

## Information and Communication Technology: A Panacea for Addressing Teaching and Learning Pedagogy Among Teachers Using Fifth Generation Technology in 21<sup>st</sup> Century Nigeria

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### **Abstract**

*This study critically explored Information and Communication Technology: As a Panacea for Addressing Teaching and Learning Pedagogy Among Teachers Using Fifth Generation Technology in 21<sup>st</sup> Century Nigeria. Two objectives and two hypotheses guided the study. Quasi experimental research design and descriptive survey research design were employed for the study. The population of the study consisted of all teachers in public senior secondary schools in FCT. Stratified random sampling technique was used to select six (6) secondary schools in the FCT, while purposive sampling technique was used to select a sample size of sixty teachers (60). The instrument for data collection were a four-point rating scale and a researcher structured questionnaire of the four-point Likert scale. The questionnaire was validated by test and measurement experts in the university of Abuja with a reliability index of 0.84 for experimental group and 0.86 for control group using Cronbach's alpha statistic. Mean score and standard deviation were used to analyze the questionnaire and rating scale, while independent sample t-test and one-way ANCOVA were employed for testing of the two hypotheses. The findings revealed that there is significant difference in the mean assessment response on the impact of modern components of fifth generation technology between male and female teachers in public secondary schools in FCT; the study also revealed that, there is significant difference in the mean assessment response of the efficiency of utilization of modern components of fifth generation technology between the experimental group and the control group of teachers. The following recommendations were made: Skills of fifth generation technology utilization should be a major requirement for recruitment of teachers both male and female in secondary schools in FCT; administrators should emphasize the mandatory use of different fifth generation methodologies, gadgets and software for teaching and learning process such as flipped classroom, adaptive learning, 'Lema', Bing, Magic School AI, amongst others for teaching and learning process in FCT.*

**Keywords:** *Information and Communication Technology, Panacea, Teaching and Learning, Pedagogy, Fifth Generation Technology*

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## Introduction

The evolution of technology has revolutionized mankind right from the days of vacuum tube, to transistor, down to integrated circuit, through to microprocessor, and finally to the present dispensation of the awesome, mindboggling, remarkable and unbelievable Artificial Intelligence which symbolizes and signifies the precursor of fifth generation technology which is a testament of the potentialities of the depth of human reasoning, intellect, creativity, innovation and intelligence which has affected, and is affecting every facet of human life including the psychology of learning, particularly cognitivism and constructivism aspects of psychology. With advancement in technology and educational technology, comes various modern 21<sup>st</sup> century technological mediums, gadgets and tools which is aiding in augmenting to make the teaching and learning process less cumbersome, more effective, individualized and learner centered, with the opportunity of selecting the most appropriate and suitable teaching and learning pedagogy to aid critical thinking and problem solving ability in the teaching and learning process in 21<sup>st</sup> century global educational setting. Information and Communication Technology even before the 21<sup>st</sup> century has always been instrumental and a pedestal for addressing diverse educational challenges, and improving the teaching and learning process right from the onset of the first generation technology, regardless of its slow pace in terms of data processing and functional capabilities which were some of the flaws that has been addressed and improved in the proceeding generations of technology up to the magnificent 21<sup>st</sup> century technology. Although, the first-generation technology had slow pace but was far better than the archaic analogue age.

The present technological dispensation of 21<sup>st</sup> century generation ICT, with diverse instrumentalities and tools being utilized in diverse educational environment for teaching and learning, and other educational purposes which is becoming a sine qua non that is globalizing the entire educational space like wide fire simplifying almost every aspects of the teaching and learning process especially in western countries where it has been fully accepted, digitalized and embraced as a way of life to meet up with the demands and needs of their teeming technologically inclined student population, while also enhancing the technical skills and ability of their teachers within their educational setting based on the latest technological and innovative trend in educational technology (Olushola & Bola, 2017). Utilization of ICT facilities is therefore a sine qua non for qualitative instructional service delivery in secondary schools (Onu & Ezhim, 2019). The integration of Science and technology in education in form of 21<sup>st</sup> century educational technology has led to massive, unimaginable and amazing developmental strides in most part of the world particularly in western countries where it has laid credence in its creative and innovative input in terms of human, material and capital development since most western countries are fully abreast of the importance of ICT in education, and have fully incorporated the 21<sup>st</sup> century generation ICT in to their educational systems compare to Nigeria and some African countries where the reverse is the case. According to Innocent (2016), the inclusion of these subjects in educational programs in nations like Japan, France, Germany, Norway, China, Finland, the UK, the United States, and others has played a significant role in raising living standards and promoting technical and economic advancement.

With the obvious evolution of 21<sup>st</sup> century information and communication technology in education which is the norm around the world, and is becoming the new normal in our educational setting in Nigeria, and the integration of technology in education which amplifies diverse teaching and learning pedagogy and educational tools to simplify educational activities to all and sundry within the educational space which has equally brought about dynamism in the teaching and learning approach, 21<sup>st</sup> century teachers are expected to explore wider while using 21<sup>st</sup> century technological knowledge in education to address peculiar teaching and learning pedagogy, while also bearing in mind that learners or students in 21<sup>st</sup> century are digitally inclined or digital students who can easily adjust to any technologically enhanced environment. Education is changing, the old methods of education are no longer relevant to satisfy the needs of the constantly changing technological world of today (Osagie, 2015). If 21<sup>st</sup> century educationists must remain relevant in our technology driven dynamic society, adequate and constant knowledge improvement in ICT is non-negotiable since technology is the modern building block and pillar of our present day society. In the education sector, for instance, to remain a 21<sup>st</sup>-century educator providing adequate services to the 21<sup>st</sup>-century learner, it is necessary to work or improvise with the 21<sup>st</sup>-century tools such as teaching and learning supported ICT facilities (Olushola & Bola, 2017).

### **Statement of the Problem**

The significance and enormity of information and communication technology in educational practices and pedagogy particularly the uniqueness of diverse fifth generation technological components in form of artificial intelligence in the 21<sup>st</sup> century is foundational for addressing contemporary distinct societal challenges including the teaching and learning pedagogy, and reduce the overreliance of human intelligence and, ignore the archaic and mundane way of solving educational problems, and focusing on inspiring students towards in-depth greater thinking and innovative ideas which could propel any society to greater prosperity since AI is a precursor of the depth of human thinking in solving problems for humanity which is a sine qua non in the 21<sup>st</sup> century educational environment. with distinct and subsequent technological improvement of various dispensations and generations of technology manifesting various assorted upgrade of improvements in terms of functioning and capabilities to the present day fifth generation technology with the emergence of magnificent, impeccable, unimaginable, and unfathomable capabilities enunciating the depth of human intelligence manifesting in machine form with human capabilities which is affecting every aspect of teaching and learning pedagogy positively with reckless abandon hence, teaching and learning can take place in any environment of choice and time using diverse digital mediums. Learners can learn at their own time, environment and pace. Teachers and learners can equally access any information and literature with the speed of light, different technological tools and gadgets can be use by both teacher and learners for impactful and a worthwhile teaching and learning process among others via the present dispensation of ICT.

With all the aforementioned potentialities of ICT in education particularly the ingenious fifth generation technology to the teacher, and the teaching and learning process, still most teachers are leaving in an illusionary and imaginary world failing to accept the reality of technological evolution with its intending manifestation in the teaching and learning pedagogy which is

spreading like wild fire ravaging every aspect of our educational sector with massive impact and impetus, with recourse to the advent of diverse teaching and learning pedagogy and tools to simplify, complement and enhance the teaching and learning process in our educational institutions of learning. Government in Nigeria, school administrators and most especially teachers, seems not to be abreast of the importance of 21<sup>st</sup> century generation technology in education or rather it seems not to be a priority to them since it has not been given due attention and recognition particularly in the Nigerian educational setting which is lagging behind in the scheme of things in almost every facet technologically hence, lack of provision of technological enhanced facilities in schools for educational purposes to meet up with the needs and demands of 21<sup>st</sup> century generation ICT, poor functionality and utilization of 21<sup>st</sup> century generation ICT gadgets and tools by teachers. Regardless of the fact that, fifth generation ICT has emerge to simplify and complement the modern day teacher in Nigerian schools, most teachers are not equipped with the requisite skills, practical knowledge and ability of the usage of many fifth generation technology ICT gadgets and tools utilize for educational purposes or which could equally be used for teaching and learning process such as chatbot, virtual medium platforms, lesson planning tools, plagiarism checkers, software for important related literatures and content sources for teachers, the recently unveiled lema software, flipped classroom model amongst others.

Most school administrators are equally guilty since some of them do not organize or make it mandatory for teachers to attend seminars, conferences, workshops and symposiums on how to improve their skills, knowledge and ability on latest educational technology, even though some of the teachers are not self-determined in improving their practical knowledge and skills on the latest educational technology pedagogy trend in boosting and improving their teaching methodology using ICT, knowing fully well that today society is a globalized society controlled and guided by technology in all facet which students have fully embraced being students of the golden age of technology. This has in turn affected the usage of fifth generation technological gadgets and tools for teaching and learning in schools making it extremely difficult for students to experience the full capabilities of the glorify 21<sup>st</sup> century generation technology in education for teaching and learning since they can only utilize some individualized aspects which in some cases are vague to comprehend. All this has equally impacted negatively to our educational setting, while other countries of the world including some in Africa have created technological frontals with limitless abilities of solving practical human problems; critical thinking and imagination to boost and improve their educational sector positively hinge on information and communication technology particularly the 21<sup>st</sup> century technology, whereas, the Nigerian educational setting is in a downward spiral regressing and drifting into oblivion begging for the mercy of a saving grace due to I don't care attitude of those in the helm of affairs in every stratum of government including school administrators who have failed to recognize that 21<sup>st</sup> century ICT is the saving grace that can rejuvenate and calibrate it back to life.

### **Purpose of the Study**

The general purpose of this study is to establish information and communication technology: as a panacea for addressing teaching and learning pedagogy among teachers using fifth generation technology in 21<sup>st</sup> century Nigeria. Specifically, the study intends to:

- (i) find out the impact of different fifth generation methodologies, gadgets and software for teaching and learning process such as Flipped classroom, adaptive learning, 'Lema', Bing, Magic School AI, chatbot in secondary schools in FCT, based on gender (male and female) teachers.
- (ii) ascertain skills and knowledge of teachers on the utilization of modern components of fifth generation technology such as Flipped classroom, adaptive learning, 'Lema', Bing, Magic School AI, chatbot in teaching and learning pedagogy in secondary schools in FCT.

### **Hypothesis**

Succeeding from the objectives of this study, the following null hypotheses were raised to guide the study.

**H01** There is no statistical significant difference in the mean assessment responses on the impact of modern components of fifth generation technology based on gender (male and female) teachers in public senior secondary schools in FCT.

**H02** There is no statistical significant difference in the mean assessment on the efficiency of utilization of modern components of fifth generation technology between the experimental group and the control group of teachers in public senior secondary schools in FCT.

### **Methodology**

Mixed-method approach was employed for the conduct of the study. Quasi experimental research design was employed to compare the (utilisation of components of fifth generation technology, n = 36) between the experimental group of teachers and control group of teachers (non utilisation of components of fifth generation technology, n = 24), while descriptive survey research design equally guided the study. The population of the study consisted of all teachers both male and female in the fifty-seven (57) public senior secondary schools in FCT Abuja, Nigeria.

A Stratified random sampling technique was used to select six (6) secondary schools from the fifty-seven (57) secondary schools in the FCT, one each from the six area councils in the FCT, while purposive sampling technique was used to select a sample size of sixty teachers (60) to participate in the study as the experimental group and control group respectively. The instrument for data collection were a four-point rating scale which was used to rate the performance of the experimental group of teachers after 3-weeks of utilisation of diverse tools of fifth generation technology, while a researcher structured questionnaire of the four-point Likert scale was used to gather data on the impact of modern components of fifth generation technology on male and female teachers. the questionnaire was validated by test and measurement experts in the university of Abuja with a reliability index of 0.84 for experimental group and 0.86 for control group using Cronbach's alpha statistics to ascertain the internal consistency of the instrument.

## Data Analysis

Data collected via research instruments from respondents were analysed using descriptive statistics such as mean score and standard deviation for the questionnaire and rating scale, while one-way Analysis of covariance (ANCOVA) and independent sample t-test were used to analyse the two hypotheses.

**Quasi Experimental Procedure:** Preceding to experimentation, a researcher structured questionnaire of the four-point Likert scale was employed to gather data on the impact of modern components of fifth generation technology on the experimental group of teachers. Furthermore, after 3-weeks of utilisation of diverse tools and components of fifth generation technology by the experimental group of teachers such as AI Research and academic writing, Quillbot, 'Lema', Bing, Magic School AI, chatbot by the experimental group of teachers, a four-point rating scale was employed by the researcher to rate the performance of the experimental group of teachers before comparing with the control group.

## Results of Hypotheses

**H01** There is no statistical significant difference in the mean assessment response of the impact of modern components of fifth generation technology between male and female teachers in public senior secondary schools in FCT.

**Table 1. Independent sample t-tests result of the mean assessment responses on the impact of modern components of fifth generation technology between male and female teachers in public senior secondary schools in FCT**

Teachers	N	Mean	SD	Df	T-Value	P-Value
Male	36	33.14	11.23	58	4.32	0.02
Female	24	28.06	9.16			

Table 1 presents the result on the outcome of the independent sample t-test examining the impact of modern components of fifth generation technology between male and female teachers in public senior secondary schools in FCT. Male teachers' responses on the impact of modern components of fifth generation technology ( $M=33.14$ ;  $SD=11.23$ ), while the Female teachers' responses on the impact of modern components of fifth generation technology ( $M=28.06$ ;  $SD=9.16$ ) and  $p = 0.02$  which is less than the significant difference of  $p<0.05$  albeit, this signposts that there is significant difference between male and female teachers in public senior secondary schools in FCT on the impact of modern components of fifth generation technology. Therefore, the null hypothesis raised is rejected for the alternate hypothesis.

**H02** There is no statistical significant difference in the mean assessment on the impact of modern components of fifth generation technology between male and female teachers in public senior secondary schools in FCT.



**Table 2. One-way ANCOVA result of the mean assessment on the efficiency of the utilisation of modern components of fifth generation technology between the experimental group and the control group of teachers in public senior secondary schools in FCT.**

Sources of Variation	Sum of Squares	Df	Mean Squares	F Values	Sig.
Corrected model	16.234a	2	8.117	33.437	.000
Intercept	5.320	1	5.320	36.674	.000
Experimental Group of Teachers	2.968	1	2.968	18.694	.002
Control Group of Teachers	2.469	1	2.469	15.916	.001
Error	9.446	53	.180		
Total	798.446	60			
Corrected Total	22.466	59			

Table 2 presents the outcome of one-way ANCOVA result examining the main efficiency of utilisation of modern components of fifth generation technology between the experimental group and the control group of teachers in public senior secondary schools in FCT. The mean assessment on the efficiency of the utilisation of modern components of fifth generation technology by the experimental group of teachers is  $F(2,103) = 18.694$ ,  $P = 0.02 < \alpha = 0.05$ , while the mean assessment on the efficiency of the utilisation of modern components of fifth generation technology by the control group of teachers  $F(1,867) = 15.916$ ,  $P = 0.01 < \alpha = 0.05$ , hence, this signifies that there is a significant difference on the efficiency of utilisation of modern components of fifth generation technology between the experimental group and the control group of teachers in public senior secondary schools in FCT. Therefore, the null hypothesis that there is no statistical significant difference in the mean assessment on the efficiency of utilisation of modern components of fifth generation technology between the experimental group and the control group of teachers in public senior secondary schools in FCT is rejected for the alternative hypothesis.

### Discussion of findings

In line with the result of the analysis of this study, the following findings were made:

Hypothesis one result showed that, there is significant difference between male and female teachers in public senior secondary schools in FCT on the impact of modern components of fifth generation technology. This is supported by Damkor, et al (2015) who posited that organizations are finding it very necessary to train and re-train their employees to establish or increase their knowledge of computer and other ICT facilities. Hypothesis two equally indicated that there is significant difference on the efficiency of utilisation of modern components of fifth generation technology between the experimental group and the control group of teachers in public senior secondary schools in FCT. This is corroborated by Onu and Ezhim (2019) who highlighted that, utilization of ICT facilities is therefore a sine qua non for qualitative instructional service delivery in secondary schools.

## Conclusion

The role and importance of the evolution of fifth generation technology and its influence on global educational sector which is revolutionising every aspect of education around the world cannot be overstressed due to the breakthrough of its impact in all aspects of global educational sector including the teaching and learning pedagogy and dynamics. While different countries in Europe, America and some parts of Africa have not only digitalised their educational sector but have incorporated fully the glorified fifth generational technology in their educational process to meet up with the demands and embraced modern educational technology with the speed of light since it has become the new normal, and also the latest trend in educational technology in the 21<sup>st</sup> century. Unfortunately, the same cannot be highlighted in the Nigerian educational sector since we are still chasing shadows and have failed in embracing the magnified fifth generation technology. If our educational sector anticipates to close the gap with other western educational sector and even some countries in Africa, hence become standardised, full and urgent incorporation of fifth generation technology such as thinking based learning, augmented reality classroom, adaptive learning, flipped classroom, 'Lema', Bing, Magic School AI, chatbot amongst others in our educational process is obligatory.

## Recommendations

Based on the findings of this study the following recommendations were made:

1. Mandatory ICT programmes on the utilisation of fifth generation technology gadgets and software for both male and female teachers who are already in the educational system should be encourage and supported with alacrity by school administrators in FCT.
2. Skills of fifth generation technology utilisation such as diverse fifth generation methodologies, gadgets and components of AI should be major requirements for recruitment of teachers in secondary schools in FCT.

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