes, offices and other relevant places (Musa, 2019). In the 21st century teaching and learning process has shifted focus from teacher-centered to learner centered approach, whereby instructors have opportunities to teach using multimedia (information provided in multiple formats e.g. text, audio, video, animations, graphics, and simulations, etc.) to meet up with diverse learning needs (Suleiman and Soetan, 2018).

METHODOLOGY

Correlation survey research design was used to collect data in order to test the hypotheses and answer the corresponding seven research questions to determine agricultural educators' digital literacy for effective instructional delivery in colleges of education in Northeast, Nigeria. Correlation research design is a type of non-experimental research that facilitates the prediction and explanation of the relationship among variables of a study (Roberts, 2021). This study is aimed at establishing the relationship between digital literacy and instructional delivery; hence this design was suitable to collect the data using questionnaires to enable the researcher to draw valid conclusions on digital literacy as a determinant of agricultural educators for effective instructional delivery in colleges of education in northeastern Nigeria that is currently in doubt.

The population used to comprise 213 Agricultural Educators in twelve (12) federal and State colleges of education located within the zone. A Census sampling technique was used to study all the 213 Agricultural educators from State and Federal Colleges of Education in the study area. Census sampling technique was adopted since the population is not large and the researchers can manage the entire population. The instruments used for data collection in this study were two self-developed structured questionnaires designed to assess agricultural educators' digital literacy competencies and their instructional delivery in Colleges of Education in Northeast Nigeria.

The first instrument, titled the Agricultural Educators' Digital Literacy Questionnaire (AEDLQ), consists of 10 items grouped into two sections. Each of these sections contains five

items, structured to capture the respondents' self-assessed competencies across the different literacy domains. Both questionnaires were designed using a five-point Likert scale of Very High Level=5, High Level=4, Moderate Level =3, Low Level =2, and Very Low Level =1 to measure the extent to which respondents demonstrate or apply specific digital skills or instructional strategies.

To ensure the validity of the research instruments, two experts from the Department of Vocational Education and one expert from the Department of Physical Science Education, all within the Faculty of Education, Modibbo Adama University, Yola were engaged for quantitative validation. Their ratings were used to compute the Content Validity Ratio (CVR) and Content Validity Index (CVI). Construct validity was also assessed and reported. The results revealed CVI values of 0.97 and 0.99

To ensure reliability, a pilot study was conducted at the Federal College of Education (FCE), Bichi. The pilot study involved 50 agricultural educators, from whom responses were obtained for trial testing of the instruments. Cronbach's Alpha was employed to assess internal consistency of the instruments, as it measures the degree of inter-item correlation and the extent to which items consistently measure the same construct. The results revealed reliability coefficients of 0.853 for the Agricultural Educators' Digital Literacy Questionnaire (AEDLQ) and 0.758 for the Agricultural Educators' Instructional Delivery Questionnaire (AEIDQ). According to established benchmarks for interpreting Cronbach's Alpha coefficients, these values indicate good and acceptable levels of internal consistency, respectively.

The researcher carried out the administration of the instrument with the help of two research assistant in each study area. At every institution, the researcher seeks permission of the college authority to administer the instrument to the affected lecturers in the Department of Agricultural Education. While at the department, the instrument was administered with the help of research assistant; the following day, the researcher and the research assistant go round and collect the filled questionnaire as well as ascertained the checklist. The entire procedure lasted for six weeks.

The data collected were analyzed using Statistical Product and Service Solution (SPSS) version 23. Inferential statistics of simple linear regression were employed to determine the relationships among variables. Hypotheses 1 and 2 were tested using simple linear regression analysis at a 0.05 significance level. The decision rule for testing the hypotheses is if p-values ≤ 0.05 the null hypothesis is rejected, otherwise the null hypothesis is retained.

RESULTS AND DISCUSSION

Photo-Visual Digital Literacy and Agricultural Educators' Instructional Delivery

Table 1a: ANOVA Results of Relationship between Photo - Visual Digital Literacy and Agricultural Educators' Instructional Delivery

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1.199	1	1.199	13.546	.000[b]
	Residual	18.676	211	.089		
	Total	19.875	212			

a. Dependent Variable: Agricultural Educators' Instructional Delivery

b. Predictors: (Constant), Photo-visual Digital Literacy

Table 1a. presents the ANOVA results for the regression model testing the relationship between photo-visual digital literacy and agricultural educators' instructional delivery. The results shows that there is significant influence of photo-visual digital literacy on agricultural

educators' instructional delivery, F (212,1) = 13.546, p< 0.05. Since the p – value is less than 0.05, the null hypothesis is rejected. This means that photo-visual digital literacy is significantly related with agricultural educators' instructional delivery in Colleges of Education in Northeast Nigeria.

Table 1b: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.246[a]	.060	.056	.29751

a. Predictors: (constant), Photo-visual Digital Literacy

Table 1b shows the model summary for the regression of photo-visual digital literacy on instructional delivery. The correlation coefficient (R) is .246, indicating a low to moderate positive influence of photo-visual digital literacy on agricultural educator's instructional delivery. The adjusted R Square value is .056, meaning that about 5.6% of the variation in instructional delivery can be explained by photo-visual digital literacy.

Table 1c: Coefficients of Beta

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.601	.122		29.491	.000
	Photo-visual Digital Literacy	.112	.030	.246	3.680	.000

a. Dependent Variable: Agricultural Educators' Instructional Delivery

Table 1c provides the coefficients for the regression model. The constant (intercept) is 3.601 with a standard error of .122, and it is highly significant (t = 29.491, Sig. = .000), indicating that when photo-visual digital literacy is zero, the predicted instructional delivery score is about 3.601. The standardized coefficient (Beta) is .246, showing that photo-visual digital literacy has a positive but relatively small effect on instructional delivery. This means that higher levels of photo-visual digital literacy are associated with higher levels of instructional delivery among agricultural educators.

Reproduction Digital Literacy and Agricultural Educators' Instructional Delivery

Table 2a: ANOVA Results of Relationship between Reproduction Digital Literacy and Agricultural Educators' Instructional Delivery

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2.568	1	2.568	31.305	.000[b]
	Residual	17.307	211	.082		
	Total	19.875	212			

a. Dependent Variable: Agricultural Educators' Instructional Delivery

b. Predictors: (Constant), Reproduction Digital Literacy

Table 2a presents the ANOVA results for the regression model testing the relationship between reproduction digital literacy and agricultural educators' instructional delivery. The regression sum of squares is 2.568 with 1 degree of freedom, while the residual sum of squares is 17.307 with 211 degrees of freedom, giving a total sum of squares of 19.875 on 212 degrees of freedom. The mean square for regression is 2.568 and for residual is .082, which produces an F-statistic of 31.305. The significance (p-value) value is .000, which is less than 0.05, indicating that the null hypothesis is rejected. This shows that reproduction digital literacy significantly relates with variation in agricultural educators' instructional delivery in Colleges of Education in Northeast Nigeria.

Table 2b: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.359[a]	.129	.125	.28640

a. Predictors: (Constant), Reproduction Digital Literacy

Table 2b shows the model summary for the regression of reproduction digital literacy on instructional delivery. The correlation coefficient (R) is .359, indicating a moderate positive influence of reproduction digital literacy on agricultural educator's instructional delivery. The R Square adjusted value is .125, meaning that about 12.5% of the variation in instructional delivery can be explained by reproduction digital literacy. The standard error of the estimate is .28640, which is slightly lower than in the other models, suggesting a better fit and more precise prediction of instructional delivery based on reproduction digital literacy.

Table 2c: Coefficients of Beta

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.217	.149		21.578	.000
	Reproduction Digital Literacy	.216	.039	.359	5.595	.000

a. Dependent Variable: Agricultural Educators' Instructional Delivery

Table 2c provides the unstandardized and standardized coefficients for the regression model. The constant (intercept) is 3.217 with a standard error of .149, and it is highly significant (t = 21.578, Sig. = .000), indicating that when reproduction digital literacy is zero, the predicted instructional delivery score is about 3.217. The unstandardized coefficient (B) for reproduction digital literacy is .216 with a standard error of .039, and it is highly significant (t = 5.595, Sig. = .000). The standardized coefficient (Beta) is .359, showing that reproduction digital literacy

has a positive and relatively moderate relationship with instructional delivery. This means that higher levels of reproduction digital literacy are associated with higher levels of instructional delivery among agricultural educators in Colleges of Education in Northeast Nigeria.

DISCUSSION

The study finding indicates that agricultural educators possessed a high level of photo-visual digital literacy (Grand Mean = 3.95). The finding also reveals a statistically significant relationship between photo-visual digital literacy and instructional delivery, $F(1, 212) = 13.546$, $p < 0.05$. This finding suggests that agricultural educators are proficient in interpreting, creating, and using visual and multimedia resources such as images, diagrams, videos, animations, and audio-visual materials during instruction. The high level of photo-visual digital literacy implies that educators can effectively integrate visual representations to simplify abstract or technical agricultural concepts, thereby improving students' understanding and retention. The significant relationship with instructional delivery further indicates that the effective use of visual and multimedia resources enhances lesson clarity, learner engagement, and overall teaching effectiveness.

This finding aligns with previous empirical studies. The finding agrees with the finding of Onyiorah (2023) who reported an importance of audio-visual resources in instructional processes, while Fakunle et al. (2022) and Adeoye and Adeoye (2017) reported that learners and educators with strong media and visual literacy skills demonstrated better interpretation of digital content and improved instructional outcomes. The finding corroborated that of Abbas et al. (2019) who found that digital literacy significantly enhanced communication skills and confidence, which are essential components of effective instructional delivery. Furthermore, Holm (2024) and Sari (2024) highlighted that specific digital literacy components, including visual and media competencies, were critical for academic success and engagement in online and blended learning environments. The consistency of these findings suggests that photo-visual digital literacy is a key driver of effective instructional delivery across different educational contexts.

The finding of the study also reveals that agricultural educators had a high level of reproduction digital literacy (Grand Mean = 3.83). The finding further reveals a statistically significant relationship between reproduction digital literacy and instructional delivery, $F(1, 212) = 31.305$, $p < 0.05$. This finding implies that agricultural educators are highly competent in adapting, modifying, reproducing, and ethically using digital content for instructional purposes. Reproduction digital literacy includes skills such as remixing instructional materials, transforming existing digital resources into context-specific teaching aids, and observing copyright and intellectual property regulations. The strong and statistically significant relationship indicates that educators who possess these skills are more capable of developing relevant, flexible, and learner-centered instructional materials, thereby enhancing instructional delivery.

The finding agrees with earlier studies. The finding agrees with the finding of Komlayut and Srivatanakul (2017) who identified reproduction skills, including copyright awareness and ethical content use, as a major priority in digital literacy development. The finding is also consistent with the finding of Madukoma and Adekunle (2022) who reported that information literacy and critical thinking significantly improved research productivity, reflecting the importance of content adaptation and reproduction skills. Nwankwo and Ifeka (2024) also found moderate-to-strong positive correlations between digital literacy dimensions and librarians' job performance. Additionally, Widana (2020) demonstrated that teachers' digital literacy significantly influenced their ability to develop higher-order thinking skills-based

assessments. These studies collectively support the conclusion that reproduction digital literacy is a strong predictor of effective instructional delivery.

CONCLUSION

In conclusion, this study has established that digital literacy is a significant predictor of effective instructional delivery among agricultural educators in Colleges of Education in Northeast Nigeria. The findings underscore that educators who possess adequate digital skills are better equipped to design, deliver, and evaluate instructional content in ways that enhance student understanding, engagement, and overall learning outcomes. Digital literacy enables the integration of modern instructional tools such as multimedia resources, virtual simulations, and online platforms, thereby shifting teaching practices from traditional, teacher-centered approaches to more interactive and learner-centered methods.

Furthermore, the study highlights that the level of digital competence among agricultural educators directly influences their ability to adapt to emerging educational technologies and respond to the evolving demands of 21st-century teaching and learning. In a region where educational challenges such as limited resources and infrastructural constraints persist, improving digital literacy among educators presents a viable pathway for strengthening instructional effectiveness and bridging existing gaps in agricultural education.

Ultimately, the study concludes that enhancing digital literacy should be prioritized through continuous professional development, targeted training programs, and institutional support. By investing in the digital capacity of agricultural educators, Colleges of Education in Northeast Nigeria can significantly improve instructional delivery, promote innovation in teaching, and better prepare students with the skills required for modern agricultural practices and national development.

RECOMMENDATIONS

Based on the study findings, the following recommendations were made.

1. Given that agricultural educators possessed a high level of photo-visual digital literacy which significantly influenced instructional delivery, it is recommended that educators be encouraged and supported to integrate more multimedia instructional resources, such as videos, animations, and simulations, into agricultural instruction to improve learner engagement and conceptual understanding.
2. It is recommended that institutions promote structured training on ethical content adaptation, copyright compliance, and instructional material customization to further enhance the quality and relevance of teaching resources.

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