

# From manual to digital: The impact of networking tools on administrative effectiveness in higher education

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## ABSTRACT

The integration of Information Technology (IT) in administrative settings has significantly enhanced management efficiency, minimized paperwork, and facilitated faster and more accurate service delivery. Despite these benefits, many administrative officers in higher education institutions still underutilize or neglect the adoption of networking tools, thereby limiting administrative effectiveness. This study aimed to investigate the impact of networking tools on administrative effectiveness in higher education institutions in Enugu State, Nigeria. A quasi-experimental research design was adopted for the study. The population consisted of 213 administrative staff members (111 males and 102 females) drawn from Enugu State College of Education (Technical) and the Federal College of Education, Eha-Amufu. A purposive sampling technique was used to select 103 administrative officers from the Federal College of Education, Eha-Amufu. Data were collected using an 18-item instrument titled Administrative Officers' Achievement Test (AOAT). The data were analyzed using mean and standard deviation to assess the pre-test and post-test results. The findings revealed that the use of networking tools significantly improved office management and service delivery compared to traditional administrative methods. Based on the findings, it is recommended that administrative officers should adopt networking tools in their daily operations. Furthermore, regular upskilling programs such as seminars, workshops, and conferences should be organized to equip administrative staff with relevant computer networking skills.

**Keywords:** Information and communication technology (ICT), computer networking, digital literacy skills, internet, colleges of education, administrative officers.

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## INTRODUCTION

The Internet has become the central nervous system of all productive activity, making offline work unimaginable in the modern era" (Schwab and Malleret, 2023, p. 45). Lee (2021), in support, contends that cloud-based architectures have reduced workplace connectivity from an advantage to an absolute necessity. Zuboff (2020) also observed that the contemporary digital economy systematically eliminates any remaining spaces for non-networked work. These authoritative views collectively emphasize that efficient work is now fundamentally inseparable from robust network infrastructure.

According to Lucas (2021), the evolution of networking technologies has revolutionized the way people act and interact, particularly in professional settings. Networking

plays a critical role in enabling efficient management and administration within the education sector (Kumar and Sharma, 2016). In today's digital age, networking tools such as cloud platforms, intranets, LANs, and communication software are essential for administrative officers in educational institutions, particularly in Nigeria's colleges of education, where service efficiency directly impacts institutional performance (Smith, 2020). Proficiency in networking skills supports streamlined communication, efficient data management, timely decision-making, and effective resource allocation, all of which enhance institutional operations (Jones and Lee, 2019). A computer network allows interconnectivity between computers, storage devices, printers, and

telephone systems (Akinola, 2013). These networks can be set up as Local Area Networks (LANs), Wide Area Networks (WANs), or Wireless Local Area Networks (WLANs) (Umezina, 2016).

Generally, administrative offices proficient in networking tools have witnessed transformative shifts from paper-based operations to paperless systems, improving transparency, reducing delays, and boosting the overall quality of service (Abdul, 2021). These changes have significantly benefited institutions like colleges of education, which handle large volumes of data and documentation daily (Orji and Anikeze, 2025). In highly competitive educational environments, networked systems contribute to improved productivity, cost-effectiveness, and quality service delivery (Onu and Amadi, 2020). Colleges of Education in Nigeria play a crucial role in training future teachers who earn the Nigerian Certificate in Education (NCE) (Onifade and Onifade, 2019). Achieving their educational objectives depends heavily on the efficiency of administrative processes (Ogah, 2007). Administrative officers are responsible for planning, organizing, and overseeing institutional operations. Their roles include office management, system analysis, document processing, records management, performance evaluation, and data coordination (Ordu, 2018; Osuala and Okeke, 2016).

However, the lack of essential networking skills among administrative staff often leads to inefficiencies, delays, poor record-keeping, and resource mismanagement. These gaps hinder institutional progress and contribute to broader socio-economic challenges, including reduced access to quality education (Anderson, 2021). Addressing this skills deficit is therefore essential for enhancing productivity and operational effectiveness in higher education (Brown et al., 2020). Hence, this study seeks to investigate the essential impact of networking tools on administrative effectiveness in higher education institutions in Enugu State, Nigeria

### **Purpose of the study**

The main purpose of this study is to find out the essential impact of computer networking skills required by administrative officers to enhance effective management and efficient service delivery in colleges of education. Specifically, the study sought to determine the:

1. Essential computer networking skills that enhance effective management by administrative officers in colleges of education
2. Essential computer networking skills that enhance effective service delivery by administrative officers in colleges of education

### **Research questions**

1. What are the essential computer networking skills that enhance effective management by administrative

officers in colleges of education?

2. What are the essential computer networking skills that enhance effective service delivery by administrative officers in colleges of education?

## **LITERATURE REVIEW**

### **ICT in education administration**

The integration of Information and Communication Technology into educational administration has become increasingly crucial in the contemporary higher education landscape, transforming traditional methodologies and opening up new avenues for efficiency, productivity, and innovation add citation. The straightforward structure of a computer network comprises of interconnected devices such as nodes, switches, routers, and transmission media (Aijuka, 2025). Each serving specific roles to enable reliable communication across LANs and WANs. These technologies are pivotal in supporting and enhancing student learning, fostering the development of enriched learning environments, and driving overall educational advancement (Amutha, 2020). The effective implementation of ICT, especially computer networking in educational administration, necessitates a comprehensive understanding of its potential benefits, challenges, and the strategies required to maximize its impact (Sutama and Utama, 2020).

Computer networking is the connection of computers, terminals, external devices, servers and other devices distributed in different locations through network devices and communication lines (Binbin et al., 2024). This can only be formed by connecting media such as twisted pair wire and optical fiber. The basic structure of computer networks includes multiple computer nodes, routers, switches, and various network devices. The main purpose of establishing a computer, which can only be achieved with the help of network skills, is to realize the sharing of computer resources. Computer resources mainly refer to computer hardware, software and data (Binbin et al, 2024). Computer Networking skills are the competencies needed to connect computer peripherals such as printers and other equipment together so that they can communicate with each other (Bakardijeva, 2014). This also allows for the maintenance of files on a network server, monitor system performance, assist others with network problems, maintain machines attached to the network, and modify software based on user needs (Ajie-Uche, 2015). Umezina (2016) opined that there are two main types of network, which are Local Area Network (LAN) and Wide Area Network (WAN). No doubt, some devices make networking possible, such as Routers, Network Cables, Distributors, Internal Network Cards, External Network Cards, etc. The internet is viewed as the network of networks, web of webs, open sharing network, and interconnectivity of millions of computers as a single network and an electronic information superhighway (Nwana, 2018).

## Digital literacy in Nigeria

Digital literacy has evolved beyond basic technical know-how into a critical 21st-century skill. It is no longer merely about the ability to operate digital devices, but rather a comprehensive competence encompassing the ability to access, evaluate, utilize, create, and communicate information using digital technologies (Attahir, 2019). As defined by Khan (2018), digital literacy includes technical proficiency in using digital tools and platforms as well as cognitive and social-emotional skills, such as critical thinking, problem-solving, ethical digital behavior, and effective communication in virtual environments. In the context of education and workplace efficiency, digital literacy enables individuals to navigate and contribute meaningfully to the digital world. These competencies are essential in today's technology-driven global economy and are particularly critical in the education sector where digital transformation is accelerating administrative and academic processes.

In Nigeria, however, the degree of digital literacy among the population, especially in higher education institutions, varies widely across demographic lines, regions, and socioeconomic groups (Emiri, 2017). While urban and well-funded institutions may have access to modern infrastructure and digitally literate personnel, rural and under-resourced institutions often struggle with poor access to technology and inadequate training, thereby widening the digital divide. Owo (2024) emphasizes on the need for inclusive development in tertiary institution through enhancing digital competence among all educational stakeholders including administrators and policymakers.

Administrative officers in tertiary institutions play a pivotal role in managing academic records, coordinating institutional operations, and facilitating communication among departments. Their level of digital literacy significantly affects their ability to execute tasks efficiently and to adapt to emerging digital platforms that enhance institutional performance. As noted by Emiri (2017), administrative effectiveness in Nigeria's tertiary institutions is increasingly dependent on the integration of digital tools, yet there is limited evidence of consistent professional development initiatives focused on improving digital competencies among non-teaching staff. Despite the growing recognition of the importance of digital literacy in education, much of the existing literature has focused primarily on students and academic staff, with little emphasis on the digital proficiency of administrative personnel. There is also a lack of empirical studies examining the specific digital skills required by administrative officers, particularly in the area of networking tools, which are critical for streamlining communication, managing databases, automating office tasks, and ensuring responsive service delivery.

## Job performance and service delivery of administrative officers

Adesida (2014) outlined some important Networking-

related ICT skills roles in enhancing the administrative efficiency and effectiveness, such as efficient management of education and institutions, enhancement of effective communication and knowledge sharing, enhancement of planning, improvement of monitoring and management of instructions. Computer networking skills is very significant in administrative work in the sense that it brings unique ideas when sharing information with staff and also generates idea that will attract staff and it involves not only a cognitive dimension (the generation of new ideas) but also motivation and emotion, and is closely linked to cultural context and personality factors. The World Bank (2024) reports that e-governance portals reduce service resolution times from 14 days to just 48 hours. Online permit systems, chatbots, and digital queues improve transparency and accessibility, ensuring faster and more reliable administrative services. Proficiency in cloud computing has become an indispensable solution for modern administrative operations. Officers should be skilful at utilizing platforms like Microsoft 365 and Google Workspace for document collaboration and real-time editing (World Bank, 2024). According to Bakardijeva (2014), competence in managing Network-Attached Storage (NAS) systems and cloud storage services such as OneDrive and Dropbox is crucial for secure institutional data management. Understanding emerging technologies like 5G networks and edge computing will be increasingly important for efficient data processing (West, 2023).

## Related empirical studies and theory

Adeniran and Alabi (2022) carried out a study on Application of ICT and Job Performance of Administrative Staff in Redeemer's University, Nigeria. The findings of the study revealed that most participants in Redeemer University use ICT tools to perform their official duties and help the participants to achieve quality work output. The study revealed that electricity interruption and limited ICT tools were the challenges faced by the respondents. This study only revealed how ICT tools are used but never addressed how positively they contribute to carrying out their administrative duties. Rodrigues (2017) describes the main challenges and problems faced by universities in the process of digitalization. The scientists emphasize the need to consider the existing problems of digitalization of higher education institutions in producing digital strategies for their development. This study also emphasized that the introduction of new technologies is the way to increase the efficiency and adaptability of higher education to an information society, but fails to pinpoint the exact technology needed in institution management.

## Theory

The theories adopted for this study are activity theory of

learning. Activity Theory was propounded by Lev Vygotsky in 1979. Activity theory of learning believes in understanding the mental capabilities of a single individual. It rejects the isolated individuals as an insufficient unit of analysis, analyzing the cultural and technical aspects of human actions. Activity theory is most often used to describe actions in a socio-technical system through six related elements of a conceptual system expanded by more nuanced theories. This theory is applied in information and communications technology skills as the theory activity sees the integration of technology as tools that mediate social action. These tools, or artefacts, include instruments, signs, language, machines, and computers. Engeström (1996) states that the work activity system is comprised of the following components: individual workers, their colleagues and co-workers; the conceptual models, tools and equipment they use in their work; the rules that govern how they work; and the purpose to which members of the workplace community direct their activity. Administrative activities are mediated by ICT tools in performing their administrative functions. The usage of these tools

influences the nature by which administrative officer carries out their duties. The theory allows for innovations and improvements of work conditions, training, and upgrading the skills of the workforce in the organization.

## METHODOLOGY

### Research design

This study adopted a quasi-experimental research design, which is appropriate when random assignment is impractical. A quasi-experiment allows the researcher to investigate cause-and-effect relationships between variables in real-world settings without full experimental control (Creswell and Creswell, 2018; Babbie, 2021). In this study, the researcher compared the performance of two groups (experimental and control) to determine the effect of networking skills on improving service delivery among administrative officers in Colleges of Education in Enugu State, Nigeria.

### Experimental design flowchart

Group	Pre-test	Treatment	Post-test	Retention Test
Experimental	✓	✓ (Networking Skills Training)	✓	✓
Control	✓	X (Traditional Method)	✓	✓

### Study setting

The study was carried out in Enugu State, Nigeria, which has one public and four private Colleges of Education. This study focused exclusively on the two public institutions, which are Federal College of Education, Eha-Amufu and Enugu State College of Education (Technical).

### Population and sampling

The population of the study comprised 213 administrative officers. Federal College of Education, Eha-Amufu - 171 officers (87 males, 84 females) and Enugu State College of Education (Technical): 42 officers (24 males, 18 females). Given the manageable size of the population, a total sampling technique was employed. This means that all administrative officers in the two public colleges were included in the study.

### Instrument for data collection

The main instrument used was the Administrative Officers' Achievement Test (AOAT), which consisted of 18 multiple-choice questions (MCQs) with options A–D.

The test assessed the participants' knowledge and competencies related to the use of networking tools in administrative duties. The same test was re-shuffled and re-administered as both the post-test and retention test to evaluate performance improvement and knowledge retention, respectively.

### Validation and reliability of the instrument

The AOAT was face and content validated by three experts from the Department of Educational Measurement and Evaluation, Computer and Robotics Education, and ICT Unit. To establish reliability, the AOAT was piloted on 25 administrative officers (15 males, 10 females) from Nwafor Orizu College of Education, Anambra State, who were not part of the main study. The internal consistency of the test was calculated using Kuder-Richardson Formula 20 (KR-20), giving a reliability coefficient of 0.85, indicating a high level of reliability.

### Experimental procedure

Week 1 (Pre-test Administration): Both the experimental and control groups were administered the AOAT

simultaneously with the assistance of trained research assistants. Weeks 2–3 (Treatment): The experimental group was exposed to a structured training on the use of networking tools (e.g., email configuration, data sharing, cloud services, network-based record management). Meanwhile, the control group continued their administrative duties using conventional/manual methods. The treatment was standardized across institutions using a pre-developed training manual and a uniform schedule to ensure consistency in delivery. Training facilitators followed the same procedures and materials to eliminate variability. Week 4 (Post-test): Both groups received a reshuffled version of the AOAT to measure the effect of the treatment. Week 6 (Retention Test): A final reshuffled version of the AOAT was administered to both groups to assess knowledge retention.

**Data analysis**

The data collected were analyzed using Mean and Standard Deviation to determine the central tendency and variability of scores. T-test was also applied to determine the significance of differences between the experimental and control groups while controlling for pre-test scores. Cohen’s d was used to estimate effect size. All analyses were conducted using SPSS Version 27.

**RESULTS**

**Research question 1**

What are the essential computer networking skills that enhance effective management by administrative officers in colleges of education?

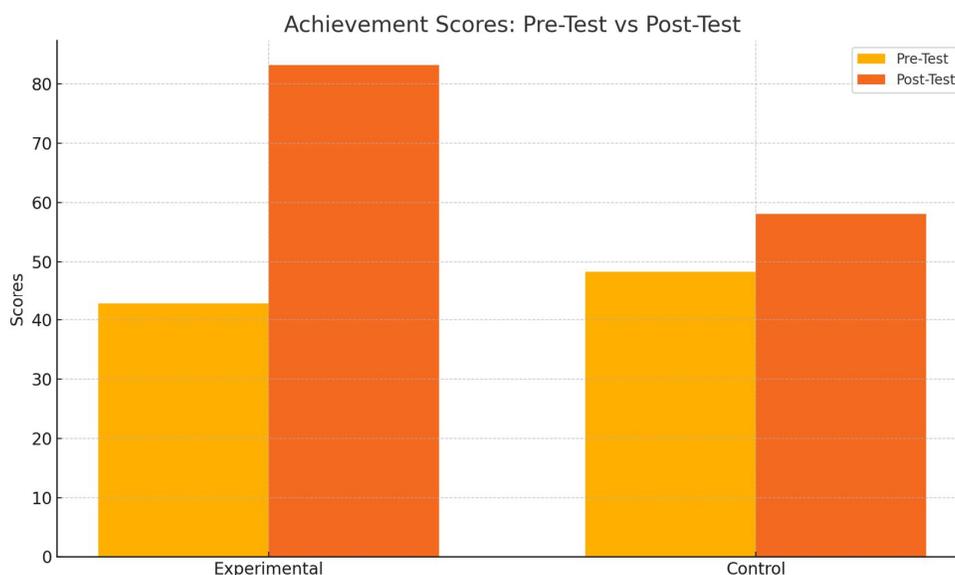


Figure 1. Achievement score. Source: researcher.

**Table 1.** Mean standard deviation and T test analysis of achievement score on administrative officers exposed to essential computer networking skills and those with traditional/normal method of office management by administrative officers in colleges of education in Enugu State.

Groups	Methods	N (151)	(Pre-test)		(Post-test)		Mg	T-value	P-value	Cohen's d
			$\bar{X}_1$	SD <sub>1</sub>	$\bar{X}_2$	SD <sub>2</sub>				
Experimental	Networking tools	48	42.82	2.61	83.24	3.93	40.42	25.37	<.001	11.37
Control group	Traditional/normal method of office management	103	48.26	2.35	58.05	3.06	9.79			

Key:  $\bar{X}$  = Mean, SD = Standard Deviation, Mg = Mean Gain, t – independent t-test.

Table 1 shows that there is a statistically significant difference between the experimental and control groups in post-test achievement scores ( $t = 25.37, p < .001$ ). The very large effect size ( $d = 11.37$ ) suggests that exposure to networking tools significantly enhanced administrative officers' management effectiveness compared to traditional methods. (Figure 1)

**Research question 2**

What are the essential computer networking skills that enhance effective service delivery by administrative officers in colleges of education?

**Table 2.** Mean, standard deviation and T-test score of the analysis of achievement score of administrative staff exposed to computer networking skills and those with traditional/normal method of job service delivery.

Groups	Methods	N (151)	(Pre-test)		(Post-test)		Mg	T-value	P-value	Cohen's d
			$\bar{X}_1$	SD <sub>1</sub>	$\bar{X}_2$	SD <sub>2</sub>				
Experimental	Networking skills	48	1.98	0.48	4.12	0.49	2.14	23.19	<.001	9.74
Control group	Traditional/normal Method of service delivery	103	2.02	0.26	2.47	0.33	0.45			

\*  $\bar{X}$  = Mean, SD = Standard Deviation, Mg = Mean Gain, t – independent t-test



**Figure 2.** Achievement score. Source: researcher.

Table 2 shows that a statistically significant difference exists in post-test service delivery scores between the experimental and control groups ( $t = 23.19, p < .001$ ). The very large effect size ( $d = 9.74$ ) indicates that training on networking skills substantially improved service delivery among administrative officers. Since the mean gain score of the treatment group is greater than that of the control group, the result implies that using networking tools in the office is more effective for effective service delivery in colleges of education than traditional/normal. (Figure 2)

**DISCUSSION**

The findings of the With respect the roles of computer networking skills office management by administrative officers in College of Education, the findings revealed that the application of networking tools such as One Drive and Dropbox for secure institutional data management as well as 5G network for fast network in office contribute immensely in effectively in by administrative officers as compare to the traditional/normal method. These findings are in line with

Luadon (2020), which opined that networking tools streamline office processes, improve communication, and enhance decision-making, which leads to more effective office management. These findings are also similar to the view of Adesida (2014), which outlined some important networking-related ICT skills roles in enhancing administrative efficiency and effectiveness, such as efficient management of education and institutions, enhancement of effective communication and knowledge sharing, enhancement of planning, improvement of monitoring and management of instructions.

The findings with respect to the essential computer networking skills that enhance effective service delivery by administrative officers in colleges of education. The findings revealed that the use of networking tools such as routers, cloud platforms, intranets, and much more in the office improves effective service delivery in daily office activities than the traditional/normal method. These findings are similar to Selwyn (2016), which states that networking tools in educational institutions improve administrative daily tasks like record-keeping, communication, and allocation of resources, thereby making service delivery more efficient and effective. Also in line with the findings is Adeyemi and Adeyinka (2013), who opined that the adoption of networking tools in administrative offices in Nigerian Universities improves service delivery and better management by administrative officers.

### **Implication of the study**

The successful service delivery of the administrative staff in this modern era greatly depends on the ability to utilize ICT tools for office use. The findings of the study will be of immense benefit to the administrative officer and management, students, and the general public.

Findings of this study have positive implications for administrative officers in colleges of education. The findings of the study will help the Administrative Officers in Colleges of Education and other sectors of work to run offices with ease, which will help improve the institution's output as well as help them to mitigate the present socio-economic challenges. As a motivator, the networking will enhance productivity and ICT skills improvements. The management at all levels in the Colleges of Education will benefit as they will work with less stress as their management will introduce a networking system which will enable them to run a virtual office.

Students of Colleges of Education and other institutions of learning, on the other hand, will benefit immensely from this study because when ICT is fully introduced, information will be made available at first-hand. Announcements, notices of lecture, time-table, examination, and their venues, academic calendar, resumption and closing dates, amount of fees to pay, courses to offer, and results of examination will be posted directly to the e-mail account and database of the students.

The findings of this study will be of immense benefit to the general public because information and communication technology is part of society, and the awareness of the skills required for ICT will grant them success in performance and manipulation of the ICT tools and subsequently introduce ICT to their various businesses. This will be achieved through public enlightenment and mass literacy. When the administrative officers are well acquainted with ICT skills, especially how to post information on the website or through social media with the help of networking tools, the public can easily get information about what is going on in the school.

### **Conclusion**

This study was conducted to ascertain the essential computer networking skills for administrative officers in enhancing effective management and service delivery in colleges of education in Enugu State. This study was necessitated to reverse the present high rate of lack of effective utilization of ICT gadgets by Administrative officers in delivering their administrative services. This study has exposed most of the numerous roles Networking skills play in effective service delivery, such as the ability to post, retrieve and update information online, among others. This study also tried to expose some factors that hinder effective utilization of these networking tools, such as lack of technical literacy, continuous advancement in hardware, networking security threat and vulnerability, among others.

The researcher further found out that networking skills such as installation and repair of network infrastructure, cryptographic equipment, and systems. Maintenance of files on a network server, among others, is very significant for the better performance of administrative jobs, and unfortunately, most administrative officers lack these skills. With digital empowerment, learners will gain new abilities and ways to participate and express themselves in a networked information technology-driven society. Being digitally empowered is likely to influence administrative future pathways since it is generally considered to be an essential requirement for access to the desirable organization. There is a need for ICT skill improvement.

These skills are not only vital for the operational success of educational institutions but also play a key role in addressing broader socio-economic challenges. The low level of networking skills among administrative officers, as revealed by the study, underscores the importance of targeted training and development programs. Addressing the identified barriers to effective use of networking tools can lead to improved productivity and institutional performance.

### **RECOMMENDATIONS**

Based on the findings and the conclusion drawn from this

study, it is recommended that government agencies, particularly the Ministry of Education, implement regular seminars, workshops, and conferences to equip administrative officers with the necessary networking skills, ensuring they can meet both institutional and socio-economic demands effectively.

### Limitations

One limitation of this study is that among 5 colleges of education in Enugu State, only two were involved in the study, and this might affect the generalizability of the results. Another limitation considered important is that the study did not take into account other aspects of ICT skills such as database management skills, analytical skills, computer maintenance skills, among others. Therefore, we recommend that future studies should consider widening the scope so as to collect robust data on ICT skills needs of administrative officers in colleges of education in Enugu state. Future studies as regards to this topic can also involve an administrative assistant.

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