# Perception on Problems and Prospects of Integrating Information and Communication Technology in Basic Science among Primary School Teachers in Zaria LGA, Kaduna State

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**Abstract**
This study investigated the perceived problems and prospects of integrating ICT in Basic Science among primary school teachers in Zaria Local Government Area of Kaduna state, Nigeria. Three research questions guided the conduct of the study. A descriptive survey through structured questionnaire called Basic Science Teachers' Questionnaire (BSTQ) with a reliability coefficient of 0.81 was used to generate data for the study. Sample for the study comprised 20 Basic Science teachers purposefully selected from a population of 349 teachers in all thirteen Universal Basic Education (UBE) primary schools in Zaria local government area. Findings revealed that ICT facilities are mostly inadequate in schools, teachers' cannot integrate ICT in teaching due to constraints such as inadequate training and lack of technical assistance. Recommendations given include, more robust training and re-training programmes for Basic science teachers should be implemented by government at all levels and integrated into the teaching of science subjects as well as evaluation of teachers' ability to use ICT in the collation and dissemination of knowledge

**Keywords:** Problem and Prospects of ICT, Basic Science Teaching, ICT Integration

## Introduction

From the nineteenth to the twenty first centuries, education has experienced many changes worldwide. The most pronounced changes is in the Information and Communication Technology (ICT). There is an increased internet usage and application of different computer packages as the computer is considered key instrument to globalization (Adeyemi & Oladele, 2010). From the widespread use of interactive whiteboards and virtual learning environments, to educational computer games and an increasing reliance on the use of cloud based technologies such as the internet, email and e-learning platforms. ICT and computing today is huge, so much so that it's even become part of the curriculum. The important role that information and communication technologies (ICTs) play in many educational and business institutions of the 21st century cannot be overemphasized. Information and communication technology (ICT) has become an unavoidable reality in human's life in this information age (Obaydullah & Abdurahim, 2019).

The present pedagogical pattern used in Nigerian classroom does not prepare students for the information age and globalization, that is, it is not equipping students to live effectively in the modern age of science and technology. It is quite over whelming to stress that ICT gadgets simplify methods and strategies of knowledge acquisition because the scope of ICT integration in education according to Albirini (2006) - have been expanded to include any kind of learning environment. ICT, according to Ibe-Bassey (2011) is regarded as a critical tool for preparing and educating students with the required skills for the global work place. The conscious attempts by the federal government and the society in developing computer /ICT education in Nigeria is appreciated as the target objectives of the federal government of Nigeria on matters related to computer/ICT integration at all levels of education are highlighted as follows: • Development of viable ICT curricula primary, secondary and institutions of higher learning • Making ICT compulsory at all stages/ of education • Provision of fellowship, scholarships and grants for ICT courses • Conducting ICT training for the Youth Service Corps associates • Conducting ICT professional development and capacity building trainings in various state levels and zones (Yusuf, 2005; Rock & Akubugwo, 2016).

Albirini (2006) opined that the relevance of ICT to education is a function of ICT's ability to improve the accessibility, quality and cost efficiency of the process of delivering instruction to the learner. Ibara (2015) also stated that ICT can enhance teaching and learning through its dynamic, interactive, engaging content and can provide real opportunities for individualized instruction. Information and communication technology can make the school more efficient and productive thereby engendering a variety of tools to enhance and facilitate teachers' professional activities (Abdullahi, 2013). Incorporating ICT into the teaching and learning of science subjects according to Nwoye and Moses (2019) allows for the educational process to be scaled in an inexpensive way. Ghavifekr, Afshari, and AmlaSalleh, (2012) noted that ICT provides a relatively cheaper and more accessible education in the long run because it provides a structure through which classes can be recorded, transmitted and accessed at anytime and anywhere depending on the framework of the technology being used. This is especially important in a developing country like Nigeria where the budgetary burden of the conventional education has produced an educational system that is largely ineffective in contributing to the achievement of national development and economic goals. ICT provides a means for scaling education and making it accessible even in the remote areas where it is deemed uneconomical or not feasible to site a school. As stated in the National Policy on

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Education (NPE) emphasis is on the provision and utilization of ICT for effective functioning in the modern world, there is the urgent need to integrate ICT in education.

Information and Communication Technology according to the National Policy on Information Technology (FGN, 2001) is any equipment or interconnected system of equipment used in the automatic acquisition, storage, manipulation, management, control, and transmission of information. In a related view ICT is conceptualized a) as enabling technologies which include both hardware and software's necessary for delivering of voice, audio, data (high speed and low speed) videos tax and internet service from one point and associated equipment's that are connected via internet proto cold (IP) and non IP network (Abdullahi, 2013). National US Higher Education ICT Initiative (2007) defined ICT as "the ability to use technology, communication tools, and/or networks appropriately to solve information problems in order to function in an information society. This according to Rock and Akubugwo (2016) includes the ability to use technology as a tool to research, organize, evaluate, and communicate information in the possession of a fundamental understanding of the ethical/legal issues surrounding the access and the use of information. Ibara (2015) explained that ICT are tools comprising electronic devices that are utilized for the information needs of institutions, organizations, and individuals.

The electronic devices include information machines (for example computer, hard and soft wares), networking, telephones, video, multimedia and the internet. ICT covers products of communication technology that stores, retrieves, manipulates, transmits or receives information electronically in a digital form. Thus, ICT can be seen as the various technological devices that enhance the creation, storage, processing, communication and transfer of information. In relation to education, ICT provides teachers and students with practical and functional knowledge of the computer, the internet and other associated areas (Ibara, 2015). The application of ICT in education according to Onuma (2007) is a challenging process that involves three levels namely, macro, meso and micro levels. Onuma (2007) notes that the macro level determines the national policy on information technology and outlines the various ICT in education needs of society as well as the implementation procedures. The meso level specifically deals with the educational institutions translating ICT policy into practice and involves the provision of personnel and facilities needed for the implementation process. The micro level is the implementation procedure using the curriculum. Thus, a good policy formulation for ICT integration in education is expected to address these levels particularly the basic level where Basic Science is being taught.

Basic Science according to Muhammed (2014) lays emphasis on both concepts and teaching methods. It is a course devised and presented to pupils in such a way that students gain the concepts of the fundamental unity of science, the commonality of approach to problems of scientific nature and are helped to gain an understanding of the role and function of science in everyday life and the world in which they live. Integrating ICT in Basic science teaching and learning can be fruitful to both teacher and pupil as Oko and Micheal (2016) reported that ICT application to the core business of education can accelerate and improve learning on a number of fronts, from basic skills; Problem solving; information management, work habits, motivation, establishing life-long learning habits and concepts development. Aina (2013) asserted that one of the relevance of ICT in the teaching and learning of science subjects is that it helps in improving the costs of education. Becta (2005) maintained that ICT helps primary school teachers to be more effective in their teaching, especially if they are well resourced and when pupils used ICT, there was a clear improvement in the

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presentation of their work, in the range of information they had to draw on, in their capacity of enter imaginatively into other situations and in their understanding and analysis of key concepts.

According to the National Policy on Education (NPE)(FGN,2013) one of the goals of primary education is in recognition of the prominent role of information and communication technology in advancing knowledge and skills necessary for effective functioning in the modern world which necessitated the urgent need to integrate information, communication and technology (ICT) into education in Nigeria. By this therefore, the curriculum for primary education shall include computer education. In spite of the political will displayed by government through the different computerization programs, rapid growth in ICT access to teachers and pupils in school is still challenging and most Basic Science teachers are reluctant in adapting and integrating ICT tools during teaching. Abdullahi (2013) stated that teacher's motivation to use ICT in the classroom is at present influenced by a number of constraints including; lack of time to gain confidence and experience with technology; limited access to reliable resources; a science curriculum overloaded with content assessment that requires no use of the technology and a lack of subject – specific guidance for using ICT to support learning. While this technology can in principle, be employed in diverse ways to support different curriculum goals and forms pedagogy. Such constraints have often stifled teachers' use of ICT in ways which effectively exploit its interactivity as teachers tends to use ICT largely to support, enhances and complement existing classroom practice rather than re-shaping subject contents, goals and pedagogy. Consequently well integrated and effective classroom use of ICT is currently inadequate. This study investigated teachers' perception on problems and prospects of integrating ICT in teaching Basic Science in Zaria local government primary schools.

## Objectives of the Study:-
The study has the following objectives to;
1. Investigate the adequacy of ICT facilities for teaching Basic Science in Zaria primary schools
2. Find out the perception of Basic science teachers on problems of integrating ICT in teaching.
3. Find out the prospects of integrating ICT in Basic Science teaching.

**Research Questions:** The following questions were raised:
1.  Do primary schools in Zaria have adequate ICT facilities for Basic Science teaching?
2. What is the perception level of teachers on problems of integrating ICT in Basic Science teaching?
3. What are the prospects of integrating ICT in Basic Science teaching?

## Methodology
This study adopted a descriptive survey design. A descriptive survey design was used for this study because it is aimed at ascertaining and establishing the status quo, facts or pieces of information concerning the population. Okoro (2013), reported that survey method is appropriate, especially for seeking individuals' opinions, attitudes and perceptions in their natural setting. The population of the study comprised of 349 teachers in all thirteen Universal Basic Education (UBE) schools in Zaria local government area council.

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The instrument for data collection was 30 – item questionnaire called Basic Science Teachers Questionnaire (BSTQ) with two sections. Section A of BSTQ had 5 items on demographic variables of the respondents such as sex, school type, qualifications teaching experience and subject taught. While, Section B of BSTQ had 25 items based on the research objectives. A four point likert scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) was used to elicit respondent's opinion. The content and face validity of BSTQ was carried out by two experts in science education department, Faculty of Education, Ahmadu Bello University, Zaria. Reliability of BSTQ was determined using Pearson Product Moment Correlation Coefficient statistics at 0.81. Data were analyzed using mean and standard deviation to answer the researcher questions. In analyzing the data, the positive response options in the questionnaire were weighted as follows: Strongly Agree – 2points, Agree – 1point. A cut-off point of 2.50 was set to agree or disagree items on the instrument. The Population of the study is presented in Table 1.

**Table 1**: **Population of the Study**

| S/No | Name of  UBE Primary School | Number of Teachers |
|------|------------------------------|--------------------|
| 1  | Abdulrahman Mora        | 25  |
| 2  | Alu Dan Sidi            | 30  |
| 3  | Dr Shehu Idris          | 33  |
| 4  | Haruna Dakace           | 28  |
| 5  | Muhammad Jumare         | 26  |
| 6  | Nuhu Baturen Makaranta  | 20  |
| 7  | Sani Adamu              | 18  |
| 8  | Sarki Jafaru            | 27  |
| 9  | Sarki Sambo             | 24  |
| 10 | Tsoho Abdullahi         | 40  |
| 11 | Umaru Isah              | 26  |
| 12 | Wazirin Kuyanbana       | 29  |
| 13 | Isah Nabawa             | 23  |
|    | **Total**               | **349** |

**Source**: Kaduna State Ministry of Education, Science and Technology Annual School Census Report 2017

Since the study focused on Basic Science Teachers, the sampling technique used for the study was purposive random sampling in which all basic science teachers in all the schools were selected as sample for the study as shown in Table 2 below.

**Table 2**: **Sample for the Study**

| S/NO | Name of  UBE Primary School | Number of Basic Science Teachers |
|------|------------------------------|----------------------------------|
| 1 | Abdulrahman Mora       | 2 |
| 2 | Alu Dan Sidi           | 2 |
| 3 | Dr Shehu Idris         | 2 |
| 4 | Haruna Dakace          | 2 |
| 5 | Muhammad Jumare        | 2 |
| 6 | Nuhu Baturen Makaranta | 1 |

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| 7 | Sani Adamu | 1 |
|----|-------------------|----|
| 8 | Sarki Jafaru | 1 |
| 9 | Sarki Sambo | 2 |
| 10 | Tsoho Abdullahi | 1 |
| 11 | Umaru Isah | 1 |
| 12 | Wazirin Kuyanbana | 2 |
| 13 | Isah Nabawa | 1 |
| | **Total** | **20** |

**Source**: Kaduna State Ministry of Education, Science and Technology Annual School Census Report 2017

## Results

**Research Question** 1: Do primary schools in Zaria have adequate ICT facilities for Basic Science teaching?

**Table** 3. Descriptive Statistics of Mean and Standard Deviation for Research Question 1

| S/n | Adequacy of ICT facilities | Mean X | Standard deviation | Remark |
|-----|----------------------------|--------|--------------------|--------|
| 1. | My school has adequate ICT facilities like computers, laptops, and projectors for Basic science teaching. | 2.67 | 0.67 | Agreed |
| 2. | My school has a well-furnished computer laboratory. | 3.50 | 1.00 | Agreed |
| 3. | The electricity supply is stable and sufficient | 4.57 | 0.86 | Agreed |
| 4. | My school has adequate web based resources for ICT. | 2.50 | 1.00 | Agreed |
| 5. | ICT accessories are adequately well maintained in my school. | 4.50 | 1.00 | Agreed |
| 6. | Internet connectivity in my school is adequate. | 4.57 | 0.86 | Agreed |
| 7. | The computers in my school laboratory are obsolete or broken. | 4.44 | 1.11 | Agreed |
| 8. | There is high computer to pupil ratio | 4.60 | 0.86 | Agreed |
| 9. | My school has adequate infrastructure for ICT usage. | 4.37 | 1.25 | Agreed |
| 10. | My school has adequate and well trained technicians to assist Basic Science teachers | 4.33 | 1.33 | Agreed |

From the 5 Likert Scale Basic Science Teachers' Questionnaire, at least an average Mean score of 2.5 is said to agree with perceived responses as provided in Table 3. Therefore, result shows that most teachers agreed that their schools do not have adequate facilities for integrating ICT into Basic Science teaching (2.50 & 4.57). The standard deviation range of between 0.60 to1.33 indicate a consensus of opinion by the respondents.

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**Research Question 2:** What is the perception level of teachers on challenges of integrating ICT?

**Table** 4. Descriptive Statistics of Mean and Standard Deviation for Research Question 2

| S/no | Challenges of integrating ICT in Basic science | Mean X | Standard Deviation | Remark |
|---|---|---|---|---|
| 11 | Basic science pupils are too young or underage to understand ICT | 2.55 | 1.09 | Agreed |
| 12 | Lack of skills preventing teachers from using ICT in teaching | 3.67 | 1.33 | Agreed |
| 13 | In-service training opportunities are not adequate enough to equip teachers on ICT usage | 2.81 | 1.63 | Agreed |
| 14 | Inadequate technical assistance on the use of ICT in the classroom | 3.75 | 1.50 | Agreed |
| 15 | Lack of update software and content areas from various websites | 3.65 | 1.29 | Agreed |
| 16 | Lack of ICT equipment's such as computers, projectors and internet connectivity | 3.60 | 1.20 | Agreed |
| 17 | Limited access to internet connectivity and were available, connection has high prohibitive cost | 3.58 | 1.18 | Agreed |
| 18 | Unstable electricity supply | 4.59 | 1.00 | Agreed |
| 19 | Large class size with only one teacher | 2.63 | 1.25 | Agreed |
| 20 | Lack of proper maintenance of ICT accessories | 3.50 | 1.00 | Agreed |

From the 5 Likert Scale Basic Science Teachers' Questionnaire, at least an average Mean score of 2.63 is said to agree with perceived responses as provided in Table 4 This implies that all respondents agreed with the challenges of integrating ICT into Basic Science teaching. The standard deviation range of 1.00 to 1.63 indicate a consensus of opinion by the respondents.

**Research Question 3:** What are the prospects of integrating ICT in Basic Science teaching?

**Table 5. Descriptive Statistics of Mean and Standard Deviation for Research Question 3**

| S/NO | Prospects of ICT Integration | Mean X | Standard Deviation | Remark |
|---|---|---|---|---|
| 21. | ICT should be integrated into Basic Science curriculum. | 2.50 | 1.00 | Agreed |
| 22. | In-service training opportunities should be provided for Basic Science teachers to equip them with ICT usage in the class. | 2.45 | 1.1 | Agreed |
| 23. | ICT could be used as a means of promoting the intellectual capabilities of Basic Science pupils. | 2.50 | 1.00 | Agreed |
| 24 | Private-public sector partnership to fast-track ICT based projects. | 2.53 | 0.94 | Agreed |
| 25. | ICT can be used as a means of developing creativity. | 2.53 | 0.94 | Agreed |

Responses provided in Table 5 shows a mean range of 2.50 and a standard deviation of 0.94-1.10. This indicate that most basic science teachers are more than willing to explore the variety of

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opportunities in integrating ICT into teaching as they believe that integration of ICT into science teaching can promote among others problem solving skills of pupils.

## Discussion of Findings

The result of Research Question 1 indicated that ICT facilities for Basic Science lessons are mostly in adequate and has resulted in slow learning interactions among learners eventually leading to loss of interest in science. This finding is in line with that of Rock and Akubugwo (2016) who found out that Lack of ICT facilities in schools hinder teachers from using ICT to teach. Studies by Aina (2013); Obydullah and Abdurahim (2019) also reported that poor ICT infrastructural facilities, poor maintenance culture, insufficient funding, lack of manpower, poor internet connectivity and non-provision of good computer/ICT laboratories resulted to poor integration and implementation of ICT in the educational system.

Result of the research question 2 in the study is similar to that of Rock and Akubugwo (2016) who reported that few available computer/ICT facilities in some schools in Abia state are not adequately utilized for teaching and learning purpose due to lack of technical knowhow on the part of teachers. Obaydullah and Abdurahim (2019) opined that the use of ICT allows for a visual display of interactions and improve the knowledge retention rates of learners as ICT promotes the multi-sensory learning.

Findings of research question 3 is in line with that of Albirni, (2006) who stated that such skills are relevant in the context of surviving and thriving in the 21st century and the knowledge society that has emerged from it. The use of ICT in the teaching and learning of science subjects provide a valuable foundation for interacting and managing knowledge by the student and these are valuable work- related skills necessary for the future (Albirni, 2006). Cox and Marshall (2007) have also shown that the use of ICT in the teaching and learning of science subjects have helped in increasing the efficacy, competence, confidence and attitude of teachers and this in the long run aids the development of the science education system as a whole. Nwoye and Moses (2019) however emphasized that the prospects of using ICT as a tool for science teaching and learning in Nigeria are best defined in terms of the potential opportunities which the integration of ICT into the educational system holds. A recurrent educational problem is the quest of getting learners to be interested in a subject- this is because learning is faster and more effective if interest is readily stimulated. Nwoye and Moses (2019) noted that ICT provide a viable means of sustaining this interest. This assertion is premised on the fact that the new generation of students already have a high level of exposure to ICT and social media and most times define their social life by their proficiency in the use of various aspects of these tools. As such, integrating ICT into the curriculum provides a readymade base upon which learning can be built.

## Conclusion

The importance of integrating ICT in the teaching of Basic Science in schools cannot be over-emphasized, asides from its demonstrated effects on improving the rate of knowledge retention, the use of ICT have also being shown to provide a valuable foundation for the development of skills which are necessary for success in the 21$^{st}$ century with the consequential effect of playing a key role in spurring national development. This is especially important in a country like Nigeria where the need for development in combatting the many ills of poverty, disease and illiteracy is dire. This paper investigated the

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perception of teachers on the adequacy of facilities for integrating ICT in Basic Science teaching, the challenges of integrating ICT as well as the prospects of ICT integration in Basic science. Nevertheless, exploring these prospects and mitigating the identified challenges can be aided through the recommendations below to enhance science education in general and Basic science in particular.

**Recommendations:**
1. Government should partner with the private sector in making adequate provision of ICT facilities in schools. This recommendation is premised on the logic that the organized private sector stands to gain tremendously from an educational sector where studying science subjects is based on the use of ICT.
2. More robust training and re-training programs for challenges of integrating ICT in Basic science should be implemented into the teaching of science subjects as well as evaluation of teachers' ability to use ICT in the collation and dissemination of knowledge.
3. Federal Government should give priority to prospects of ICT Integration in basic science education by assisting the state government in funding ICT diffusion in institutions at all level and also provide modern computer laboratories.

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