

Junior Secondary School Students Achievement in Computer Studies: A Closer Look at Modelling Instructional Approach

Umoke Collins Chukwudum¹ Abonyi Okechukwu Sunday² Ndukwe Oji Nnachi² Aja Lucy²

1.Faculty of Education, Alex Ekwueme Federal University, Ndufu Alike, Ebonyi State

2.Department of Science Education, Ebonyi State University, Abakaliki, Nigeria

okeyabony@yahoo.com

Abstract

This study explored the effect of modelling instructional approach on junior secondary school students' achievement in computer studies. The study adopted a pretest, post-test, non-equivalent control group design, three research questions and three null hypotheses guided the study. Four secondary schools were drawn for this study from co-educational secondary schools in Abakaliki Education zone was used for the study. Out of the four schools two were assigned to the treatment group while the remaining two were assigned to the control group through simple balloting. The treatment group was taught computer studies using modelling approach, while the control group was taught the same topics using the conventional approach. The instrument used for data collection is Computer Studies Achievement Test (CSAT). The instrument was subjected to face and content validation. It was also subjected to tests of internal consistency. A reliability index of 0.88 using Kuder-Richardson's (K-R20) approach was obtained after pilot test of the instruments. The CSAT was further subjected to a test of stability using the test retest procedure which yielded a stability coefficient of 0.86. Research questions were answered using adjusted mean and standard deviation while the hypotheses were tested at 95% confidence level using the Analysis of Co-variance (ANCOVA). Summary of result reveals that modelling approach is superior to the conventional approach in enhancing students' achievement in computer studies. There is no significant interaction between methods and gender on students mean achievement scores in computer studies. There is no significant difference in the mean computer studies achievement scores of male and female students who were taught computer studies using modelling approach

Keywords: Modelling Instructions, Academic Achievement, gender, computer Studies

DOI: 10.7176/JEP/13-26-07

Publication date:September 30th 2022

1.0 Introduction

The computer studies curriculum for the junior secondary school represents the total experience to which all learners must be exposed. It is of a thematic format build around the themes computer, technology and society. Computer as a revolution left no area of life untouched in the present world. It is of tremendous help in all fields of life. Hence, the knowledge of computer is a necessity for existence of everybody in this global village. The invention of computer has transformed our simple manual works to sophisticated life of automated works to meet the global demand for the higher productivity and increased efficiency with high precision. Computer is increasingly becoming compulsory in nearly all fields of studies, not because of anything but its accuracy and versatility in processing data. Many tasks at home or office are being automated rapidly with computer. Thus it is becoming apparent that in whatever discipline or working sector, the computer is now a very vital tool for efficiency improvement and precision of job or task execution. This is designed to meet the prerequisite need of everybody that are interested and wish to know about computer science and computing in general. This informed the current Federal Government policy on compulsory computer education at the primary and junior secondary school level. Computer studies as a vital subject in Junior Secondary school has the following aims: To enable the learner to acquire basic computer skills, such as the use of keyboard, mouse and operating system. To enable the learner to use the computer to facilitate learning electronically and to develop reasonable level of competence in ICT applications that will engender entrepreneurial skills (NERDC, 2007).

Although the usefulness and indispensability of computer knowledge and skills in all human endeavours cannot be over emphasized, available evidence reveal a general poor achievement in computer studies among students. Antheson (2003) and Osho, (2007) contended that students' achievement is dependent of several factors among which are learning environment, instructional methods and teaching strategy. Basic Education Certificate Examination (BECE) Chief examiner's report indicated that the shortcomings of the present teaching method partly accounted for the poor performance of students in Computer studies in the recent years. According to Universal Basic Education Board (UBEB), the performance of students in Computer Studies in Basic Education Certificate Examination was poor. The report showed that the level of achievement in Computer studies was lower than expectation as most students scored less than 50 percent in the subject. This low achievement may be due to the conventional teaching method adopted by Computer teachers in Junior Secondary School while teaching in the classroom. The essence of teaching is to facilitate learning. Effective teaching and learning is

determined by the way students are engaged and their outcome. Searching for a better way to engage students during learning process is imperative to researchers and educational systems, which could lead to improving standard and quality of education.

The application of innovative instructional approach like modelling instructional approach can improve student's performance and enhances the classroom experience. It improves interaction between learners and input materials, and classroom communication in general. The use of modelling instructional approach in teaching and learning process is assumed to create a mental reality of certain concept for better understanding. Model was defined as a construct designed and formulated to study a particular real-world system or phenomenon (Confrey, 2007). Modelling instructional approach is a strategy in which the teacher demonstrates a new concept or approach to learning and students learn by observing (Eggen and Kauchak 2001). Modelling can be done by using visual, auditory, tactile, and/or kinesthetic instructional techniques. The application of model in teaching and learning process is expected to enhance concentration of students on particular learning concepts especially when it comes to practically based subject like Computer studies that involves skill acquisition.

Although modelling as an instructional approach has been used with success in developed countries (Alrabai, 2016), its efficacy in developing nations like Nigeria is yet to be confirmed. Another interesting issue of academic debate is the issue of gender in modelling based instruction. Uwameiye and Osunde (2005) describe gender as a psychological term, which describes behaviours and attributes expected of individual on the basis of being a male or female. Gender is a socio-cultural ascription of roles on the basis of masculinity or femininity. It is the social or cultural construct, characteristics, behaviours and roles which society ascribes to females and males (Okeke, 2008). Gender disparities in field of Computer Education, have been attributed to family formation and child rearing - gender stereotyping, lifestyles choices, religion, careers preferences, personal choices among others (Ceci & Williams, 2011). Owing to the nature of modelling in science and computer classrooms and the arguments of its masculinity, it has been speculated that models may likely generate a bias in achievement among male and female computer studies students (Abdullahi and Emmanuel 2014; Njoku, 1996). As such, there is need to investigate the effect of modelling instructional approach and gender on students' interest and achievement in computer studies in Junior Secondary Schools in Nigeria.

1.1 Objectives of the Study

The purpose of the study was to investigate the effect of modelling instructional approach and gender on students' achievement in computer studies in Junior Secondary Schools in Ebonyi State, Nigeria. Specifically, the study determined:

1. The effect of modelling instructional approach on students' achievement in Computer studies.
2. The interaction effect of methods and gender on students' achievement in Computer studies.
3. The mean achievement scores of male and female students taught computer studies using the modelling approach.

1.2 Research Questions

The following research questions guided the study:

1. What are the achievement mean scores of students taught computer studies using modelling approach and those taught with conventional method?
2. What are the achievement mean scores of male and female students taught computer studies using the modelling approach?
3. What is the interaction effect of methods and gender on students' achievement in computer studies?

1.3 Hypotheses

HO₁: There is no significant difference in the achievement mean scores of students taught computer studies using the modelling approach and those taught using conventional method.

HO₂: There is no significant difference in the achievement mean scores of male and female students taught computer studies using the modelling approach.

HO₃: There is no significant interaction between methods and gender on students mean achievement scores in computer studies.

2.0 Methodology

This study adopted the quasi-experimental design. Specifically, this study employed Pretest Post-test non-equivalent control group design. The population for this study was seven thousand eight hundred and sixty four (7864) JSS2 students in the four local government area of Abakaliki Education Zone. This comprised of three thousand six hundred and twenty five (3625) males and four thousand two hundred and thirty-nine (4239) females. Four junior secondary schools were drawn for this study from co-educational secondary schools in Abakaliki Education zone through a random sampling approach. Out of the four schools two was assigned to the

treatment group while the remaining two was assigned to the control group. Assignment of schools to treatment and control groups was done through simple balloting. The instrument for data collection was Computer Studies Achievement Test (CSAT). The instrument is a 30-item multiple choice test drawn from the topics that was taught during the experiment. The instrument was subjected to face and content validation. It was given to two specialists in Measurement evaluation and one specialist in Computer Education. The face validation scrutinized the items in terms of relevance, general test format, suitability and clarity. After the face validation and modification in line with recommendations of the specialists, it was also subjected to content validation. The population parameter estimation was conducted for the CSAT using item analysis. The Computer studies achievement test was also subjected to a test of internal consistency using Kuder-Richardson's (K-R20) approach. The test of internal consistency with the K.R 20 yielded a reliability index of 0.88. The CSAT was further subjected to a test of stability using the test retest procedure. This is necessary because the same instrument will be used for both pretest and posttest. Using the Pearson Product Moment correlation procedure the instrument yielded a stability coefficient of 0.86. After the pre-test the regular computer studies teachers started the experiment in their respective schools adhering strictly to the lesson procedure that was developed from the packages during the pre-experimental conference. The experiment was conducted during the normal school periods, following the normal timetable of the school. At the end of the experiment that lasted for 8 weeks the teachers administered the post-tests to the subjects in the two groups. Data that was collected from the pre-test and post-test (CSAT) was kept separately for the two groups and was used to answer the research questions. Data was analysed using adjusted mean and standard deviation while hypotheses were tested at an alpha level of 0.05 using the Analysis of Co-Variance (ANCOVA).

3.0 Research Questions

3.1 Research Question 1:

What are the achievement mean scores of students taught computer studies with the modelling approach and those taught with the conventional method?

Data collected with the pre-test and post-test on achievement was used to answer this research question using adjusted mean and standard deviation. Summary of result is presented on Table1

Table 1: *effect of modelling approach on students mean achievement in computer studies*

Groups	Adjusted Mean	Standard dev.	N
Modelling approach	69.31	9.06	120
Conventional Approach	49.35	6.91	140

Result on Table1 shows the mean achievement scores of students who were exposed to the modelling approach and those taught with conventional teaching method. Students taught with modelling approach have mean score of 69.31 with a standard deviation of 9.06 while students taught the same topics in computer studies with conventional approach have mean score of 49.35 with a standard deviation of 6.91. The result shows that students taught with modelling approach performed better in computer studies than those taught with conventional method.

3.2 Research Question 2

What are the achievement mean scores of male and female students who were taught computer studies using the modelling approach?

Data on achievement collected from male and female students taught computer studies with modelling approach were analyzed descriptively using adjusted mean and standard deviation. Summary is presented on table 3.

Table 2: *Mean Score of males and females taught computer studies with modelling approach*

Students	Mean	Standard deviation	N
Male	67.89	9.20	55
Female	70.51	8.84	65

Summary of data analysis presented on Table2 reveals that male students taught computer studies using the modelling approach had mean score of 67.89 with standard deviation of 9.20 while their female counterparts taught same topics in computer studies using the same modelling approach had mean score of 70.51 with standard deviation of 8.84.

3.3 Research Question 3

What is the interaction effect of instructional methods and gender on students' achievement in computer studies? Data on achievement for male and female students taught computer studies using modelling instructional method and those taught with the conventional method were used to answer this research question. Summary of result is presented on Table2

Table 2: Interaction effect of gender and method on students' achievement in computer studies

Method	Gender	
	Male	Female
Modelling approach	67.89	70.51
Conventional Method	51.03	47.93

As shown in Table2 the modelling instructional approach is superior to the conventional method at the two levels of gender. For both males and females the mean achievement scores are higher for the modelling approach. This implies that there is no interaction between method and gender on students mean achievement in computer studies.

3.4 Hypotheses:

HO₁: There is no significant difference in the achievement mean scores of students taught computer studies using the modelling approach and those taught using conventional method.

HO₃: There is no significant interaction between methods and gender on students mean achievement scores in computer studies.

Hypotheses 1 and 2 were tested using analysis of covariance (ANCOVA). The summary is presented in table4.

Table4: Analysis of Co Variance for students overall computer studies achievement scores by teaching strategies and interaction.

Source of variation	Sum of squares	DF	Mean square	F	f- probability
Covariates (Pretest)	20659.192	1	20659.192	1889.309	.000
Main Effects	18655.236	2	9327.618	853.022	.000
Method	18644.282	1	18644.282	1705.042	.000
Gender	4.887	1	4.887	.447	.504
2-way Interactions: (Method and Gender)	27.215	1	27.215	2.489	.093
Explained)	39371.643	4	9842.911	900.146	.000
Residual	2788.373	255	10.935		
Total	42160.015	259	162.780		

For hypothesis 1, the ANCOVA table shows that the level of significance (0.05) is greater than the F-probability value (.000). The decision rule is to reject the null hypothesis when the level of significance exceeds the given probability level. Since the level of significance is greater than the f-probability value, the null hypothesis was rejected. The researcher, therefore, concludes that there is a significant difference in the mean achievement scores of students taught computer studies using the modelling approach and those taught the same topics in computer studies using the conventional method.

For hypothesis 3, result in table4 reveals that for two way interactions, the f-probability value at 0.05 significance level is .093. Because the alpha level (0.05) is less than the F. probability value (.093), the researcher upholds the null hypothesis and concludes that there is no significant interaction between instructional methods and gender on students' mean achievement in computer studies.

HO₂: There is no significant difference in the achievement mean scores of male and female students taught computer studies using the modelling approach.

These hypotheses were also tested using the Analysis of Co-variance. Summary of result is shown in Table5

Table5: Analysis of Co-Variance of Mean Achievement Scores of male and female students taught computer studies using modelling approach (Treatment group only).

Source of variation	Sum of squares	DF	Mean square	F	F- probability
Covariates (Pretest)	7158.134	1	7158.134	325.866	.000
Main Effects (Gender)	49.377	1	49.377	2.248	.136
Explained	7207.511	2	3603.755	164.057	.000
Residual	2570.081	117	21.967		
Total	9777.592	119	82.165		

Summary of result on Table5 reveals that for hypothesis 4, the F-probability (.136) is greater than the alpha level (0.05). Since the level of significance is less than the f-probability value the null hypothesis is upheld. The researcher, therefore, concludes that there is no significance difference between the mean achievement score of male and female students taught computer studies using the modelling approach.

4.0 Discussion of Findings

The result of data analysis shown in Table 1 of chapter four reveals that the modelling approach is superior to the conventional approach in fostering junior secondary school students' achievement in computer studies. As

shown in Table 1, Students taught with modelling approach have mean score of 69.31 with a standard deviation of 9.06 while students taught the same topics in computer studies with conventional approach have mean score of 49.35 with a standard deviation of 6.91. The result shows that students taught with modelling approach performed better in computer studies than those taught with conventional method. On the test of hypothesis, summary of result in Table 4 also reveals a statistically significant difference in the mean achievement scores of junior secondary school students taught computer studies using the modelling approach and those taught using the conventional approach. This result conforms to Oyenuga (2010) that the use of model introduces novelty in science classrooms in general. Although Abonyi and Umaru (2013) worked on ethnoscience based learning the elements of modelling was captured in their study on Live Science and Love Learning. In the same vein Abonyi (2013) in his study on experiential learning provided a graphic analysis of the implications of modelling in fostering achievement and retention in science. According to the study learning is made permanent when students learn using stimulating models that capture real life situations in the classroom.

5.0 Conclusion and Recommendations

Based on the results of this study, the researchers concluded that there is significant difference in the interest mean scores of students taught computer studies using the modelling approach and those taught the same topics using the conventional method. It is gender unbiased and hence, there is no significant interaction between instructional methods and gender on students' mean interest scores in computer studies. The researchers recommends that State and Federal Governments should encourage and sponsor in-service training for computer studies teachers on the application of instructional modelling in the classroom. Most importantly the government should beef up literacy programmes on the need of models in teaching for maximum utilization of instructional modelling. In addition there is a need to review the existing curriculum in computer studies to ensure that modelling approaches are enshrined it. State and Federal Government should equip all schools with required models to facilitate instructional modelling.

Reference

- Abonyi O. S (2013). Effects of Experiential Learning Strategy on Secondary School Students Achievement in Biology. World Conference on Science and Technology education, Sarawak, Borneo, **Malaysia**, Book of Abstract pp 29
- Abonyi O. S and Umaru M. (2013). Live Science and Love Learning Through Ethnoscience: A Case against Cognitive Re-Wiring. World Conference on Science and Technology education, Sarawak, Borneo, **Malaysia**, Book of Abstract pp 224
- Abdullahi S. and Emmanuel N. R. (2014). The role of modelling towards impacting quality Education. *International Letters of Social and Humanistic Sciences*. 32 (1) 54-61
- Antherson, J. S. (2003). Learning and Teaching : Intelligence. Retrieve from February 20, 2004 <http://www.dmu.ac.uk/~Jamessa/learningintellig.htm>
- Anna, B. (2011). *Vocational orientation: how to achieve your goals*. Ibadan: Oyinlola Press Ltd.
- Aroh D. C. (2006). Effects of Video-Taped Instruction on Secondary School Students' Achievement and Interest in Mathematics. *Unpublished M. Ed Thesis*. University of Nigeria, Nsukka.
- Bono, M. (2012). *Instructional pedagogy in teaching languages*. N. Y.: Ellen Books, 2 (1): 31- 32.
- Ceci, S. J. & Williams, W. M. (2011). Understanding current causes of women under representation in science. PNAS early edition 1-6. www.pnas.org/cgi/doi/10.1073/pnas.
- Confrey, J. (2007) "Tracing the Evolution of Mathematics Content Standards in the United States: Looking Back and Projecting Forward toward National Standards." Paper presented at the Conference on K-12 Mathematics Curriculum Standards, Arlington, Va.
- Eggen, P. D., & Kauchak, D. P. (2001) *Strategies for Teachers*. Fourth edition. Needham Heights, MA: Allyn and Bacon.
- Gambari, A. I. (2010). Effects of instructional models on the Performance of junior secondary school students in geometry in Minna, Niger State. *DELSU Journal of Educational Research and Development*, Vol 9, No. 1
- Jimoh, J. A. (2010). Comparative Effects of Two and Three Dimensional Techniques of AutoCad on Spatial Ability, Interest and Achievement of National Diploma Students in Engineering Graphics. *Unpublished Ph.D Thesis*. University of Nigeria. Nsukka.
- Mezieobi, D.I. (2009). *Managing Instruction in the classroom*. In U. L. Igbokwe & U.N. Eze Nigerian Educational Research and Development Council (2007). 9-Year Basic Education Curriculum (Computer Studies) for JS 1-3. Abuja: UBEC Press.
- Njoku, Z. C. (1996). Effects of instruction under difference sex groupings on the students' skills acquisition and interest in chemistry practical activities. *Unpublished Ph.D Thesis*. University of Nigeria. Nsukka.
- Oyenuga, A. O. (2010). Effect of models on interest and academic achievement of auto-mechanics students in technical colleges in Lagos-State. *Unpublished Ph.D Thesis* University of Nigeria, Nsukka.

- Okeke, E. A. C. (2008). Classification and analysis of gender concepts. Focus on research, reproductive health education, and gender sensitive classrooms. *Science teachers' association of Nigeria- Gender and STEM Education series (2)*, 5-8
- Osho, S. O. (2007). The future of Auto-mechanics work Students in Nigerian Technical Colleges. A paper presented at a Seminar organized by the Department of Technical Education, Tai Solarin University of Education, Ijagun. On 28th April.
- Uwameiye, R. And Osunde, A. U. (2005). Analysis of Enrolment Pattern in Nigeria Polytechnics" Academic Programmes and Gender Imbalance. *Journal of Home Economics Research*. 6. (1). 150-155.