Prospects and Perceived Challenges of Information Communication Technology Curricula Implementation in Smart Green Schools in Enugu Educational Zone, Enugu, Nigeria

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Abstract: This descriptive survey research was conducted in the Enugu Educational Zone, Enugu State, to explore the perceived prospects and challenges associated with implementing the Information and Communication Technology (ICT) curriculum in the Smart Green School Initiative. The study employed a multi-stage sampling method. Initially, five primary and five junior secondary schools were randomly selected from each of the Enugu North, Enugu East, and Isi Uzo Local Government Areas (LGAs), resulting in a total of 15 primary and 15 junior secondary schools. In the second stage, stratified sampling was used to select Primary Six and Junior Secondary Three (JSS3) classes from these schools. Finally, three pupils, three students, and three teachers were randomly chosen from each selected class, leading to a total of 180 respondents across the three LGAs. Data were analyzed using descriptive statistics, particularly percentages. Key challenges identified include the high cost of ICT facilities, inadequate infrastructure, and insufficient electricity supply. However, the prospects are promising, with benefits such as the effective use of artificial intelligence (AI) in teaching and learning, enhanced classroom activities, increased collaborative work, improved motivation for both learners and teachers and the promotion of critical and creative thinking. The study concludes that while there are significant challenges, the potential benefits of ICT curriculum implementation in the proposed Smart Green School Initiative are substantial. Recommendations include strengthening ICT programs, installing supportive power supplies like solar panels, and training staff and students to ensure effective ICT curriculum implementation.
Keywords: Smart green school initiative, ICT curriculum implementation, prospects, challenges, intervening factors

Introduction

Green smart schools are centres of innovation, equipped with a cutting-edge computer and internet gadgets to enhance a total learning experience and outcomes. These schools are equipped with alternative solar power energy, internet connectivity, medical care, 1,000,000 litres of underground water storage accessories, integrated smart farms for practical, robs, artificial intelligence laboratories, modern information communication technology (ICT) facilities, adequately equipped science laboratories for both primary and junior secondary schools. There are also hybrid multimedia libraries, technology laboratories, studios for creative innovation, inclusive classrooms

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for students with special needs or physically impaired, classroom interactive digital whiteboards, and about 700 Android tablets among others (Enugu State, 2024).

Empirical studies on post COVID -19 pandemic have shown that covid-19 crisis had left an indelible mark on education sector particularly on the teachers ranging from pre-nursery through pre-primary to tertiary levels(Deepanjah and Adesh,2022). Another study by National Research Council according to Olelewe and Amaka (2012), investigated the influence of innovative and sustainable school classrooms designs on middle years schooling in Victoria Island. The studies aimed at understanding the links between design, sustainability, pedagogy and use of ICT within innovative 21st century learning spaces.

The studies found out that the drivers of spatial change were by development of very close intimacy between designers, educators and students –users during the designing and occupation of learning periods, and teachers wishing to implement new pedagogies requiring a multiples of spatial setting(eg: inquiry learning, problem based learning). This is vital in curriculum being planned and taught by multi- disciplinary teams of instructors /facilitators who desired agile and flexible learning spaces. The study by George and Udeme(2017), also agreed on its critical use in ubiquitous learning ie learners becoming more self –directed, collaborative and resilient across a variety of settings. Its use by teachers and students who were technologically literate and therefore, able to use space in variety of ways to good pedagogical effect have also been reported.

Teacher Education, Information and communication (TEIC, 2013) noted that there are many challenges in using ICT in educational process in Nigeria. These include poor infrastructure, poorly trained manpower, irregular internet connectivity, and lack of adequate funding, expensive ICT hard and software, poor maintenance culture among others. UNESCO (2022), stated that to address various educational impediments, the global education coalition should established a new prototype of international cooperation that will produce innovative response to reduce the crisis in educational sector. This assertion was confirmed by Katyeudo, Oliverlral and Souza (2022) and can be engaged effectively by technology, human beings, organizational bodies and teachers in due process. Offorma (2016), opined that ICT curricular are those technologies that are currently in use to interlink information technology devices such as personal computers with communication technologies such as telephones and their telecommunication networks. The characteristics of new technologies offer the esteemed possibilities of developing new ways of teaching and learning, transforming the traditional educational model.

Application and Gratification theory proposes that people use the media in order to achieve some benefits. Adi (2010), noted that audience use of the media stem from their attainment through the tools of such gratifications like socialisation, education/research, information and entertainment. Abdulraheem and Adebowale (2021) further stated that as active listeners, viewers and readers, media audience filter avalanche of available media products and select ones gratifying to and in tune with their aspirations. The theory suites this study with its position that media users here represented by pupils, students, and their teachers choose to use those media organs from where they would derive the desired benefits, including professional knowledge and experience, social interaction, and being abreast with daily global developments.

Given the imperatives to make the Enugu state green smart curriculum a conscious concept in every child that passes through the school system in the state to acquire the necessary skills to adapt technology-driven concepts and environment, each school was ear-marked for an e-learning laboratory in the 260 political wards in the State. It is planned for each laboratory to be fully equipped with computers and internet facilities and every teacher in the state is provided with a laptop. To keep them functional, efforts will be made to imbue the teachers with the

appropriate skills so that they can teach the students. Katyeudo, Oliverlral, and Souza (2022) agreed that the older the teacher, the lesser their competence in integrating ICT curriculum in teaching. More worrisome is that despite much enthusiasm about the roles of ICT in the teaching and learning process, many teachers are turning away from ICT curriculum usage in teaching, after the early attempts met with mitigated success (Abdulraheem & Adebowale, 2021).

Statement of the Problem

Enugu state schools' Information Communication Technology (ICT) related curricular performance level was rated 28 percent in 2018 (UNICEF, 2019). United Nations' Education, Scientific and Cultural Organization (UNESCO, 2020) stated that in 2019 due to COVID 19, at all school levels the percentage poor performance in ICT curricular of schools in the state rose to an all high index of 48 percent, and the UNICEF (2022) also reported an index of 48 % poor ICT curriculum implementation across Enugu state upper and lower basic schools. There was therefore, an identified low ICT curricular implementation in both our primary and junior secondary schools across the Enugu state schools. There are observed problems in the use of educational communication technology for teaching. The difficulties come as the teachers design the curriculum using more complex approaches and design the experience for students in classroom, especially when they need to adjust ICT in the curriculum and the classroom practice.

Presently the traditional teaching transmitted from teacher to student is losing relevance as a consequence of the digital transformation of education process. Adi (2010), stated that a research carried out by Annenberg Centre for the Digital Future, indicated that these digital technologies are more at home with the younger generation of users of 18 to 34 years of age than others above. This is the age of studentship, age of inquisitiveness and age of adventurism. This age rage has fallen within the lower and upper basic schools of the six years in primary and first three years in secondary schools of Enugu state.

The adoption of green smart schools initiative in primary and junior secondary school by Enugu state Government ,in a holistic manner will greatly change conventional teaching and learning practices in Enugu state. The whole idea and essence is to ensure that a child that passes through primary and secondary school in Enugu State , Nigeria have acquired basic computer skills via the curricular (MOE ,Enugu, 2023).

Research Objectives

The major objective of this study was to determine the prospects and challenges of use of information communication technology(ICT) in curricular implementation of Enugu State Smart Green School Initiative in Enugu Educational Zone. Specifically, this study sought to ;

i). Determine the factors that influence the use of ICT in teaching and learning process.

ii). examine the perceived challenges facing the use of ICT in curricular implementation of Enugu Smart Green School Initiative in Enugu Education Zone.

iii). find out the prospects or benefits of use of ICT in curricular implementation of Enugu Smart Green School Initiative in Enugu Education Zone.

Research Questions

i. What are the factors that influence the use of ICT curricular in teaching and learning process?

ii. What are the perceived challenges facing the use of ICT in curricular implementation of Enugu Smart Green School Initiative in Enugu Education Zone.?

iii. What are the prospects or benefits of use of ICT in curricular implementation of Enugu Smart Green School Initiative in Enugu Education Zone.

Methodology

A descriptive survey research design was adopted for the study. A simple random sampling (SRS)technique was used to select fifteen (15) primary and fifteen(15)junior secondary schools in each of the three(3) local education council areas in the Enugu Education Zone of Enugu State Nigeria. The total number of schools at both primary and junior secondary schools are (30) thirty in number. These Local Government Areas include; Enugu East, Enugu North and Isi Uzo local education authorities.

Multi-stage sampling (MSS) method was employed in the study. In the first stage, five (5) primary and five (5) junior secondary schools were selected in each of Enugu North, Enugu East and Isi uzo LGAs by use of simple random sampling method. This process was repeated for primary schools in the three council areas. This gave rise to fifteen (15) primary and fifteen (15) junior secondary schools. In second stage, stratified sampling method was adopted to select primary six and junior secondary three (JSS3) from each of the schools selected.

The schools include: 1. National Grammer School, Nike; 2. Annunciation Secondary Sch. Nkwo Nike; 3.St. Patrick Sec. Sch. Emene; 4. Girls Sec. Sch. Abakpa Nike; 5. Godfrey Okoye Sec. Sch. Thinkers' Corner, Enugu; 6. . Godfrey Okoye Primary Sch. Thinkers' Corner,;7. Community Primary Sch. Amorji Nike; 8. Community Primary Sch. Umuchigbo Nike; 9. Housing Estate Primary Sch. Abakpa 1; 10. St. Pauls Primary Sch. Amokpo Nike in Enugu East ; 11. City Girls Sec. Sch. Enugu; 12. Day Sec. Sch. Independence Layout Enugu; 13. Government Technical College Enugu; 14. Community Sec, Sch. Iva-valley Enugu; 15.New Haven Sec. Sch. Enugu; 16. Obiagu Primary Sch. Ogui New Layout, Enugu; 17. Ogbete Primary Sch. Coal Camp Enugu.; 18. Iva valley Primary Sch. Enugu; 19. Market Road Primary Sch. Ogbete Enugu; 20. St.Bridget Primary Sch. Asata Enugu in Enugu North; 21. Ehaohuala Community Sec. Sch. 22. Community Sec. Sch. Mbu; 23. Ikem Isioroto Community Sec. Sch.; 24. St. John's Sec. Sch. Agumede; 25. Union Sec. Sch. Eha Amufu ; 26. Abor Community Primary Sch.; 27. Agumede Community Primary Sch.; 28. Mbu Amon Community Primary Sch.; 29. Neke Community Primary Sch. ; and 30. Eha Township Primary Sch. In Isi Uzo council areas respectively.

Thirdly, (3) pupils and three (3) students were selected by simple random sampling in the respective schools with three(3) teachers at primary six and junior secondary JSS 3 schools. Thus, a sub total of sixty (60) respondents was selected in each council area education authority and a total of 180 respondents. The total of one hundred and eighty (180) respondents served as the sample size out of about grand total of 18,700 pupils and students with 109 teachers target population in the sampled schools in the zone. These 180 sample size responded to structured questionnaire on the research objectives on the proposed green smart schools in the state.

Structured questionnaires were used in primary data collection and secondary data were sourced from literature review. The questionnaire was face-validated by two experts in science education and one specialist in measurement and evaluation to get a high reliability of 79.8 coefficient. To ensure adequate interpretation, distribution, and collection of questionnaire tools, two research assistants were recruited from each local government. They were trained and given rudiments on the essence of the survey. This yielded high results with a recovery of 178 questionnaires out of 180 given out to respondents. The data collected were analysed by descriptive statistics such as simple percentages and ranking.

Result and Discussion

The results and discussion are presented in accordance with both the research objectives and questions in the following tables:

Table 1

Determinant factors in use of ICT curricular in the study area.

S/NO .	Determinant factors	Respondents(no)	Respondents(%)	Ranking
1.	Network speed for up/down load files	150	82.2	9th
2.	Ease of availability of ICT tools	160	88.5	6th
3.	Technical expertise of teachers	158	86.9	8th
4.	Data/internet source availability	169	92.4	5th
5.	Technical support from LGAs.	140	77.0	10th
6.	Pupils/students ICT ability	170	93.5	4th
7.	Educational software accessibility	160	88 .0	7th
8.	Available power/electricity or solar power	176	96.8	2nd
9.	Adequacy of ICT Infrastructures	172	94.5	3rd
10.	Government interest in ICT application in our primary and junior secondary schools	178	97.9	1st

The data results of the study in table 1 have revealed the following findings on the determinants factors for the use of ICT in educational process . First is government interest in ICT curricular application junior primary and junior secondary schools with positive response of 97.9 percent of the respondents. This was seconded by availability of power, either electricity or solar supply with 96.8 percent of the respondents. Third in the ranking was the availability adequacy of ICT infrastructures soft wares and accessories (94.6%). The fourth was pupils' /students' and teachers' ICT ability(93.5%). The fifth ranked on determinants of ICT usage was data/internet source availability(92.9%).

Other intervening factors were ease of supply of ICT tools with 88.8 percent and accessibility of education soft wares (88.0%). The next was the technical expertise of the teachers(86.9%) to rank 8th position. The ninth in ranking was network speed for up/download (82.5%) while the local government area technical support at 77.0 percent had the least effect in determinant of ICT usage. These findings were in agreement with the earlier study on determinants of use of ICT curricular in educational process.

Results of table 2 indicated that the highest perceived challenge was inadequate connectivity (97.9%) or 178 respondents that ranked first among others. This was followed by low government interest in ICT development and poor funding for ICT tools acquisition(96.8%) respectively. The next in fourth position was inadequate functional ICT in the local government areas (96.25%). The fifth was irregular electricity supply which was concurred by 95.7 percent of the respondents. The sixth constraint identified by data was poor rural and urban infrastructures (94.6%) and the seventh was very high cost of ICT facilities (93.5%).

However, other impending variables were low trained manpower in ICT operations(90.2%)., inaccessibility to relevant software installation and use (85.0%). Others include lukewarm attitudes of the teachers to be ICT literate(81.4%) and very low awareness of the application of ICT in teaching in our schools with 71.5 percent positive response.

Table 2

Perceived challenges of ICT use in curricular implementation of Enugu State Smart Green School Initiative in Enugu Educational Zone.

S/NO	Perceived Challenging factors	Respondents(no)	Respondents(%)	Ranking
1.	High cost of ICT facilities	170	93.5	7th
2.	Poor rural /urban infrastructures	172	94.6	6th
3.	Inadequate electricity/solar power supply	174	95.7	5th
4.	Low trained in ICT operations	164	90.2	8th
5.	Lack of skilled personnel for ICT care	160	88.0	9th
6.	Low govt.s 'interest in ICT development	176	96.8	2nd
7.	Inadequate internet connectivity	178	97.9	1st
8.	Lukewarm attitudes of teachers to be ICT literate	148	81.4	11th
9.	Poor funding for acquiring ICT tools/software	176	96.8	2nd
10.	Inaccessibility to relevant software installation and use.	156	85.8	10th
11.	low awareness of applying ICT in teaching	130	71.5	12th
12.	Insufficient functional ICT in LGAs	175	96.25	4th

The results agreed with the study of Nigeria Teacher Education , Information and communication that there exist many challenges in using ICT in educational process in Nigeria which include poor electricity and poor infrastructure, poorly trained manpower , irregular internet connectivity, lack of adequate funding, expensive ICT hard and software, poor maintenance culture among others. This is tandem with the report of American Journal of Humanities & Social Science(2013).

Table 3:

Prospects of Use of ICT in curricular Implementation of Enugu State Smart Green School Initiative(GSSI) in Enugu Educational Zone.

S/NO	Prospects of ICT use in Curricular Implementation in Enugu SGSI	Respondents (no)	Respondents(%)	Ranking
1.	Improving concentration /understanding	120	66	11th
2.	Enhancing learning by reinforcement	140	77	9th
3.	Promotes learners' flexibility /autonomy	150	82.5	7th
4.	Digital online courses help learners learn at their own pace & maximize time/resources	178	97.9	1st
5.	Encourage critical & creative thinking	144	79.2	8th
6.	ICT enhance interactive learning among learners	165	90.75	6th
7.	Digital tools/software allow direct interactions.	170	93.5	4th
8.	Increase in classroom activities & collaborations	172	94.5	3rd
9.	Enable effective use of AI in teaching /learning	174	95.7	2nd
10.	World class education by use of 21st century tools	140	77.0	9th
11.	ICT integration can help improve learners/ teachers motivation in teaching/learning process.	168	92.4	5th

The results on table 3 shows the prospects and benefits of proposed use of ICT in curricular implementation in Smart Green Schools Initiative in Enugu Education Zone. The findings implicated the following benefits of information communication technology as an effective enablement in use of artificial intelligence (AI) in teaching and learning process(95.7%). The use of ICT shall witness tremendous increase in classroom activities(94.2%) and collaborative work as indeed in allowing for direct or immediate interactions in using digital tools(93.5%). Again, proper integration and interpretation of ICT into smart green schools initiative curricular shall in no small ways improve and impact on learners/ teachers motivation through the teaching /learning process in the study are (90.75%). Subsequently, ICT would step up critical and creative thinking by 79.2 percent , thereby enhancing interactive learning among all strata of learners. It is also on record that Enugu State Ministry of Education was able to break the dormancy in teaching and learning during the COVID 19 pandemic by her use of digital on – line teachings via radios, Televisions, WhatsApp and zoom platforms, leading to about 88 percent attendance level in both primary and post primary schools across Enugu state. Thus, when efficiently and effectively employed, ICT would promote learners flexibility(82.5%) and enhance learning by reinforcement (77,0%). Improving concentration with understanding and world class education by use of 21st century tools(77.0%) would clearly be among other prospects of information communication technology (ICT) in Enugu State Smart Green Schools Initiative curricular implementation under the leadership of Professor Ndubueze Leo Mbah, Honourable commissioner for education .

These results concurred with earlier study findings of UNESCO (2023) that to address various educational impediments, the global education coalition established a new prototype of international cooperation that produced innovative response to reduce the crisis in educational sector via ICT. This assertion was also confirmed by Katyeudo, Oliverlral and Souza(2022) that ICT can be engaged effectively by technology, human beings, organizational bodies and teachers in due process.

Conclusion and Recommendations

Government interest in ICT application (97.9 %), availability of electricity / solar power(96.8%); supply of ICT 1infrastructures (94.6%); students' ICT ability (93.5 %) , and data/internet sources availability(92.4%)were implicated for use of ICT. Challenges are; ICT facilities high cost (93.5 %); Poor infrastructure (94.6%), inadequate electricity supply(95.7%) among other constraints. The prospects of ICT include : effective use of artificial intelligence(AI) in teaching /learning process(95.7%); increase in classroom activities(94.2%) , collaborative work and direct interactions using digital tools(93.5%); improved learners and teachers motivation and stepped up critical/creative thinking (79.2%) ; Promotion of learners' flexibility (82.5%),and improving concentration among other benefits. Based on the findings, the researchers concluded that there are many perceived challenges and prospects of ICT curricular implementation the proposed Smart green school initiative in Enugu Education Zone, Enugu state , and Nigeria in general.

Based on the conclusion, these recommendations were made:

i. All stakeholders are to improve , strengthen and sustain ICT programmes in the proposed green smart school initiative of Enugu state.

ii. Installation of supportive power supply/ solar panels and schools linkage with the national grid.

iii. Continuous training and retraining of supportive staff/students as well as maintenance of installations and supplies to enhance effective teaching and learning of ICT curricular in our schools.

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