



The Impact of Information and Communication Technology (ICT) On Teaching and Learning of Physics

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ABSTRACT

This study investigated the impact of information and communication technology on teaching and learning of physics. The respondents used for the study were one hundred and fifty-seven (157) physics students and two (2) physics teachers drawn randomly from two senior secondary schools from each of the five educational districts out of the six educational districts available in Lagos State. Three null hypotheses were postulated and tested at 0.05 level of significant.

The instruments used for the study were information and communication technology impact on teaching and learning questionnaire (ICTIT LQ). The data collected were analyzed using simple percentage and chi-square. The research findings indicated that ICT have great impact on teaching and learning of physics. Also the introduction of ICT makes learning of physics so interesting for the students. Based on the findings suggestions and recommendations were made.

INTRODUCTION

Ever since ancient times people have devised various techniques for communicating their thoughts, needs and desires to others. In early civilized times, people tend to communicate in geographically localized cluster in which communication were adequately achieved through speech and written messages. As civilization spread over larger geographic areas, a variety of long - distance communication methods were tried such as smoke signals, carrier pigeons etc. one of the earliest known optical links, was the use of fire signal by Greeks in the eighth century B.C. for sending alarms, calls for help, or announcement of certain events.

However, because of environmental and technology limitation; it generally turned out to be faster and more efficient to send letter messages by courier over the road network.

The discovery of telegraph by Samuel, F.B. Morse 1938 ushered in a new development in communication that is, the era of electrical telegraphy system were first encoded into strings of binary symbols, and were then manually transmitted and received. The development and implementation of communication systems employing electric signals became increasingly sophisticated leading in turn to the birth of telephone, radar and microwave links. Today, these communication systems have become an integral part of everyday life 'with circuits spanning the entire world carrying voice, text, pictures and many other types of information. As recent advances integrated circuits to technology have allowed computers to become recognized, less expensive and widely available, which make people to be more interested in connecting them to internet.

Internet is a computer system that allows millions of computer users around the world to exchange information with the use of the internet, which made communication easier and faster, many bodies have sprung up to assist the use of this technology such as information services (MIS), management information services (MIS), INFORMATION TECHNOLOGY (IT) and many others.

Information technology (IT) is concerned with the use of technology in large organizations .In particular, IT deals with the use of electronic computers and computer software to convert, store, protect, process, transmit and retrieve information. For that reason, computer professionals are often called IT specialists or Business process consultants and the division of a company or university that deals with software technology is often called the IT department.

In United Kingdom education system, information technology was formally integrated into the school curriculum when the natural curriculum was devised. It was quickly realized that the work covered

was useful in all subjects. With the arrival of the internet and the broad band connections to all schools, the application of IT knowledge, skills and understanding in all subjects became a reality. This change in emphasis has resulted in a change of name from information technology to information and communication technology (ICT).

Information and communication technology in education can be understood as the application of digital equipment to all aspects of teaching and learning. It is present in almost all schools in advance countries and is of growing influence.

However, for the past three (3) decades there is a legitimate concern that developing countries have been slow in terms of facilitation of learning among the majority of citizens. Hubert(2006).

The National Grid for learning, UK government initiatives indicated that teachers must move swiftly to more internets and web based work in schools. According to Busari (2006), the whole world is experiencing the advancement of science and technology. Each nation is either a powerful producer of technology or a consumer of other nation's technology efforts.

Infact technology has made the whole world a global village and ICT breakthrough has made anew landmark in globalizing education. The use of ICT is fast gaining prominence and becoming one of the most important elements defining the basic competencies of the students.

According to World Bank, ICT consists of the hardware, software, networks, and media for the collection, storage, processing, transmission and presentation of information; The use of ICT falls into four (4) major categories; constructing knowledge and problem solving (through the internet-mail, CD-ROMs, databases, videoconferencing); using process skills; aiding explanation of concepts; and communicating ideas {power point, desktop publishing} (WCEA,2002).

The use ICT in teaching is a relevant and functional way of providing education to learners that will assist in imbibing in them the required capacity for the world of work. Very few jobs today do not require the use of skills in technology, collaboration, teamwork, and information; all of these can be acquired through teaching with ICT. It fundamentally changes the way we live, learn and work. Technology has entered the classroom in a big way to become part of the teaching and learning process.

However, physics as a science oriented course or discipline is known for its abstract nature (having no material existence). Sometimes the physics teacher do not have adequate knowledge, but have to fall on ideas which lead to contradictions with what the physics theory says or meant.

Students are left on their own, even when they are to read on their own, they find no material to read, where it is available most of them are obsolete material. That is, some of these materials include text book, journals, research publications and news papers e.t.c. where these materials are lacking the students are forced to lose interest, motivation and passion; in some cases frustration sets in and students abandon the discipline or subject matter (physics) for another which they can cope with i.e. students leaving science class because of physics to commercial or Art subjects, simply point to the fact that other disciplines are not abstract in nature like that of physics.

However, physics is a unique subject, which promotes the acquisition of specialized science skills and knowledge, which explain the natural phenomena of life in the society. It is a subject that grew up with civilization as man's quantitative needs increased. It arose out of practical problems and mans need to solve these problems. It has contributed to the development of the sciences and to the development of civilization.

Despite the abstract nature of physics its teaching is to bring about scientific thinking in students; a mind set that requires students to test out, through experimentation.

However, through the use of ICT, whether CD-Rom, power point, e.t.c the teaching and learning of physics is interesting.

According to Osunade (2003) internet is a valuable source of information for students looking for ideas for project and assignments. Supporting this, Agommoh & Nzewi (2003) believed that secondary students who are exposed to video-based instructions in physics had significantly better results than those who were taught using the conventional method. It is against this background of looking at ICT as a medium of instruction in teaching and learning in secondary schools that this study is conceived. Therefore, the study is an attempt to establish through a statistical model the impact of ICT on teaching and learning of physics in secondary schools.

STATEMENT OF THE PROBLEM

Today, as the educational sector is faced with series of changes and reforms, it is good to reflect on matters concerned with physics and the dissemination of physics knowledge and lessons. Numerous teaching strategies have been developed which correspond to the accommodation of students' need and diverse learning method. One of such strategy involves the use of information and communication technology (ICT).

The use of CT in teaching is a relevant and functional way of providing education to learners that will assist in imbuing them the required capacity for the worth of work.

Investigations reveal that many learners at the senior secondary school in Lagos State strongly detest the manners in which the physics teachers handle and deliver physics knowledge and lessons.

Information and communication technology (ICT) is the use of technology in managing and processing information with the use of electronic computer system and computer software to convert, store, protect, process, transmit and retrieve information. Physics on its own requires observation and knowledge to solve natural problems. Oshodi (1999) states that awareness towards the use of communication technology is increasing in the classroom in the developing world such that mere verbalization or over verbalization of words alone in the room to communicate ideas, skills and attitude to educate learners is futile. Angaye (2005) noted that the problem of information technology illiteracy was a serious one among teachers in the country as it cuts across primary, secondary schools and tertiary institutions. He said that many teachers in the country did not have basic computer appreciation skills and noted that the problem was a hindrance to efforts at achieving the use of computers for educational purposes in schools.

Busari (2006) is of the view that poor reading skills of science and technology students, the state of laboratory facilities, dearth of science text books affect effective teaching and learning of science subjects.

If physics Teachers and students in senior secondary schools are exposed to video and computer usage in classroom teachings, would it bring about an impact in teaching and learning of physics?

LITERATURE REVIEW

The use of information and communication technology (ICT) is becoming an integral part of Education in many parts of the globe. Nigeria is not left behind as ICT gradually finds its way unto the Educational systems despite chronic limitations brought about by economic disadvantages. Fundamentally, education is a discipline like any other; it is a branch of human knowledge which is basically concerned with getting the young in the society prepared when they come of age.

According to Gbamanja, (1989. p. 131), education is a process, which seeks to change the behavior of a learner. Overall, behaviorist view education as the process of changing the behavioral pattern of people. Behavior in this sense refers to the way we change the learner, his or her thinking, his or her feelings and his other overt actions (Hergenhahn & Olson 1997)

Thus education is the process by which society deliberately transmits its cultural heritage through schools, colleges, universities and other institution (Gbemanja 1989).

In order to achieve the above- mentioned purpose in education, information and communication technology (ICT) .one could argue is an essential ingredient that could help bring these gains and benefits to the fore.

Realistically, several researchers admitted that ICT have an impact in learning and teaching of science.

Globally, the use of information and communication technologies (ICTs) is fast gaining prominence and becoming one of the most important elements defining the basic competencies of student.

In Nigeria, science teaching at that various level still retains the old conservative approach and if this situation would change, there is need for a diagnostic study.

Many researchers have carried out research on the implication of ICT for science teaching.

However, the research works of Francisca Aladejana (2007). The implication of ICT and a new kind of science (NKS) will be reviewed.

The author in her work examines the attitude to the use of information and communication technologies (I.T.C.) and A New kind of science (NKS) for learning science among undergraduates from selected universities in Nigeria. She also tries to find out the impact of the use of simple

computer experiments on the learning of science and also assesses the availability of resource for this new paradigm.

Multiple research method was used including questionnaire, observation, discussion, and interview. Two questionnaires ARCAL to asses availability of resources was administered on 106 teachers from 25 secondary school.

The students' attitudes were measured using an adapted established instrument Selwyn-Soh information technology attitude scale(SSITAS) which was administered on 50 Obafemi Awolowo University (OAU) under graduates purposively selected based on having any basic science as their subject of specialization.

The five sub-scales of attitude assessed affective, usefulness, behaviour control and defense components, semi-structured interview of twenty (20) secondary school science teachers. Observation were carried out in the c asses often (10) secondary school science teachers.

Analysis was done using descriptive and inferential statistics. The rating of the sub scales and overall attitude are as follows; 0-20 very poor 21-40 poor , 41-60 good 61-80 very good.

The result of her work shows that; None of the teachers have heard about Nks and its relevance to science teaching.

1. 9.43% of the teacher asked student to browse on the internet
2. 2.83% of the teachers have used over-head projectors and 1.89% makes use of CD-ROM containing educational topics.
3. 20.0% of schools have one or two computer. While 4.0% have more than two computers.
4. None of the schools have laptop, LCD projector, video recorder, talking books, and roor robots.
5. 4.0% of the school has an overhead projector, 4.0% fixed line internet access.
6. 5.67% of teachers have personal computers used for business and commercial purposes.
7. Some students have access to computer and internet outside the school setting. Thus classroom are still very much traditional without much influence on ICT and NKS.

She made the following recommendation in her work thus;

1. Government should make converted effort to provide the required ICT facilities for secondary schools.
2. There is need for government policies to take care of issues such as class size.
3. Both pre-service and in service training are necessary.
4. NKS should be introduced to many other countries through workshops and seminars.
5. Lastly fear and apprehensiveness of learner must be allayed by teachers.

The role of technology in teaching and learning and is rapidly becoming one of the most important and widely discussed issues in contemporary education policy (Rosen and well. 1995; and Thierer. 2000). Most experts in the field of education agreed that, when properly used, information and communication technology hold great promise to improve teaching aid learning in addition to shaping work force opportunities.

Poole (199 S) has indicated that computer illiteracy now regard as the new illiteracy.

Many studies have found positive effect associated with technology aided

Instruction

Mcfarlane, A. Sakellarious, S., (2002).The role of ICT in science education which was published in Cambridge formal of education 32(2,) PP. 219-232.

The paper consider two perspectives on the relationship between the science curriculum and the potential of ICT in science education; the first perspective is based on the current English Secondary Science Curriculum, while the second look at how the role of ICT might be developed if the curriculum were to emphasize scientific reasoning rather than the practice of empirical science. It focuses on the use of ICT to support or replace practical work and the use of the internet as a tool for scientists reasoning.

The key findings of the research are as follows;

.Using ICT either as a tool in a practical investigation or as a substitute for the laboratory-based elements of an investigation can aid theoretical understanding.

.Electronic communications should be used not just to disseminate information but to create a community of learners.

Another researchers Osborne, J., Hennessy, S.,(2003).Literature review in science education and the role of ICT: promise, problem and future directions.

This paper reviews the current state of science education, the impact of ICT use on the curriculum, pedagogy and learning, and the implications there are diverse ways of linking ICT use to exiting classroom teaching, including supporting or replacing it.

The researcher made use of observation and questionnaire method. The questionnaire was administered on six (6) middle school teachers and 100 tenth grade pupils.

Descriptive statistics was used for the analysis. Also the research show that;

- Transformative use of ICT in science found only in isolated pocket.
- ICT many have a greater role to play in a curriculum that places greater emphasis on scientific reasoning and analytical skill.

The importance of ICT is quite evidence from the educational perspective. Though the chalkboard textbooks, radio/television and film have been used for educational purpose over the years, none has quite impacted on the educational process like computer. While television and film impact only on the audio visual facilities of users, the computer is capable of activating the senses of sight, hearing and touch of the users. ICT has the capacity to provide higher interactive potential for users to develop their individual, intellectual and creative ability.

Various researchers have carried out research work to show the impact of ICT in learning.

Among these is Belts, S. (2003) ICT contributions to quality learning in science at key stage 3. This research was conducted in United Kingdom (U.K.).

The study assesses the extent to which ICT contributes to quality in learning i i science at key stage 3.

The author considers the meaning of quality in the content of science education and identifies some of the indicators of quality.

Data's were drawn from test, interviews and observations; the study examines how ICT affect pupils understanding, their mental engagement and the context for learning. 117Key stage 3 pupils were used as sample for the research. The researches however come out jwith the following findings;

1. ICT offers particular opportunities to enhance learning by making more time available for predicting and searching for explanations.
2. ICT allows pupils to work at their own speed.
3. Lessons need to be structured according to the possible outcomes that a specific application of ICT allows in other to take full advantage of ICT.

BETTS, S. result suggested that ICT can enhance the quality of learning where its use is tailored to lesson objectives and the needs of pupils. In conclusion, the author presents a model for the possible use of ICT to increase the quality of learning in science.

Also, Huppert, J., et al., (2002). Computer simulation in the high school student cognitive stages science process skills and academic achievement in microbiology.

Huppert in the study investigates the impact of a biology simulation "the growth curve of micro-organism' on high school students' academic achievement and their science process skills.

The study focuses on the relations between academic achievement, mastery of process skills, gender and cognitive stages.

The research however, shows that the achievement of students using the stimulation was higher than those not using the stimulation, with girls achieving equally with boys. The stimulation was found to benefit students with low reasoning abilities in particular, enabling them to cope with learning scientific concepts and principles which requires high cognitive skill. A total of 181tenth grade pupils were sample for this research. The researcher 'vas able to conclude with the following findings. That;

1. Pupils in the stimulated learning environment exhibited complex and integrative reasoning.
2. The simulation provided a self-paced, non-competitive learning environment which allowed girls and boys to achieved equally.

3. The simulation allowed repetition of experiments which in turn aided understanding.

The most challenging aspect of the post industrial area is how to meet the demand of the information society that modern man is trying to build. The role of education in developing modern society cannot be over emphasized. Intact, society and education are highly interdependent. As society changes, the educational system has to change according (Westra and sleep, 2001).

Numerous researchers have carried out research on ICTs and teacher education.

However, the research works of Nwachukwu prince Ololube (2006), the secondary schools in Nigeria. Journal of information technology impact vol 6, no,2, and pp 101-118 will be review.

The research sets out to identify and evaluate the relevant strategies professional and non-professional ICT instructional material utilization competencies play in stimulating student' academic achievement during and after instruction. To achieve the purpose of his study, he employed several statistical procedures such as a four point Likert-type scale. The research questionnaire was divided into two sections. Section A and B.

Section "A" of the research questionnaire describe respondents' background information, these include: gender, age, status, subject's taught, academic qualification, professional qualification and length of service. While section "B" comprised of possible ICT instructional material utilization competencies .The research population used for the study was drawn from Rivers state (accessible) of Nigeria. The population comprises of ten (10) principals which is 3.3%, two hundred and seventy (270) subject heads and teachers which is 90% from ten (10) randomly selected secondary schools, as well as twenty (20) supervisors from the ministry of education and post primary school board. Out of the total number of respondents 76(which is 25.3%) were academically qualified, while 224 (that is, 74.7%) were professionally qualified. He uses several sets of statistical analyses such as S.P.S.S. Version 11.5 of a computer programmer; mean and standard deviation, ANOVA, T-test of significance and cross tabulation (N-300).One-way analysis of variance (ANOVA) was employed to test the relationship between variables and respondent's background and information. He tested the reliability of the research instrument used with crookbach alpha coefficient and a reliability coefficient of 0.91 was obtained;

His result shows that varieties of techniques are needed for teachers to effectively utilized ICT instructional material in the teaching and learning processes. Also, their were significant differences between academically qualified teachers and professionally qualified teachers in all the variables. Finally, cross tabulation was employed to test the degree of agreement and disagreement; 77.7% of the respondent agree that professionally qualified teachers are prone to effectively select, operate and apply the use of ICT instructional materials in the classroom environment compared to 22.3% of their counter parts who are academically qualified. In support of the result of his study, Abdal-Haqq (1995), Baker, et al (1995), and Lancaster (1999) also indicated in their research that teachers who are professionally trained demonstrate a sound understanding of information and communication technology (ICT) operations and concepts, use productivity tools to enhance professional tasks such as correspondence, assessment, classroom materials, presentation etc.

Teachers like any other professional workers need essential tools to do their work most excellently. Certainly, it is true that the central figures in any learning situation are always the students and the teachers .But it is equally true that learning may be greatly enhanced by the utilization of the many resources available in the school and through various school agencies.

Nevertheless, teacher's planning of effective learning activities will be easier, less time consuming and often vastly expanded in potential scope when teachers know precisely what type of ICT materials are available to them and when to draw upon them regularly to affect their teaching ability (Brown, Lewis and Harcleroad, 1959. p.47)

A lot of researchers have carried out research work on ICT impact on teacher and pedagogy. The work of Wetzel, D.R., (2001). A model for pedagogical and curricula. Transformation for the integration of technology in middle school science. His study investigates the factor that influenced five (5) middle school science teachers as they implemented and integrated calculator-based laboratory (C.B.L) probe -ware in the curriculum, the researcher made use of interviews/questionnaires, anecdotal records and observations of teachers. While the population sample comprises of five (5) middle school teachers in United States. His study presents a holistic view of the influences on the level of teacher technical proficiency with CBL probe ware, level of actual use during integration into curriculum, changes in pedagogy, and changes in organisational culture.

It also identities the contextual barriers to integration, including training in the use of the technology and pedagogical support. The finding of his study shows that 80% of participating teachers successfully integrated C.B.L. probe ware into their teaching. Also it was found that there are barrier to the integration of CBL probe ware and such barriers includes; lack of time for training, lack of CBL resources, lack of support by the school system.

PURPOSE OF STUDY

This study investigated the extent of the impact of ICT on teaching and learning of physics and found out whether students were taught physics with the use of ICT materials such as computer system, internet facilities, projectile, video player etc performed better than those taught with textbook only.

RESEARCH HYPOTHESIS

H0₁ ICT will not have any significant impact on teaching and learning of physics.

H0₂ Introduction of ICT does not make physics class so interesting.

H0₃ ICT will have no significant effect in improving the students learning and knowledge in physics.

METHODS

The descriptive survey design was adopted for this study. The study was directed at the population of senior secondary physics students and teachers from five out of six educational districts in Lagos state. Two teachers and twenty students were randomly selected from two senior secondary schools that were selected through stratified random sampling technique across the five educational districts. The schools included single sex and co-educational senior secondary schools. In all, a total of 200 students and 20 teachers formed the study sample.

INSTRUMENT

Data were collected using two basic instruments namely: Information and Communication Technology Impact on Teaching (ICTIT) and Learning Questionnaire (LQ). The first instrument was a structured questionnaire that featured section A and B. Section A was used to collect information on respondents' biodata (gender, age, class, local educational district and name of school. Length of service and academic qualification were included in the teachers' questionnaire.) The section B contained 20 items statement developed on a five (5) point Likert scale. The statistical treatment of data collected was analyzed using statistical packages for social science (SPSS) and these include: Simple percentages Chi – Square. In compliance with (Nworgu 1991) a pre –test of the instrument was carried out and tested with Cronbach alpha coefficient and a reliability coefficient of 0.91 was obtained, which showed a strong reliability of the research instrument (Sanders, Lewis and Thornhill,2000).

DATA ANALYSIS

The data analysis and results are presented with special reference to the research hypothesis in the study.

H0₁: ICT will not have any significant impact on teaching and learning of physics.

In testing the above hypothesis, Chi-square statistics was adopted using question asked to ascertain the use of ICT in enhancing teaching and learning of physics. The results are presented in the table below:

Table 1

| RESPONDENT | SD | D | U | A | SA | TOTAL |
|------------|----|----|----|----|----|-------|
| STUDENT 3 | 16 | 24 | 6 | 83 | 28 | 157 |
| TEACHERS | 1 | 1 | 6 | 5 | 7 | 20 |
| TOTAL | 17 | 25 | 12 | 88 | 35 | 177 |

The respond to statement " The use of ICT enhances my method of teaching of Physics" (teacher questionnaire) and "the introduction of ICT produces positive impact in the learning of physics" (students' questionnaire) produced the figures above. These figures are analyzed as follows:

Table 2

| 0 | E | 0-E | (0 - E)2 | (0 - E)2 /E |
|----|------|------|----------|-------------|
| 16 | 15.1 | 0.9 | 0.81 | 0.0536 |
| 24 | 22.5 | 1.8 | 3.24 | 0.1460 |
| 6 | 10.6 | -4.6 | 21.16 | 1.9962 |
| 83 | 78.1 | 4.9 | 24.01 | 0.3074 |
| 28 | 31.1 | -3.1 | 9.61 | 0.3090 |
| 1 | 1.9 | -0.9 | 0.81 | 0.4263 |
| 1 | 2.8 | -1.8 | 3.24 | 1.1571 |
| 6 | 1.4 | 4.6 | 21.16 | 15.1143 |
| 5 | 9.9 | -4.9 | 24.01 | 2.4253 |
| 7 | 4.0 | 3.0 | 9.00 | 2.2500 |
| | | | | 24.1852 |

Using df = 4, level of significance = 0.05 and table value of 5.99.

Evidence from the table above shows that the calculated Chi-square of 24.19 was greater than critical Chi-square of 5.99. This was significance at 75% confidence interval. Thus the use of ICT has enhances teaching and learning of physics, the null hypothesis is rejected while the alternate hypothesis is accepted.

H02: THE INTRODUCTION OF ICT DOES NOT MAKE PHYSICS CLASS SO INTERESTING.

Table 3

| Respondent | SD | D | U | A | SA | Total |
|------------|----|----|----|----|----|-------|
| Students | 27 | 80 | 19 | 21 | 10 | 157 |
| Teachers | 6 | 5 | 9 | - | - | 20 |
| Total | 33 | 85 | 28 | 21 | 10 | 177 |

The above table was generated from the respond of the teachers and students questionnaire.

Students' questionnaire: The use of multi-media projector makes learning of physics boring to me.

Teachers' questionnaire: usage of ICT makes my physics class boring.

The analysis of the above table is as follows;

Table 4

| 0 | E | 0E | (0-E)2 | (0-E)2/E |
|----|------|------|--------|----------|
| 27 | 29.3 | -2.3 | 5.29 | 0.1806 |
| 80 | 78.1 | 1.9 | 3.61 | 0.0462 |
| 19 | 24.8 | -5.8 | 33.64 | 1.3565 |
| 21 | 18.6 | 2.4 | 5.76 | 0.3097 |
| 10 | 8.9 | 1.1 | 1.21 | 0.1360 |
| 6 | 2.9 | 3.1 | 9.61 | 0.4160 |
| 5 | 9.6 | -4.6 | 21.16 | 2.2042 |
| 9 | 3.2 | 5.8 | 33.64 | 10.5125 |
| 0 | 2.4 | -2.4 | 5.76 | 2.4000 |
| 0 | 1.1 | 1.1 | 1.21 | 0.1360 |
| | | | | 17.6977 |

Calculate value = 17.70 and table value = 5.99 using df = 4, level of significant = 0.05.

Evidence from table iv above shows that the calculated chi-square of 17.70 ^as greater than critical chi-square of 5.99. This was significance at 66% confidence interval. Thus the use ICT has makes teaching of physics interesting, the null hypothesis is rejected while the alternate hypothesis is accepted. Also it implies that, the introduction of ICT make physics class so interesting.

H0₃: ICT will have no significant effect in improving the students learning and knowledge in physics.

Table 5

| Respondent | SD | D | U | A | SA | TOTAL |
|------------|----|----|----|----|----|-------|
| Students | 7 | 15 | 15 | 95 | 25 | 157 |
| Teachers | 2 | 1 | 3 | 2 | 12 | 20 |
| Total | 9 | 16 | 18 | 97 | 37 | 177 |

The respond to the statement "the knowledge require in physics should be gotten from the use of ICT". (teachers questionnaire and "ICT improve the knowledge of physics you acquire" (students questionnaire) generated the data in table v above the analysis the result is as follows:

Table 6

| 0 | E | 0-E | $(0-E)^2$ | $(0-e)2/E$ |
|----|------|------|-----------|------------|
| 7 | 8.0 | -1.0 | 1.00 | 0.1250 |
| 15 | 14.2 | 0.8 | 0.64 | 0.0451 |
| 15 | 16.0 | -1.0 | 1.00 | 0.0625 |
| 95 | 86.0 | 9.0 | 81.00 | 0.9419 |
| 25 | 32.8 | -7.8 | 60.84 | 1.8549 |
| 2 | 1.0 | -1.0 | 1.00 | 1.0000 |
| 1 | 1.8 | -0.8 | 0.64 | 0.3556 |
| 3 | 2.0 | 1.0 | 1.00 | 0.5000 |
| 2 | 11.0 | -9.0 | 81.00 | 7.3637 |
| 12 | 4.2 | 7.8 | 60.84 | 14.4807 |
| | | | | 26.7344 |

Using df = 4, level of significance = 0.05 and table value of 5.99.

Evidence from table vi above shows that the calculated Chi-square of 26.73 v/as greater than critical Chi-square of 5.99. This was at significance at 78% confidence interval. Thus most teachers agreed that the knowledge required in physics should be gotten from the use of ICT, the null hypothesis is rejected while the alternate hypothesis is accepted. This means that information and communication technology have significant effect in improving the students' knowledge in physics. Since the world today is being running on communication Medias such as internet which can share information from person to another person from different part of the would, without leaving where he is or travel to that country, simply because of ideal of communication. This allow us to get more facts on the new discovery of physics.

DISCUSSION

It was established from the review of relevant literature that there are always some basic skills and knowledge derived from Information and Communication Technology which are very useful in the teaching and learning of physics in our senior secondary schools.

The physics skills which involves the use of graph without the use of pen and paper, derivation of formula's in physics with the use of internet, solving problems using different methods, introduction of Electronic computer system into the learning and teaching of physics. E.t.c.

Since these sets of skills are unavoidable for effective understanding of physics via with the use of Information and Communication Technology, the study was set to provide answers to the following questions.

1. Information and Communication Technology will not have any significant impact on teaching and learning of physics?
2. Introduction of Information and Communication Technology does not make physics class so interesting?
3. Information and Communication Technology will have no significant effect in improving the students' learning and knowledge in Physics?

To provide answers to these questions one hundred and fifty -seven students from senior secondary school were sampled from two secondary schools each from five out of the six educational districts in Lagos State.

These secondary schools are equipped with electronic computer system connected to internet.

Questionnaire tagged ICTITLQ was designed for both teachers and students to know the level of their familiarity with Information and Communication Technology and to know the impact of information and communication Technology in the teaching and learning of Physics. Both the teachers' questionnaire and students' questionnaire was administered.

The results of the study however indicated that students performed better in physics when Information and Communication Technology is been applied in the teaching and learning of physics.

This is because their response from the questionnaire shows that the students prefer the use of ICT in teaching and learning of physics.

From the responses of the teachers in these sampled secondary schools, it shows that teachers enjoy teaching physics using ICT because it also add to their understanding and make their students to perform better in the subject.

CONCLUSION

It is clear that Lagos state and indeed the country has no smooth running of education system. Infact, all levels of education are plague with catalogue of problems ranging from under funding to under management or mismanagement. There is no way for our society to go except in the direction of more science, more introduction of technologies, more manipulation and control by man on the aspects of physical environment.

If our schools throughout the country are to maintain maximum educational standards, they should be provided with adequate funds, infrastructural facilities in terms of modern classrooms equipped with electronic computer system which are connected to internet, well equipped laboratories, workshops, libraries, instructional materials and highly qualified personnel that can effectively utilize these resources. With the introduction of information and communication Technology, a new challenge for science and physics education has emerged.

Information and communication Technology is significant because -t is necessary for the development of our educational system. Therefore, there is no doubt that the world are in the grip of a telecommunications resolution. This means that we are at the advantage to develop our educational system to meet the demand of other developed countries. So the need for information and communication Technology is of great advantage for our schools.

Schools should be introduced to ICT so that government will pay more attention to educational system of the country and provide necessary support to the growing trend of education to meet the standard of the developed countries.

Finally, our secondary school students should be given the best in education with modem facilities which will in turn draw out the best in every student and ensures the utility of these students to the development of Nigeria and the world at large.

The major focus of the study was actually to evaluate the impact of Information and Communication Technology on teaching and learning of physics in our senior secondary schools. Based on this investigation, it is considered very important to make the following recommendations:

1. Government should encourage and put in incentive to attract state, local, international bodies and non-governmental organizations (NGOs) to invest on ICT related projects in secondary schools.
2. ICT equipment and facilities should be made available to all secondary schools.
3. Only qualified and competence physics teachers should be employed to teach in our secondary schools.
4. Those teachers that are not ICT compliance should be encourage to study further in order to meet up with the new demand.
5. Attention should be paid to the deploring state of facilities in our secondary schools. Also ICT system together with necessary peripherals should be bought. This will enhance the teaching and learning of physics and allow discovery of more facts.

6. Conferences, seminars and workshops and relevant programmes should be organized by professionals of ICT to teach physics teachers and science teachers on modern technology and its uses.
7. Since ICT depends largely on power supply, the erratic power supply needs to be improved upon throughout the country. Also schools authority should improvise for alternative source of power supply such as generator set in case of power failure.
8. ICT relevant curriculum should be developed specially for primary schools, secondary schools and tertiary institutions.
9. Establishing facilities for electronic distance learning networks opportunities in our schools.
10. Standardization, focused spectrum management, engaging and mastering the internet and knowledge about networks.
11. Improved national security and protection of life and human worthiness at all levels.
12. Introduction of electronic computer system into classrooms in which the teacher can use to teach the students, how to operate computers, so that they can do it on their own.
13. Creating ICT Application, content and domesticating technology through a conscious Research Design and Development (RD & D) strategy, advocacy and activities for students.

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