

EFFECTS OF INFORMATION COMMUNICATION TECHNOLOGY (ICT) ON CLASS PARTICIPATION AND ACADEMIC ACHIEVEMENT AMONG SECONDARY SCHOOL STUDENTS

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Abstract

The study was conducted to investigate the effects of Information and Communication Technology (ICT) on class participation and academic achievement among secondary school students. The sample consisted of 80 secondary school students in Christ the King College, Onitsha, drawn through cluster and simple random sample techniques, with three research questions and three null hypotheses that guided the study. The design adopted for the study was quasi-experimental, pretest and posttest non-equivalent control group design, involving one treatment and one control group. Instrument for data collection were Classroom Participation Rating Scale (CPRS) and Academic Achievement Questionnaire (AAQ) with a reliability coefficient of $r = .75$. Mean (\bar{X}) and standard deviation (SD) scores were used to answer the research questions while Analysis of covariance (ANCOVA) was used to test the null hypotheses at 0.05 level of significant. The results as F-value = 2.622E3, $df = (1, 77)$, $p (.000) < 0.05$, F-value = 1.040E4, $df = (1, 77)$, $p (.000) < 0.05$ and F-value = 126.897, $df (1, 77)$, $p (.000) < 0.05$ obtained indicate that there is significant difference in the effects of ICT tools' efficiency among students in the experimental and control groups in both class participation and academic achievement as well as in the relationship of class participation and academic achievement due to ICT tools' efficiency treatment respectively. Based on the findings of the study, recommendations were made, including: that the students will be well informed/trained on the ICT learning strategies as to explore, imply, monitor, analyze and evaluate their own learning

using adequate and appropriate problem-solving strategies for adequate improvement in their intellectual functioning, while teachers only scaffold and facilitate.

Education is the process of developing the capacities and potentials of the individual so as to prepare that individual to be successful and useful to the society and to oneself. Education in its broadest sense may be defined as a process designed to inculcate the knowledge, skills and attitudes necessary to enable individuals to cope effectively within their environment. Achieving this goal requires understanding of commitment to the position that education is a primary instrument for social and economic advancement of human welfare (Verma, 1990).

Academic achievement or (academic) performance is the outcome of education, the extent to which a student, teacher or institution has achieved their educational goals. Academic achievement refers to how students deal with their studies; accomplish different tasks given by their teachers or how well they pass their examinations. In line with the above assertion, academic achievement according to Wikipedia, (2009, p. 58) is "the ability to study and remember facts and being able to communicate your knowledge verbally or down on paper".

As of great concern in the Education sector since after the civil war is that teachers and schools are failing to help children acquire the knowledge, skills, and dispositions that are crucial for life outside school and in the workplace. In support of this assertion, Maduabum (1994) rightly pointed out that poor

academic performance is traced to as far back as the 1960s. A report published by the West African Examination Council (W.A.E.C) on mathematics and English Language Examinations conducted between 2003 and 2007 reported in Amadi (2007) indicates a high failure rate Mathematics and English language. Also currently in August, 15th 2011, W.A.E.C published their 2011 S.S.C.E results showing 30% pass in Mathematics. This is an important phenomenon that needs to be arrested because poor academic achievement is known to culminate in other problems which can be detrimental to the economic, social, and behavioural aspects of the society. Nwankwo (2006, p. 5), in support of the above assertion emphasized that, "Poor quality achievement in academic field is later transferred to the occupational sectors of a nation's Economy".

Experiences reveal that students are very lazy and only depend on their teachers' traditional direct instructional strategies. The challenge faced now is how to make the learning in schools more active, more authentic, more useful, and more contextualized for students so that they will participate actively during lessons and therefore be well equipped to solve problems that they confront in and beyond school. Active learners are self-propelled and activity learners, who possess relevant skills which enhance their ability to construct knowledge, assume responsibility for their own learning and realize that learning is not only a personal experience but interactive activity that requires active and dedicated class participation.

Outside school, children engage confidently with ICT in their social and creative lives. It seems inevitable that classroom will, in time, reflect these changing lifestyle patterns. While the advent of ICT integration in the classroom can be daunting, we are all aware that it can be a huge positive

addition to the learning environment. Information and Communication Technology (ICT) refers to technologies that provide access to information through telecommunication. This includes the internet, wireless networks, cell phones, and other communication mediums. ICT (Information and Communication Technology) is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as video-conferencing and distance learning. Some researchers have suggested that effective use of ICT is embedded in a large process of school change (Honey, Culp Carrigg, 2000); and that the effect of ICT implementation needs to be examined as part of multifaceted school reforms rather than in isolation (Bober, 2002). However, the impact on education is just beginning to be felt as students integrate this new technology into their learning. In view of all these findings, the researchers intended to ascertain empirically the effect of ICT on classroom participation which can lead to the creation of a more dynamic, rewarding and productive learning environment leading to high academic achievement.

The purpose of the study is to determine the effects of Information and Communication Technology (ICT) on class participation and academic achievement of students in the experimental and control groups as measured by their pretest and posttest scores in Class Participation Rating Scale (CPRS) and Academic Achievement Questionnaire (AAQ). The study will bring about improvement in the intellectual functioning for the betterment of the individual and the society at large.

Research Questions

1. What is the difference of the effect of Information and Communication Technology (ICT) tools' efficiency on class

- participation of students in the experimental and control groups as measured by their pretest and posttest scores in the Class Participation Rating Scale (CPRS)?
2. What is the difference of the effect of Information and Communication Technology (ICT) tools' efficiency on academic achievement of students in the experimental and control groups as measured by their pretest and posttest scores in the Academic Achievement Questionnaire (AAQ)?
 3. What is the relationship of the effect of Information and Communication Technology (ICT) tools' efficiency on class participation and academic achievement of students in the experimental group on as measured by their pretest and posttest scores in Classroom Participation Rating Scale (CPRS) and Academic Achievement Questionnaire (AAQ)?

Hypotheses

The understated null hypotheses were tested at the 0.05 levels of significance to facilitate decision making in the study.

1. There is no significance difference of the effect of Information and Communication Technology (ICT) tools' efficiency on class participation of students in the experimental and control groups as measured by their pretest and posttest scores in the Class Participation Rating Scale (CPRS)
2. There is no significance difference of the effect of Information and Communication Technology (ICT) tools' efficiency on academic achievement of students in the experimental and control groups as measured by their pretest and posttest scores in the Academic Achievement Questionnaire (AAQ).

3. There is no significant relationship of the effect of class participation on academic achievement of students in the experimental group on Information and Communication Technology (ICT) tools' efficiency as measured by their pretest and posttest scores in Classroom Participation Rating Scale (CPRS) and Academic Achievement Questionnaire (AAQ).

Method

The research design adopted for this study was quasi-experimental, a pretest and posttest design, involving one treatment and one control group was used to determine the effects of ICT, the independent variable on students' class participation and academic achievement, the dependent variables, among secondary school students. Quasi-experimental designs are used where true experimental designs are not feasible for instance; Ary, Jacobs, and Razavieh (1985) suggest that, one must use designs that will provide as much control as possible under the existing situations.

The study was carried out in Anambra state, in Christ the King college, Onitsha. The population for this study consists of all Senior Secondary one (SS1).

The sample for the study, 80 students was drawn from two (2) classes of SSI in the sample school. The cluster sampling and simple random sampling techniques were utilized in drawing the sample. Each of the five classes was identified and was treated as a cluster. Simple random sampling technique was used to draw two aims of the SS I class, "A" and "B" with 40 students each as the sample size. The two classes were randomly assigned into two groups, experimental and control (A & B) groups and were used for the study in order not to disrupt administrative arrangement of the school. This became necessary as the study lasted for four weeks.

The two groups, experimental and control (A and B) were rated and weighed on ICT tools' efficiency using Participation Rating Scale (CPRS) and Academic Achievement Questionnaire (AAQ) with the minimum scores of 5 and the maximum scores of 50, and their scores were recorded as pretest scores. Then group "A", experimental group was exposed to Information and Communication Technology (ICT) tools' efficiency training while group "B", the control group was not given any training. After the training, both groups, experimental and control were weighted again on ICT tool's efficiency using Class Participation Rating Scale (CPRS) and Academic Achievement Questionnaire (AAQ) respectively and their performances recorded as post test scores . Two secondary school ICT experts validated the Class Participation Rating Scale (CPRS) and Academic Achievement Questionnaire (AAQ) in ICT tool's efficiency. Reliability was ensured using Kuder Richardson formula 21. Data generated was collated, organized and analyzed using mean and standard deviation in answering the research questions and ANCOVA for testing the hypotheses. It was assumed in this study that the difference between the population regression coefficient of the experimental and control group is not significant at 0.05 level of significant.

Results

The results of the finding of the study are presented in tables 1 to 6. The research questions and the null hypotheses are presented differently.

Research Question 1: What is the difference of the effect of Information and Communication Technology (ICT) on class participation of students in the experimental and control groups as measured by their pretest

and posttest scores in the Class Participation Rating Scale (CPRS)?

Table 1: Mean scores and Standard Deviation of the Effects of ICT on Classroom Participation of Students in the Experimental and Control Groups

Groups	Mean	Std Deviation	N
Experimental Group	38.10	2.808	40
Control Group	14.05	2.943	40
Total	26.07	12.434	80

Table 1 above, indicates the mean (\bar{x}) score of 38.10 and the standard deviation (SD) of 2.808 for the experimental group and the mean (\bar{x}) score of 14.05 and the standard deviation (SD) of 2.943 for the control group.

Hypothesis 1: There is no significance difference of the effect of Information and Communication Technology (ICT) tools' efficiency on class participation of students in the experimental and control groups as measured by their pretest and posttest scores in the Class Participation Rating Scale (CPRS).

Table 2: ANCOVA analysis of the Effects of ICT on Classroom Participation of Students in the Experimental and Control Groups.

	Sum of squares	df	Mean square	F	Sig.
Contrast	11582.810	1	11582.810	2.622E3	.000
Error	340.158	77	4.418		

Table 2 above indicates F-value 2.622E3, df (1, 77), p (.000) < 0.05. This result shows that the null hypothesis is rejected, and the alternative accepted.

Research question 2: What is the difference of the effect of Information and Communication Technology (ICT) on academic achievement of students in the experimental and control groups as measured by their pretest and posttest scores in the Academic Achievement Questionnaire (AAQ)?

Table 3: Mean Scores and Standard Deviation of the Effects of ICT on Classroom Participation of Students in the Experimental and Control Groups.

Groups	Mean	Std deviation	N
Experimental group	43.07	1.607	40
Control group	12.12	1.800	40
Total	27.60	15.665	80

Table 3 above, indicates the mean (\bar{x}) score of 43.07 and the standard deviation (SD) of 1.607 for the experimental group and the mean (\bar{x}) score of 12.12 and the standard deviation (SD) of 1.800 for the control group. This shows that the scores of the students in the experimental group are greater than their scores in the control group.

Hypothesis 2: There is no significance difference of the effect of Information and Communication Technology (ICT) tools' efficiency on academic achievement of students in the experimental and control groups as measured by their pretest and posttest scores in the Academic Achievement Questionnaire (AAQ).

Table 4: ANCOVA Analysis of the Effect of ICT on Academic Achievement of Students in the Experimental and Control Groups

	Sum of squares	df	Mean square	F	Sig.
Contrast	18393.736	1	18396	1.040E4	.000
Error	136.152	77	1.768		

Table 4 above indicates the F-value=1.040E4, df = (1, 77), p (.000) < 0.05, shows that the null hypothesis is rejected, and the alternative accepted.

Research Question 3: What is the relationship of the effect of Information and Communication Technology (ICT) tools' efficiency on class participation and academic achievement of students in the experimental group on as measured by their pretest and posttest scores in Classroom Participation Rating Scale (CPRS) and Academic Achievement Questionnaire (AAQ)?

Table 5: Mean scores and Standard Deviation of the Effects of ICT on Classroom Participation and Academic Achievement of Students in the Experimental Group

Independent Variables	Mean	Std Deviation	N
Class participation	38.07	2.805	40
Academic achievement	42.97	1.577	40
Total	40.52	3.345	80

Table 3 above, indicates the mean (\bar{x}) score of 38.07 and the standard deviation (SD) of 2.805 for students class participation and the mean (\bar{x})

score of 42.97 and the standard deviation (SD) of 1.577 for the control group. This shows that the scores of the students in the experimental group are greater than their scores in the control group.

Hypothesis 3: There is no significant relationship of the effect of class participation on academic achievement of students in the experimental group on Information and Communication Technology (ICT) tools' efficiency as measured by their pretest and posttest scores in Classroom Participation Rating Scale (CPRS) on Academic Achievement Questionnaire (AAQ).

Table 6: ANCOVA Analysis of Relationship of the Effect of Class Participation and Academic Achievement on ICT Tools' Efficiency Among Students in the Experimental Group

	Sum of squares	df	Mean square	F	Sig.
Contrast	546.449	1	546.449	126.897	.000
Error	381.580	77	4.306		

Table 6 indicates f-value =126.897, df 1, 77, p (.000) < 0.05. The null hypothesis therefore rejected while the alternative is accepted.

Discussion of Results

Tables 1, 2, 3 & 4 showed that, there is significant different between the pretest and posttest scores of the students in the experimental and control groups on classroom participation and academic achievement in ICT tools' efficiency as measured in the Classroom Participation Rating Scale (CPRS) and Academic Achievement Questionnaire (AAQ) respectively. The difference is represented by the mean scores of 38.10 and 14.05; and 43.07 and 12.12 for experimental and control groups respectively, as well as F-value =2.622E3, df =

(1, 77), p (.000) < 0.05 and F-value =1.040E4, df = (1, 77), p (.000) < 0.05.

The findings of this study may be explained in line with the study of Kozma and Anderson et al (2002) that observed that ICT knowledge/learning enhances internet connectivity benefits awareness, learning skills acquisition, confidence as well as improvement in performance as a learner engages in learning tasks.

Tables 5 & 6 showed that, there is significant relationship of the effect of classroom participation and academic achievement of students on ICT Tools' knowledge as measured by their Classroom Participation Rating Scale (CPRS) and Academic Achievement Questionnaire (AAQ). This is represented by the mean scores of 38.07 and 42.97 for the classroom participation and academic achievement respectively, and the F-value =126.897, df (1, 77), p (.000) < 0.05. Panel on Educational Technology (1997) had similar findings with the above result. They observed that when skills in ICT Tools are red and practiced, students become powerful stimulants to higher achievement.

Conclusion

The use of Information and Communication Technology (ICT) such as Internet applications, CD-ROMs, video technology and various computer attachments and software programs have caused many changes in society. Finally, many countries around the world have established organizations for the promotion of ICTs, because it is feared that unless less technologically advanced areas have a chance to catch up, the increasing technological advances in developed nations will only serve to exacerbate the already-existing economic gap between technological "have" and "have not" areas.

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Recommendations

The following recommendations are made based on the findings of the study:

1. Students should be equipped with ICT Tools so that in the problem solving process, they would be able to transfer these skills to enable them to pursue their own learning purposefully and independently.
2. In the practice of teaching in the classroom, teachers should provide ample opportunity for students to mutually discuss and exchange ideas and experiences from ICT knowledge/learning
3. Effective use of ICT Tools will help Students to use the computer for assessment, presentation, accessing information, and communication; to compose, edit, revise, build charts and graphs, make concept maps, create web pages, build presentations, large group projects and create timelines.

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