Effects of Inquiry Method of Instruction on Achievement of Computer Studies in Upper Basic II Education Studtents

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Abstract: This study investigated the Effects of Inquiry Method of instruction on achievement of upper Basic Education in computer studies in Abakaliki Education Zone of Ebonyi State. Inquiry method of instruction is a teaching method whereby a problem is formulated and learners systematically attempts to find out a solution to the problem. It allows learner to discover reliable information by themselves before they make conclusion. Three research questions and three null hypotheses guided the study. Quasi –experimental design was adopted for the study. Multistage sampling techniques were used to draw 300 upper Basic II Education students. The experimental group was taught using inquiry method of instruction while control group were taught using lecture method of instruction. Instrument used for data collection is computer studies achievement Test (CSAT). Data collected were analyzed using mean, standard deviation and Analysis of covariance (ANCOVA). The result showed that inquiry method of instruction was more superior to lecture method of instruction in students' achievement on computer studies. There was no significant difference in the mean scores of male and female students in computer studies. Based on this finding of the study, the educational implications of the findings were highlighted and recommendations were made.

Key words: Computer Studies · Teaching Methods · Achievement · Inquiry-Based Learning

INTRODUCTION

One of the fundamental rights for every human being is education. Education prepares an individual for challenges in life. Consequently, [1] opined that education does not only deliver information, but for developing complete personality of a child. It is a nation's responsibility to provide quality education for its citizens at all level of education especially for the young people. The basic fact that a nation undertakes such important responsibility is simply that education aids in reshaping individuals and it helps in finding lasting solutions to societal problems.

Education according to [2] is a holistic approach by which students are motivated to showcase their potentialities. He also viewed that education offers instrument in which an individual could benefit from his natural environment for herself which the whole nation would be of benefit. It is believed that education is a medium through which schools, colleges, universities and other institutions continuously transfer its cultural heritage from one individual to anther over the years.

In contemporary times, educational system is gradually becoming a system of technology especially in the present information driven economy. Owing to advances in science and technology which continues to revolutionize the global world, the Federal Ministry of Education introduced computer studies at all levels of education in Nigeria in the year 1988 (Federal Republic of Nigeria, 2004). It was hinged on the fact that all learners should be computer literate in different categories of education. Students were made to have knowledge of how to operate computer by understanding the techniques in data processing, word processing, keeping record and organizing financial analysis [3].

Computer studies according to [4] involve teaching and inculcating in the learner the basic skills required to independently manipulate the computer to achieve educational goals. It can also be looked at as a process of educating the people on how to use a computer to run a program and diverse application including business, industry and commerce [5]. [6] stated that computer studies as a subject is aimed at making students acquire skills and competencies required in this digital word of

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competitiveness. Such basic skills and competencies upon graduation make them conversant with term and practices embedded in the world of computer. Computer studies are therefore a subject organized to enable people understand the function, uses and limitations of the computer and to provide an opportunity for the study of the modern methods of information processing.

The national policy on Education encourages all processes geared toward producing educators and students that will encourage the spirit of inquiry (FME.2008); The major aim of computer studies in upper basic Education in Nigeria is to teach students how to operate computer, how to use it for dissemination of information accurately and effectively. Computer is machine that can takes in data as imputed by the operator then process the data and brings out the outcome through the output unit. [7] stated that, computer is an the electronic gadget which is capable of accepting data through input unit, processes the data and produces the outcome of the data as information through output unit. However, computer studies are defined operationally as the learning of the main necessary elements in computer operations [8].

The general objectives of teaching and learning of computer studies in upper basic education according to National Policy on Education (2012) are to expose the school children to the basic rudiment of computer and its workings, to enable the students meet with the demand of our nation, keeping up with the changing strides in technological development, to make a good background in the computer studies at lower basic level of students in their 'academic pursuit thereby catching the school children young, to make it easier for students to integrate experiences gained from computer and apply it in various human learning, to make sure there is mass literacy in the computer studies at the grass root level of the upper basic Education, to boost, stimulate and draw the interest of school children towards computer studies (National Policy on Education, 2012).

There are strategies for teaching computer studies. The term strategy is referred to as a method used by educators to engage learners with the task designed to bring about meaningful learning experiences. The several approaches to computer studies teaching include the following: lecture method, demonstration method, discover method, inquiry method, process method, laboratory method, simulation and gaming method, discussion method, project method and many other methods [9]. Unfortunately, despite various methods of teaching computer studies, it is discovered that students do not perform well in computer studies in the Upper Basic Education certificate examination. The poor achievement in computer studies as indicated by Chief examiner's report 2013, 2014, 2015 respectively in the Upper basic Education certificate examination have attracted the concern of stakeholders in Education.

Inquiry method of instruction is a method that encourages the students to formulate solution to problems and systematically attempt to find a solution to the problem. [10] advocates that this approach is suitable for science teaching and argue that problem solving must provide students with an opportunity to experience the difficulty of acquiring data. The knowledge on how students learn requires that teachers help them discover, see the relationship in what they discover and organize new discoveries in meaningful ideas and not just learning through rote. Students have opportunity to carry out a research and discover facts about events and make student observe carefully, ask questions, measure, classify and communicate their findings through the use of inquiry method of instruction.

Adoption of inquiry based learning instruction make learners to expertise on their own, acquiring how to reason scientifically and understand the relationship that exist among the proved facts and theory in all science related subjects. Hence, it is not the outcome of inquiry based instruction is most valuable but the process used to stimulate students to think critically and gain new knowledge on their own and it makes them to have better understanding of learning content and perform better in their examinations. [11]. Going by the major reason of introducing of science inquiry, making an investigation boost workability of inquiry as teaching guide [12]. Presently, the modern trait in computer technology is making learners to learn more through inquiry method of instruction [13]. [14] stated that all technological tools aid to change the abstract nature of science, because it helps students to do things practically on their own not by cramming the basic content of science principles to achieve the changes that occur in carrying out investigation.

However, an issue among the researchers today in the educational system is gender, educators have expressed diverse views about gender and achievement especially in science and technology related subjects while some are of the view that males do better than females others disagree with this view, arguing that achievement is a factor dependent on instructional method, socio-economic background among others.

In view to the issues on the use of instructional method used for student's achievement. The researcher wishes to investigate the effects of inquiry method of instruction on student's achievement of upper basic Education in computer studies irrespective of gender.

Purpose of Study: The purpose of this study is to determine the effects of inquiry method of instruction on the achievement of Upper basic education students in computer studies in Abakaliki Educational Zone of Ebonyi State. Specifically, the study sought to:

- Determine effect of inquiry method of instruction on students' mean achievement score in computer studies.
- Ascertain the effect of inquiry method of instruction on mean achievement scores of male and female students on computer studies.
- Determine the interaction effect between methods and gender on students' mean achievement score in computer studies in our various upper basic educations levels

Scope of the Study: This study centered on the students of Upper Basic Education within Abakaliki Education zone of Ebonyi State.

The scope was also delimited to the method of teaching computer studies to the Upper Basic Education in Abakaliki Education zone in Ebonyi State.

Research Questions: The following research questions were formulated to guide the study.

- What is the effect of inquiry method of instruction on students' mean achievement score in computer studies?
- What is the effect of inquiry method of instruction on the mean achievement score of male and female students in computer studies?
- What is the interaction effect of teaching methods and gender on students' mean achievement score in computer studies

Hypotheses: The following null hypotheses were formulated and tested at 0.5 level of significant.

$H0_1$: There is no significant difference in the mean achievement scores of students taught computer studies with inquiry method and those taught using lecture method.

$H0_2$: There is no significance difference in the mean achievement scores of male and female students taught computer studies using both methods.

$H0_3$: There is no significant interaction effect of teaching methods and gender and students mean achievement scores in computer studies.

Design of the Study: Quasi-experimental design was used for the study. Quasi-experimental design is chosen for the research because intact classes which include males and female students was used for the study.

Illustration for specific design is shown below in the Figure.

$$\frac{Q_1 \quad n \quad Q_2}{Q_1 \sim n \quad Q_2}$$

where,
Q_1 Represent pre test
Q_2 Represents post- test
n   Inquiry method of instruction (treatment for Experiment)
~n   Lecture method of instruction (control group)
………… indicates they are two groups.

Area of the Study: The study was carried out within Abakaliki Education Zone of Ebonyi State. Ebonyi State is divided into three education zones, namely: Abakaliki, Onueke and Afiko. Abakaliki Education Zone, the focus of this study is Abakaliki Education Zone.

Population of the Study: The population of the study comprises of 85, 922 Upper Basic Education students II in Abakaliki Education zone of Ebonyi State (Ebonyi State Ministry of Education).

Sample and Sampling Technique: The sample for the study comprised 300 upper basic II students. Six schools were drawn for the study through stratified random sampling. In each school, One intact class was drawn for the study through simple balloting. Out of the six schools, three schools (one male, one female and one co-educational) were assigned to the treatment group while the remaining three schools were assigned to the control group. The assignment of the schools to the treatment and control group was done through a stratified random sampling.

Instrument for Data Collection: The instruments the researcher used for data collection is computer studies achievement test (CSAT). The instrument consists 20 multiple-choice items. The instrument contains four options A-D for each pretest and post test

Validation of the Instrument: The instrument was validated using experts in computer studies and experts in measurement and evaluation in Ebonyi state university Abakaliki were consulted. They subjected the instrument to both face and content validation. CSAT was face validated by experts in terms of clarity of instruction, proper wording of the items, appropriateness and adequacy of the items in addressing the purpose and problem of the study.

Reliability of the Instrument: The 20 items that survived the item analysis exercise were subjected to test of reliability using k-20 procedure. The pilot test of the instrument yielded a reliability index of 0.91. the instrument was therefore considered to have high internal consistency.

Method of Data Collection: At the onset of the experiment, the researcher administered the text to the entire students in both the treatment and control groups. Scores of the students on the pre-test were recorded for use after the experiment. At the end of the experiment, post-test were administered to the entire members of the class. The scripts were marked by researcher. The scores were kept separately for use during data analysis. The pre-test and post-test items were the same in content and scope. The results of the pretest and post-test were recorded separately.

Method of Data Analysis: The scores obtained from the pre and post test were analyze using mean and standard deviation while analysis of covariance (ANCOVA) was used for testing the hypothesis at 0.05 level of significance. ANCOVA was applied to determine the hypothesis because the experiment involved pretesting of the subject. ANCOVA was used to remove the effect of covariate.

RESULTS

Research Question 1: What is the effect of inquiry method of instruction on students' mean achievement score in computer studies?

The result in Table 1 revealed that students in inquiry group had a mean score of 45.45 and standard Deviation of 11.75, while students in lecture group had a mean of 38.94 with a standard deviation of 12. 87. This indicates that students taught with computer studies using inquiry method scored higher than students taught using lecture method of instruction. By this implies that inquiry method is superior to lecture method in teaching computer studies.

Research Question 2: What is the effect of inquiry method of instruction on the mean achievement score of male and female students in computer studies?

The result in Table 2 revealed that male students had a mean score of 47.43 and standard Deviation of 13 38 while their female counterparts had mean achievement of 45.81 standard deviation of 12.77. Therefore male students score higher compared to female class mates in computer studies.

Research Question 3: What is the interaction effect of teaching method and gender on students' mean achievement score in computer studies?

The result in Table 3 revealed that male students had higher mean of 47.53 for using inquiry method while their female counterpart had a mean of 43.76. Male students who are taught computer studies with lecture method got a mean score of 44.78 and female got a mean score of 45.82. The result does not suggest ordinal interaction effect that exist among method of instruction and gender on students mean achievement scores in computer studies.

This was because at all level of gender, the mean scores were higher. Student taught computer studies using inquiry method and different in the mean scores obtained by male and female students in each group was tangible. The result showed that there is no interaction effect exists in gender and methods on students' mean achievement scores in computer studies.

Due to the significance, multiple classification analysis is carried out to determine levels of contribution of each treatment level. From table 4, the adjusted mean for the lecture group is 43. 81. Hence, inquiry method of instruction is proved from the scores obtained to be a better method of instruction than the lecture method in improving students' achievement in computer studies.

Hypotheses: Hypotheses were tested below: Hypotheses 1, 2 and 3 were based using data on Table 1, 2 and 3 respectively.

|Table 1: Mean (x̄) and Standard Deviation (SD) on achievement of students' based on method of Teaching

S/N.	Group	No	x̄	SD
1.	Inquiry method of instruction	105	45.45	11.76
2.	Lecture method of Instruction	95	38. 94	12.87

Note: No = Number of students, x̄ = Mean, SD = Standard deviation.

Table 2: Mean (x̄) and Standard Deviation (SD) on Achievement of students' based on Gender

		Gender					
		Male			Female		
S/N	Teaching Methods	No	x̄	SD	NO	x̄	SD
1.	Inquiry method of instruction	47	47.43	13.38	58	43.75	10.06
2	Lecture method instruction	40	44.77	13.14	55	45.81	12.77

Note: No = Number of students, x̄ = Mean, SD = Standard deviation

Table 3: Mean (x̄) and Standard Deviation (SD) Based effect of teaching methods and gender on the mean achievement score of students in computer studies.

		Gender					
		Male			Female		
S/N	Teaching Method	No	x̄	SD	NO	x̄	SD
1.	Inquiry method of instruction	4.7	47.53	13.25	58	43.76	10.00
2	Lecture method instruction	40	44.78	13.01	55	45.82	12.75

Note: No = Number of students, x̄ = Mean, SD = Standard deviation

Table 4: Multiple classification results based on methods of teaching grand mean = 45.42

S/N	Variable to category	N	Unadjusted Dev'n	Eta	Adjusted for independents covariates Dev'n	Beta
1	Method inquiry method	105	.03		.55	.05
2	Lecture method	95	-.04	.00	-1.61	.912
3.	Multiple R square multiple R					.955

Table 5: Analysis of Covariance (ANCOVA) of Student's result based on teaching methods

Source of variation	Sun of squares	DF	Mean square	F.cal	Sig of F	F.Crit
Covariates	27256.851	1	27256.851	2043.985	.000	
Pretest	27256.851	1	27256.851	2043.985	.000	
Main effects	66.679	1	66.679	5.000	026	
Methods	66.679	1	66.679	5.000	.026	3.84
Explained	27323. 530	2	13661.765	1024.493	.000	
Residual	2627.025	199	13.335			
Total	29950.555	199	150. 505			

Significant at $P < 0.05$

Table 6: ACOVA Results based on Gender

Source of variation	Sun of squares	DF	Mean square	F.cal	Sig of F	F. Crits
Covariates	27256.851	1	27256.851	1995.349	.000	
Pretest	27256.851	1	27256.851	1995.349	.000	
Main effects	2.647	1	2.647	.194	660	
Gender	2.647	1	2.647	194	.660	3.84
Explained	27259. 5497	2	13629.749	997.771	.000	
Residual	2691.058	197	13.660			
Total	29950.555	199	150. 505			

Not significant at $p < 0 .05$

Table 7: ANCOVA Results based on interaction of methods and Gender

Source of variation	Sun of squares	DF	Mean square	F.cal	Sig of F	F.Crit
Covariates	27256.851	1	27256.851	2065.372	.000	
Pretest	27256.851	1	27256.851	2065.372	.000	
Main effects	70.195	2	66.679	2.660	.073	
Methods	66.679	1	66.679	5.053	.026	
Gender	3.516	1	3.516	.266	.606	
2-way interaction	50.081	1	50.081	3.795	.053	
Method Gender	50.081	1	50. 081	3.795	.053	3.84
Explained	27377.127	4	6844.282	518.621	.000	
Residual	2573. 428	195	13.197			
Total	2995.555	199	150.505			

Hypotheses (H0₁): The result proved no significant difference in the mean achievement scores of students studied computer studies with inquiry method of instruction and students engaged by applying lecture method of instruction.

Result in Table 5, indicated that f.cal score is higher than f. Crit score therefore, the null hypothesis is not accepted hence, there is a significant difference in the mean achievement scores of students taught computer studies with Inquiry method of instruction and students in lecture method of instruction class.

Hypotheses (H0₂): There is no significant difference in the mean achievement score of male and female students taught computer studies using both method.

The result in Table 6 indicates that F. crit is higher in score compared F.cal. Hence, H0₂ accepted. This means no significant difference in the mean achievement scores of male and female students groomed in computer studies by applying both methods of instruction.

Hypotheses (H0₃): There are no significant interaction effects of teaching methods and gender and students' mean achievement scores in computer studies.

For Hypothesis 3, Table 7, indicates F.crit is greater than F.cal at alpha level of 0.05 since, calculated is less than critical value at the given alpha level, the null hypothesis is accepted. Therefore, it is upholds by the researcher that null hypothesis has no significant interaction effects of teaching methods and gender and students mean achievement scores in computer studies.

DISCUSSION

The result of the study in Table 1 shows the advantages of Inquiry method of instruction has over lecture methods of instruction as it attributed to the high level of academic achievement of students' in computer studies in Abakaliki Education zone in Ebony State school systems. Based on the table one, the mean of score obtained by the students taught with inquiry method of instruction is higher with mean score of 45. 45 while student taught with lecture method had lower score academic achievement of 38. 94 showing that computer studies taught with inquiry method are better taught with a scientific skill (process skills) for proper knowledge acquisition on the part of the learners. The inquiry method may have been more effective because the instructions were characterized by active students' involvement, thereby capturing the interest of the students and maximizing comprehension of the subject matter. This result is in accordance with the observation made by [4], [5] which shows that inquiry method of instruction prove to enhance student's achievement in science more than lecture method. Also [7] revealed significant difference between inquiry and lecture method in enhancing student's performance in biology achievement test in favor of inquiry method.

Similarly, results of this study as presented in Table 2 showed that male students had mean score of 47.43 while the female counterparts had mean score of 43.75. This may be different socialization processes of male between female students. Here male students explored their environment better than the female students maintain the existing environment. Hence, male students proved to have better score than female students in computer studies .However, male student achieved noticeably better than female students in computer studies. The finding supports [9] who found out that male student achieved more scores in academic performance than female students who took the same test in biology. The finding is not in accordance with that of [11] that upholds female achieved better than the male in science subjects.

CONCLUSION

Inquiry is a term often used in science classroom to express student-centered approach due to the fact that it employs the scientific process in the search and construction of knowledge. Computer studies are inquiry in nature because it encourages the students to formulate solutions to problems and systematically attempt to find a solution to the problem. Inquiry-based learning instruction enables learners to expertise on their own, acquiring how to reason scientifically and understand the relationship that exist among the proved facts and theory in all science related subjects.

It was established in this study that inquiry method of instruction was superior to lecture method of instruction in promoting students achievement in computer studies. There was no much noticeable gap in the mean score of male and female student in computer studies after treatment, although observation male students scored little higher compared to female counterpart. Result on interaction, it was revealed that mode of instruction and gender had a significant ordinal interaction effect on student's achievement in computer studies. According to the finding of researcher, the educational implications of finding were outlined among others that science teachers should adopt inquiry method of instruction when teaching in other to promote students achievement in computer studies.

Recommendations: Based on the findings, the researcher recommends as follows:

- Government should provide instructors that can teach computer studies using inquiry method of instruction.
- The government should provide in-service training for the computer studies instructors
- Both the government, Parents Teachers Association (PTA) and Non Governmental Organization should assist in providing more computer systems to the various Upper Basic Schools.
- The instructors should always apply suitable teaching method in teaching Upper Basic Education students.
- Infrastructural facilities should be made available for conducive learning environment.

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