Effect of Collaborative Instruction on Secondary School Students' Achievement in Computer Studies in Imo State

Okoli, J. N.
Department of Science Education, Nnamdi Azikiwe University, Awka, Anambra State, Nigeria
jn.okoli@unizik.edu.ng

&

Ekebosi, C. A.

Abstract

The study investigated the effects of collaborative instruction on secondary school students' achievement in Computer studies in Mbaitoli L.G.A. of Imo State. The study was guided by two research questions and two null hypotheses tested at 0.05 level of significance. Design was quasi-experimental specifically the pre-test, post-test design that involved 80 JS3 students from the two secondary schools randomly selected using balloting from 14 government owned co-educational secondary schools in Mbaitoli L.G.A of Imo state. The students in their intact classes were randomly assigned to experimental group and control group by a toss of coin and were taught by their regular class teachers trained for the purpose. All the groups were pre and post tested, data were collected using validated Computer Achievement Test (CAT). The reliability estimate of 0.82 using Kuder Richardson formula 20 was obtained for CAT. The data obtained were analysed using mean, Analysis of Covariance (ANCOVA), and standard deviation. The result of data analysis indicated that collaborative instruction enhanced students' achievement in computer studies than the conventional method. The study also revealed that there were no significant differences in the mean achievement scores of male and female students taught computer studies using collaborative instructional method. Based on the findings, the researcher recommended that computer studies teacher should adopt collaborative teaching method since it enhanced students' achievement in computer studies so as to develop more knowledge and skill in computer studies students.

Keywords: Collaborative instruction, Computer Science and Achievement

Introduction

The role of computer in scientific and technological development has been established because it is used in almost all fields of human endeavour such as education, medicine, agriculture and engineering. Computer has changed lives in many ways and is expected to also change schools and education in general. As the world lives in Information and Communication Technology (ICT) era, and in a rapidly changing economy, schools should equip students with computer knowledge that will allow them to fully participate in the rapidly changing economy. Today, most schools have computers installed in their laboratories. However introducing

computer into schools generated new opportunities and challenges and it is difficult to find conclusive evidence on the positive effects of computer on students' learning outcomes. The learning outcomes can be ascertained with students' academic performance.

Student Academic Performance in any particular area of learning is an important factor in education. Thus, Okoli J.N. & Okeke I.S. (2018) defined performance as the accomplishment of academic goals, the educational outcome of students, or rather the extent to which a student, a teacher or an instructor has achieved the stated educational objectives. In this regard, Student Academic Performance can be described as the extent to which students meet the pre-set short or long term specific instructional objectives or educational goals. This is usually measured by continuous assessment or/and examination. It is one of the measures/ indicators of the quality of teaching-learning process in schools. This implies that the quality of teaching-learning process seriously affect the outcome of students' performance in continuous assessment or examination. Factors that affect students' academic performance are numerous and have gained increased attention of educators and researchers in education in the recent times. Directly or indirectly, it forms the theme and sub-themes of research work published in both local and international journals. One of such factors is the method of teaching and learning.

Teaching methods or instructional strategies have been defined by some scholars in education. Duru (2011) defined it as the mode by which material fact is communicated from teacher to the learner. According to Izuegbunam (2018) a teaching method comprises the principle and methods used for instruction to be communicated by teachers to students to achieve the desired learning objectives. In this study, teaching method is defined as the pedagogical activities and strategies through which the teacher imparts the desired knowledge and skills to students during teaching-learning process. There are many teaching methods which a teacher can use depending on the concept to be taught. Several factors affect the

selection of teaching method. The factors include: educational objectives, nature of subject matter, cost implication, size of class, available time, age of the students and their interest (Ughammadu, 2006). This means that for the appropriate teaching method to be selected and utilized, the teacher should be well informed about these factors. Despite the volumes of research work in the areas of factors that affect students' academic performance, there is still need for further empirical research in areas of determining teaching method that will be most suitable for teaching computer studies and other areas of science subjects, which students consider as difficult in order to achieve the desired result and also bridge the gender gap in education.

Recently in Nigeria educational system, Computer Studies at Junior Secondary School level was merged with other subjects such as Physical and health Education, Basic Science and Basic Technology; and called Basic Science and Technology. Despite the fact that they were merged as one subject, presently they are still being taught separately by specialized teachers from each of these four major areas. The content of the curriculum of Computer studies changed after the merger. This current development calls for a re-examination of how well the teaching and learning of the subject is executed.

The objectives of Computer Studies at the secondary school level of education according to Federal Ministry of Education (FME, 2007) is to enable the learner to: acquire basic computer skills such as the use of the keyboard, mouse and system, use the computer to facilitate learning electronically; develop reasonable level of competence on ICT applications that will engender entrepreneurial skills. Realising the objectives of computer studies as stipulated in the curriculum requires appropriate teaching methods, techniques, approaches and strategies. School subjects differ in content and difficulty level at which students learn them. One teaching method may not be suitable for learning all the subjects in school, consequently

the need to explore the effects of some teaching methods on the academic achievement of students. The teacher-centred technique which still goes on in schools seems to make teaching/learning of Computer studies clumsy, uninteresting and ineffective and hence very difficult to achieve its objectives in students' academic achievement in computer studies. There is need to search for appropriate teaching methods that will meaningfully supplement the conventional method already in use.

Despite the huge material and human resources employed in developing the new curriculum, it does appear that teachers are still employing more of traditional (conventional) teaching methods in their classroom instructions notwithstanding the fact that the present curriculum in use is activity based. Probably, the reasons for using traditional teaching method in schools might be primarily due to the fact that it was the same process the teachers were trained during their training days. Most teachers, who have the interest of implementing the curriculum as designed, are hindered by some challenges which may include: lack of requisite instructional materials, lack of training on how to use and practice some of the stated teacher activities, poor motivation, overload and large class size.

However, traditional teaching method according to Zvavanh (2010) can be described as the old school method of teaching which is teacher centred. Under conventional teaching method students are regarded as having "knowledge hole" that needed to be filled with information. Leaving this method for another teaching method means that, the new teaching method must be more effective in achieving the desired results. Several educators have outlined methods of teaching (Izuagba 2017). Some of the methods mentioned include: lecture method, problem solving method, discovery method, project method, individualized method and collaborative method. The choice of any of these methods in teaching depends on the age, content availability of resources, previous knowledge and teacher's versatility (Alamina 2008).

Thus, the cognitive, affective and psychomotor domains of the students can be developed and improved through collaborative teaching.

Collaborative learning according to some scholars is concerned with constructing meaning through interactions with others. It is an effective teaching and learning strategy for encouraging the sharing of ideas and discussions (Woolfolk, Hughes & Walkup, 2008). It is a learning strategy which involves groups of learners working together to solve a problem, complete a task, or create product (Izuagba, 2017). National Association for Language Development in the Curriculum (NALDIC) (2006) also found that group work stimulate dialogue and support the development of language skills. Using this approach in learning requires students to be active participant in the learning process in which they assimilate information and relate the new knowledge to their cognitive structure for future utilization and subsequent task.

Computer studies like every other science subjects, requires the use of appropriate teaching method if the stated objectives are to be achieved. Most computer studies students learn at different pace while the researcher has observed that some of the students learn easily from some of their peer/classmates. Based on these observations the researcher decided to investigate the effects of collaborative instruction on secondary schools students' achievement in computer studies in Imo State.

Purpose of the Study:

The purpose of the study was to determine the effects of collaborative instruction on secondary school students' achievement in computer studies. Specifically, the study determined the:

1. The differences between the mean achievement scores of students taught computer studies using collaborative instruction and those taught using the conventional method.

2. The differences between the mean achievement scores of male and female students taught computer studies using collaborative instructional methods.

Research Questions

In order to achieve the specific purposes of the study, the following research questions guided the study:

1. What is the difference between the mean achievement scores of students taught computer studies using collaborative instructional method and those taught using the conventional method?
2. What is the difference between the mean achievement scores of male and female students taught computer studies using collaborative instructional methods?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. There is no significant difference between the mean achievement scores of students taught computer studies using collaborative instructional method and those taught with conventional method.
2. There is no significant difference between the post-test mean achievement scores of male and female student taught computer studies using collaborative instructional methods?

Method

The study adopted quasi-experiment specifically, pre-test/post-test non-equivalent control group research design in which student exit in intact classes. Treatments with the use of collaborative method were administered to the experimental group and the conventional method for the control group.

The population of the study was made up of 1,647 JS3 students in the 14 public co-educational secondary schools in Mbaitoli L. G. A. The sample comprised 80 Junior Secondary Year Three (JS3) Computer studies Students. Two co-educational secondary schools were randomly drawn by paper balloting from the fourteen co-educational secondary schools in Mbaitoli Local Government Area. The two schools picked were categorised with the flip of a coin into experimental group one and control group. For each of the two drawn schools, one intact class of 40 JS3 Computer studies Students was randomly selected, making a total of two intact classes of 80 JS3 computer studies students from the two co-educational schools which were selected

The researcher designed Computer Achievement Test (CAT) to guide the study. It was subjected to face and content validity by two experts in Computer studies at Alvan Ikoku Federal College of Education Owerri, one lecturer in Science Education Department and one expert in Educational Measurement and Evaluation from Nnamdi Azikiwe University Awka. The instrument was administered before and after the treatment were applied to obtain the pre-test and post-test scores of the students on their computer performance. The CAT contained 20 items with four options drawn from computer Virus, Antivirus, spreadsheet packages and Search Engine to be taught to the students. The test items in CAT which has 20 items in number were answered within 45 minutes and had total scores of 100. Each question has four answer options and each correctly answered question attracts 5 marks, while each incorrect answer is zero. Kuder Richardson formular 20 was used to determine the coefficient as 0.82

Data for the study were collected through pre-test and post test scores using CAT. The pre-test was administered to the students before the treatment to provide the researcher with baseline data about the subject while post test (reshuffled CAT) was administered to the

students after the treatment to determine the students' actual achievement on computer studies. Data collected from the two tests (pre and post) after treatments were used for data analysis**.**

The administered CAT was collected and the sum of each of the students' score on CAT was determined. The mean and percentage scores of the pre-test and post-test scores for each of the two groups were obtained, mean and standard deviation were used to analyse data related to the research questions while Analysis of Covariance (ANCOVA) was used to test the hypotheses at 0.05 significant level.

Results

The results of the study are presented in line with the research questions and hypotheses

Research Question 1:

What is the difference between the mean achievement scores of students taught computer studies using collaborative instructional method and those taught using the conventional method?

Table 1: Pre-test and post-test mean achievement scores of students taught computer studies with collaborative and conventional methods.

Instruction	N	pre-test mean	post-test mean	gained mean	pre-test SD	post-test SD	Remark
Collaborative	40	31.00	72.63	41.63	9.28	10.56	Effective
Conventional	40	24.13	47.38	23.25	6.00	7.34	

Table 1 shows that the students taught computer studies using collaborative method have a pre-test mean score of 31.00 and a post-test mean score of 72.63 with gained mean 41.63, while students taught using conventional method (control) have a pre-test mean score of 24.13 and post-test mean score of 47.38 with gained mean 23.25. With gained mean of 41.63, it shows that collaborative teaching method enhances achievement in computer studies than the conventional method. Table 1 shows from the standard deviation scores that the spread of scores increased in both from pre-test to post-test with collaborative learning group having the

highest standard deviation. With post-test mean score of 72.63 which is above 60% for collaborative instruction as against that of 47.38 for control group, collaborative instruction is effective in enhancing students' achievement in computer studies.

Research Question 2:

What is the difference between the mean achievement scores of male and female student taught computer studies using collaborative instructional methods?

Table 2: Differences in performances of male and female students taught computer studies using collaborative instructional methods

Instruction	Gender	N	pre-test	post-test	gained	pre-test post-test
			mean	mean	SD	SD
Collaborative	male	19	31.84	74.21	42.37	9.89 11.70
Instruction	female	21	30.24	71.19	40.95	8.87 9.47

Table 2 also shows that male students taught computer studies using collaborative instruction have a pre-test mean score of 31.84 and post-test mean score of 74.21 with gained mean 42.37, while the female students taught computer studies using collaborative have a pre-test mean score of 30.24 and post-test mean score of 71.19, with gained mean 40.95. With gained mean 42.37, it shows that male students performed better than female students in collaborative instructional method.

Hypothesis 1

There is no significant difference in post-test mean achievement scores of students taught computer studies using collaborative teaching method and those taught with conventional teaching method.

Table 3: ANCOVA on the differences in the post-test mean achievement scores of students taught computer studies using collaborative teaching method and those taught with conventional teaching method

Source of variation	SS	df	MS	Cal. F	P-value	P ≤ 0.05
Corrected Model	15080.981	2	7540.491			
Intercept	9617.447	1	9617.447			
Pre-test	2329.731	1	2329.731			
Group	6968.256	1	6968.256	130.26	0.000	S
Error	4119.019	77	53.494			
Total	307200.000	80				
Corrected Total	19200.000	79				

Table 3 indicates that at 0.05 level of significance, 1df numerator and 79df denominator, the calculated F is 130.26 with P-value of 0.000 which is less than 0.05. Therefore, the second null hypothesis is rejected. So, there is significant difference in post-test mean achievement scores of students taught computer studies using collaborative teaching method and those taught with conventional teaching method.

Hypothesis 2

There is no significant difference in post-test mean achievement scores of male and female students taught computer studies using collaborative teaching method.

Table 4: ANCOVA on the differences in the post-test mean achievement scores of male and female students taught computer studies using collaborative teaching method

Source of variation	SS	df	MS	Cal. F	P-value	P ≤ 0.05
Corrected Model	2074.443	2	1037.221			
Intercept	7571.289	1	7571.289			
Pre-test	1983.464	1	1983.464			
Gender	31.466	1	31.466	0.512	0.479	NS
Error	2274.932	37	61.485			
Total	215325.000	40				
Corrected Total	4349.375	39				

Table 4 indicates that at 0.05 level of significance, 1df numerator and 39df denominator, the calculated F is 0.512 with P-value of 0.479which is greater than 0.05. Therefore, the second null hypothesis is not rejected. So, there is no significant difference in post-test mean achievement scores of male and female students taught computer studies using collaborative teaching method.

Discussion of Findings

The findings of the study showed that students taught using collaborative teaching method performed higher than those taught using conventional group in the achievement tests as shown by the mean gain. It shows that collaborative teaching method significantly enhanced students' achievement in computer studies more than the conventional method. This improvement in the achievement of computer studies students through the use of collaborative instruction can be explained from the fact that collaborative instruction increased personal, social and intellectual development, academic attainment and positive interaction among students. Collaborative instruction engage students in group and thereby increase learning, education, knowledge and skills (Brown & Ciuffetelli, 2009) The findings of this study support the findings of the previous researchers (Offiah & Okonkwo, 2011) that affirmed that cooperative learning strategy facilitate students' achievement in chemistry than the conventional teaching method. Ogbuefi (2006) held that many students have shown that two or more individuals can solve problems of different kinds better, when they work in groups than when they work independently. It also agrees with the studies of Ogbaji (2003) who reported that cooperative learning interaction strategy is more effective in enhancing students' academic achievement in biology than the conventional method. It is also supported by Odumodu (2016) who reported that there was a significance difference in the proportion of students taught in cooperative classroom goal structure whose locus of control changed from

external to internal locus when compared with those taught in a competitive classroom goal structure.

More so, the findings in this study revealed that gender is not a significant factor in students' achievement in computer studies. This finding of the study is supported by the findings of Awofola and Nneji (2013) who reported that there was no significant difference between mathematics achievement of male and female students taught with team assisted individualized instructional approach. The finding of this study is also supported by the findings of Izuegbunam (2018) who reported that there was no significant difference in the mean achievement scores of male and female students' achievement in chemistry both in the cooperative learning and individualized instruction

Conclusion

Collaborative teaching method significantly enhanced students' achievement in computer studies more than the conventional method and also gender is not a significant factor in students' achievement in computer studies. Therefore, this study lends empirical support to the fact that students' academic achievement in computer studies could be greatly improved when the teacher exposes the students to innovative, student-centred and activity-based instructional methods such as collaborative instructional method.

Recommendations

The following recommendations are made based on the findings:

1. Teachers should adopt collaborative teaching method since it enhanced students' achievement in computer studies. It will enable students develop more knowledge and skill in computer.

2. Teachers' training institutions should ensure that student teachers are adequately exposed to collaborative teaching method so that they should effectively and efficiently employ them when they graduate and use them in the field of teaching.
3. Ministry of education and policy makers in education should organize seminars, workshops and conference in order to train and retrain the teachers already in the field and to create awareness about this teaching method so as to adopt them in their teaching.

References

Awofola, A. O.A., & Nneji, L. M. (2013). Effects of framing and team assisted individualized instruction strategies on students' achievement in mathematics. *Journal of Science Teachers Association of Nigeria*, 1,1-9s

Brown, H. & Ciuffetelli, D. C. (2009). *Foundational methods: Understanding teaching and learning.* Toronto: Pearson Education

Duru, V. N. (2011). *Curriculum studies: concepts, development and implementation.* Owerri: Alvan Gloal Publishers.

Federal Ministry of Education (2007). 9-year Basic education curriculum: computer Studies for JSS1-3. Abuja: NERDC.

Izuagba A.C. (2004) Effective teaching principles and methods. *Approaches, methods and techniques in teaching*, Owerri, Chinas-Hop Publishers

Izuegbunam A. G. (2018). Effect of cooperative learning and individualized instructions on students' achievement in chemistry. *Unpublished Thesis.* Department of Science Education. Faculty of Education Nnamdi Azikiwe University Awka.

National Association for Language Development in the Curriculum (2006). Supporting language and cognitive development. *Retrieved August 10, 2016 from http: //www.naidic.org.nk/ITTSEALZ/teaching/supporting language and cognitive development.cfm*

Odumodu N. C. (2014) Effects of classroom goal structures on junior secondary school students academic achievement in computer education and there locus of control. *Unpublished Thesis.* Department of Education Foundation, Faculty of Education Nnamdi Azikiwe University Awka.

Offiah F.C.& Okonkwo C.O. (2011) Cooperative learning strategy and students' academic achievement in chemistry. *UNIZIK. Journal of STM*, 1(2), 63-69

Ogbaji C.I. (2003). Effectiveness of cooperative learning interaction strategy and conventional teaching method on senior secondary school students achievement in biology. *Unpublished MSC Ed Thesis.* Nnamdi Azikiwe University Awka.

Ogbuefi R.E. (2006). The effect of cooperative learning and direct instruction in reading comprehension strategies of main idea identification. *Journal of Education Psychology 183(1)8-16*

Okoli J.N. & Okeke I.S. (2018) Effects of problem-solving instructional technique on students' achievement and interest in ecology in Awka education zone. *Journal of the Science Teachers Association of Nigeria*, 53, 82-91

Ughammadu, K.A. (2006), *Curriculum development and implementation.* Onitsha: Lincol Publishers.

Woolfolk, A., Hughes, M. & Walkup, V. (2008). *Psychology in education. Boston: Pearson Education Limited.*

Zvavahn, H (2010). Traditional teaching method: Education is life itself so let's preserve it. *Retrieved October, 10 2016 from http:// www blogger.com/profile/04587310596059356896*