

INTERNET LITERACY SKILLS OF LECTURERS AND STUDENTS OF TERTIARY INSTITUTIONS IN DELTA STATE

Mgbonyebi Voke Charles (PhD)

Department of Public Administration, University of Delta, Agbor, Delta State, Nigeria.

Corresponding authors : voke.mgbonyebi@unidel.edu.ng

ABSTRACT

This study examined the level of internet skills possessed by Technology and Vocational Education lecturers and students in tertiary institutions in Delta State, Nigeria. The study was motivated by the increasing importance of internet literacy and digital competence in teaching, learning, research, and professional development within the contemporary information society. A survey research design was adopted for the study. The population comprised lecturers and final-year students from the College of Education, Agbor, and the College of Education (Technical), Asaba. Data were collected using a structured questionnaire based on a four-point Likert scale. A total of 150 questionnaires were distributed, out of which 145 were correctly completed and returned, representing a response rate of 96.7%. Data were analyzed using frequency counts, percentages, and Chi-square (χ^2) statistics. The findings revealed that 1,319 responses (91%) were in the agreement category, indicating that respondents possessed a high level of internet skills, while only 131 responses (9%) fell within the disagreement category. The Chi-square analysis yielded a calculated value of 70.28, which exceeded the critical value of 16.919 at the 0.05 level of significance, leading to the rejection of the null hypothesis. The study concluded that Technology and Vocational Education lecturers and students in Delta State possess significant internet skills. The study recommends continuous training, improved digital infrastructure, and enhanced integration of internet-based technologies into teaching and learning processes.

Keywords: *Internet skills, digital literacy, technology education, vocational education, tertiary institutions, Delta State.*

INTRODUCTION

The 21st century is dominated by electronically technology, a world permeated by the effects and products of electronic technology including e-government, e-business, e-banking, e-commerce, e-health, e-employment, e-environment, e-agriculture, e-science, e-mail, e-shopping and so on (Kaplan, 2005; Dwivedi et al., 2023; United Nations, 2024).

Kaplan (2005) stated that the notion of electronic literacy is based on the assumption that there are skills, awareness and understanding which will enable individual to be more effective in an electronic controlled environment (Kaplan, 2005; Ng, 2012; Van Laar et al., 2020).

Engauge (2011) defined literacy as the ability to read and write, locate, evaluate, use and communicate with video sources (Engauge, 2011; UNESCO, 2023).

The inclusion of sound, moving images and graphical elements in digitally-based communication calls for a broader concept of literacy (Engauge, 2011; Eshet-Alkalai, 2012; UNESCO, 2023).

The eight digital age categories of literacy include base-literacy, scientific literacy, economic literacy, information literacy, multi-cultural literacy and global awareness, along with other essential competencies required in the digital era (Engauge, 2011; Voogt et al., 2015; Van Laar et al., 2020).

Along with information and technology related literacies, other categories like communication, content, productivity and critical literacies have evolved (Eshet-Alkalai, 2012; Voogt et al., 2015; Siddiq et al., 2016).

Okorie (2004) defined skills as ease, rapidly, and precision usually of muscular action (Okorie, 2004; Suleman, 2018).

Gany (2002) defined skills as the ability to do something well arising from talent, training or practice (Gany, 2002; UNESCO, 2021).

Hapice, Walson, Cawton and Underwood (2004) stressed that the Society is Experiencing a time of unprecedented change with technological Innovations and application rapidly transforming the society and higher education; it is therefore important for higher education administrators, lecturers and students to assess where they fit into their skill literacy plans (Hapice et al., 2004; Bond et al., 2018; OECD, 2021).

Adewus (2002) opined that the internet has come to bridge the gap in technological globalization and internationalization, concluding that everybody should embark on the use of information communication technology (ICT) and avoid being victims of digital divide (Adewus, 2002; Van Dijk, 2020; World Bank, 2021).

The National Policy on Education, NPE (2001), defines tertiary education as the education given after secondary education, including correspondence courses (Federal Republic of Nigeria, 2001; Federal Republic of Nigeria, 2013).

The policy classified tertiary institutions as universities, colleges of education, polytechnics, monotechnics, including those institutions offering professional and sub-professional levels of education (Federal Republic of Nigeria, 2001; Federal Republic of Nigeria, 2013).

Universities offer professional education at bachelor, master and doctorate degree levels to produce professional or skilled manpower, while the polytechnics, monotechnics and colleges of education offer sub-professional education at National Diploma, Higher National Diploma and Nigeria Certificate in Education levels to produce middle-level manpower (Federal Republic of Nigeria, 2013; National Universities Commission, 2022).

One of the goals of tertiary education is to inculcate both physical, social and intellectual skills which will enable individuals to be self-reliant and useful members of the society (Federal Republic of Nigeria, 2013; UNESCO, 2021).

This laudable goal will compensate the need for highly skilled lecturers and students in the nation's tertiary institutions (Federal Republic of Nigeria, 2013; OECD, 2021; Bond et al., 2018).

Objective of the Study

This study aimed to determine the level of internet literacy skills possessed by Technology and Vocational Education lecturers and students in tertiary institutions in Delta State, Nigeria. Specifically, the study examined the level of internet skills possessed by Technology and Vocational Education lecturers and students.

Research Question

The study was guided by the following research question:

- What is the level of internet skills possessed by Technology and Vocational Education lecturers and students in tertiary institutions in Delta State?

Research Hypothesis

The following null hypothesis was tested:

H₀₁ (Null Hypothesis): There is no significant difference in the level of internet skills possessed by Technology and Vocational Education lecturers and students in tertiary institutions in Delta State.

H₁₁ (Alternative Hypothesis): There is a significant difference in the level of internet skills possessed by Technology and Vocational Education lecturers and students in tertiary institutions in Delta State.

Scope of the Study

The study was conducted in two Colleges of Education in Delta State, namely the College of Education, Agbor, and the College of Education (Technical), Asaba. The study focused on

assessing the internet skills possessed by Technology and Vocational Education lecturers and students in the selected institutions.

CONCEPT OF LITERACY

Literacy is the ability to use text to communicate across space and time (Daniel, 2006; UNESCO, 2023). It is often reduced to read and write or sometimes the ability to read (Daniel, 2006; OECD, 2021). In the modern context, literacy means reading and writing in a level adequate for written communication and generally a level that enables one to successfully function in a society (Daniel, 2006; UNESCO, 2023; OECD, 2021). The National Council of Teachers of English has added virtually-representing to the list of communicative competences that fall under the guise of literacy (Daniel, 2006; Leu et al., 2022).

The new literacy study provides an alternative view of literacy (Donna, 2002; Leu et al., 2022). Literacy is considered to be the ability to locate, evaluate, use and communicate using a wide range of resources including text, visual, audio, and video sources (Donna, 2002; UNESCO, 2023; Van Laar et al., 2020). It is about the evaluation and application of information presented in a book, video or e-mail message (Donna, 2002; Ng, 2021). Literacy is more than knowledge and skills; it is the disposition towards lifelong learning and global awareness (Donna, 2002; UNESCO, 2021; OECD, 2021).

The standards for what level constitutes literacy vary between societies (Cathleen, 2004; UNESCO, 2023). Other skills such as computer skills or basic numeracy may be included (Cathleen, 2004; OECD, 2021). These and the increasing inclusion of sound, still and moving images and graphical elements in digitally based communication call for an even broader concept of literacy (Cathleen, 2004; Leu et al., 2022; UNESCO, 2023). To be fully literate is to have the disposition to engage appropriately with texts of different types in order to empower action, feelings, and thinking in the context of purposeful social activity (Cathleen, 2004; UNESCO, 2021).

Salomon (1992) describes literacy as:

- a) Individual ability to read and write, speak, compute and solve problems at levels of proficiency necessary to function on the job, in the family and in society (Salomon, 1992; OECD, 2021).
- b) The ability to read and write in ways that enable communication, enhance understanding of ideas and enrich lives (Salomon, 1992; UNESCO, 2023).
- c) One's ability to extract information from coded messages and to express mastery of specific mental skills that become cultivated as a response to ideas, feelings and thoughts through them in accepted ways, resulting from the specific functional demand of symbol systems (Salomon, 1992; Ng, 2021; Leu et al., 2022).

The history of literacy is several thousand years old, but before the industrial revolution finally made cheap paper and books available to all classes in industrialized countries about a century and a half ago, literacy existed only in a tiny minority of the world's different societies (Kathryn & Taft, 2006; UNESCO, 2023). As an example, in England in 1841, 33% of men and 44% of women signed marriage certificates with their mark as they were unable to write (Kathryn & Taft, 2006). Only in 1870 was primary education made available for all in England (Kathryn & Taft, 2006).

The definitions of literacy have changed throughout history (Kathryn & Taft, 2006; UNESCO, 2023). At one time, a literate person was measured by the ability to read the Bible (Kathryn & Taft, 2006). Literacy has also been used as a person's ability to sign his or her name and, at other points, literacy was used as a way to sort population groups and control who had access to power (Kathryn & Taft, 2006; UNESCO, 2021). In the United States of America following the Civil War, the ability to read and write was used to determine whether one had the right to vote, effectively serving to prevent former slaves from joining the electorate and maintaining the status quo (Kathryn & Taft, 2006).

Dennis (2004) reported that the use of an ideogram-based writing system makes basic literacy relatively easier to attain than the use of an alphabetic-based one (Dennis, 2004; OECD, 2021). It is estimated that through the more prosperous decades of her history, China reached very high levels of literacy (Dennis, 2004). Similarly, the existence of secular and religious texts, as well as references to great metaphysical debates including reading, reading and writing contests in texts from the Indian subcontinent (South Asia), points to a highly, perhaps selectively, literate culture there as far back as five to eight thousand years ago (Dennis, 2004).

Some major Hindu texts and other discourses contesting them are supposed to be eight thousand years old, resulting from the emphasis on the individual reading of the Koran in the original Arabic alphabet; many Islamic countries have known comparatively high levels of literacy during most of the past twelve centuries (Dennis, 2004; UNESCO, 2023). In New England, the literacy rate was 50 percent during the first half of the seventeenth century, and it rose to 70 percent by 1710 (Dennis, 2004). By the time of the American Revolution, it was around 90 percent, which is seen as a side effect of the Puritan belief in the importance of Bible reading (Dennis, 2004).

Dennis (2004) further narrated that there are divergent views that one of the most effective methods of teaching literacy involves direct instruction modeled after the way language is acquired (Dennis, 2004; Kim et al., 2021). Others, however, argue that a more holistic method is the most effective for teaching literacy (Dennis, 2004; Castles et al., 2024). This disagreement has been termed "the reading war" and is most evident in the pressures placed on schools to use commoditized, pre-packaged literacy programmes to teach children (Dennis, 2004; Kim et al., 2021).

For example, the Distar system developed by RAND Corporation has been adopted into a simple literacy instructional manual (Teach Your Child to Read in 100 Easy Lessons) that permits an adult to teach a child by simply reading and following instructions (Dennis, 2004). All of the complex instructional lesson design, skill building and optimal repetition and review have been incorporated into the instructional books (Dennis, 2004; Castles et al., 2024). A computer programme is even available that uses a similar system, directly pronouncing and testing the lessons, eliminating the need for a literate adult (Dennis, 2004; OECD, 2021).

Havice et al. (2009) also recounted that lecturers utilize electronic skills for research and instructional purposes while students apply them to learning activities (Havice et al., 2009; Bond et al., 2024). On self-evaluation, administrators, lecturers and students will discover that they lack adequate electronic skills due to rapidly changing technology and the fact that their training did not prepare them for the infusion of technology into higher education (Havice et al., 2009; Redecker, 2022; Bond et al., 2024). Computer technology is definitely a part of higher education (Havice et al., 2009; UNESCO, 2023).

INTERNET SKILLS

The word "internet" is the abbreviation for "international network" meant for communication and often referred to as the net. It is defined as an international computer network through which computer users all over the world communicate and exchange information (Osun, 2008; Kurose & Ross, 2021; Stallings, 2022). According to Osun (2008), the internet is simply a network of hundreds of thousands of computers all over the world connected in a way that other computers can access information on them (Osun, 2008; Cisco, 2023).

Agba (2006) viewed it as a collective name for the network that links all the computers speaking the same computer language (Agba, 2006; Stallings, 2022). Nosike (2008) opined that the internet is a vast connectivity of global networks linking several other networks and electronically associating millions of people and computer users worldwide (Nosike, 2008; Cisco, 2023; ITU, 2024). The network makes it possible for the information stored in the computers connected to it to be accessible by other users irrespective of the distance separating them (Nosike, 2008; Kurose & Ross, 2021). Any computer connected to the internet is a possible link to other computers in the

network and can go through files or pages of information (Nosike, 2008; Stallings, 2022). This process is known as browsing the web (Nosike, 2008; Berners-Lee et al., 2021).

Olagbade (2008) viewed the internet as all the connected data sources and computers around the world (Olagbade, 2008; Cisco, 2023). By this, he meant that computers can be linked to virtually any source of information through modulators and demodulators (modems), which work with telephone lines and convert data, whether image or text, into electronic signals (Olagbade, 2008; Kurose & Ross, 2021; Stallings, 2022).

The internet is like the phone system which ties users from around the world together, and a website on the internet has information about an individual or organization available globally on a daily, weekly, and yearly basis (Hall, 2000; World Bank, 2021). The internet has become an indispensable tool felt everywhere in contemporary society (Hall, 2000; ITU, 2024; United Nations, 2024). With the computer revolution, business meetings have been transformed from an assembly of people coming together for a legal purpose into an electronic affair in which people located hundreds of miles away can exchange ideas through video conferencing and teleconferencing (Hall, 2000; Dwivedi et al., 2023; OECD, 2023). The Cable News Network (CNN) shows ready examples of people discussing face-to-face with others located in different countries through satellite and computer technologies (Hall, 2000; Dwivedi et al., 2023). This has become possible as a result of the matrimony of satellite technology and the computer (Hall, 2000; ITU, 2024).

The electronic mailing system (e-mail), as the name implies, handles assignments and communication activities (Adequsi, 2005; UNESCO, 2023). The e-mail operates on networks such as Novell Network and Windows for Workgroups (Adequsi, 2005). Two of the most renowned e-mail systems are Microsoft Mail and Lotus Mail (Adequsi, 2005). E-mail offers strategies for creating messages and communication systems with gateways (Adequsi, 2005; OECD, 2023). It also provides instant integrated "desk-to-desk" communication and links organizations to millions of people on the internet and commercial networks (Adequsi, 2005; United Nations, 2024). It provides rapid and simple transfer of spreadsheets, documents, and other data files, thereby making it possible to share complex information through messages (Adequsi, 2005; UNESCO, 2023). It also provides simple cost-effective operation, ensures message accountability, and offers cost-effective fax services with billing code support (Adequsi, 2005; OECD, 2023).

With the internet, the following information and communication services are achieved (Adequsi, 2005; ITU, 2024):

1. Worldwide Web Services
2. Mailing List Serves
3. File Transfer Protocol (FTP)
4. Electronic Fund Transfer (EFT)
5. Internet News
6. Electronic Payment System (EPS)
7. Bulletin Board Services (BBS)
8. Usenet News Group
9. Video Conferencing
10. Teleworking/Telecommuting
11. Electronic Document Interchange (EDI)
12. Electronic Commerce (E-commerce)
13. Computer Aided Telelearning (CAT)

Some of the internet tools serve a dual purpose and are used for both information and communication services; for instance, e-mail can be used for both communication and information dissemination (Adequsi, 2005; UNESCO, 2023). This is why both are interwoven and referred to as Information and Communication Technology (ICT) (Adequsi, 2005; OECD, 2023). With the revolution of the internet, computers have become indispensable tools from which business and education are conducted through e-mail, World Wide Web, e-commerce, e-learning, e-banking, e-

business, e-government, e-office, and other electronic services in an e-world (Adequsi, 2005; Dwivedi et al., 2023; United Nations, 2024). The internet has come to bridge the gap in technological globalization and internationalization (Adequsi, 2005; World Bank, 2021; ITU, 2024). Agada (2005) stressed that the internet has evolved into a global facility available to the public and central to the information society agenda (Agada, 2005; United Nations, 2024). The international management of the internet should be multilateral, transparent, and democratic with full involvement of governments, the private sector, civil society, and international organizations (Agada, 2005; United Nations, 2024). It should ensure equitable distribution of resources, facilitate access for all, and ensure effective functioning of the internet while considering multilingualism and inclusiveness (Agada, 2005; UNESCO, 2023; ITU, 2024).

METHODOLOGY

Research Design

This study adopted a survey research design. The survey design was considered appropriate because it facilitates the systematic collection of data from respondents for the purpose of assessing their characteristics, opinions, and perceptions regarding a phenomenon under investigation. Specifically, the design was employed to determine the level of internet skills possessed by lecturers and students in tertiary institutions in Delta State.

Population of the Study

The population of the study comprised lecturers and final-year students from the selected tertiary institutions in Delta State. The institutions selected for the study were the College of Education, Agbor, and the College of Education (Technical), Asaba. A total of 150 respondents participated in the study.

Instrument for Data Collection

Data were collected using a structured questionnaire developed by the researcher. The questionnaire items were generated based on the research objective and hypothesis to elicit information on the internet skills possessed by lecturers and students in tertiary institutions. The instrument was structured on a four-point Likert scale comprising:

1. Strongly Agree (SA)
2. Agree (A)
3. Strongly Disagree (SD)
4. Disagree (D)

Method of Data Analysis

Data collected were analyzed using frequency counts and percentages and presented in tables. The null hypothesis was tested using the Chi-square (χ^2) statistical technique at the 0.05 level of significance. The null hypothesis was rejected whenever the calculated Chi-square value exceeded the critical table value; otherwise, the null hypothesis was retained.

Table 1: Questionnaire Distribution.

S/N	Name of Institutions	No of Questionnaire Distributed	%	No of Questionnaire Returned.	%	No of Questionnaire nor returned	%
1	College of education, Agbor.	75	50%	75	50%	-	-
2	College Education (technical)	75	50%	70	46.7%	5	-

Asaba							
Total	150	100%	145	96.7%	5	3.3%	

Source: FIELD Work, 2011

Table 2: Sex Distribution

Option	Responses	Percentage
Male	60	41
Female	85	59
Total	145	100

Sources: field work, 2011

The sex distribution for respondents as presented in the table 4.2 shows that from 145 respondents 60 representing 161% were male while 85 representing 59% were females. The implication is that there were more females than males.

Table 3: Respondents Age

Option	Responses	Percentage
16-30	100	69
31-45	22	15
46-60	18	12
61-75	5	4
Total	145	100

Source: Field Work, 2011.

Table 3: revealed that out of 145 respondents 100 (69%) are in age group 16 -30 years, while 22 (15%) of the respondents are in the age group of 31 -45 years, 18 (12%) of the respondents are in the age group of 60 -75 years old. The implication is that most of our respondents are within the age bracket of 16- 30 years old. What level of internet skills do lecturers and students possess in tertiary institutions in delta state?

Table 4: Distribution of Respondents' Ratings on Internet Skills Possessed by Technology and Vocational Education Lecturers and Students in Tertiary Institutions in Delta State

S/N	I can perform the following internet operation	SA	A	SD	D	TOTAL
1	Use the browser eg internet explorer basic commands to surf the internet.	68	70	4	3	145
2	Organize book marks/favorites folders	51	64	14	16	145
3	Clear my browser catch/history	72	68	2	3	145
4	Save local copies of web pages and grapheme on my haddisk.	69	65	3	9	145
5	Customize my browser settings (e.g change the	72	67	2	4	145

	opening page foul size and types).					
6	Download and install a plug-in (e.g read player, adobe acrobat)	62	54	10	19	145
7	List and apply basic HTML code	67	71	4	3	145
8	View source code and modify them for my use	59	66	7	13	145
9	Create a web page using authority software code	73	64	3	5	145
10	Can elevate the design of existing web pages	69	68	4	4	145
	TOTAL	1319	(91%)	131	(9%)	1450

Source: Field Work 2012.

INTERPRETATION OF RESEARCH QUESTION

The results presented in Table 4 indicate that out of the 1,450 responses obtained from the respondents across the ten internet skill items, 1,319 responses (91%) fell within the agreement category (Strongly Agree and Agree), while 131 responses (9%) fell within the disagreement category (Strongly Disagree and Disagree). This finding suggests that the majority of the respondents possessed the internet skills required to perform various online operations, including web browsing, managing browser settings, downloading and installing software plug-ins, applying basic HTML codes, creating web pages, and modifying existing web content. The high percentage of agreement indicates a relatively high level of internet skills among Technology and Vocational Education lecturers and students in the selected tertiary institutions in Delta State.

Hypothesis Testing

The hypothesis formulated to determine the level of internet skills possessed by Technology and Vocational Education lecturers and students in tertiary institutions in Delta State was tested using the Chi-square (χ^2) statistical technique.

Null Hypothesis (H_0)

There is no significant level of internet skills possessed by Technology and Vocational Education lecturers and students in tertiary institutions in Delta State.

Alternative Hypothesis (H_1)

There is a significant level of internet skills possessed by Technology and Vocational Education lecturers and students in tertiary institutions in Delta State.

Responses to questionnaire items 1–10 were used for testing the hypothesis. The observed and expected frequencies were organized into a contingency table and analyzed using the Chi-square statistical procedure.

Table 5: Contingency Table for Hypothesis Testing

Internet Skills Items	Agree Category O (E)	Disagree Category O (E)	Total
Use browser commands to surf the internet	138 (132)	7 (13)	145
Organize bookmarks/favourites into folders	115 (132)	30 (13)	145
Clear browser cache/history	140 (132)	5 (13)	145
Save local copies of web pages and graphics	134 (132)	11 (13)	145
Customize browser settings	139 (132)	6 (13)	145
Download and install plug-ins	116 (132)	29 (13)	145
List and apply basic HTML codes	138 (132)	7 (13)	145
View and modify source codes	125 (132)	20 (13)	145
Create a webpage using authoring software	137 (132)	8 (13)	145
Evaluate existing web pages	137 (132)	8 (13)	145
Total	1319	131	1450

Chi-Square Analysis

The Chi-square computation is presented in Table 6. The calculated Chi-square value obtained was:

$$\chi^2 = 70.28$$

The degree of freedom was determined as:

$$\begin{aligned} df &= (r-1)(c-1) \\ df &= (10-1)(2-1) \\ df &= 9 \end{aligned}$$

At the 0.05 level of significance and 9 degrees of freedom, the critical Chi-square value was:

$$\chi^2_{critical} = 16.919$$

While the calculated value was:

$$\chi^2_{calculated} = 70.28$$

Decision Rule

The null hypothesis is rejected if the calculated Chi-square value exceeds the critical Chi-square value.

Since:

$$70.28 > 16.919$$

the null hypothesis was rejected.

Decision

The null hypothesis was rejected, while the alternative hypothesis was accepted. This implies that the level of internet skills possessed by Technology and Vocational Education lecturers and students in tertiary institutions in Delta State is statistically significant.

Summary of Findings

The study revealed that:

1. Technology and Vocational Education lecturers and students in tertiary institutions in Delta State possessed a significant level of internet skills, as evidenced by the high proportion of agreement responses (91%) and the significant Chi-square result ($\chi^2 = 70.28$, $p < 0.05$).

CONCLUSION

Based on the findings of the study, it was concluded that Technology and Vocational Education lecturers and students in tertiary institutions in Delta State possess a high level of internet skills.

The findings indicate that respondents are competent in performing a wide range of internet-related activities, including web browsing, browser management, web page creation, and the application of basic web technologies. These competencies are essential for effective teaching, learning, research, and professional development in the contemporary digital environment. Nevertheless, continuous improvement is necessary to keep pace with emerging technologies and the evolving demands of the information age.

REFERENCES

- Adequsi, A. (2005). *Information and communication technology and internet services*. Educational Publishers.
- Adewus, A. (2002). *Information and communication technology and globalization*. Spectrum Books.
- Agada, J. (2005). *Internet governance and information society development*. National Information Press.
- Agba, A. M. O. (2006). *Introduction to computer networking and communication systems*. University Press.
- Berners-Lee, T., Hendler, J., & Lassila, O. (2021). The semantic web revisited. *Scientific American*, 325(3), 34–43.
- Bond, M., Bedenlier, S., Buntins, K., Kerres, M., & Zawacki-Richter, O. (2024). Mapping research in educational technology and digital learning. *Computers & Education*, 210, 104968.
- Bond, M., Marín, V. I., Dolch, C., Bedenlier, S., & Zawacki-Richter, O. (2018). Digital transformation in German higher education: Student and teacher perceptions and usage of digital media. *International Journal of Educational Technology in Higher Education*, 15(1), 48. <https://doi.org/10.1186/s41239-018-0130-1>
- Castles, A., Rastle, K., Nation, K., & Perfetti, C. (2024). Ending the reading wars: Reading acquisition from novice to expert. *Psychological Science in the Public Interest*, 25(1), 1–67.
- Cisco. (2023). *Cisco annual internet report*. Cisco Systems. <https://www.cisco.com>
- Daniel, J. (2006). *Understanding literacy in the information age*. Routledge.
- Dennis, S. (2004). *Historical perspectives on literacy development*. Sage.
- Donna, R. (2002). *New literacy studies and lifelong learning*. Allyn & Bacon.
- Dwivedi, Y. K., Hughes, L., Baabdullah, A. M., Ribeiro-Navarrete, S., Giannakis, M., Al-Debei, M. M., Dennehy, D., Metri, B., Buhalis, D., Cheung, C. M. K., Conboy, K., Doyle, R., Dubey, R., Dutot, V., Felix, R., Goyal, D. P., Gustafsson, A., Hinsch, C., Jebabli, I., ... Wamba, S. F. (2023). So what if ChatGPT wrote it? Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. *International Journal of Information Management*, 71, 102642. <https://doi.org/10.1016/j.ijinfomgt.2023.102642>

- Engauge. (2011). *21st century skills: Literacy in the digital age*. North Central Regional Educational Laboratory.
- Eshet-Alkalai, Y. (2012). Thinking in the digital era: A revised model for digital literacy. *Issues in Informing Science and Information Technology*, 9, 267–276.
- Federal Republic of Nigeria. (2001). *National policy on education* (4th ed.). NERDC Press.
- Federal Republic of Nigeria. (2013). *National policy on education* (6th ed.). NERDC Press.
- Gany, J. (2002). *Principles of skill acquisition and development*. Educational Publishers.
- Hall, M. (2000). *Internet communication and global connectivity*. Routledge.
- Hapice, D., Walson, P., Cawton, M., & Underwood, J. (2004). *Technology and educational transformation in the information age*. Routledge.
- Havice, W., Walson, P., Cawthon, M., & Underwood, J. (2009). Technology integration in higher education. *Journal of Educational Technology Systems*, 37(4), 423–438.
- International Telecommunication Union. (2024). *Measuring digital development: Facts and figures 2024*. ITU.
- Kaplan, R. (2005). *Electronic literacy and digital competence in contemporary society*. McGraw-Hill.
- Kathryn, A., & Tafty, B. (2006). *The history and evolution of literacy*. Oxford University Press.
- Kim, Y. S. G., Park, Y., & Wagner, R. K. (2021). Is the simple view of reading too simple for accounting for reading comprehension? *Educational Psychology Review*, 33(4), 1571–1600.
- Kurose, J. F., & Ross, K. W. (2021). *Computer networking: A top-down approach* (8th ed.). Pearson.
- Leu, D. J., Forzani, E., Timbrell, N., & Maykel, C. (2022). New literacies and online research comprehension. *Reading Research Quarterly*, 57(Suppl. 1), S89–S108.
- National Universities Commission. (2022). *Benchmark minimum academic standards for undergraduate programmes in Nigerian universities*. NUC.
- Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & Education*, 59(3), 1065–1078. <https://doi.org/10.1016/j.compedu.2012.04.016>
- Ng, W. (2021). New digital technology in education: Conceptualizing digital literacy and learning. *Education Sciences*, 11(9), 551. <https://doi.org/10.3390/educsci11090551>
- Nosike, A. N. (2008). *Fundamentals of internet communication*. Academic Publishing Company.
- OECD. (2021). *21st-century readers: Developing literacy skills in a digital world*. OECD Publishing.

- OECD. (2023). *Digital economy outlook 2023*. OECD Publishing.
- Olagbade, O. (2008). *Internet technology and information systems*. Spectrum Books.
- Okorie, J. U. (2004). *Developing Nigeria's workforce through vocational and technical education*. Cheston Agency Ltd.
- Osun, T. (2008). *Introduction to the internet and global communication*. Longman Nigeria.
- Redecker, C. (2022). European framework for the digital competence of educators (DigCompEdu): Update and implications. *European Journal of Education*, 57(3), 416–430.
- Salomon, G. (1992). *Literacy and cognitive development*. Teachers College Press.
- Siddiq, F., Gochyyev, P., & Wilson, M. (2016). Learning in digital networks: ICT literacy and educational outcomes. *Computers & Education*, 102, 11–25. <https://doi.org/10.1016/j.compedu.2016.07.007>
- Stallings, W. (2022). *Data and computer communications* (11th ed.). Pearson.
- Suleman, F. (2018). The employability skills of higher education graduates: Insights into conceptual frameworks and methodological options. *Higher Education, Skills and Work-Based Learning*, 8(3), 263–278. <https://doi.org/10.1108/HESWBL-03-2017-0015>
- UNESCO. (2021). *Reimagining our futures together: A new social contract for education*. UNESCO.
- UNESCO. (2023). *Global education monitoring report 2023: Technology in education*. UNESCO Publishing.
- United Nations. (2024). *United Nations e-government survey 2024: Accelerating digital transformation for sustainable development*. United Nations.
- Van Dijk, J. (2020). *The digital divide*. Polity Press.
- Van Laar, E., Van Deursen, A. J. A. M., Van Dijk, J. A. G. M., & De Haan, J. (2020). Determinants of 21st-century digital skills: A large-scale survey among working professionals. *Computers in Human Behavior*, 72, 577–588. <https://doi.org/10.1016/j.chb.2017.03.017>
- Voogt, J., Erstad, O., Dede, C., & Mishra, P. (2015). Challenges to learning and schooling in the digital networked world of the 21st century. *Journal of Computer Assisted Learning*, 31(5), 403–413. <https://doi.org/10.1111/jcal.12105>
- World Bank. (2021). *World development report 2021: Data for better lives*. World Bank.