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Assessment of Awareness Level of e-Learning Classroom Strategies of University Lecturers: Implication for Evaluation of Library and Information Science Resources

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Assessment of Awareness Level of e-Learning Classroom Strategies of University Lecturers: Implication for Evaluation of Library and Information Science Resources

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Abstract

The emergence of information technology has brought a drastic change in the role of university libraries. University Libraries play key role in supporting e-learning implying that Library and information science personnel can significantly assist in the integration of information resources in the process of electronic learning. Thus, this study investigated lecturers' level of awareness of e-learning classroom strategies. Descriptive survey design was adopted for the study. The sample comprised 149 lecturers teaching integrated science courses. Instrument used for data collection was a questionnaire titled Lecturers' Awareness Level of E-learning Strategies (LALES). LALES was validated and the reliability index of the items was estimated at 0.897 using Cronbach's Alpha method. The data collected were analyzed using mean and standard deviation to answer the research questions while the hypotheses were tested using t-test. Findings revealed among others, that the lecturers were partially aware of strategies to facilitate e-learning. Based on the findings, it was recommended among others that the Nigerian government should provide e-learning facilities through proper evaluation of Library and information science resources.

Keywords: E-Learning, Integrated Science, Lecturers, Library and Information Science

Introduction

One of the professions which is full of people who are passionate about making a positive change in the world through the provision of Library services is Library and Information Science (Eze et al., 2021). According El-Shaimaa (2021), supporting education and literacy is the major role of public libraries. Public libraries carry out many essential services which include collections of necessary resources for education and leisure. These collections can be made available through electronic learning (e-learning). One of the major emerging and

promising method for teaching and learning different subjects is e-learning. Such subjects include science, technology, engineering and mathematics (STEM).

Integrated science also known as basic science in Nigeria is an all-encompassing science subject presented to learners at an early age. This subject is taught at both the primary and junior secondary school level. Students that perform very well in basic science have been reported to perform even better in core sciences including Physics and Chemistry. Integrated science lecturers in colleges of education in Nigeria are saddled with the responsibility of churning out integrated science teachers who understand the intricacies and importance of the subject. These lecturers must be prepared to carry out this responsibility to the best of their abilities even in a post COVID-19 pandemic Nigeria.

The devastating impacts of the COVID-19 pandemic have been felt in all sectors of the world including education. The lockdown that was enforced to curb the spread of the deadly virus led to the total shut down of schools. In Nigeria, students and teachers spent nearly eight months away from classrooms. The COVID-19 pandemic era revealed vulnerabilities in the Nigerian education sector especially as it concerns technology enhanced learning or e-learning. This pandemic era has shown Nigerian lecturers that the use of technology in learning and teaching is no longer an option. According to Al-Ataby (2020), using technology in teaching and learning does not refer to just providing (dumping) contents to students digitally, but to facilitate learning and deliver engaging and highly interactive experience to compensate for lack of face-to-face interaction between the students and their teachers and also amongst the students themselves. As a way to mitigate the negative impact of the pandemic, many higher education institutions have decided to completely switch to online (remote) teaching delivery and virtual or e-learning education (Daniel, 2020).

E-learning (electronic learning) comprises all forms of electronically supported learning and teaching. It can also be referred to as computer assisted learning (CAL) and as pedagogy for student-centered and co-operative learning. E-learning involves use of electronic media (the Internet, DVD, CD-ROM, Videotape, television, cell phones, etc.) for teaching and learning at a distance. E-learning requires a different skill set to be successful because it presents an entirely new learning environment for students.

E-learning could be web-based learning, ICT/computer-based learning, or virtual classrooms and content delivery is done via e-networks, audio or video tape, satellite TV, video

conferencing, CD-ROM, WhatsApp, Zoom, E-mails, wireless and mobile technology. Studies have shown that these facilities facilitate teaching and learning irrespective of time and space (Hoque & Alam, 2010; Watson, 2001). Electronic learning is even considered to be an adequate method for the training of human resources of contemporary organizations and enterprises; due to the advantages it offers (Cantoni et al, 2004 and Marinoni et al, 2020). The importance of electronic learning cannot be overemphasized yet its integration in teaching and learning process in Nigerian schools must involve more than just the technology but also the curriculum, pedagogy, institutional readiness and teacher competencies. Electronic learning has been shown to improve students' success in Science (Ugwuanyi et al., 2020a, 2020b, 2020c; Ugwuanyi et al., 2019a, 2019b, Ugwuanyi & Okeke, 2020); Mathematics (Onah et al., 2020), and Social Science courses (Ejimuonye et al., 2020a, 2020b).

Studies have shown that the availability of E-learning facilities is no longer the major concern of teachers in the developed countries, but rather, how best to integrate these facilities in teaching and learning (Tella et al, 2017). While some studies found e-learning facilities to be available (Ajegbomogun, Okunlaya & Alawiye, 2017; Obahiagbon & Osahon, 2014), others found them either not available or inadequate (Enakrire & Ocholla, 2017). Where some of these ICT facilities are available, Egberongbe (2011) and Nweze (2010) found from their respective studies that the lecturers were aware of their availability while Tella et al, 2017; Amusa & Atinmo, 2016 and Agbatogun, 2013 agree that there is a problem of lack of awareness of the availability of these facilities by the lecturers, therefore, severely under-utilized.

According to Olutola & Olatoye (2015), four obstacles affecting the total implementation of e-learning in developing countries are connectivity, equipment, software and training. Where the facilities are available, the lecturers may have poor internet connectivity, lack of technical know-how and find it difficult to build or create software for their courses. The use of e-learning facilities is no longer an option in Nigerian schools especially the tertiary institutions. Incorporating e-learning and face to face components into teaching and learning in a post pandemic era should be the best way to enforce social distancing measures while delivering curriculum content. Although many tertiary institutions in Nigeria are still struggling to integrate e-learning into teaching and learning, the few schools that have the ability and resources to use these strategies, are not doing so. It is in view of this that this study investigated lecturers' level of awareness of e-learning classroom strategies in post COVID-19 pandemic Nigeria.

The purpose of this study was to examine integrated science lecturers' level of awareness of e-learning classroom strategies in post COVID-19 pandemic Nigeria. Specifically, the study sought to determine:

- i. the integrated science lecturers' awareness level of the available e-learning facilities.
- ii. the strategies used by integrated science lecturers to facilitate e-learning in a post COVID-19 pandemic Nigeria.
- iii. the constraints to the use of e-learning facilities in a post COVID-19 pandemic Nigeria.

The following research questions guided the study

1. What is the level of integrated science lecturers' awareness of available e-learning facilities in a post COVID-19 pandemic Nigeria?
2. What are the strategies used by integrated science lecturers to facilitate e-learning in a post COVID-19 pandemic Nigeria?
3. What are the constraints to the use of e-learning facilities in a post COVID-19 pandemic Nigeria?

Method

The study was a descriptive survey research design. A descriptive survey research design is one which is aimed at collecting data and describing systematically the characteristics, features or facts about a given population. The population comprised all lecturers teaching integrated science courses in two colleges of education and two universities in Nigeria. The four tertiary institutions were purposively sampled because they offer integrated science education. The sample comprised 149 lecturers (50 males and 99 females) teaching integrated science courses.

The instrument for data collection was a 31-item questionnaire developed by the researchers and tagged "Lecturers' Awareness Level of E-learning Strategies (LALES)". LALES was in two sections, sections A and B. Section A sought information on the gender of the respondents' while section B sought information on the research questions.

The items on awareness of e-learning facilities and strategies to facilitate e-learning in a post COVID-19 pandemic Nigeria were structured on a four point Likert's scale of: Very Much Aware (VMA) – 4 points; Partially Aware (PA) – 3 points, Not aware (NA) – 2 points; Very Much Not Aware (VMNA) – 1 point while items on constraints to the use of e-learning facilities in a post COVID-19 pandemic Nigeria were structured on a four point Likert's scale of: Strongly Agree (SA) – 4 points, Agree (A) – 3 point, Disagree (D) – 2 points, Strongly Disagree (SD) – 1 point. The instrument was face and content validated by experts in test

development. The comments and suggestions of these experts were incorporated into the final draft of the instrument.

The instrument was trial tested on 30 integrated science lecturers drawn from schools not involved in the study. The result was used to compute the internal consistency of the instrument using Cronbach’s Alpha technique. A reliability of 0.827 was established and this shows that the instrument is reliable and adequate for the study.

The researchers sent the questionnaires electronically to the respondents who completed and returned them to the researchers through the same mode. This was to minimize physical contacts between the researchers and respondents in line with the COVID-19 prevention protocol in Nigeria. Data collected were analyzed using mean and standard deviation to answer the research questions while the hypotheses were tested using t-test at 0.05 level of significance. Real limits were used for the interpretation of the research questions thus: 1.00-1.49 Very Much Not Aware (VMNA), 1.50-2.49 Not Aware (NA), 2.50 – 3.49 Partially Aware (PA) and 3.50 – 4.00 Very much aware (VMA).

Results

Research Question One: What is the level of integrated science lecturers’ awareness of available e-learning facilities in a post COVID-19 pandemic Nigeria?

Table 1: Mean analysis of the Integrated science lecturers’ level of awareness of available e-learning facilities in a post COVID-19 pandemic Nigeria

S/No	E-learning facilities	Mean	SD	Decision
1	Internet messenger tools (e.g Email, Gmail)	1.66	0.47	NA
2	Computer/iPad/Tablet	4.00	0.00	VMA
3	Google suite (e.g Google forms, Google slides, etc)	3.60	0.64	VMA
4	Microsoft Office suite (e.g Ms Word, PowerPoint, Excel, etc)	3.26	0.74	PA
5	Computer Simulations/Animations	3.51	0.64	VMA
6	Statistical packages e.g SPSS	3.09	0.81	PA
7	Graphic packages e.g CorelDraw, etc	2.98	0.83	PA
8	WhatsApp/Facebook/Telegram, etc	3.13	0.79	PA

9	Internet search engines e.g google, kiddle, etc	3.77	0.50	VMA
10	Video chat/ video conference apps e.g Zoom, Skype	3.56	0.67	VMA
11	Interactive boards/ Star boards, etc	3.68	0.52	VMA
Cluster mean		3.29	3.31	PA

Key: Very Much Not Aware (VMNA) 1.00-1.49, Not Aware (NA) 1.50-2.49, Partially Aware (PA) 2.50 – 3.49, and Very much aware (VMA) 3.50 – 4.00

Table 1 showed the level of integrated science lecturers' awareness on the available e-learning facilities. Items 2, 3, 5, 9, 10, and 11 had mean ratings within the range of 3.50 – 4.00 (VMA). This means that the lecturers are very much aware of the availability of those items. Items 4, 6, 7 and 8 had mean ratings within the range of 2.50-3.49 (PA) which means that the lecturers are partially aware of the availability of these facilities. Item 1 had mean rating within the range of 1.50-2.49 (NA) which means that the lecturers are not aware of the availability of that facility. The items had a cluster mean of 3.29 which falls under the mean rating of Partially Aware.

Research Question Two: What are the strategies used by integrated science lecturers to facilitate e-learning in a post COVID-19 pandemic Nigeria?

Table 2: Mean analysis off the strategies used by integrated science lecturers to facilitate e-learning

S/No	E-learning facilities	Mean	SD	Decision
1	Internet messenger tools (e.g Email, Gmail)	3.59	0.59	VMA
2	Computer/iPad/Tablet	3.60	0.60	VMA
3	Google suite (e.g Google forms, Google slides, etc)	3.26	0.80	PA
4	Microsoft Office suite (e.g Ms Word, PowerPoint, Excel, etc)	3.52	0.61	VMA
5	Computer Simulations/Animations	3.17	0.81	PA
6	Statistical packages e.g SPSS	2.93	0.86	PA
7	Graphic packages e.g CorelDraw, etc	3.13	0.83	PA
8	WhatsApp/Facebook/Telegram, etc	3.71	0.51	VMA

9	Internet search engines e.g google, kiddle, etc	3.52	0.62	VMA
10	Video chat/ video conference apps e.g Zoom, Skype	3.64	0.53	VMA
11	Interactive boards/ Star boards, etc	3.09	0.81	PA
Cluster mean		3.38	1.69	PA

Key: Very Much Not Aware (VMNA) 1.00-1.49, Not Aware (NA) 1.50-2.49, Partially Aware (PA) 2.50 – 3.49, and Very much aware (VMA) 3.50 – 4.00

Table 2 showed the strategies used by integrated science lecturers to facilitate e-learning in a Post COVID-19 pandemic Nigeria. Items 1, 2, 4, 8, 9 and 10 had mean ratings within the range of 3.50 – 4.00 (VMA). This means that the lecturers are very much aware of these items as strategies to facilitate e-learning in Nigeria. Items 3, 5, 6, 7 and 11 had mean ratings within the range of 2.50-3.49 (PA) which means that the lecturers are partially aware of these items as strategies to facilitate e-learning in Nigeria. The items had a cluster mean of 3.38 which falls under the mean rating of Partially Aware (PA).

Research Question Three: What are the constraints to the use of e-learning facilities in a post COVID-19 pandemic Nigeria?

Table 3: Mean analysis of the Integrated science lecturers' responses to the constraints to the use of e-learning facilities in a post COVID-19 pandemic Nigeria

S/No	E-learning facilities	Mean	SD	Decision
1	Lack of adequate infrastructure	3.58	0.64	SA
2	Insufficient funds for internet data subscription	3.56	0.70	SA
3	Limited/unsteady internet access is a constraint to the use of E-learning facilities	3.59	0.59	SA
4	My students are not comfortable with E-learning	2.39	0.82	D
5	Poor/inconsistent power supply is a constraint on the use of E-learning facilities	3.69	0.52	SA
6	I find it difficult to operate E-learning facilities	2.23	0.87	D
7	Some curriculum contents cannot be delivered effectively using E-learning facilities	2.77	0.86	A

8	I prefer the traditional lecture/ chalk & board method	2.25	0.84	D
9	Most of my students are not internet savvy	2.77	0.74	A
	Cluster Mean	3.66	1.83	SA

Key: Strongly Disagree (SD) 1.00-1.49, Disagree (D) 1.50-2.49, Agree (A) 2.50 – 3.49, and Strongly Agree (SA) 3.50 – 4.00

Table 3 showed the responses of integrated science lecturers on the constraints to the use of e-learning facilities in a post COVID-19 pandemic Nigeria. Items 1, 2, 3 and 5 had mean ratings within the range of 3.50 – 4.00 (SA). This means that the lecturers strongly agree that those items act as constraints to the use of e-learning facilities in a post COVID-19 pandemic Nigeria. Items 7 and 9 had mean ratings within the range of 2.50-3.49 (A) which means that the lecturers agree that the items are constraining factors to the use of e-learning facilities in post COVID-19 pandemic Nigeria. Items 4, 6 and 8 had mean rating within the range of 1.50-2.49 (D) which means that the lecturers disagree with the items as constraints to the use of e-learning facilities in a post COVID-19 pandemic Nigeria. The items had a cluster mean of 3.66 which falls under the mean rating of Strongly Agree.

Discussion

Level of integrated science lecturers' awareness of available e-learning facilities

Table 1 showed that the integrated science lecturers used for the study are very much aware of the availability of Computers/iPad/Tablet, Google suite, Internet search engines e.g google, Video chat/ video conference apps e.g Zoom, and Interactive boards/ Star boards; partially aware of the availability of Microsoft Office suite, Statistical packages, Graphic packages, WhatsApp/Facebook/Telegram; and are not aware of the availability of Internet messenger tools (e.g Email, Gmail) as e-learning facilities in a post COVID-19 pandemic Nigeria. These e-learning facilities are the norm in developed countries especially in this 21st century. It is rather surprising that these lecturers are mostly partially aware of their availability for teaching in a post COVID-19 era.

This result agrees with the findings of Tella et al. (2017); Amusa and Atinmo (2016) and Agbatogun (2013) who found from their respective studies that there is a problem of lack of awareness of the availability of these facilities by the lecturers but disagrees with the findings of Egberongbe (2011) and Nweze (2010) who found from their respective studies that the lecturers were aware of the availability of these e-learning facilities.

Strategies used by integrated science lecturers to facilitate e-learning

Results in Table 2 showed that the lecturers are very much aware of Internet messenger tools, Computer/iPad/Tablet, Microsoft Office suite, WhatsApp/Facebook/Telegram as strategies to facilitate e-learning in a post COVID-19 pandemic Nigeria. The lecturers are partially aware of Google suite, Computer Simulations/Animations, Statistical packages, Graphic packages, and Interactive boards/ Star boards as strategies to facilitate e-learning in a post COVID-19 pandemic Nigeria. The cluster mean shows that the lecturers are mostly partially aware of these facilities as strategies to facilitate e-learning in a post COVID-19 pandemic Nigeria.

Constraints to the use of e-learning facilities

Results in Table 3 showed that the lecturers strongly agree that lack of adequate infrastructure, insufficient funds for internet data subscription, limited/unsteady internet access, poor/inconsistent power supply are constraints to the use of e-learning facilities. The lecturers agree that some curriculum contents cannot be delivered effectively using e-learning facilities and that most of their students are not internet savvy. These they agree are constraints to the use of e-learning facilities in a post COVID-19 pandemic Nigeria.

They however disagree that their students are not comfortable with e-learning, they find it difficult to operate e-learning facilities and that they prefer the traditional lecture/ chalk & board method. The cluster mean shows that most of the lecturers strongly agree with the items as constraints to the use of e-learning facilities in post COVID-19 pandemic Nigeria. These results agree with that of Olutola and Olatoye (2015) who discovered from their study that there were constraints to the use of e-learning facilities in Nigerian universities.

Implication for Evaluation of Library and Information Science Resources

The findings of this study implicate evaluation of library and information science resources in that the effective evaluation of teaching and learning of library and information science is largely dependent on the use of e-learning. The emergence of information technology tools affected the role of university libraries. Thus, university libraries play supporting role in e-learning and the development of virtual university libraries. Library and information science personnel contribute significantly to the integration of information resources through the process of electronic learning. Therefore, e-learning provides new services and resources thereby enhancing the role of the information centre within the organization, and career development of library and information professionals.

Conclusion and recommendations

This study investigated integrated science lecturers' awareness of strategies to facilitate e-learning in a post COVID-19 pandemic Nigeria: implications for Chemistry and Mathematics lecturers. Findings from this study show that generally, the integrated science lecturers at the four tertiary institutions used for this research, are partially aware of available e-learning facilities and strategies to facilitate e-learning in a post COVID-19 pandemic Nigeria. These lecturers strongly agree with most of the items listed as constraints to the use of e-learning facilities in a post COVID-19 pandemic Nigeria.

It is recommended therefore that government and school administrators should provide facilities in Nigerian tertiary institutions to improve e-learning in this post pandemic era. Trainings should be organized and conducted for lecturers so as to keep them abreast with the workings of e-learning facilities. Proper infrastructure like adequate internet connection and power supply should be provided for lecturers.

It has been deduced from this study that Nigeria as a country is lagging behind in the use of e-learning strategies for teaching and learning. This has continued to hinder effective content delivery especially in a post covid-19 pandemic era. This study is significant in the sense that it will go a long way in showing the Nigeria lecturers their lapses. This study will lead to a significant improvement in the use of e-learning strategies by lecturers in Nigeria since it has shown elaborately that they do not know that some of these facilities are available and that they must use these facilities to effectively deliver their lessons amidst the pandemic-induced restrictions.

School administrators in tertiary institutions must develop ways to ascertain the level of awareness of these lecturers in the usage of these facilities where they are available. This is because without proper awareness, these available facilities will be under-utilized. When these facilities are available, there must be measures put in place to enforce their utilization by the lecturers. Further studies should be conducted on chemistry and mathematics lecturers to ascertain their level of awareness of these e-learning facilities and find out if they are utilized especially in this post COVID-19 era as most of these facilities help to enforce social distancing measures and curb the spread of the deadly corona virus.

References

- Agbatogun, A.O. (2013). Interactive digital technologies' use in Southwest Nigerian universities. *Education Technology Research and Development* 61, 333–357. <https://doi.org/10.1007/s11423-012-9282-1>
- Ajebomogun, F.O., Okunlaya, R.O.A. & Alawiye, M.K. (2017). Analytical study of E-learning resources in National Open University of Nigeria. *Education and Information Technologies*, 22, 2403–2415. <https://doi.org/10.1007/s10639-016-9548-z>
- Al-Ataby, A. (2020). Technology-Enhanced Learning and Teaching in COVID-19 Era: Challenges and Recommendations. *International Journal for Innovation Education and Research*, 8(10), 317–331. <https://doi.org/10.31686/ijer.vol8.iss10.2684>
- Amusa, O., & Atinmo, M. (2016). Availability, Level of use and Constraints to use of Electronic Resources by Law Lecturers in Public Universities in Nigeria. *JLIS.it*, 7(3), 139-172. doi:<http://dx.doi.org/10.4403/jlis.it-11955>
- Cantoni, V., Cellario, M. & Porta, M. (2004). Perspectives and challenges in e-learning: towards natural interaction paradigms. *Journal of Visual Languages & Computing*, 15 (5), 333-345. Retrieved from <https://doi.org/10.1016/j.jvlc.2003.10.002>
- Daniel, S.J. (2020). Education and the COVID-19 pandemic. *Prospects*, 49, 91-96. <https://link.springer.com/article/10.1007%2Fs11125-020-09464-3>
- Egberongbe, H. S. (2011). The Use and Impact of Electronic Resources at the University of Lagos. *Library Philosophy and Practice (e-journal)*. 472. <https://digitalcommons.unl.edu/libphilprac/472>
- Ejimonye, J.C., Onuoha, J.C., Ugwuanyi, C.S., Eneogu, N.D., Ugwuanyi, B.E & Ogbuehu, S.N (2020a). Effectiveness of Two-Dimensional Animation Technique in Enhancing Students' Motivation in Quantitative Economics Concepts. *International Journal of Future Generation Communication and Networking (IJFGCN)*, 13(1),27-38.
- Ejimonye, J.C., Ugwuanyi, C.S., Okeke, C.I.O., & Nwoye, M.N. (2020b). Two-Dimensional Animation and Students' Achievement in Mathematical Economics: Implications for Science Teaching. *International Journal of Engineering Research and Technology*, 13(6), 1220-1230
- El-Shaimaa, T.A. (2021). Public libraries' role in supporting e-learning and spreading lifelong education: a case study. *Journal of Research in Innovative Teaching & Learning*, 14(2), 178-217. DOI 10.1108/JRIT-06-2019-0063

- Enakrire, R., & Ocholla, D. (2017). Information and communication technologies for knowledge management in academic libraries in Nigeria and South Africa. *SA Journal of Information Management*, 19(1). doi:<https://doi.org/10.4102/sajim.v19i1.750>
- Eze, K.O., Offorma, G.C., Ugwuanyi, C.S. & Okeke, C.I.O. (2021). Pre-Reading Activities and Students' Achievement in French Oracy: Implication for Evaluation in Library and Information Science. *Library Philosophy and Practice (e-journal)*. 5952. <https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=11426&context=libphilprac>
- Hoque, S.S. & Alam, S. M. (2010). The Role of Information and Communication Technologies (ICTs) in Delivering Higher Education – A Case of Bangladesh. *International Education Studies*, 3(2), 97-106. DOI:[10.5539/ies.v3n2p97](https://doi.org/10.5539/ies.v3n2p97)
- Marinoni, G., Land, H., & Jensen, T. (2020). *The Impact of COVID-19 on Higher Education around the World*. IAU Global Survey Report, International Association of Universities, 2020. Retrieved from <https://www.iau-aiu.net/COVID-19-Higher-Education-challenges-and-responses>
- Nweze, Chinwe M.T. (2010). The Use of ICT in Nigerian Universities: A Case Study of Obafemi Awolowo University, Ile-Ife. *Library Philosophy and Practice (e-journal)*, 494. <https://digitalcommons.unl.edu/libphilprac/494>
- Obahiagbon, K. & Otabor J.O. (2014). Information and Communication Technology (ICT) Key Tool for Enhancing Teaching and Learning in Nigeria: A Study of Two Tertiary Institutions in Benin Metropolis. *American Journal of Educational Research* (2)12, 1257-1259 DOI: [10.12691/education-2-12-20](https://doi.org/10.12691/education-2-12-20)
- Olutola, A. T. & Olatoye, O. O (2015). Challenges of E-Learning Technologies in Nigerian University Education. *Journal of Educational and Social Research*, 1(5), 1. Retrieved from <<https://www.mcser.org/journal/index.php/jesr/article/view/5623>>
- Onah, E.N., Ugwuanyi, C.S., Okeke, C.I.O., Nworgu, B.G., Agwagah, U.V.N., Ugwuanyi, C.C., Obe, P.I., Nwoye, M. N., & Okeke, A.O. (2020). Evaluation of the Impact of Computer-Assisted Instruction on Mathematics and Physics Students' Achievement: Implication for Industrial Technical Education. *International Journal of Engineering Research and Technology*, 13(7): 1786-1794. http://irphouse.com/ijert20/ijertv13n7_35.pdf.
- Tella, A., Orim, F., Ibrahim, D.M. & Memudu S.D. (2018). The use of electronic resources by academic staff at The University of Ilorin, Nigeria. *Education and Information Technologies* 23, 9–27. <https://doi.org/10.1007/s10639-017-9577-2>
- Ugwuanyi, C.S., Nduji, C.C., Gana, C.S., Nwajiuba, C.A., Ene, C.U., Okeke, A.O., Eseadi, C., Okeke, C.F. (2019b). Effectiveness of flipped classroom instructional technology model in enhancing students' achievement in physics. *International Journal of u- and e- Service, Science and Technology*, 12(4): 37-46.
- Ugwuanyi, C. S., Okeke, C. I. O., Nnamani, P. A., Obochi, E. C. & Obasi, C. C. (2020a). Relative effect of animated and non-animated powerpoint presentations on physics

- students' achievement. *Cypriot Journal of Educational Science*. 15(2), 282–291. <https://doi.org/10.18844/cjes.v15i2.4647>
- Ugwuanyi, C.S., Nduji, C.C., Elejere, U.C., & Omeke, N.E. (2020b). Effect of flipped classroom and think pair share strategy on achievement and retention among senior secondary school Physics students. *International Journal of Sciences: Basic and Applied Research (IJSBAR)*, 52(2), 136-148. <https://www.gssrr.org/index.php/JournalOfBasicAndApplied/article/view/11250/5681>
- Ugwuanyi, C.S., & Okeke, C.I.O.(2020). Enhancing university students ' achievement in physics using computer-assisted instruction. *International Journal of Higher Education* 9(5), 115–124. <https://doi.org/10.5430/ijhe.v9n5p115>
- Ugwuanyi, C.S., Okenyi, E.C., Ezema, V., & Amoke, C. (2020c). Effect of digital game-based learning on achievement of primary school pupils in sciences in Enugu State, Nigeria *.Journal of Educational Research on Children, Parents & Teachers*, 1(1), 35-44.
- Ugwuanyi, C.S., Ugwuanyi, C.C., Ezenwa-Nebife, D.C., Gana, C., Ene, C., Oguguo, B.C., Ikeh, F.E., Okeke, A.O., Nwoye, M.N., Obi, C.N., Anyaegbu, C. & Agah, J.J. (2019b). Assessment of the efficacy of information and communication technology tool on achievement of students in physics and mathematics: A case of repeated measures. *Journal of Engineering and Applied Sciences*,14(13), 4541-4546.
- Watson, D.M. (2001). Pedagogy before Technology: Re-thinking the Relationship between ICT and Teaching. *Education and Information Technologies* 6, 251–266. <https://doi.org/10.1023/A:1012976702296>