

Learning with Smart Devices: Influence of Technostress on Undergraduate Students' Learning at University of Ilorin, Nigeria

**Kamaldeen K. Oladosu, Ndaceko J. Alasan, Emmanuel S. Ibrinke,
Hammed A. Ajani & Taofeeq A. Jimoh
University of Ilorin, Nigeria**

ABSTRACT

The wide use of smart devices among students has generated concerns in the last decades. Critical among many others is stress accumulated from the increasing dependency on the use of smart devices, especially among undergraduate students: "technostress." Observations that prompted this study hypothesized that if technostress is affecting professionals from other walks of life, can students who are digital natives be exempted from the rave? This study adopted a descriptive research design of the survey type, employed a validated researcher-designed questionnaire tagged "USIToL", with a reliability co-efficient value of 0.73 to elicit responses from the respondents. The participants were 150 multistage sampled undergraduate students across two technology-dependent faculties at the University of Ilorin, Nigeria. The findings of the study revealed that as undergraduate students use smart devices, they become technostressed, and this is negatively influencing their learning with the devices. Therefore, this study recommended the need to rework how these devices can be better used to positively affect students' learning.

Keywords: *Technostress, Undergraduates, Use, Smart Devices, Stress*

INTRODUCTION

The advancement in Information and Communication Technology (ICT) has allowed every human endeavor to embrace its utilization for specific and varied purposes. Importantly, the education sector has benefited from the emergence of ICT. The flexibility and ability of ICT to cater to individual needs have encouraged educators to integrate it into instruction. Evidently, the integration of ICT into education provides greater opportunity for individualized and personalized learning (Oladosu, Adedokun-Shittu, Sanni & Ajani, 2020); facilitates higher efficiency, productivity, and educational outcomes (Anikweze & Kanu, 2018); improves the quality of cognitive, creative and innovative thinking among students (Adedokun-Shittu, Ajani, Nuhu, & Shittu, 2020); influence students' higher-order thinking skills (Polly, 2011); promotes self-paced learning, collaborative learning, and active participation in classroom (Oladosu et al., 2020); and a host of others.

Ogunlade (2015) described ICT as computer-based tools used by both teachers and students to work with the information and communication processing needs of learners, irrespective of time, place and location. In another description, Sanni, Amosa, Danmaigoro & Ajani (2017) described ICT as a means of processing and dispensing information by merging computers and telecommunication skills and procedures in order to offer predicted results with little error or faultless, firm, consistent interactivity in learning. Fundamentally, Abanikannda and Ajani (2019) posited that the most common reason for using ICT in education has been to prepare students to tackle future encounters, especially with the availability and affordability of smart mobile devices, which encourage access to educational resources irrespective of time, space and location.

LITERATURE REVIEW

Smart devices are interactive electronic gadgets that understand simple commands sent by users and help in daily activities. Kwok (2017) stated that smart devices are distinguished by their portability, processing power and mobility. They include tablets, phablets, laptops, and mobile smart phones. Owing to the ubiquitous nature of smart devices, its affordable cost of ownership, and maintenance among digital natives and migrants, its utilization for learning, especially in tertiary

education, was encouraged. Lepp, Barkley, Sanders, Rebold, & Gates, (2013) opined that the increasing digitalization of everyday routine makes it a cultural norm to use mobile smart devices in daily endeavors. This accounts for its wide visibility among tertiary education students, and its deployment for instructional purposes.

In the context of higher education in Nigeria, smart devices are being integrated and utilized by lecturers for content delivery, collaboration, communication, and assessment, while students utilize them for collaboration, connection, and communication (Abanikannda & Ajani, 2019). The advent of mobile smart devices brought about a paradigm shift in the manner in which several instructional activities are conducted, thereby creating avenues for newer approaches, concepts, and challenges. Critical among the many ICT challenges that mobile smart devices introduced is technostress.

Technostress as a concept emanated from the unhealthy use of ICT. Ahmet, Erkan, Yusuf, & Arif (2016) asserted that technostress is a disease of adaptation caused by the inability to cope with new computer technologies in a healthy manner. Other researchers such as Ragu-Nathan, Tarafdar, Ragu-Nathan, and Tu (2008) described technostress as the user experience of information and communication overload on smart technologies. El-Hussein and Conje (2010) argued that smart devices improve collaborative learning, and promote education for all. However, Jena (2015) countered that students' use of smart devices could equally promote compulsive behavior, while addiction to the use of social media on smart devices might lead to impulsive behavior. Either way, this could lead to technostress, especially among tertiary education students where the wide use of smart devices is mostly visible and deployed.

Technostress is anxiety, mental exhaustion, skepticism, and ineffectiveness caused by the inability to focus on the use of ICTs or their future use (Salanova, Cifre & Nogareda, (2007). Al-Fudail and Mellar (2008) classified the stressors of technostress as problems related to technology, problems when using technology, technical and social support problems, and lack of training at school on technology use. Maier (2012) grouped the causes of technostress into three classifications: job characteristics (this encompasses social and technological characteristics of ICT), organizational factors and personal characteristics of ICT users. In the opinion of Ayyangari, Grover and Purvis (2011), technostress can be caused by other factors, predominant of which are work overload and role definition. Technostress has been studied predominantly within organizational structures and among workers. Less emphasis has been placed on learning and students. Booker and Rebman (2014) also reported that previous research on technostress focused on the work environment, with few to no studies measuring technostress in the education environment.

Lee, Chang, Lin, and Cheng (2014) asserted that the compulsive use of smart devices among students aggregates their psychological and biological stress. Psychological technostress could result in social media overload. The researchers described a situation where a student belonged to both academic and social groups; trying to process information simultaneously from both groups could lead to cognitive overload. Physiological stress is described as the stress accrued from having to respond to messages through reading, typing and other forms of physiological stress or discomfort. These two dimensions appear to be very widespread in Nigerian universities, because virtually all lecturers create a course group where instructional resources are shared, leading to a form of both psychological and physiological technostress.

Peeraer and Van Petegem (2012) posited that students might find it difficult to cope with new applications, and that learning with those applications using a smart device may not be possible, thus resulting in stress. Ahmad and Amin (2012) indicated that the majority of librarians who use ICT to enhance their job roles experience medium levels of technostress, thereby influencing their job performance negatively. Therefore, if technostress can influence the performance of librarians, then students who use the library and library resources frequently to aid learning might be greatly influenced.

In other instances, the compulsive need to integrate ICT into instruction in order to provide 21st century viable citizens can induce technostress among the principal stakeholders in education. Longman (2013) asserted that pressure for technology integration in education, from both institution and the society, and the lack of knowledge and support could result in technostress among students and teachers.

RESEARCH QUESTIONS

This study generated three research purposes, and subsequently answered two research questions and one research hypothesis:

1. Do undergraduate students utilize smart devices for learning?
2. What is the influence of technostress on undergraduate students' learning with smart devices?
3. What is the relationship between undergraduate students' use of smart devices and the influence of technostress on their learning?

METHODOLOGY

Sample: The research was a descriptive study of the survey type. The target population comprised all undergraduate students at the University of Ilorin, Nigeria. The sample size included 150 undergraduates from two technology-dependent faculties: Faculty of Computer and Information Science (FCIS), 98; and Faculty of Engineering (FoE), 52. The data collected were analyzed using descriptive statistics of simple percentage and mean, while the hypothesis formulated was tested at 0.05 level of significance using Pearson Product Moment Correlation (PPMC).

Instrumentation: A researcher-designed questionnaire was used to elicit responses from the participants on the use of smart devices, while the influence of technostress on learning was tagged "USIToL". The draft instrument was given to three educational technology lecturers for face and content validity of the instrument. The corrected instrument was pilot tested to determine its reliability. The data collected were analyzed with Cronbach Alpha, resulting in a reliability coefficient of 0.73.

RESULTS

Demographic Information

The demographic characteristics of respondents with regard to faculty, gender, age group, and academic level are shown in Table 1 below.

Table 1: Distribution of Respondents by Gender

Faculty	Gender		Age Group				Academic Level				
	Freq.	%	Freq.	%	Freq.	%	Freq.	%			
FCIS	98	65.3	Male	87	58.0	<20	79	52.7	100	26	17.4
FoE	52	34.7	Female	63	42.0	>20	71	47.3	200	45	30.0
Total	150	100	Total	150	100	Total	150	100	300	38	25.3
									400	41	27.3
									Total	150	100

As shown in Table 1, the majority of the students are from the Faculty of Communication and Information Science, they are male, and are younger than 20 years of age. This implies that the sample size consisted of digital natives, which is appropriate for this study.

Research Question One: Do undergraduate students utilize smart devices for learning?

Table 2: Utilization of Smart Devices for Learning

S/N	Use of Smart Device	Mean	Ranking
1.	Communication	3.65	1 st
2.	Collaboration	3.17	5 th
3.	Feedback and Assessment	3.59	3 rd
4.	Learning Skills	3.61	2 nd
5.	Content Downloading and Sharing	3.19	4 th
Grand Mean		3.44	

Data collected to examine the use of smart devices among undergraduate students were analyzed using the statistical mean. A 4-point Likert scale was employed, where a benchmark of 2.5: <2.5 meant Lack of Use (Disagreed); =2.5 meant Indecision; and > 2.5 as Use (Agreed). According to the benchmark, all the items generated a response of agreed, indicating that undergraduate students were using smart devices to communicate, learn skills, generate feedback and assessment, download and share content, and collaborate with their peers. The grand mean of 3.44>2.5 implies that undergraduates utilized smart devices for their learning.

Research Question Two: What is the influence of technostress on undergraduate students' learning with smart devices?

Table 3: Influence of Technostress on Undergraduate Students Learning with Smart Devices

S/N	Items	Mean	Ranking
1.	I get forcefully engaged in my academics because of the availability of Internet and mobile device.	3.02	4 th
2.	The seat and the smart devices at the e-library are not comfortable to utilize when researching for assignment.	3.44	1 st
3.	The screen light of my device is not easily reduced to suit my vision.	3.07	3 rd
4.	Due to my subscription rate to various social networking sites, I have to be always available to respond to messages.	3.11	2 nd
5.	I seem to be largely dependent on my smart device(s).	2.89	5 th
Grand Mean		3.11	

Data collected to investigate the influence of technostress on undergraduate students' learning with smart devices were analyzed using the statistical mean, while adopting a 4-point Likert scale: a benchmark of 2.5: <2.5 was marked Not Stressed (Disagreed); =2.5 marked as Indecision; and > 2.5 as Stressed (Agreed). Consequent on the benchmark, all the items generated a response of agreed, indicating that undergraduate students claimed that they are technologically stressed, thus implying that they are technostressed. The grand mean of 3.11>2.5 implies that technostress has an influence on undergraduate students' learning with smart devices.

Research Question Three: What is the relationship between undergraduate students' use of smart devices and the influence of technostress on their learning?

To ascertain that a relationship exists between undergraduate students' use of smart devices and the influence of technostress on their learning, the research question was converted to a null hypothesis:

H₀₁: There is no significant relationship between undergraduate students' use of smart devices and the influence of technostress on learning.

Table 4: Relationship between the use of smart devices and the influence of Technostress on learning

	Technostress	Use of Smart Devices
Pearson Correlation	Technostress	.218
Sig (2-tailed)	Use of Smart Devices	.222
	Technostress	.462
	Use of Smart Devices	.007
		.000
		.003

In order to ascertain the relationship between undergraduate students' use of smart devices and the influence of technostress on their learning, a bivariate correlation of PPMC was employed. The results obtained are shown in Table 3, which indicates that there is a significant relationship between technostress and the use of smart devices for learning, with $\rho r = .222$, $p < .05$. Therefore, the hypothesis which states that there is no significant relationship between undergraduate students' use of smart devices and the influence of technostress on their learning is rejected.

DISCUSSION

Smart devices, as an affordable and readily available tool among undergraduate students, have provided a paradigm shift to how learning is approached. In spite of the popular notion that there is no best tool that can solve educational problems, the affordability and use of smart devices are breaking the bond and changing the narrative, by trying to bring many problems to an end. This study has contributed to identifying the reasons why smart devices are used among undergraduate students. Communication, learning skills, generating feedback and assessment, downloading and sharing content, and collaborating with peers are the key reasons why undergraduate students use smart devices. This finding corroborates the findings of Komala and Meena (2017), which reported that students find digital devices an important part of their being, and they use it to seek help and solve many of their daily challenges. Thus, the intense use of smart devices among undergraduate students.

The use of smart devices for learning boosts learners' motivation. This might be due to the multimedia capabilities of smart devices, which appeal to the senses of digital natives compared to digital immigrants (Connolly & Rush, 2019), which unconsciously influence the learning of undergraduate students, thereby allowing technostress to set in. In addition, the need for multiple competencies to complete specific and varied tasks could encourage technostress.

This study revealed a significant relationship between the use of smart devices and the influence of technostress on students' learning. This supports the findings of Booker and Rebman (2014), and Muhammad (2016), whose studies found a relationship between technostress and student outcomes in an online environment among aviation workers. The availability and use of different smart devices for learning activities have been identified as a key factor in this study. However, not

coping with these devices in a healthy manner have resulted in stress, especially eye discomfort from the inconveniences of reading course materials off the screen of Smart devices, as well as stress acquired through improper ergonomics. Technostress is inevitable among undergraduate students as they use many more of these smart devices. This finding is in line with the work of Ragu-Nathan, et al. (2008), who found that the surge in ICT for educational process is demanding students to constantly adapt to new applications, functionalities and workflows.

Conclusion

In line with the findings of this study, the authors concluded that smart devices, which have become a blessing to this generation, are currently being enjoyed by undergraduate students who are avid users of the technology, and who utilize them for various learning activities, which range from communication to collaboration. However, intense use of smart devices for learning has created a path to reduction in learning, which could be credited to technostress. This implies that while undergraduate students at the University of Ilorin have access to different smart devices, which they utilize in their learning, technostress is a critical factor that is influencing the learning of undergraduate students.

REFERENCES

- Abanikannda M. O., & Ajani A. H. (2019). Mobile Learning Technology for National Development: Enhancing Blended Learning among Engaged Pre-Service Teachers in Osun State. *African Research Journal of Education and Social Sciences (ARJESS Journal)*, vol. 6, no. 1, 2019. Retrieved from www.arjess.org.
- Adedokun-Shittu, N. A., Ajani, A. H., Nuhu K. M., & Shittu, A. J. K. (2020). Augmented Reality Instructional Tool in Enhancing Geography Learners' Academic Performance and Retention in Osun state, Nigeria. *Education and Information Technologies*. Pp. 1-12. <https://doi.org/10.1007/s10639-020-10099-2>
- Ahmad, U. N. Ungku and Amin M. S. (2012). The Dimensions of Technostress among Academic Librarians. *Procedia - Social and Behavioral Sciences*. 65 (2012) 266 – 271
- Ahmet, N. C., Erkan. E., Yusuf, L. S. & Arif, A. (2016). Determining the Reasons of Technostress Experienced by Teachers: A Qualitative Study *Turkish Online Journal of Qualitative Inquiry (TOJQI)* vol. 7, no. 2, pp. 71-96. DOI: 10.17569/tojq.96082
- Al-Fudail, M., & Mellar, H. (2008). Investigating teacher stress when using technology. *Computers & Education*, vol. 51, no. 3, pp. 1103-1110.
- Anikweze, C. M., & Kanu, A. C. (2018). Information and Communication Technology (ICT) and 21st Century Education in Nigeria.
- Ayyagari, R., Grover, V., & Purvis, R. (2011). Technostress: Technological antecedents and implications. *MIS Quarterly*, vol. 35, no. 4, pp. 831-858.
- Booker, Q. E., & Rebman, C. M. (2014). A model for testing techno-stress in the online education environment: An exploratory Study. *Issues in Information Systems*, vol. 15, no. 11, pp. 214-222.

- Connolly, A.J. & Rush, D. (2019). "How Emotional Self-Control Relates to IT Mindfulness and Technostress in Students". 25th Americas Conference on Information Systems, AMCIS 2019 Proceedings,
- El-Hussein, M. O. M., & Cronje, J. C. (2010). Defining Mobile Learning in the Higher Education Landscape. *Educational Technology & Society*, vol. 13, no. 3, 12–21.
- Jena, R. K. (2015). Compulsive use of smartphone and technostress: a study among Indian students. *International Journal of Applied Business and Economic Research*, vol. 13, no. 1, pp. 353-362.
- Komala, H. M., Meena, P. T. (2017). "Techno Stress- A New Bane to the students". *International Journal of Informative & Futuristic Research*, vol. 4, no. 5.
- Kwok, S. W. H. (2017). Impulsivity and Addiction Symptoms of Internet and Electronic Screen Based Device Use Among Adolescents. *EC Psychology and Psychiatry*, vol. 6, pp. 01-05.
- Lee, Y. K., Chang, C. T., Lin, Y., & Cheng, Z. H. (2014). The dark side of smartphone usage: Psychological traits, compulsive behavior and technostress. *Computers in human behavior*, vol. 31, pp. 373-383.
- Lepp, A., Barkley, J. E., Sanders, G. J., Rebold, M., & Gates, P. (2013). The relationship between cell phone use, physical and sedentary activity, and cardiorespiratory fitness in a sample of US college students. *International Journal of Behavioral Nutrition and Physical Activity*, vol. 10, no. 1, pp. 79.
- Longman, S. M. D. (2013). *A comparison of the perceptions of technostress experienced by teachers versus technology used by teachers in elementary education in a southeastern school district*. Southeastern Louisiana University.
- Maier, C., Laumer, S., von Stetten, A., Weitzel, T., Eckhardt, A., and Guhl, E. (2012), Recruiting Trends im Mittelstand 2012 - Eine empirische Untersuchung mit 1.000 Unternehmen aus dem deutschen Mittelstand, Research Report, Otto-Friedrich-Universität Bamberg und Goethe-Universität Frankfurt am Main.
- Muhammad, A. A. (2016). Techno-stress and productivity: Survey evidence from the aviation industry. *Journal of Air Transport management*. www.elsevier.com/locate/jairtraman
- Ogunlade. (2015). Information and Communication Technology in Education in M.O Yusuf & S.A Onasanya, *Critical Issues in educational technology* (pp.98-109), Nigeria, Department of Educational Technology University of Ilorin.
- Oladosu, K. K., Adedokun-Shittu, N. A., Sanni, T. A., & Ajani, A. H. (2020). Arabic Students' Perceived Usefulness and Ease of Use of ICT Resources in Universities in Kwara State. *The Festschrift in Honour of Professor AGAS, Oladosu*, vol. 1, no. 1, pp. 212-219. Department of Arts Education, University of Ilorin.
- Peeraer J, & Petegem P. V. (2012). The limits of programmed professional development on integration of information and communication technology in education. *Australasian Journal of Educational Technology*. 28(Special issue, 6), 1039-1056.

- Polly, D. (2011). Developing Students' Higher-Order Thinking Skills (HOTS) through Technology-Rich Tasks: *The Influence of Technological Pedagogical and Content Knowledge (TPACK)*. *Educational Technology*, vol. 51, no. 4, pp. 20-26.
- Ragu-Nathan, T. S., Tarafdar, M., Ragu-Nathan, B. S., & Tu, Q. (2008). The consequences of technostress for end users in organizations: Conceptual development and empirical validation. *Information systems research*, vol. 19, no. 4, pp. 417-433.
- Salanova, M., Llorens, S., Cifre, E., & Nogareda, C. (2007). *El Tecnoestrés: Concepto, Medida e Intervención Psicosocial. [Technostress: Concept, Measurement and Prevention]*. Madrid: Nota Técnica de Prevención. Instituto Nacional de Seguridad e Higiene en el Trabajo.
- Sanni, T. A., Amosa, A. A., Danmaigoro, H., & Ajani, A. H. (2017). Technology Education Students' Use of Web-Based Instruction for Learning: A Case of University of Ilorin, Nigeria. *Jamia Journal of Education*, vol. 4, no.1, pp 31-39.

Copyright for articles published in this journal is retained by the authors, with first publication rights granted to the journal. By virtue of their appearance in this open access journal, articles are free to use, with proper attribution, in educational and other non-commercial settings.