# Effect of Computer Graphics Instructional Mode on SS2 Secondary School Students': A Study of Agbani Education Zone of Enugu State

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## Abstract

*There is a perceived trend of poor academic achievement and interest of students in Computer Studies in Secondary schools in Agbani Education Zone of Enugu State. This situation has been attributed to many factors one of which is poor method of teaching. The research design was quasi – experimental. Two groups (one experimental and one control) made up of 135 senior secondary one (SS two) students were drawn from a population of 2,608 SS two students. Two instruments were used for data collection namely- Computer Graphics Interest Scale (CGIS) and Computer Graphics Achievement Test (CGAT). Analysis of Co-variance (ANCOVA) was used to test the null hypotheses. The findings revealed that computer graphics instructional mode had significant effect on the mean interest and achievement scores of students in computer Studies. Based on the findings, it was recommended among others that Computer Science teachers should adopt computer graphics in the teaching of Computer Studies in order to enhance the interest and performance of students in Computer Studies. Enugu State Government and Agbani Education Zone.*

## 1. **Introduction**

The value of education in human development has been widely proven, with studies demonstrating education's catalytic roles in national and human capital development (Fägerlind & Saha, 2016; Griffin et al., 2012). Education is a way of self-development via the transmission of information, skills, and habits from generation to generation. Despite the importance of Computer Studies, available statistics from the West African Examination Council (WAEC, 2015 - 2019) recorded very poor performance at Senior School Certificate (SSC) examinations. Poor achievement in computer studies has been blamed on a number of factors such as ineffective instructional strategies adopted by computer studies teachers and difficulty in understanding some topics in computer studies. The method used by teachers in teaching computer studies has been blamed for poor interest, achievement of knowledge by the students. Studies have shown that secondary school students are exhibiting low interest in computer studies (Esiobu, 2015). This low interest of students has resulted in poor achievement in examination questions on computer studies. Ibitoye and Fape (2017) held that poor achievement in computer studies could be traced to poor usage of instructional resources for computer studies teaching and learning, poor state of infrastructural facilities, large class size, poor teaching method, and use of faulty assessment practices and inadequacy of quality. Anyaegbunam (2012) indicated that many science teachers especially computer science prefer the conventional method of teaching and shy away from innovative, activity. Consequently, students find it difficult to comprehend and retain what they were taught. To understand and perform well in computer studies students must be made to be interested in the learning of the concepts.

Ogbu (2011) observed that students' unsatisfactory performance in computer Studies in Secondary schools has persisted over the last ten years, and consequently has resulted in poor performance of students in computer studies in both West African Senior School Certificate Examination (WASSCE) and National Examination Council (NECO) in recent years. Raj (2012) further faulted the traditional learning aids because they are based on posters and motionless pictures of the end products, which do not depict the methods and principles. The student takes on a passive role, which hinders learning and denies students the opportunity to visualise learning content. Evidence about the status of computer science in secondary schools in Agbani Education Zone of Enugu state showed that computer science classroom activities are still dominated by teachers–centered methods (conventional method) which have been found to be ineffective in promoting interest and achievement in computer science learning at primary and secondary levels. Despite the fact that various methods such as discovery, guided inquiry and expository method among others have also been in use, the WASSCE Chief Examiner's annual reports and comments on computer science still show that students' performance in computer studies have not improved appreciably (WAEC, 2019). There is therefore, the need to find out if Computer Graphics Instructional modes can enhance students' interest and achievement in Computer science. The study also would consider the influence of gender on students' interest and achievement in computer science.

Computer graphics has been found effective in the teaching and learning of arts subjects like Christian Religious Knowledge. Computer graphics is the creation, storage and manipulation of drawings and pictures with the aid of computer system (Adekoya & Adekoya, 2002). Computer graphics offer the potential to increase the challenges and curiosity of tasks, as well as encourage students to be creative and use their imaginations. Interest is an important variable in the teaching

and learning of biology. This is because when one student becomes interested in an activity, one is likely to be more deeply involved in that activity. Interest, according to Imoko and Agwagah (2006) is a subjective feeling of concentration or persisting tendency to pay attention and enjoy some activities or content. It can also be regarded as the condition of being eager to know or learn about something. Okigbo and Okeke (2011) held that though some children may be intellectually and physically capable of learning, they may never learn until their interest is stimulated.

Achievement is the act or process of finishing something successfully. Achievement is used synonymously with success. According to Ezeh (2009) achievement could be referred to as something very good or difficult which was carried out successfully. Despite the fact that various methods such as discovery, guided inquiry and expository method among others have also been in use, the Chief Examiner's annual reports and comments in computer studies shows that students' performance in computer studies have not improved appreciably (WAEC, 2019).Thus this study is geared towards finding out if Computer Graphics Instructional modes can enhance students' interest and achievement in computer studies. Gender constitutes the characteristics that distinguish the male from the female. Nworgu (2015) saw it as certain characteristics of men and women which are culturally and socially determined. Those that are biologically determined are regarded as sex. Gender influence on achievement is still inconclusive. Hence gender will be considered as an intervening variable in this study. Gender is the different socio-cultural stereotyped roles and responsibilities expected of men and women. According to Eze (2008), gender is parallel and socially unequal division into masculinity and femininity. Biases and misconceptions about women and science is that science is a male enterprise and this has remained the main focus of concern among science educators. In Nigeria, gender bias is still prevalent. It has persisted even within the science classroom. The issues of gender have generated a lot of concern for science educators in achievement. For instance, Anagbogu and Ezeliora (2007) found that females achieved better than males in science subjects while Kost, Pollock and Finkelstein (2009) found that males achieved better in science. Okoli and Okoli (2014) found that there is no statistically significant difference in the mean achievement scores of male and female students in biology. Thus, there is no consensus as to whether gender influences achievement, interest and retention in science or not. The present study therefore, is challenged with the dearth of research studies on the effect of computer graphics instructional mode in secondary school male and female students' interest and achievement in computer studies in Enugu State, Nigeria.

## 1,1 Statement of Problem

Despite the importance of computer science, available statistics from the West African Examination Council (WAEC, 2015 - 2019) recorded very poor performance at Senior School Certificate (SSC) examinations. Poor achievement in computer studies has been blamed on a number of factors such as ineffective instructional strategies adopted by computer studies teachers and difficulty in understanding some topics in computer studies. Consequently, students find it difficult to comprehend and retain what they were taught. To understand and perform well in computer studies students must be made to be interested in the learning of the concepts. Research reports on the status of computer studies in schools in Enugu state showed that computer science classroom activities are still dominated by teacher–centered methods (conventional method) which have been found to be ineffective in promoting computer studies learning at secondary levels (Cimer, 2012). Despite the fact that various methods such as discovery, guided inquiry and

expository method among others have also been in use, the WAEC Chief Examiner's annual reports and comments on computer studies still show that students' performance in computer science have not improved appreciably (WAEC, 2019). There is therefore, the need to find out if Computer Graphics Instructional modes can enhance students' interest and achievement in computer studies. The study also would consider the influence of gender on students' interest and achievement in computer studies.

## 1.2 Purpose of the Study

The main purpose of this study was to determine the effects of computer graphics and computer animation on students' interest and achievement in the learning of computer studies. Specifically, the study determined the:

(1) difference in the mean interest rating scores of male and female students taught computer studies using computer graphics and those taught using conventional method.

(2) difference in the mean achievement scores of male and female students taught computer studies using computer graphics and those taught using conventional method.

(3) interaction effects of gender and method (computer graphics and conventional method) on students' mean interest scores in computer studies.

(4) interaction effects of gender and method (computer graphics and conventional method) on students' mean achievement scores in computer studies.

## 1.3 Hypotheses

1. There is no significant difference between the mean interest rating scores of male and female students taught computer studies using computer graphics and that of those taught using conventional method.

2. There is no significant difference between the mean achievement scores of male and female students taught computer studies using computer graphics and that of those taught using conventional method.

3. There is no significant interaction between gender and the use of computer graphics and conventional method on students' mean interest rating scores in computer studies.

4. There is no significant interaction between gender and the use of computer graphics and conventional method on students' mean achievement scores in computer studies.

## 2. Methodology

The study adopted quasi–experimental design. Specifically, the study adopted a non-randomized pre-test, post-test, control group design. The area of this study was Agbani Education Zone of Enugu State. Agbani Education Zone consisted of three Local Government Areas namely: Enugu South Nkanu East and Nkanu West. Agbani Education zone has 45 secondary schools. The people of the area are predominantly farmers and traders. The population of the study was all the Senior Secondary year one (SS2) Computer studies students in the 45 government owned secondary schools numbering 2,183 SS2 students in Agbani Education Zone of Enugu State. The population was made up of 1,080 males and 1,103 females. Purposive and simple random sampling techniques were used to get a sample size of 135 SS2 students. Two instruments were used for data collection, namely: Computer Graphics Interest Scale (CGIS) and Computer Graphics Achievement Test (CGAT).The CGIS is a 20- item interest scale developed by the researcher with a 4- point Scale response options. The students indicated their extent of agreement or disagreement on the twenty statements (10 positive and 10 negative), The CGAT was used for the pre-test and post- test. The

selection of the items was based on a well-planned test- blue print to ensure even coverage of the content. The reliability of the instruments (CGIS and CGAT) was established through trial testing in the schools not used for the study but have homogenous environment with the schools used. Cronbach Alpha was used in determining the coefficient of the CGIS and 0.85 was obtained while Kuder Richardson formula 20 (K-R 20) was used in determining the reliability coefficient of CGAT and 0.87 was obtained. The research questions were answered using mean and standard deviation while the hypotheses were tested at 0.05 level of significance using ANCOVA.

**Research Procedure**

The regular teachers in the schools were employed as research assistants. They were given adequate orientation on the use of the instructional strategies and were given the lesson plans. The same topics were given to the experimental and control groups. The only difference was that the experimental group was taught using computer graphics instructional mode while the control group was taught using conventional method. Before the treatment, the research subjects in the two groups were given pre CGIS and pre CGAT. After the pretest, teachers commenced the treatment and after five weeks, the post CGIS and the post CGAT were given. The post CGAT had the same test items as the pre CGAT but the items were rearranged. Data on the students' CGIS and CGAT from the two groups were recorded and used to answer the research questions and test the hypotheses.

**3. Results**

Hypotheses Testing Hypothesis 1: There is no significant difference between the mean interest rating scores of male and female students taught Computer Studies using computer graphics and those taught using conventional method.

Table 1: Summary of ANCOVA Test of Difference between the Mean Interest Rating Scores of Students' Taught Computer Studies Using Computer Graphics and Those Taught Using Conventional Method

| Source | SS | Df | MS | F | P-value | Decision |
|--------|-----|-----|------|------|---------|----------|
| Corrected Model | 37.103a | 4 | 9.276 | 83.902 | .000 | |
| Intercept | 1.856 | 1 | 1.856 | 16.788 | .000 | |
| Pretest_Interest | 32.385 | 1 | 32.385 | 292.929 | .000 | |
| Method | 2.531 | 1 | 2.531 | 22.894 | .000 | *S |
| Gender | .145 | 1 | .145 1 | .310 | .256 | **NS |
| Method * | . 181 | 1 | .181 | 1.638 | .204 | NS |
| Gender Error . | 9.176 | 1 83 | .111 | | | |
| Total | 853.350 | 88 | ---------------------------------------------------------------------- | | | |

*Significant **Not Significant

In Table 1, the analysis shows that there is a significant difference in mean interest scores of male and female students taught computer studies using computer graphics and those taught using conventional method, F(1,83) = .256P

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**Hypothesis 2:** There is no significant difference between the mean achievement scores of male and female students taught genetics using computer graphics and those taught using conventional method

Table 2: Summary of ANCOVA Test of Difference Between the Mean Achievement Scores of Students' Taught Computer graphics Using Computer Graphics and Those Taught Using Conventional Method------------------------------------------------------------------------------------

| Source | SS | D f | MS | F | P- value | Decision |
|--------|-----|-----|-----|-----|----------|----------|
| Corrected Model | 4358.758 a | 4 | 1089.690 | 31.510 | .000 | |
| Intercept | 6857.611 | 1 | 6857.611 | 198.298 | .000 | |
| Pretest_Achievement | 1409.941 | 1 | 1409.941 | 40.771 | .000 | |
| Method | 2639.476 | 1 | 2639.476 | 76.324 | .000 | S |
| Gender | 7.326 | 1 | 7.326 | .212 | .647 | NS |
| Method * Gender | 30.966 | 1 | 30.966 | .89 | .347 | NS |
| Error | 2870.333 | 83 | 34.582 | | | |
| Total | 315448.000 | 88 | | | | |
| Corrected Total | 7229.091 | 87 | | | | |

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As shown in Table 2, there is a significant difference in the mean achievement scores of students taught computer studies using computer graphics and those taught using conventional method, F(1,83) = .647P Hypothesis 4: There is no significant interaction effect of students' gender and method (computer graphics and conventional method) on students' achievement in computer studies. As shown in Table 2, there is no significant interaction of gender and method on students' mean achievement scores in computer studies, F(1,83)= .347, P female students taught with computer graphics and conventional method. The ANCOVA result in table 1 F(1,83) = .256, p 0.05. This means that both male and female students tended to have almost the same achievement scores in computer studies when taught using computer graphics and conventional method. The implication is that the relative efficacy of the instructional strategies was consistent across gender levels. Gender as a main factor is not significant on students' achievement in computer studies. Consequently, the null hypothesis of no significant difference between pre-test and post- test mean achievement scores of male and female students taught computer studies using computer graphics and conventional method was accepted. This means that both male and female students tended to have increase in achievement in when taught using computer graphics and conventional method. These findings are in line with the studies of Falode et al (2016); Okoli and Okoli (2014) and Egbunonu (2012) who agreed that once equal educational and learning experiences are provided for both male and female students, achievement will be even for both sexes. The interaction effect of method (computer graphics and conventional method) and gender on students' overall cognitive interest in Table 1 was not significant in computer studies F(1,83) = .204, p >0.05. The null hypothesis of no significant difference between the interaction effect of students' gender and method on students' achievement in computer studies was therefore accepted. This implies that the relative efficacy of the instructional mode was consistent across gender level. The present study is in line with the findings of Okoli & Okoli (2014), Egbunonu (2012) which revealed that the

interaction effects of instructional technique and gender on students' achievement was not significant. The interaction effect of method (computer graphics and conventional method) and gender on students' overall cognitive achievement in Table 2 was not significant in genetics $F(1,83) = .347$, $p > 0.05$. The null hypothesis of no significant difference between the interaction effect of students' gender and method on students' achievement in genetics was therefore accepted. This implies that the relative efficacy of the instructional mode was consistent across gender levels. The present study is in line with the findings of Okoli and Okoli (2014) and Egbunonu (2012) which revealed that the interaction effects of instructional technique and gender on students' achievement was not significant.

## 4. Conclusion:

On the basis of the findings, it was established that there was a significant difference in the mean interest and achievement scores of male and female students taught computer studies using computer graphics and those taught using conventional method. However, there was no significant difference in the mean interest and achievement scores of both male female and students taught computer studies in both computer graphics and conventional method. Also there was no significant interaction effect in the mean interest and achievement scores between the two groups

### 4.1 Recommendations

Based on the findings of this study, the following recommendations are proffered:

1. Teachers, especially those teaching computer studies should always adopt the computer graphics instructional mode that will enable them to cater for the diverse learning styles of students in their classrooms and hence, captivate their interest and improve their achievement in computer studies.

2. Teacher education prorgrammes should include computer graphics instructional mode in computer studies method course content. This will ensure that the biology teachers are adequately trained on how to use computer graphics instructional mode in the teaching and learning of computer studies.

3. Ministries of Education and other stakeholders in the education industry should organize workshops and seminars and sponsor teachers to attend in-service courses on how to use computer graphics instructional mode to improve their teaching skills which are found by this study to be effective in promoting students' interest and achievement

4. Computer studies teachers should pay attention to the issue of gender–related differences in the classroom. Such gender–related differences which are known not to be innate could be minimized if not eliminated through curricular restructuring or use of appropriate teaching techniques such as computer graphics instructional mode. Students should be encouraged to be serious to embrace this activity-oriented and student- centered approach which will enable them carry out independent or group work such as assignment and project given to them by the computer studies teachers and also make their instructions authentic by relating what they have learnt to their personal experiences or real world situation.

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