



Original Research Article

Effect of Information and Communication Technology (ICT) on students' interest in basic electricity

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This study investigated the effect of information and communications technology (ICT) on student's interest in basic electricity in technical colleges in Rivers State. The interest of students' taught with ICT was compared with that of those taught with the conventional teaching methods (CTM). Three research questions guided the study while three null hypotheses were tested at .05 level of significance. A quasi-experimental design was used. Population of the study was 123 students. Basic electricity interest inventory (BEII) instrument was developed, validated and used for data collection. Reliability of BEII was .94. Mean and standard deviation were used to answer the research questions while ANCOVA was used to test the hypotheses. Findings of the study revealed that ICT has significant effect on students' interest in basic electricity. The effect of ICT and gender combined in students' interest in basic electricity was significant. ICT is a necessary instructional technique to enhance students' interest. It is recommended that government and professional bodies like Nigerian Association of Teachers of Technology (NATT) should organize workshops, conferences and seminars as to train and encourage teachers on the use of this innovative technique.

Key words: Information and communication technology, students, interest, basic electricity.

INTRODUCTION

Today, new theories and approaches (e.g. constructivism, multiple intelligence, active learning, and inquiry based learning) are put forward to eliminate the limitation of the traditional way of teaching and to improve the quality of instruction. Various theoretical and practical studies are carried out to come up with diverse and efficient ways of teaching. One of these is the use of information and communications technology (ICT) in education.

Information and communications technology is a set of activities that is facilitated by means of electronic means; for capturing, storage, processing, transmission and display of information. It is the combination of the computer, telecommunication and media technologies (UNESCO, in Shobowale and Akinwale 2011). ICT is the technology of creating, processing, storage, retrieval and transmission of data and information. This includes combining

telecommunications, satellite technologies, electrical and electronic (hardware) and electronic computing (software). ICT also include all forms of computer mediated communication that researchers can benefit from and eventually will be able to teach their pupils/students at any level. Examples are: Computer application, e-mail, audio-video conferencing, e-learning, multiuser among others.

The use of information and communication technology in teaching apparently facilitates both the effort of the teacher as well as that of the learner, as the entire world is said to have been globally connected, it then follows that connectivity has no exception. The information and communication technology tools required in education among others include computers and the internet. Computers are used to present instruction by the means of a modern teaching method known as computer assisted

instruction (CAI).

Computer assisted instruction (CAI) is an automated instructional technique in which a computer (electronic machine) is used to present an instructional programme to the learners through an interactive process in the computer (Ajelabi in Okorieocha, 2010). According to Bontempi and Hazelwood (2003), one of the most powerful features of CAI is its capacity to individualize instruction to meet the specific needs of the learner. Computer assisted instruction consists of the five modes of course which are tutorial, drill, problem solving, game and simulation (Simi in Okorieocha, 2010). Tutorial mode of CAI is the use of any computer application to present material to a learner working alone or in a small group independent of time and space constraints (Hardbeck et al., 2007). The use of a computer assisted instruction tutorial in a CD-ROM is ideal to improve the conventional teaching methods.

Conventional teaching methods are instruction strategies which make the teacher more active and the learner passive participant in the teaching learning environment (Awotua-Efebo, 1999). Teaching methods like lecture, discussion, and role-playing among others are classified as conventional teaching methods (Nwizu and Nwobi (2006) maintained that lecture method makes the instruction boring and the facilitator cannot carry the audience along. Conventional teaching methods are employed in the technical education programme.

Studies have shown decline in students' enrolment into technical education programme mainly in the technical colleges in Nigeria. Aina (2000) stressed that a close examination of the factors responsible for the decline indicates that technical education is no longer attractive to youths because of poor teaching, poor instructional techniques and scanty infrastructural facilities, hence no interest in technical education programme.

Technical education refers to those aspects of educational process involving, in addition to general education, the study of technologies and related sciences and acquisition of practical skills, attitudes, understanding and knowledge relating to occupation in various sectors of economic and social life (Federal Republic of Nigeria, 2004). The range of courses in the technical education programme as obtained in the technical colleges includes electrical installation and maintenance work, building construction, welding and fabrication, motor vehicle maintenance and basic electricity.

Contents of basic electricity dwell in principle of electricity which involves calculations mainly. Students perform poorly in this subject at the National Technical Certificate (NTC) examination. According to NABTEB (2006, and 2004) credit pass of students in basic electricity was very low and quite unimpressive.

Students' poor performance in some subjects in the views of Okpara (1995) may be related to lack of interest and commitment to their studies and inadequate support from parents and even the government, all that teachers are use to is the conventional talk or lecture method rather than strategies that involve students' participation.

Consequently, students lose interest in learning and hence low academic achievement.

Interest is referred to as persisting tendency to pay attention and enjoy some activities or content of interest if it is pleasing and engaging ones attention (Hilary, Atkinson and Atkinson in Olikeze, 1999). Njoku (1997) maintained that interest in any activity or object can be sustained depending on what the individual whose interest is engaged stands to gain or lose by so doing.

Statement of the Problem

It has become apparently obvious that there is an astronomical decline in students' interest in basic electricity in technical colleges in Rivers State. Lack of success can lead to inappropriate behaviour and frustration on the part of students (Umunadi, 2009). Daramola and Emmanuel (2000) pointed out that this unsatisfactory situation could lead to breakdown in the economic, industrial, technological and educational growth of a nation since the main goal of technical education is to enhance self reliance. Besides, technical education is also geared towards skill acquisition. It is sad to note that technical education graduates no longer possess the needed employable skills expected of them. This makes it difficult for the graduates to secure jobs in companies and industries, on completion of their courses of study thereby contributing to an increase in the unemployment rate of the nation. The problem of this study posed as a question is how does information and communications technology affect the interest of students' in basic electricity as compared to classes using only conventional teaching methods?

Purpose of the Study

The major purpose of the study was to determine the effect of information and communications technology on students' interest in basic electricity. Specifically, the study sought out to:

- i. compare the mean interest scores of students taught basic electricity using information and communications technology and those taught with conventional teaching methods.
- ii. ascertain whether there are differences in the overall interest scores of female and male students exposed to ICT.
- iii. determine the extent to which treatment gender interaction affect students' interest in basic electricity.

Hypotheses

- i. There is no significant difference in the mean interest scores of students taught basic electricity with ICT and CTM.
- ii. There is no significant difference in the mean interest scores of female and male students taught basic electricity with ICT.

iii. There is no significant difference in the treatment gender interaction effect on students' interest in basic electricity.

Literature Review

Interest according to Okoro (2016) refers to activities or things, a person likes or dislikes. It is the act of showing favourable curiosity or concern about somebody or something. Students' interest in the learning tasks determines their learning styles and cognition; which in turn determine students mean terminal cognitive achievement. The major determinant of students' interest in the learning task on any subject matter is the existing instructional system or teaching methods adopted by teaches especially in science based subjects. Traditional teaching methods are teacher centered and therefore do not involve the active participation of the learners in the teaching learning process thereby retarding students interest (Eze, 2005). As teacher-centered instructional methods and strategies retard students interest in science subjects; it also hinders students interest in Basic Electricity.

Poor students' interest in Basic Electricity has far reaching negative effects on the national technological advancement Ogwa (2002) posited that there is nowhere in which technological advancement and explosion is more apparent than in the field of electrical electronics. This is absolutely true because the present civilization and technological advancement world over are basically electrical and electronics advancement and breakthrough such high sounding terms as globalization, internet computers', industrial drive/mass production, satellite communications, radar communication/general telecommunications e-learning, e-commerce, e-banking among others are all through electrically electronics breakthrough of which basic electricity is the basic.

Hence, poor students, interest in the study of Basic Electricity at the secondary education level spells doom on the nation. Low interest in general terms signifies that the students will have poor outlook in all aspects or dimensions of interest in Basic Electricity. This will lead to loss of technical manpower in all service areas of electricity electronics by the time the students would have graduated and be in the world of work.

For the above danger to the national economy Ogwa (2002) maintained that qualitative instruction is imperative. Only dynamic instructional strategy can help improve students' interest in Basic Electricity and thereby reduce the resultant enrolment attrition, students dropout from programme. Tinio (2002) opined that for developing countries like Nigeria, Information And Communication Technology (ICT) has the potential for increase access to and improving the relevance and quality education.

ICT can enhance the quality of education by increasing learner motivation and teacher training the transmission of basic skills and concepts which are the foundation of higher order thinking skills can be facilitated by ICTs through drill

and practice. Furtherance, on the relevance of ICT in education revealed that ICT stimulates interest in experimenting with emerging technology, increase emphasis an individualized instruction, less directive and more students-centered teaching among others (Hannafin and Savenye) Okorieocha (2010).

METHODS

The study employed a quasi experimental design, specifically the non-randomized control group design involving two groups. The design is also termed 2×2 factorial design involving two independent variables (interest and gender). The factor gender has male and female as its levels. The study was conducted in two technical colleges in Rivers State. They are Government Technical College, Ele-Ogu and Government Technical College, Port Harcourt. The population of the study comprised all the National Technical Certificate (NTC) II students in the Technical Colleges in Rivers State. They were 123 in number made up of 150 males and 62 females. The population of the study comprised all the NTC II Basic Electricity students in the technical colleges in Rivers State.

The choice of National Technical Certificate II students was based on the topics for the study which fell within NTC II Basic Electricity curriculum. Besides, evidence by NABTEB Chief Examiner's Report has shown that students in the state have consistently recorded low achievement in basic electricity. The study adopted purposive sampling technique. This is due to the fact that out of the four technical colleges in the state only two of them have information and communications technology (ICT) facilities and therefore were used for the study. Both the information and communications technology and conventional teaching methods groups were in the same school.

The technical colleges used for the study were Government Technical College, Ele-Ogu and Government Technical College, Port Harcourt. At the end of the study it was discovered that only 12 students fully participated by taking part in both pre-test and post-test. At the Government Technical College, Ele-Ogu the ICT group was made up of 14 males and 7 female while the CTM group comprised of 17 males and 8 females giving a total of 46 subjects from the school. At the Government Technical College, Port - Harcourt the ICT group was made up of 18 males and 10 females while the CTM group consisted of 30 males and 19 females, totaling 77 subjects from the school. Since other instruments cannot be used to record the evidence of learning curiosity, concern, feelings or desires of the students caused by the teaching behaviour of the teacher, there is need for students' interest inventory. The Basic Electricity Interest Inventory (BEII) was an interest measure designed to elicit students' like and dislikes that could amuse their curiosity and desire to learn as the teacher teaches. The Basic Electricity Interest Inventory is students' self-report questionnaire designed for the study. The items were worded in such a way that the respondents

(students) cannot easily guess the purpose of the questions. The instrument made up of 30 items used a summated five point scale positively cued as follows: Strongly Disagree (SD) = 1; Disagree (D) = 2; Undecided (UD) = 3; Agree (A) = 4 and Strongly Agree (SA) = 5. The instrument (Basic Electricity Interest Inventory (BEII)) was pilot tested on 30NTC II students of Government Technical College, Ekowe, Bayelsa State. The reliability of the instrument was determined by computing the Cronbach Alpha internal consistency of the pilot test scores of the items which was found to be 0.94. The research questions were answered using mean and standard deviations.

The hypotheses were tested at 0.05 level of significance, using a 2x2 (mode of instrument x gender) analysis of covariance (ANCOVA). The pre-interest score was used as covariate or control measure to the post interest scores. The statistical package for the social sciences (SPSS) computer analysis software package was used for all data analysis in this study.

RESULTS

The findings of this study are presented in accordance with the research questions and hypotheses.

Research Question 1

What are the mean interest scores of students taught with ICT and CTM in basic electricity interest inventory?

Table 1 revealed that students taught with ICT had mean post interest score of 4.36 with a standard deviation of .31 while those taught using CTM had mean post interest score of 3.46 with a standard deviation of .71. This implies that students in the experimental group showed more interest in the basic electricity lessons than their counterparts in the control group.

Research Question 2

What is the difference in the overall interest mean scores of female and male students taught with ICT?

Data on Table 2 revealed that female students taught basic electricity with ICT had post-interest mean score of 4.26 with a standard deviation of .44 while their male counterparts had a post-interest mean score of 3.86 with a standard deviation of .25. This implies that both female and male students showed interest in the subject with mean scores above 3.50. From the pre-interest, post-interest mean gain, the female students have mean gain of .93 while the male students have mean gain of .50. This indicates that to an extent female students are more interested in the subject than the male students.

Research Question 3

To what extent would treatment-gender affect the interest of students in basic electricity?

Table 3 revealed that students in the experimental group had mean interest score of 4.06 while their counterparts in the control group had mean interest score of 3.43. The overall score of female subjects is 3.8 while that of the males is 3.69. This simply indicates that with respect to treatment gender interaction, female students have greater interest in basic electricity than their male counterparts because they have a mean difference of 0.11 more than the male students.

Hypothesis 1

There is no significant difference in the mean interest scores of students taught basic electricity with ICT and CTM.

Table 4 showed that the f-calculated for group is 28.651 at a significant level of .000. The hypothesis being tested at .05 significant level is higher than .000. It implies that the null hypothesis 1 is rejected. This means that there is significant difference in the mean interest scores of students taught basic electricity with ICT and CTM.

Hypothesis 2

There is no significant difference in the mean interest scores of female and male students taught basic electricity using ICT.

Result on Table 4 indicates that gender (sex) is a significant factor in students' interest in basic electricity. The calculated f-ratio is 4.559 at 0.35 significant level. The hypothesis being tested at .05 significant level is higher than .035. This implies that the null hypothesis 2 is rejected. This means that there is significant difference in the mean interest scores of female and male students taught basic electricity with the information and communication technology tools.

Hypothesis 3

There is no significant difference in the treatment gender interaction effect on students' interest in basic electricity.

Table 4 revealed that the relationship between teaching methods and gender has f-cal value of 7.697 at 0.006 level of significance which is less than .05 significant level. It implies that the null hypothesis is rejected. It means that there is significant difference in the treatment gender interaction effect on students' interest in basic electricity. This means that teaching method employed, enhanced students interest in basic electricity as a subject. That is, the information and communication technology made both male and female subjects in the group to have more interest in the lessons delivered than those taught with the conventional teaching methods.

DISCUSSION

Information from the present study revealed that students

Table 1. Mean interest scores of students taught with ICT and CTN in Basic Electricity Interest Inventory (BEII)

Group	Test	N	Mean	Standard Deviation	Mean Gain
Experimental (ICT)	Pre-interest	49	3.3522	.2946	1.0072
	Post-interest	49	4.3594	.3120	
Control (CTM)	Pre-interest	74	3.1710	.6583	.2861
	Post-interest	74	3.4571	.7190	

Table 2. Mean Interest Scores of Female and Male students taught with ICT

Gender	Test	N	Mean	Standard Deviation	Pre-Interest	Post-Interest	(Mean Gain)
Female	Pre-interest	17	3.3357	.2946			.9276
	Post-interest	17	4.2633	.4382			
Male	Pre-interest	32	3.3594	.2987			.4979
	Post-interest	32	3.8573	.2464			

Table 3. Overall Interest Mean Scores of Male and Female Students Based on Treatment-Gender Interaction

Gender		Experimental	Control	Overall
Male	Mean	3.8573	3.5306	3.6939
	SD	.2464	.5965	.4215
	N	32	47	79
Female	Mean	4.2633	3.3356	3.7995
	SD	.4382	.8839	.6611
	N	17	27	44
Total	Mean	4.0603	3.4331	3.7467
	SD	.3119	.7189	.5154
	N	49	74	123

Table 4. Analysis of Covariance (ANCOVA) of Students Post-Interest Scores in Basic Electricity Interest Inventory (BEII)

Source	Sum of Square	df	Mean Square	f-cal	Sig.
Corrected Model	41.557	4	10.389	181.092	.000
Intercept	.567	1	.567	9.886	.002
Pretest	36.209	1	36.209	631.1587	.000
Group	1.644	1	1.644	28.65*	.000
Sex	.262	1	.262	4.559*	.035
Group x Sex	.442	1	.442	7.697*	.006
Error	6.770	118	.057		
Total	1649.133	123			
Corrected total	48.326	122			

Significant at P<0.05

taught using ICT showed significant interest towards basic electricity than those taught with CTM. The findings with respect to students interest agreed with that of Ifeakor(2005) who observed that students taught with commercial produced computer assisted instruction package (CPCAIP) showed higher interest in chemistry concepts than students taught with CTM. This means that mode of instructions has significant effect on the interest rating of students. The high overall interest rate displayed by the treatment group against the control group may be as a result of the fact that manipulating the computer as a mechanical device involves some activities and is also

exciting. According to Jersild and Tasch in Ifeakor (2005) children's interest is also as a result of learning opportunities. This peculiar learning opportunity of ICT could have aroused students' interest. Hence, it will be justified to say that ICT computer assisted instruction has the ability of arousing and sustaining students' interest in basic electricity.

The study further revealed that gender has significant influence on the interest demonstrated by students toward basic electricity. This finding is in consonance with that of Anaekwe (1997), Ifeakor (1999) and Olikeze (1999) who reported statistically significant effect of gender in

students' development of interest in Chemistry and Biology respectively. They noted that female students showed greater interest in the subjects than male students.

On the combined effect of ICT and gender on students' interest, there was significant effect. This is not in conformity with Anaekwe (1997) who found the combined effects on students' interaction pattern and gender on students' interest towards chemistry not significant. This implies that the relative efficacy of ICT on students' interest was no consistent across sex levels.

Conclusion

This study indicates that the use of information and communications technology computer assisted instruction produced a higher level of interest in basic electricity by the students in the schools used for the study. There was a statistically significant difference between the experimental and control groups. The combined effect of ICT and gender on students' was significant. Female students showed more interest in the subject than the male students. There was a statistical difference between the female and male subjects in the experimental group with respect to their interest in basic electricity as their values were below the probability level of .05. Hence, ICT should be employed as an instructional method in technical colleges to enhance students interest in the programme.

Recommendations

In view of the research findings, the following recommendations are made.

1. Since the use of ICT has been found to enhance students interest in basic electricity, the subject teachers should be encouraged to employ it more to teach the subject.
2. There should be seminars, conferences and workshops organized by the government and professional bodies like the Nigerian Association of Teachers of Technology (NATT) and Science Teachers Association of Nigeria (STAN) for teachers in the use of information and communication technology.
3. Basic electricity teachers should pay attention to the issue of gender differences in the classroom. They should try at all cost to eliminate contents, instructional techniques and materials that will introduce gender differences in the classroom.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of the paper

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