Research Paper

Digital Citizenship Education: Literacy Strengths and Security Gaps in Higher Institutions in Rivers State

Agbarakwe, Harriet Akudo[1], Attih, Juliana Asuquo[2]

[1,2]Department of Curriculum Studies and Educational Technology, Faculty of Education, University of Port Harcourt, Nigeria.

Corresponding Author: Agbarakwe, Harriet Akudo

ABSTRACT

This study investigated the level of digital literacy among students in universities in Rivers State. Three research questions and corresponding hypotheses guided the inquiry in line with the study's objectives. A descriptive survey design was adopted. The population comprised 8,761 undergraduate students across three public universities, from which a sample of 2,137 was selected using a multi-stage sampling procedure. Data were collected with a researcher-designed instrument titled Assessment of Digital Citizenship Education Literacy Strengths and Security Gaps Questionnaire (ADCELSSGQ). The instrument was validated by three experts, and its overall reliability coefficient, determined using Cronbach's Alpha, was 0.91. Research questions were analyzed using mean and standard deviation, while hypotheses were tested with Analysis of Variance (ANOVA) at the 0.05 significance level. Findings revealed that students in universities in Rivers State have substantial access to digital technologies and exhibit digital citizenship behaviors to a high extent. Results further established that students demonstrate strong digital literacy and possess digital communication skills necessary for effective digital citizenship. The study concluded that equitable access is central to digital citizenship, underscoring the need for institutional improvements in infrastructure, e-library utilization, and pedagogical training. Situated within existing literature, the study advocates for policies that foster inclusive digital integration in higher education. Among its recommendations, lecturers and educators are encouraged to pursue professional development in digital literacy to align their competencies with the high proficiency already demonstrated by students.

Keywords: Digital citizenship, education, digital literacy, security gaps, higher institutions.

INTRODUCTION

People have seen many civilizations grow and fall. Different human civilizations face several problems that people always have to deal with. The 21st century is marked by digital innovations, which are defined by swift and significant transformations in technology and techniques. Education is essential for providing individuals with the essential skills and abilities required to thrive in the swiftly changing digital age. Ule and Demudia (2020) asserted that education is an essential instrument for social reengineering, transformation, and the economic advancement of any nation. Countries that have made good changes to

their schools usually do quite well in terms of growth and progress.

Amadi and Nwachukwu (2020) opined that technology has truly changed the contemporary instructive setting, providing a wide range of learning experiences to support teaching and learning. Using technology in schools goes back to ancient times, and changes in technology have changed the way schools work. The original classrooms had a chalkboard and school slates. It was also common to find inscribed texts on things that were shown in Egyptian hieroglyphs. This phase changed into pre-computer classrooms that taught lessons through televised classes (Purdue University 2017). During this time, the film projector, overhead projector, ballpoint pen, mimeographs, and language labs all came into being.

The next classes had a variety of portable computers, the Internet, and personal digital assistants. In the end, the 21st-century classroom had social media, Web 2.0 tools, and YouTube. The advancements in technological products and instructional tools highlight the fundamental abilities and behavioral attributes that students must acquire to optimize their educational experiences. This is important for students to be able to live and work in society. In today's information economy, digital technologies have become important tools for education, learning, and communication. Digital citizenship refers to the standards, abilities, and moral principles that regulate people's use of digital technologies. These include important things like access, literacy, communication, legal awareness, rights, and security habits. Digital citizenship is not just a theoretical idea in Nigerian higher education, especially in university education programs; it is also a necessary skill.

As universities increasingly integrate digital platforms into teaching, administration, and student interaction, the ability of future educators to navigate this landscape proficiently is essential for their professional readiness. This integration takes place despite persistent infrastructural inadequacies, unequal resource availability, and varying degrees of digital competency advancement. These paradoxes highlight the need to examine student interactions with digital technology, their levels of literacy and communication skills, and the institutional factors that affect these encounters.

Students use digital platforms to learn, talk to each other, do research, and work together. This shows that they are good at basic digital literacy skills including using devices, accessing online materials, and taking part in virtual classrooms. There is still a big gap in knowledge about digital ethics, online safety, and how to act properly online. This difference puts both individual students and the school's data and infrastructure at risk. Also, the surge in cyber threats, false information, and digital exploitation shows how easy it is for students who don't have enough cybersecurity training to be hurt. Many people don't know how to protect their personal information, spot phishing attempts, or critically evaluate what they see online. Most colleges and universities don't teach digital citizenship formally, which makes these differences even bigger. This means that students have to figure out how to use complicated digital spaces without explicit instructions. This study is important for figuring out how well pupils are currently digitally literate, what their capabilities are, and what security risks are most important. The goal of this program is to guide the creation of certain educational programs and institutional rules that encourage responsible digital use, raise knowledge of cybersecurity, and create a culture of ethical online behavior. In an increasingly linked world, the study will help students become skilled internet users and responsible digital citizens. The objective of this study is to assess the digital literacy levels of university students in Rivers State.

Purpose of the Study

The main purpose of this study was to investigate the level of digital literacy among students in universities in Rivers State. The specific objectives of the study were to:

1. determine the extent to which students in the Universities in Rivers State have access to digital technologies.
2. find out the level of digital literacy possessed by students in the Universities in Rivers State.
3. examine the digital communication skills exhibited by students in the Universities in Rivers State.

Research Questions

The following understated research questions guided this study:

1. To what extent do Faculty of students in Universities in Rivers State have access to digital technologies?
2. To what extent do students possess digital literacy in Universities in Rivers State?
3. What are the digital communication skills exhibited by students in Universities in Rivers State?

Hypotheses

The following null hypotheses were formulated and tested at a 0.05 level of significance:

H01: There is no significant difference in the level of access students have to digital technologies across the three Universities in Rivers State.

H02: The level of digital literacy among students across the three Universities in Rivers State does not differ significantly.

H03: The digital communication skills exhibited among students across the three Universities in Rivers State do not differ significantly.

MATERIALS AND METHODS

This study adopted a descriptive survey research design and was carried out in three universities in Rivers State. The population of the study comprised eight thousand seven hundred and sixty-one (8761) students in the Faculty of Education in the three universities in Rivers State. The sample for this study comprised two thousand one hundred and thirty-seven (2137) 400 level undergraduate students in the Faculties of Education in the three public Universities in Rivers State. The multistage sampling technique was adopted to select the sample for this study. The instrument that was used for data collection was a self-structured questionnaire titled: Assessment of Digital Citizenship Education Literacy Strengths and Security Gaps Questionnaire (ADCELSSGQ). The questionnaire contained two sections structured to elicit responses that answered the research questions posed to guide the study. The first section, Section A, elicited demographic data on the respondents' institution and gender. Section B had several parts. Part 1 sought to elicited information on the extent to which the respondents had access to digital technologies. Part 2 established the extent to which students could use different digital technologies and Part 3 was designed to gather data on the digital communication skills possessed by students. The instrument was validated by three experts and an overall reliability coefficient for the entire instrument yielded 0.91 determined using Cronbach Alpha. Direct delivery and retrieval systems were used to administer the instrument. However, out of the 2137 copies of the questionnaire that were administered to the respondents, 1506 copies were duly completed and returned and were then used for data analysis. The data was analysed using descriptive and inferential statistical tools. Mean and standard deviation were used to answer the research questions. The hypotheses were tested using Analysis of Variance (ANOVA) at 0.05 level of significance.

RESULTS AND FINDINGS

Research Question 1: To what extent do students in the Universities in Rivers State have access to digital technologies?

Table 1 Results showing the extent to which students in Universities in Rivers State have access to digital technologies.

S/N	Access to Digital Technologies	Very High Extent	High Extent	Low Extent	Very Low Extent	Mean	Std. Deviation	Remark
1	I have a personal computer	642	368	268	228	2.95	1.10	HE
2	I have access to a smart phone	1004	383	93	26	3.57	0.69	VHE
3	There is a cybercafé in my school that i can easily access	851	385	193	77	3.33	0.89	VHE
4	I have an email address which I easily use	1038	339	82	47	3.57	0.74	VHE
5	My Facebook account is active	1032	289	104	81	3.51	0.84	VHE
6	My WhatsApp account is active	1080	301	82	43	3.61	0.72	VHE
7	I have data that enable me carry out searches online and communicate with others	774	490	184	58	3.31	0.83	VHE
8	My department has a computer lab that I can easily access	355	357	360	434	2.42	1.14	LE
9	I access the university's e-library	426	388	452	240	2.66	1.05	HE
10	I connect to the class online forum or chat group or blog	573	467	251	215	2.93	1.06	HE
	Grand Mean					3.19	0.90	HE

Research Data, (2026)   N = 2137   Criterion Mean (CM) = 2.50

Table 1 shows students' digital access. Many students use the university's e-library (X=2.66, SD=1.05), personal computers (X=2.95, SD=1.06), and the online class forum (X=2.93, SD=1.06). A standard deviation above 1.0 suggests scores are diverse and variable. Students have limited access to department computer labs (X=2.42, SD=1.14). The respondents have cell phones (X=3.57, SD=0.69), access to school cybercafés (X=3.33, SD=0.89), active email accounts (X=3.57, SD=0.74), Facebook accounts (X=3.51, SD=0.84), and WhatsApp accounts (X=3.61, SD=0.72). The grand mean of 3.19 indicates that Rivers State university Faculty of Education students have good digital technology access.

Research Question 2: To what extent do students possess digital literacy in the Universities in Rivers State?

Table 2 Results showing the extent to which in Universities in Rivers State possess digital literacy.

S/N	Level of Digital Literacy	Very High Extent	High Extent	Low Extent	Very Low Extent	Mean	Std. Deviation	Remark
11	I can navigate a computer using arrow keys, scroll bars, special keys, and mouse functionality	919	451	90	61	3.47	0.78	VHE
12	I can send an email from my phone	917	459	119	26	3.50	0.71	VHE

13	I know how to change the settings of my phone	965	389	126	41	3.52	0.74	VHE
14	I can use formatting and editing functions of a word processing program (cut and paste, spell check, margins etc.)	774	536	146	65	3.35	0.80	VHE
15	I know how to chat using social media handles Facebook, WhatsApp, Instagram and Twitter	1010	382	107	22	3.58	0.68	VHE
16	I know how to blog	417	434	445	225	2.66	1.03	HE
17	I understand internet terminology (URL, https, hyperlinks etc)	599	525	301	96	3.09	0.91	HE
18	I know how to detect phishing emails	364	456	453	248	2.61	1.03	HE
19	I can prepare simple multimedia presentations	407	551	400	163	2.78	0.96	HE
20	I understand software licenses and copyrights	393	469	439	220	2.67	1.01	HE
	Grand Mean					3.12	0.87	HE

Research Data, (2026)   N = 2137   CM = 2.50

Table 2 shows that Rivers State university students are good at using a mouse and arrow keys to navigate a computer (X=3.47, SD=0.78), sending emails from a phone (X=3.50, SD=0.71), changing phone settings (X=3.52, SD=0.74), formatting word documents (X=3.35, SD=0.80), and talking to people on social media sites like Facebook, WhatsApp, Instagram, and Twitter. These questions have standard deviations < 1.00, which means that the answers are similar. Some important skills were blogging (X=2.66, SD=0.78), online terminology (X=3.09, SD=0.1), phishing email detection (X=2.61, SD=1.03), and making basic multimedia presentations (X=2.78, SD=0.96). The grand mean of 3.12 shows that students in Rivers State institutions' Faculty of Education are quite good with computers.

Research Question 3: What are the digital communication skills exhibited by students in the Universities in Rivers State?

Table 3 Results showing the digital communication skills exhibited by students in Universities in Rivers State.

S/N	Digital Communication Skills Exhibited	Strongly Agree	Agree	Disagree	Strongly Disagree	Mean	Std. Deviation	Remark
21	I am strategic in the contents that I post online	704	640	110	52	3.33	0.76	Strongly Agree
22	I only post materials that are related to my education	315	522	514	155	2.66	0.92	Agree
23	I post "selfies" on my status and wall	717	514	213	62	3.25	0.85	Strongly Agree
24	I scrutinize messages before I forward them to my contacts	760	579	134	33	3.37	0.74	Strongly Agree
25	I know how and where to find all the information that I require on the internet	669	598	167	72	3.24	0.83	Agree

26	I respond to every chat and every post on my wall	353	534	445	174	2.71	0.95	Agree
27	I always update my status with recent happenings in my life and family	339	369	521	277	2.51	1.03	Agree
28	I only post educational materials on my social media handles	346	446	480	234	2.60	1.01	Agree
29	I use pidgin English when sharing my posts or replying to a message	378	473	443	212	2.68	1.00	Agree
30	I abbreviate words (short forms) when typing an online message or chat	502	557	259	188	2.91	1.00	Agree
	Grand Mean					3.19	0.91	Agree

Research Data, (2026) N = 2137 CM = 2.50

Table 3 shows students' digital communication skills. The respondents agreed they are strategic with internet content (X=3.33, SD=0.76). With averages of 2.66 and 2.60, respondents agreed they only share educational content (items 2 and 8). Respondents knew how to find all relevant information online (X=3.24, SD=0.83). Students agreed to read messages before sending them (X=3.37, SD=0.74). Effective digital communication includes these. The respondents admitted to poor digital communication. The average score of 3.25 for item 3 shows that students agree to publish selfies on their status and wall. They agreed to answer to every chat and post on their wall (X=2.7, SD=0.95), update their status with recent life and family events (X=2.51, SD=1.03), and use Pidgin English when sharing posts and replying to comments (X=2.68, SD=1.00). Participants also used abbreviations and acronyms in online discussions and communications (X=2.91, SD=1.00). The results show that students have good and bad digital communication skills.

Hypothesis 1: There is no significant difference in the level of access students have to digital technologies across the three universities in Rivers State.

Table 4: One-way ANOVA Results showing difference in the level of access to digital technologies among the three Universities in Rivers State

	Sum of Squares	Df	Mean Square	F-cal	F-crit	α-level	P-Value	Decision
Between Groups	1.675	2	0.838	3.467	3.000	0.050	0.031	Reject Null Hypotheses
Within Groups	363.089	1503	0.242					
Total	364.764	1505						
Multiple Comparisons								
Dunnett T3								

(I) Institution		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval			
					Lower Bound	Upper Bound		
IAUE	RSU	0.07957	0.03574	0.077	-0.0059	0.1651		
	UNIPORT	0.00659	0.03067	0.995	-0.0668	0.0800		
RSU	IAUE	-0.07957	0.03574	0.077	-0.1651	0.0059		

	UNIPORT	-0.07298	0.03115*	0.037	-0.1475	0.0016		
UNIPORT	IAUE	-0.00659	0.03067	0.995	-0.0800	0.0668		
	RSU	0.07298	0.03115*	0.037	-0.0016	0.1475		
*. The mean difference is significant at the 0.05 level.								

Table 4 shows that the F-calculated value is 3.467 and the P-value is 0.031, with 2 degrees of freedom between groups and 1503 within groups. Results show considerable access discrepancy among students at three Rivers State colleges (F2,1053=3.467, P<0.05). Thus, the null hypothesis is rejected, suggesting that Rivers State students at the three universities have different digital technology access.

Hypothesis 2: The level of digital literacy among students across the three universities in Rivers State does not differ significantly.

Table 5: One-way ANOVA Results showing difference in the level of digital literacy among students in the three Universities in Rivers State

	Sum of Squares	Df	Mean Square	F-cal	F-crit	α-level	P-Value	Decision
Between Groups	2.0066	2	1.0033	3.2058	3.000	0.05	0.0408	Reject Null Hypothesis
Within Groups	470.3854	1503	0.3130					
Total	472.3919	1505						
Multiple Comparisons								
Dunnett T3								
(I) Institution		**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**			
					Lower Bound	**Upper Bound**		
IAUE	RSU	0.0350	0.0404	0.7697	-0.0618	0.1317		
	UNIPORT	-0.0517	0.0336	0.3278	-0.1320	0.0286		
RSU	IAUE	-0.0350	0.0404	0.7697	-0.1317	0.0618		
	UNIPORT	-0.0867	0.0368	0.0350*	-0.1747	0.0013		
UNIPORT	IAUE	0.0517	0.0336	0.3278	-0.0286	0.1320		
	RSU	0.0867	0.0368	0.0350*	-0.0013	0.1747		
*. The mean difference is significant at the 0.05 level.								

Table 5 shows that the F-calculated value is 3.2058 and the P-value is 0.0408, with 2 degrees of freedom between groups and 1503 within groups. The study found significant differences in digital literacy levels among students at three Rivers State universities (F2,1053=3.2058, P<0.05). The null hypothesis is rejected, demonstrating that Rivers State students' digital literacy levels vary greatly across the three universities.

Hypothesis 3: The digital communication skills exhibited among students across the three universities in Rivers State does not differ significantly.

Table 6: One-way ANOVA Results showing difference in the digital communication skills exhibited by Students in the three Universities in Rivers State

	Sum of Squares	Df	Mean Square	F-cal	F-crit	α-level	P-Value	Decision
Between Groups	1.4955	2	0.7477	2.7742	3.0000	0.05	0.0627	Do not reject null hypothesis
Within Groups	405.1103	1503	0.2695					
Total	406.6058	1505						

Table 6 shows that the F-calculated value is 2.7742 and the P-value is 0.0627, with 2 degrees of freedom across groups and 1503 within groups. $F_{2,1053}=2.7742$, $P>0.05$, hence the P-value is not significant. This does not reject the null hypothesis. Rivers State's three institutions' students have similar digital communication skills. No post hoc comparisons were made since the null hypothesis was accepted.

DISCUSSION OF FINDINGS

According to Table 1, Research Question 1 had a grand mean of 3.19. This shows that students have many digital resources. In particular, 67% had extensive personal computer access and 33% inadequate. Most respondents had smartphones. Over 70% said the university's cybercafé was accessible. The majority (91.5%) of respondents had active email accounts, while 8.5% did not. The Joint Admissions and Matriculation Board's Computer-Based Testing, which requires email addresses, explains this high figure. Social media involvement was high, with 87% of participants having active Facebook accounts and almost 90% having active WhatsApp accounts. Respondents reported extensive mobile data availability for online communication and engagement. They reported limited departmental computer access, which may hinder technology integration into instruction. Digital citizenship requires equal access to technology for all students, but just 54% used the university's e-library. This rate is above average, yet 45% of students do not use the e-library, requiring further study.

1,040 respondents regularly used online class forums or chat groups, demonstrating digital access. The findings match Roberts and Mehrotra (2020), who found few pupils without cellphones, and Villanti et al. (2017), who found students had significant social media access. The findings contradict with Heponiemi et al. (2021), who found poor digital access among Finnish adults, impeding healthcare access. In their research, Tulinayo, Ssentume, and Najjuma (2018) found that less than 40% of pupils possessed personal computers. Table 4 shows that Hypothesis 1 has a significant p-value, rejecting the null hypothesis. The three colleges examined—IAUE, RSU, and UNIPORT—have very different student access to digital technologies. Post hoc analysis showed no significant differences between IAUE and RSU or IAUE and UNIPORT students. RSU students had lower access than UNIPORT students (mean difference = -0.07298). Institutional officials must prioritize student digital access. Cueto, Felipe, and Leon (2018) found that young adults in Peru and Vietnam have better digital technology access than those in Ethiopia and India, probably due to government digital infrastructure investments.

Research Question 2, shown in Table 2, shows that Rivers State university students are digitally literate. Computer users were proficient with mice, keyboards, and specialty keys. They showed how to send emails from mobile devices, change phone settings, and structure documents with word processing software. Students used Facebook, WhatsApp, and Twitter well and understood internet language. Many respondents were proficient in spotting phishing emails, a vital cybercrime prevention ability. These findings contradict with Heponiemi et al. (2021) and Tejedor, Cervi, Perez-Escoda, et Jumbo (2020), who found low digital literacy among students and educators, respectively. The latter proposed digitization-focused training for educators. This study found that instructors' pedagogical methods increased literacy. Digital storytelling improves students' digital literacy, say Chan, Churchill, and Chiu (2017). According to Dewi, Pahriah, and Purmadi (2021), technology in education enhances students' digital literacy. While Zehra (2016) found differences between students' and instructors' digital literacy ideas, the current study shows that kids have high digital literacy, which digitally adept educators may use. Table 5 shows that Hypothesis 2 had a significant p-

value (0.0408), rejecting the null hypothesis. This shows large digital literacy gaps between the three colleges. Post hoc studies showed that RSU students had worse digital literacy than UNIPORT students (mean difference = -0.0867). Nguyen and Habok (2021) found that final-year students had better digital literacy and access to digital resources at home and school than their classmates.

Research Question 3 results, shown in Table 3, demonstrate students' digital communication skills. Participants carefully reviewed their internet posts before posting. 837 said they only uploaded educational content online, while 659 disagreed. As expected, several students posted "selfies" on social media. Participants knew where to get information online. The mean score of 2.68 indicates that respondents utilize Pidgin English and acronyms online. Bearden (2017) advised students to carefully review materials before publishing. Makhzoum, Berri, and Ajami (2021) highlight that teacher participation may affect students' digital communication skills.

Table 6 shows that Hypothesis 3 has a non-significant p-value (0.0627), supporting the null hypothesis. This suggests that students from the three universities have similar digital communication skills. Thus, institutional issues appear to have little impact on student communication. Santos, Batista, and Marques (2019) found that students preferred email and instant messaging for teacher interactions. Al-Abdullatif and Gameil (2020) found that participants used digital technology to communicate.

CONCLUSION
The evaluation of digital technology, digital literacy, and communication abilities was conducted among students at Rivers State University. Access to smartphones, social media, and email was substantial, yet utilization of departmental computer laboratories and e-libraries was minimal, necessitating an examination of barriers.

Technology-integrated pedagogy may have facilitated students' proficiency in computer navigation, document formatting, phishing detection, and platform participation. Students at Rivers State University (RSU) reported lower access and literacy levels compared to those at the University of Port Harcourt.

Digital communication abilities demonstrated strategic online content management and information retrieval, revealing little inter-institutional disparities, indicating that individual and cultural factors outweigh institutional influences. The findings emphasized the necessity of fair access to digital citizenship, advocating for infrastructure development, e-library enhancement, and pedagogical training. The paper advocates for comprehensive digital integration strategies in higher education based on the current literature.

Recommendations
Based on the findings and conclusions of this study, the following recommendations were made:
1. Every departments in the university should establish and sustain computer laboratories equipped with functional, internet-connected computers to enhance students' access to digital environments.
2. Lecturers and other educators should pursue professional training to elevate their digital literacy, aligning it with the high proficiency already demonstrated by students.
3. Universities in Rivers State should implement digital citizenship education programs, particularly for first-year students, to instruct them on appropriate communication models and etiquette in digital spaces.

REFERENCES

1. Al-Abdullatif, A. M., & Gameil, A. A. (2020). Exploring students' knowledge and practice of digital citizenship in higher education. *International Journal of Emerging Technologies in Learning, 15*(19), 122–142. https://doi.org/10.3991/ijet.v15i19.15611

2. Amadi, U., & Nwachukwu, C. (2020). Comparative effects of Google Classroom and WhatsApp discussion strategies on university students' performance in computer education. *European Advanced Academic Research*, *3*(10), 5008.

3. Bearden, S. M. (2017). 5 tips to help students become good digital communicators. Edmodo. https://go.edmodo.com/5-tips-to-help-students-become-good-digital-communicators/

4. Chan, B. S., Churchill, D., & Chiu, T. K. (2017). Digital literacy learning in higher education through digital storytelling approach. *Journal of International Educational Research, 13*(1), 1–16. https://files.eric.ed.gov/fulltext/EJ1144564.pdf

5. Cueto, S., Felipe, C., & Leon, J. (2018). Digital access, use and skills across four countries: Construction of scales and preliminary results from the Young Lives Round 5 survey. *Young Lives Technical Note 46*. Oxford Department of International Development, University of Oxford. http://www.ninosdelmilenio.org/wp-content/uploads/2018/07/YL-TN46.pdf

6. Dewi, C. A., Pahriah, P., & Purmadi, A. (2021). The urgency of digital literacy for Generation Z students in chemistry learning. *International Journal of Emerging Technologies in Learning, 16*(11), 88–103. https://doi.org/10.3991/ijet.v16i11.19871

7. Heponiemi, T., Gluschkoff, K., Leemann, L., Manderbacka, K., Aalto, A.-M., & Hypponen, H. (2021). Digital inequality in Finland: Access, skills and attitudes as social impact mediators. *New Media & Society*, 1–17. https://doi.org/10.1177/14614448211023007 (doi.org in Bing)

8. Makhzoum, V., Berri, A., & Ajami, Z. (2021). The role of teachers' digital communication skills in the success of the distance learning process in private universities in Lebanon. *Middle Eastern Journal of Research in Education and Social Sciences, 2*(1), 16–30. https://doi.org/10.47631/mejress.v2i1.120

9. Nguyen, L. A. T., & Habok, A. (2021). Digital literacy of EFL students: An empirical study in Vietnamese universities. *Libri, 71*(1), 57–66. https://doi.org/10.1515/libri-2020-0165

10. Roberts, E. T., & Mehrotra, A. (2020). Assessment of disparities in digital access among Medicare beneficiaries and implications for telemedicine. *JAMA Internal Medicine, 180*(10), 1386–1389. https://jamanetwork.com/

11. Santos, H., Batista, J., & Marques, R. P. (2019). Digital transformation in higher education: The use of communication technologies by students. *Procedia Computer Science, 164*, 123–130. https://doi.org/10.1016/j.procs.2019.12.167 (doi.org in Bing)

12. Tejedor, S., Cervi, L., Perez-Escoda, A., & Jumbo, F. T. (2020). Digital literacy and higher education during COVID-19 lockdown: Spain, Italy and Ecuador. *Publications, 8*(4), 48. https://doi.org/10.3390/publications8040048 (doi.org in Bing)

13. Tulinayo, F., Ssentume, P., & Najjuma, R. (2018). Digital technologies in resource-constrained higher institutions of learning: A study on students' acceptance and usability. *International Journal of Educational Technology in Higher Education, 15*, 36. https://doi.org/10.1186/s41239-018-0117-y

14. Ule, P. A., & Idemudia, S. A. (2020). Resuscitating the educational sector in a depressed economy: Relying on transformational leadership for effective national development. *International Academy Journal of Management Annals, 6*(1), 25–34.

15. Villanti AC, Johnson AL, Ilakkuvan V, Jacobs MA, Graham AL, Rath JM. Social Media Use and Access to Digital Technology in US Young Adults in 2016. J Med Internet Res. 2017 Jun 7;19(6): e196. doi: 10.2196/jmir.7303.

16. Zehra, A. G. (2016). Internalization of digital citizenship for the future of all levels of education. *Education and Science, 41*(186), 137–148. https://doi.org/10.15390/EB.2016.4533

******