



DIGITAL CAPABILITIES OF AGRICULTURAL STUDENTS AT THE FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI, IMO STATE, NIGERIA

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Abstract

The paper investigated capabilities to use digital technologies among agricultural students at the Federal University of Technology, Owerri, Nigeria. This study is built upon the Unified Theory of Acceptance and Use of Technology which provides a framework for understanding how behavioural intention, usage patterns and performance expectancy affect technology usage. The population for the study comprised all undergraduate students in the School of Agriculture and Agricultural Technology, FUTO. Snowball sampling technique was used to select a sample of 120 agricultural students. A structured questionnaire was used for data collection while data were analyzed using percentages and mean score. Results revealed that the internet (57.5%) and friends and peers (45.0%) were the major sources of digital capabilities to the students. The major digital technologies used by the students in learning were laptops (56.4%) and artificial intelligence (44.4%). The result further showed that most of the students were capable of searching information on the internet (74.6%), typing with computers (55.9%) and downloading lecture notes from the internet (52.5%). It was also found that most of the students used digital technologies to learn on their own (70.7%), access educational materials (64.7%) and search information online (60.3%). The challenges to acquiring digital capabilities were power instability ($\bar{x} = 2.98$), high cost of digital devices ($\bar{x} = 2.70$) and high cost of data ($\bar{x} = 2.65$). The paper concluded that the students possessed digital capabilities which were still at the foundational level. It was recommended that digital skill enhancement programmes should be organized to boost the digital capabilities of the students. Also, essential digital infrastructure should be provided in the institution.

Keywords: Digital technologies, usage, digital capabilities, agricultural students, teaching and learning

Introduction

As the cornerstone of social cohesiveness, economic growth, and personal development, education plays a vital role in shaping both individuals and societies. It equips people with the capability to solve problems and fosters a feeling of community (Sharma, 2023). This gives countries with robust educational systems a higher adaptability and competitive edge in the global market (Oktavianty, 2024).

Agricultural education plays a pivotal role in advancing sustainable development, improving food security, and protecting the environment. It supplies the skills and knowledge necessary for food production, which drives economic growth, better living standards, higher employment rates, and overall economic stability (Walkiluzzaman, 2025; Innocent-Ene et al., 2023; Oba et al., 2025). However, the teaching of agriculture, mostly in developing countries, faces challenges like the shortage of teaching materials (Abdullahi et al., 2022; Kaboniire, 2024) and the scarcity of qualified teachers (Onwunali & Muhammed; 2024). Digital technologies can address these challenges.

Digital technologies are tools for finding, analyzing, creating, and sharing information (Kumi-Yeboah *et al.*, 2020). Digitizing education is crucial for making it effective (Turluev & Mutsorva, 2021). Digital technologies transform teacher-student relationship, encouraging a competency-based approach and allowing students to shape their own learning experiences (Abysova *et al.*, 2023). They also promote interaction and engagement (Stoyanova & Markova, 2022). For digital tools to be used effectively, both teachers and learners need to adjust to new roles and learn how to use these tools effectively (Abysova *et al.*, 2023).

Across the world, frameworks such as the Organization for Economic Cooperation and Development (OECD) learning framework and the P21 framework have been used to support digital education and prepare students for technology-focused jobs (Reddy *et al.*, 2023). Despite these efforts, high decay rates in higher education remain worrisome (Drugova *et al.*, 2021; Chigona & Nyarai, 2020), and many learners do not have the requisite digital skills, making it hard for them to succeed in technology-enhanced learning (Reddy *et al.*, 2023). Having the right digital skills is essential for improving student creativity, innovation, and access to information (Ismuni *et al.*, 2024), as shown during the COVID-19 pandemic outbreak. Digital skills according to the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2018) refers to the ability to access, manage, understand, integrate, communicate and create information safely and appropriately through digital technologies for employment, decent jobs and entrepreneurship. Digital skills are crucial in adjusting both individual opportunities and societal progress. Proficiency in digital skills is a basic requirement for active participation in various aspects of life, including education, jobs and social interaction. ECORYS UK (2016) stated that the rapid expansion of technology has changed the global economy. The widespread influence of digital technologies throughout industries stress the need for individuals to gain and continuously update their digital skills to remain competitive in the job market (Abdullahi *et al.*, 2026; Ragnedda & Muschert, 2017).

The term ‘digital capabilities’ have been used interchangeably with such terms as ‘IT capabilities’, ‘technological capabilities’, ‘IT-enabled digital capabilities’ It refers to the collective skills, attitudes and behaviours along with organizational and technical infrastructure that help individuals to live and work, and organizations to thrive in a digital society. Ganbold *et al.* (2020) viewed it as the technological capability used to acquire, process, and transmit information to support organizational decision-making and to facilitate communication, coordination and corroboration between multiple parties along the supply chain. Scuotto *et al.* (2021) described it as a firm’s ability to exploit and to use their own digital skills for an organization’s purpose. It transcends basic ICT proficiency, innovation, communication and secure, responsible and creative use of technologies. Thus, digital capabilities allow firms to adjust to the increasing uncertainty and risk associated with business operations as a result of the continuous emergence of new knowledge and opportunities emanating from unpredictable technological advancements enabling them reduce cost and redesign processes (Heredio *et al.*, 2022). While digital capability is related to certain constructs such as organizational capability, dynamic capability and operational capability, it is distinct from them. Digital capability focuses on the strategic, actionable and organizational ability to use technology for value creation, instead of only having technical expertise or functional knowledge. Digital capability stresses the ‘how’ of technology i.e. the dynamic process of integrating, creating and re-configuring digital assets in response to environmental changes whereas other constructs focus on the ‘what’ or ‘where’ of technology (Junior & Macada, 2020).

Simone and Manolio (2024) argued that the acquisition of digital skills from an early stage is vital in preparing future generations for success in today’s digital world. However, several studies have highlighted significant digital literacy gap among young people in Nigeria especially in rural areas and among low-income groups. These gaps persists despite increasing digital penetration and government initiatives, with differences in access, skills and usage, limiting opportunities in education, work and digital economy (UNICEF, 2025). A 2025 UNICEF report indicated that 78% of Nigerian youths lack digital literacy (Adegbohunge, 2025). The World Bank (2023) reported that 72.1% of young people who are digital literate in Nigeria are ‘digital beginners’ with very low proficiency. The UNICEF (2025) further reported that only 36% of youths in Nigeria use the internet.

Further corroborating the prevailing digital skill gaps among young people in Nigeria are studies conducted in some tertiary institutions. A study at the University of Lagos found that distant learning students lacked digital competencies (Adewumi & Oladele, 2023). A similar study by Amini and Oluyode (2020) analyzed the ICT competencies of distance learning students at the National Open University of Nigeria. The study found that while all the students are generally technology literate and can use ICTs to deepen knowledge, few can create knowledge using technology. According to UNICEF (2025) these systemic issues coupled with inadequate digital infrastructure are leaving millions of Nigeria young population without access to quality education and the digital skills needed for the future.

At the Federal University of Technology, Owerri (FUTO), successive administrations have initiated programmes to encourage digital transformation, but the expected results remain elusive. A lack of digital competence can widen digital divide and negatively affect teaching and learning (Gonzalez-Prida *et al.*, 2024). It can also reduce

the employability of future workforce (Umeha, 2026; Anuforo, 2025). For the study of agriculture, low digital capability could limit the application of digital technologies in agriculture, thereby reducing food security. While it is crucial to enhance the digital skills of future workforce, empirical literature is scant on information pertaining to digital capabilities of agricultural students at FUTO.

To understand the digital capabilities of agricultural students in FUTO, this study is specifically framed by the Unified Theory of Acceptance and Use of Technology. This theory is considered appropriate for the study because it integrates the strength of earlier models while addressing their limitations. The theory also incorporates individual, social and institutional factors that directly influence digital capability development. While other theories such as the Technology Acceptance Model (TAM), Diffusion of Innovations Theory (DOI), the Capability Approach and Digital Competence Framework (DigComp) can be applied, they are considered less suitable because of their inherent weaknesses.

Objectives

The broad of objectives of the study was to investigate the digital capabilities of agricultural students at the Federal University of Technology, Owerri, Imo State, Nigeria. The specific objectives were to:

1. ascertain the sources of digital capabilities acquisition by students;
2. identify the digital technologies used for learning for learning by the students;
3. identify the digital capabilities possessed by the students;
4. ascertain the specific usage of digital technologies for learning by the students; and
5. determine the challenges to the acquisition of digital capabilities by the students.

Methodology

The study was conducted at the Federal University of Technology, Owerri, (FUTO) Imo State, Nigeria. The university is among the universities of technologies established by the Federal Government of Nigeria in 1980. FUTO is located within latitude 5°23' N 5.39° and longitude 6°59' E 6°98' E (<https://findlatitudeandlongitude.com>). The university has 11 schools and 12 institutes. FUTO has an undergraduate population of about 25,000 students (<https://legit.ng/education/1595500-futo-cut-mark-courses-admission-exercise/>).

The study employed a descriptive survey research design as used by Akorede et al. (2022). The population for the study comprised all undergraduate students from the eight departments in the School of Agriculture and Agricultural Technology, FUTO. The total number of undergraduate students in this School could not be determined as at the time of the study. Hence, fifteen (15) students, were selected from each of the departments, using snowball sampling technique. This gave rise to a total of 120 respondents. Information sources on digital capabilities' acquisition were identified through a selection list provided to the students. The digital technologies employed for learning were also listed for selection. The capability to use these technologies was evaluated through multiple-choice questions addressing skills and necessary actions for effective learning. The intended uses of digital technologies were assessed using a list of potential applications of the technologies in learning. Finally, the challenges of utilizing digital technologies in learning were determined by presenting a list of possible drawbacks to the use of digital technologies in learning and responses were measured on a 4-point Likert-type scale of 4 = strongly agreed, 3 = agreed, 2 = disagreed and 1 = strongly disagreed. The mean of the scale was computed by summing the values assigned to the scale and dividing by the number of points in the scale. Any item with $\bar{x} \geq 2.5$ was taken as a challenge to the use of digital technologies in learning. Primary data were collected for the study using a structured questionnaire administered digitally using a Google form. The validity of the questionnaire was established using the face and content validity method. Copies of the questionnaire were given to seven lecturers from relevant departments. Items they approved were taken as valid. The reliability of the instrument was determined using and test re-test method. Copies of the questionnaire were administered to 20 undergraduates from agricultural departments outside FUTO. After a period of two weeks, the same instrument was re-administered to the same students. Pearson Product Moment Correlation was used to correlate the scores of scaled item (i.e. challenges to acquisition of digital capabilities) in the instrument. A coefficient of correlation value, $r = 0.80$ was obtained, which implied that the instrument was reliable. Data collected were analysed using percentages and mean scores. The students were assured that the information they provided would be handled with confidentiality and strictly for the purpose of the study.

Results and Discussion

Students' sources of digital capabilities acquisition

The result in Figure 1 reveals that more than half of the students (57.5%) acquired digital capabilities through the internet, with friends and peers being the second most common source (45.0%). In contrast, business centers and cyber cafes were infrequently used (5.8%). This finding reflects the internet's effectiveness in offering access to databases and resources that detail the use of digital technologies. Access to the internet allows students to participate in various digital activities, supporting informal knowledge sharing among peers. Mena-Guacas et al. (2023) reported that interactions with friends enhance the teaching and learning of digital skills through collaboration, which is connected to the enhancement of digital skills development (Yu et al., 2024). Universities enhance students' digital skills through workshops and training. Nigerian universities are adopting digital technologies, supporting international best practices to improve capabilities. This finding agrees with Ewata et al. (2024) who reported that universities are implementing Learning Management Systems like MOOCs and digital libraries to boost academic performance for both teachers and students.

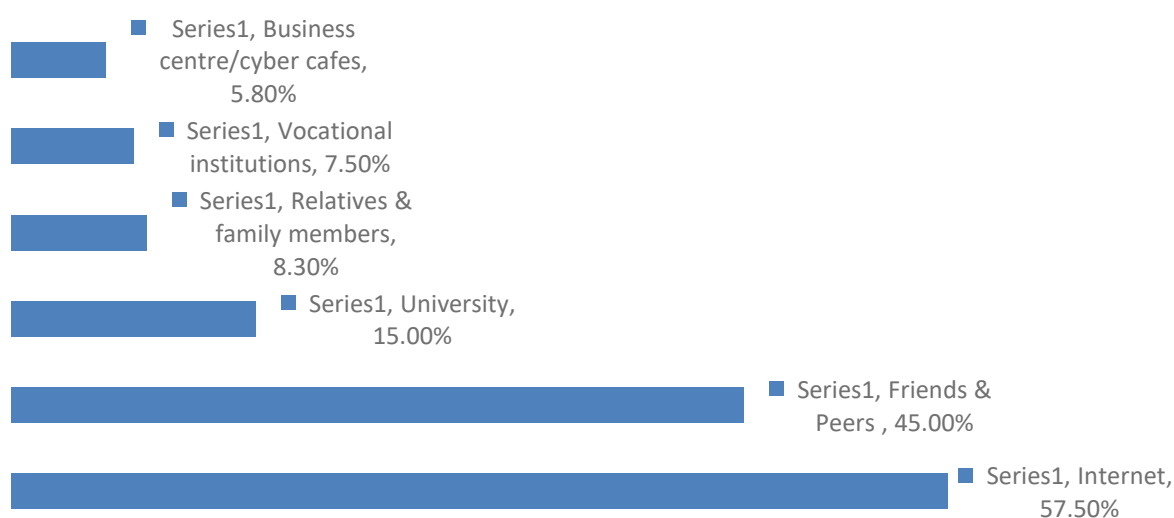


Figure 1: Students' sources of information on digital capabilities

Digital technologies used by the students for learning

The result in Figure 2 reveals that laptops (56.4%), Artificial Intelligence (44.4%) and tablets (24.7%) were the major digital technologies used for learning by the students. Other digital technologies used by the students for learning include multimedia (18.8%), Google Meet (17.1%), Ebooks (12.8%) and smart television (11.1%). The least-used digital technology by the students was Moodle (4.0%). In using laptops and tablets, students can use Google Meet, AI, Ebooks and other services for learning. The result suggests that the use of digital technologies for learning among students in FUTO is still low. This finding agrees with Nuru et al. (2026) and Apuke et al. (2018) who reported that students in Nigeria are using internet in their learning.

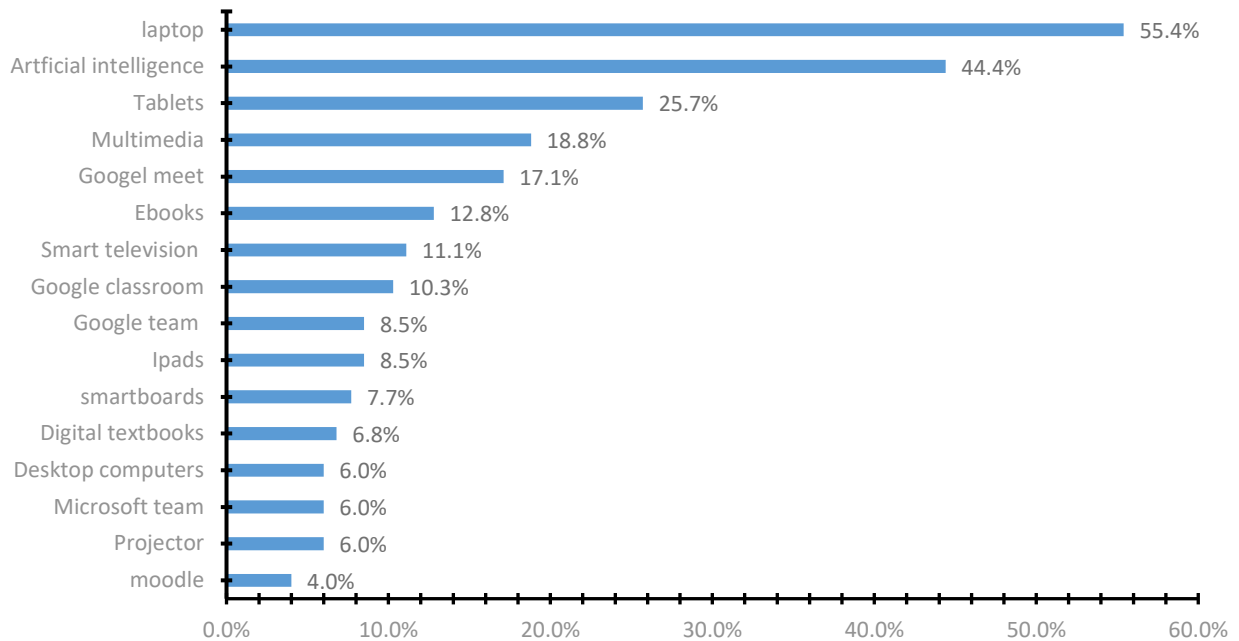


Figure 2: Digital technologies used for learning

Digital capabilities possessed by the students

Results in Figure 3 show that the students were capable of searching for information in websites and databases (55.9%), sending and receiving emails (55.1%), sharing and downloading lecture materials from the internet (52.5%) as well as shutting down and booting computers (47.5%). The ability of the respondents to search for information in websites and databases would enhance their access to information, which will improve research and learning. Also, their ability to send and receive emails would facilitate communication and enhance their global reach. The result further revealed that less than half (44.9%) of the students were able to save information online, use keyboards effectively (40.7%), evaluate online resources for relevance, accuracy and validity (40.7%) and collaborate with other students (40.7%). However, very few (18.6%) of the respondents were capable of managing data (18.6%). The finding implies that the students could performing varieties of operations that enhance digital learning. This finding agrees with Liminiou et al. (2021) who noted that teaching can take place via digital technologies without any physical contact between the teachers and learners as observed during COVID-19 pandemic. Dyantyi (2023) also noted that digital technologies facilitates access to information and resources enriching the learning experience for students.

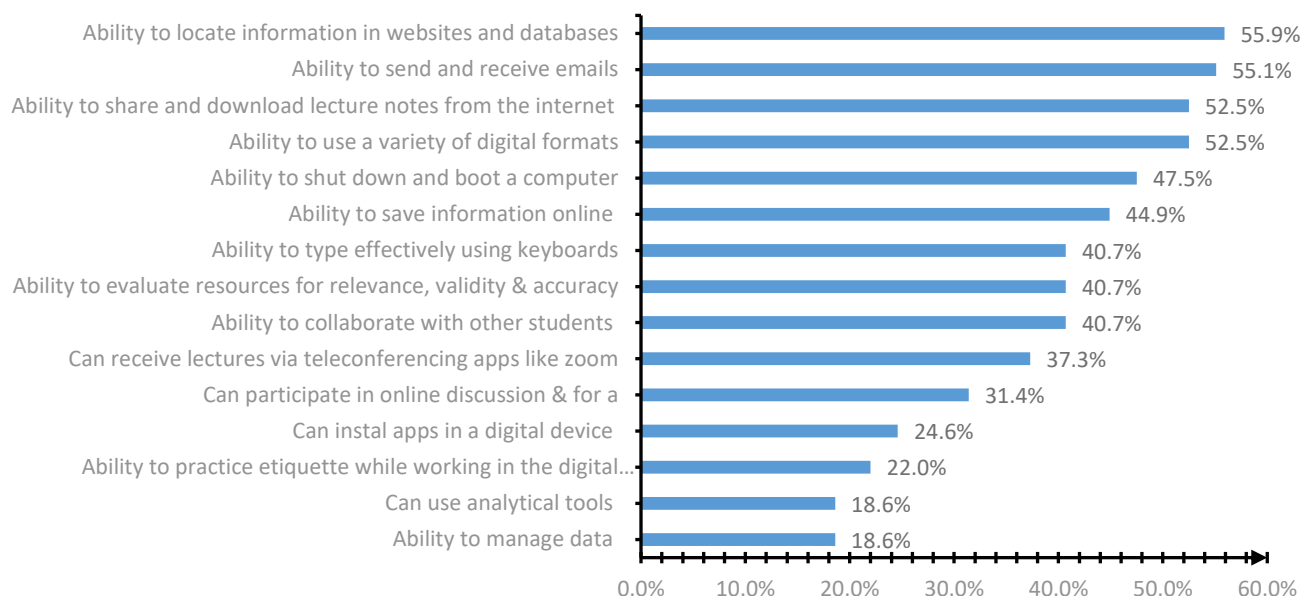


Figure 3: Students' digital capabilities

Purpose of digital technologies' utilisation for learning by the students

Results in Figure 4 show that most (71.0%) of the students used digital technologies for self-learning (71.0%), access educational materials (65.0%), search information (60.0%), conduct research (58.0%) and save or store teaching materials (49.0%). Other uses of digital technologies include to do assignments and projects (41.0%), share teaching materials (35.0%) and hold online classes (33.0%). The result suggests that digital technologies facilitated learning among the students. Digital technologies enhance students' self-education, enabling them to acquire additional knowledge beyond classroom instructions. Access to educational materials allows for deeper study and reduced reliance on classroom teaching. Moreover, the ability to store teaching materials enhances individualized study and supports the mobility of resources. This aligns with findings by Sumara and Rabani (2023) which reported that digital tools improve cognitive skills, motivation, critical thinking, and memory through interactive learning platforms (Abdulahi et al., 2025; de Barros, 2024).

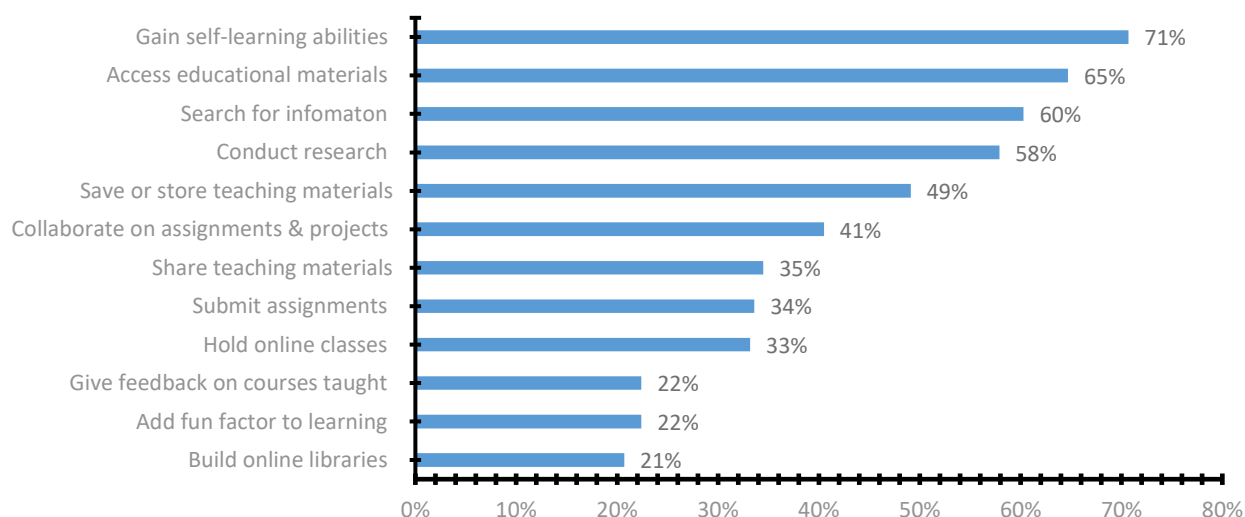


Figure 4: Students' uses of digital technologies in learning

Challenges to the use of digital technologies by the students

Results in Table 1 shows that unstable power supply ($\bar{x} = 2.98$), inadequate digital infrastructure ($\bar{x} = 2.50$), high cost of digital devices ($\bar{x} = 2.70$) and high cost of data ($\bar{x} = 2.65$) were the drawbacks faced by the students in the utilisation of digital technologies. The absence of a reliable internet access hinders the effective use digital technologies. Poor digital skills prevent people from participating in the digital economy. Erratic power supply disrupts access to online learning resources and training opportunities. These challenges hinder students' use of digital technologies in learning. This supports the findings of Satvik and Naik (2024) on obstacles to effective of digital technologies in education. This finding agrees with Garifullina and Gilmanov (2024) who found that many educational institutions in developing countries lack the necessary infrastructure for the use of digital tools. The high costs of data and devices pose barriers, especially in developing areas (Quansah, 2024). Imported devices, changing exchange rates, and economic struggles make access nearly impossible for low-income students, increasing digital divide. Rising data costs further limit usage of digital technologies in learning (Satvik and Naik, 2024). Celeste and Osias (2024) highlighted that these problems frustrate both teachers and students, reducing the effectiveness of digital technologies in education.

Table 1: Challenges to the use of digital technologies in learning by students

Challenges	$\bar{x}$	SD
Unstable power supply	2.98*	1.00
Lack of digital skills	2.04	1.00
Poor government support	2.24	1.00
Lack of digital skills	2.17	1.00
Inadequate digital infrastructure	2.50*	1.00
High cost of digital devices	2.70*	1.00
High cost of data	2.65*	1.00
Lack of technical support	2.31	1.00
Distractions	2.12	1.00
Sub-standard ICT accessories	2.19	1.00
Complexity of digital technologies	1.98	1.00

* Challenges

Source: Field Survey, 2025

Conclusion

The findings of this indicate that the students mainly used laptop and artificial intelligence in learning. The students were able to search for information on the internet, send and receive emails and download lecture notes from the internet. Many of the students used digital technologies for self-learning, access educational materials and search for information online. The challenges to the use of digital technologies by the students in learning were basically infrastructural and financial. The study concludes that while digital capabilities enhanced the integration of digital technologies in learning, certain constraints impaired the utilisation of those technologies by the students. Enhancing the digital capabilities of agricultural students such as digital literacy, data analytical skills etc can make the learning of agriculture more engaging, practical and relevant to modern agriculture. Acquisition of digital capabilities can provide access to instant up-to-date agricultural resources, hence providing access to real-time and low-cost agricultural information. The findings of this study adds to the body of knowledge by determining the specific tasks students in a particular branch of study could perform using digital technologies. It equally explored the challenges of acquiring digital technologies which is specific to these set of students. This makes it easier to direct efforts aimed at enhancing digital capabilities of students. It is however recommended that the capability of the students for digital agriculture should be enhanced by organizing training on the use of farm simulation software and promoting the large scale use of Artificial Intelligence in teaching and learning. The accessibility and use of digital devices such as laptop and Tablets among the students should be promoted by subsidizing their costs. Furthermore, learning management systems like Moodle should be promoted by building

the capacity of students and staff on their use and institutionalizing their use. Finally, opportunities should be created and promoted for peer-based learning to enable the exchange of skills among peers.

Limitations of the study

The study was limited to agricultural and undergraduate students in FUTO. This means that the findings of the study cannot be generalized to students in other disciplines, postgraduate students or students at other universities in Nigeria. The study used a sample size of 120 students. Given that the total undergraduate population of FUTO is about 25,000 and the specific population of students within the School of Agriculture and Agricultural Technology could not be determined, this sample size is small and may not adequately represent the variety of digital capabilities across all agricultural students. The use of snowball sampling technique, which is non-probabilistic introduces some sampling bias, which may over represent students with stronger social networks or particular characteristics. It also does not allow for statistical generalization to the wider population. The study relied on findings generated through self-reported data (structured questionnaire). self-reported measures digital capabilities may not accurately reflect actual skills as students were likely to overestimate or underestimate their abilities. The study did not include any practical tests or observation of digital tasks.

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