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EFFECT OF COMPUTER MEDIA INSTRUCTION ON SECONDARY SCHOOL STUDENTS' ACADEMIC ACHIEVEMENT IN BASIC TECHNOLOGY IN AWGU LOCAL GOVERNMENT AREA OF ENUGU STATE

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ABSTRACT

This study was to examine the effects of computer media instruction on secondary school students' academic achievement in Basic Technology in Awgu Local Government Area of Enugu State. Two research questions were answered while three hypotheses were tested. The study adopted a factorial research design using intact classes. A 2x3 factorial model was employed in the study. A sample of 118 Junior Secondary School two (JS2) Basic Technology students from Awgu Education Zone of Enugu state was used in the study. The instrument for data collection was Basic Technology Achievement Test (BTAT) and was validated by four experts. The reliability of the instrument was established using Kudder-Richardson formula 20 which yielded coefficient of internal consistency of 0.92. Teachers were trained as research assistants and they administered the treatment on the students using the designed lesson plans. The method of data collection was by administering the BTAT as pretest and posttest. The data obtained were analyzed using mean gain and Analysis of Covariance (ANCOVA). The results revealed among others that the students taught basic technology using computer media instruction performed better than those in the conventional lecture method. There was a significant difference between the mean achievement of students in basic technology in the computer media instruction group and conventional method in favour of computer media instruction. Based on the findings, the study recommended among others that basic technology teachers should adopt computer media instruction to involve students in the learning process actively and make them take more responsibility for their own learning.

Keywords: Computer Media Instruction; Students' Academic Achievement; Basic Technology.

Introduction

Every educational system is developed and structured according to many diverse and distinct needs and demands of the society that established it. However, education is constantly changing and adapting itself to new demands and circumstances. In the National Policy on Education, the Federal Government of Nigeria (FGN, 2013) had continued to

update her educational system to meet up various educational challenges. The FGN properly placed a significant emphasis on the importance of students acquiring and developing appropriate skills as equipment for them to live in and contribute positively to the society. Moreover, secondary education in Nigeria, on its part, aims at equipping students to live effectively in our modern age of science and technology, hence the inclusion of Basic Technology education in the secondary school curriculum in Nigeria.

Basic technology as viewed by (Elom and Ogwa, 2017) is an integrated subject which comprises of woodwork, metal work, building technology, auto mechanics, electrical electronics and technical drawing at their basic level. It is a subject that is offered at the junior secondary school level. Basic technology, as part of science and technology education is a subject in the Nine Year Basic Education programme to be studied in primary and junior secondary levels of education. Basic technology enhances skill acquisition which makes the implementation of the 6-3-3-4 system of education successful. This can be possible if teachers are able to make students acquire the desired technological skills. Because technological knowledge is very important in secondary education, voluntary organizations and even parents contribute to the establishment and maintenance of schools. Basic technology is of great importance to students as it facilitates seamless learning and online education, providing access to up-to-date information. In support of the above, Java-assignment (2022) opined that technology is an essential part of our daily lives. Every other task we do today relies heavily on technology. We depend so much on it that we can't even imagine our lives without technology. We use hundreds of gadgets in our homes, schools, and offices.

The importance of basic technology cannot be over-emphasized. Within the context of technology education, basic technology has been identified as a very important school subject and its importance in scientific and technological development of any nation has been widely reported. It was as a result of the recognition given to basic technology in the development of the individual and the nation that made it one of the vocational core subjects among other science related subject in Nigeria education system. Its inclusion as a core subject in the junior secondary schools calls for the need to teach it effectively (Ezeocha in Ogwa, 2016). This is because effective teaching of basic technology can lead to the attainment of technological greatness. Basic technology as opined by Nwachukwu (2014), exposes students to their desired vocation as the goals of vocational education as stated in the National Policy on Education is to provide trained manpower in the applied science, technology and business particularly at craft, advanced craft and technical levels. If basic technology can be a means to achieve this, the nation will then be sure of bringing up youths of admirable behaviours who, rather than being liabilities to the government, will contribute positively to the social, economical and technological development of the nation. This study of basic technology

helps to reduce ignorance about technology. The subject has three main objectives as stated in the National Policy on Education (FRN 2014), which are; to provide pre-vocational orientation for further training in technology, to provide basic technological literacy for everyday living and to stimulate creativity and simulation. Towards the attainment of these objectives of basic technology, adequate teaching methods must be put in place for its teaching so that optimum academic achievement and retention can be guaranteed.

Despite the importance of basic technology in Nigerian, it is very disappointing to note that students' achievement in the subject at both internal and external examinations has remained consistently poor (Osuyi, 2021). Okoro (2011) asserted that for some years, the percentage of students who obtained credit pass in basic technology at Basic Education Certificate Examination (BECE) in Nigeria has been low and their performance is poor. In Obollo-Afor Education Zone of Enugu State, statistics from August/September 2017-2021 for Basic Education Certificate Examination showed the percentage of candidates who passed BECE at credit level and above in basic technology as follows; 59.7% in 2017, 32.9% in 2018, 47.3% in 2019, 70.8% in 2020 and 44.6% in 2021 (Source: Planning, Research, and Statistics Department, Post-primary Education Board, Obollo-Afor, 2021). The trend although showed some improvement in the subject, but the performance of students fluctuates with a decline in 2018, 2019 and 2021. This evidence indicates that secondary school students' academic achievement in basic technology is still not at its best. If the grades that students get at the end of a course of study continue to either fluctuate or sometimes decline, the implication is that Nigeria may have inconsistent supply of manpower or facility for teaching science and technology related disciplines particularly basic technology. This may affect Nigeria's vision to become one of the 20 industrialized nations in the world by year 2025. These have raised research interest in order to understand the factors responsible for fluctuations and decline in students' achievement as well as poor students' achievement and proffer solutions to them.

Achievement in teaching-learning process means attainment of set educational objectives of instruction. Academic achievement according to Gadzama (2012) is the measure of the pupils learning outcome at the end of teaching-learning activities, which can be assessed by outcomes and improvement in the performance resulting from education. It is the educational goal that is achieved by students or learners over a certain period of time. Academic achievement can be measured either by examinations or continuous assessments and the goal may differ from one individual or institution to another. Hoyle in Ikeanumba (2017) argued that schools are established with the aim of imparting knowledge and skills to those who go through them and behind all this is the idea of enhancing good academic achievement. The academic deans and the quality assurance committee are concerned

about those who do not perform well because if this poor achievement goes unchecked, the school may lose its reputation, which may result in loss of confidence in graduates. Kyoshaba in Esomonu (2020) saw academic achievement as achievement outcomes that indicate the extent to which a person has accomplished specific goals that were the focus of activities in instructional environments, specifically in school, college, and university. The researcher defines academic achievement as students' success in meeting short or long-term goals in education. The academic achievement of secondary school students in basic technology has been a thing of worry to education stakeholders including the students.

Many factors have been identified by researchers as being responsible for the decline and poor achievement of students in basic technology. Some of these include; lack of qualified basic technology teachers, lack of educational facilities like laboratories, overloaded syllabus, laziness, poor attitude and lack of interest on the part of the students, large class size, and family/home background of the students (Osuafor and Okonkwo, 2013). Apart from these factors, poor teaching methods adopted by teachers at secondary school level in Nigeria have also been identified as one of the major factors contributing to poor performance of students in basic technology (Ahmed and Abimbola, 2011; Umar, 2011; Wanbugu, Changeiywo and Ndritu, 2013). If students are not happy with the way basic technology is taught, they may show disinterest and develop poor retention in and towards basic technology and its teaching and this would affect their academic achievement in basic technology.

The students' poor achievement has been blamed on the teaching methods adopted by the teachers which de-emphasize activities or practical lessons (Olufemi and Ibukun, 2013). The common teaching methods used in secondary schools are often teacher-centered or chalk-and-talk. According to Olufemi and Ibukun, the teacher-centered methods such as lecture method and chalk-and-talk has been implicated in a number of studies as one of the major factors contributing to students' underachievement. Students may improve their achievement if opportunity is given to them to carry out certain activities that are related to the concepts being taught to them. There is need to examine whether technology-oriented activity-based instruction can improve students' achievement to its best level in basic technology. The method that comes to the mind of the researcher at this point is computer media instruction since it is student-centered and democratic in nature.

Computer media instruction, (CMI), as opined by Timothy (2007) is an interactive technique whereby computer packages are used to present the instruction and also to monitor the learning that takes place. It uses the combination of texts, graphics, sound and video in the learning process. It is the personalized teaching methodology by depending on the abilities of the computer to find relevant experience with different serial contents. Computer

media instructional packages such as PowerPoint enhance students' academic performance in all aspects of learning in our institutions. By well-prepared lesson programs, therefore, a computer is one of the assisted teaching methods that students can learn by themselves. Computer Media Instruction (CMI) is based on the principles of programmed instruction. Computer knowledge can be stated as knowing the various fundamental aspects of computers and the basic skills involved in the operations of computers. It also includes the applications of computer in teaching and learning processes. Computer-media instruction (CMI) is an instructional package where a computer is used to communicate the instructional materials and evaluate the learning outcomes. It uses a blend of graphs, texts, sounds and videos for learning process (Onasanya, Daramola, and Asuquo, 2006). Computer media instruction refers to virtually any sort of computer application in instructional settings comprising of drill and practice, simulations, instructional exercises, supplementary exercises, instructional management, database development, programming, composing using word processors, and other different applications (Gana, 2013). Gana (2013) expressed that CMI is learner-centered and activity oriented. The challenge is how to optimize usage, Gonzalez and Birch (2000) ascertain that computer-assisted learning has the ability to promote active learning in a wide variety of disciplines from literature to the social sciences and beyond. Ochoyi and Ukwumunu (2008) announced that the utilization and growing development of technology in the classroom gives new chances for delivering instruction. Researchers were of the view that computer media instruction increases students' achievement and is significantly better than the conventional teaching approach such as lecture method.

The conventional method involves other methods used by the teacher in lesson delivery which are teacher-centered. Typical examples are the lecture method and chalk talk method. Lecture method is a teacher-centred approach to teaching and learning in which the teacher is seen as an authority, dispensing knowledge to students who contribute little or nothing to the instruction. Lecture method has been criticized by Adegoke (2011) who posited that only hardworking students can benefit from it. The classrooms in Nigeria are predominantly dominated by conventional method like the lecture method of instruction which does not encourage students-students interaction. The common use of conventional method is obviously due to the fact that it is suitable for teaching a large number of students and saves a lot of time. It also requires lesser skill on the part of the teachers who use the approach. Conventional method as a teacher-centred approach makes for students' passivity and therefore leads often times to poor academic achievement in school subjects.

Computer media instruction have been reported in a number of studies to bear characteristics that could improve on the students' achievement (Neboh, 2009; Rose, 2014; Zakaria, Solfitri, Daud and Abidin, 2013), they are however, not without

limitations. For teachers, stepping out of the teacher-centred method and engaging students in group activity is hard work, especially when doing it for the first time. Designing group work requires a demanding yet important rethinking of the syllabus, in terms of course content and time allocation. Both computer media instruction and cooperative learning hold many benefits for the students due to the nature of students' involvement. These benefits of computer media instruction are accessible to both genders of the students. The findings of Muhammad (2014) and Okpala and Onocha as cited in Offiah and Okonkwo (2011), indicated that achievement in basic technology towards the subject could be influenced by some learner characteristics such as gender. Another issue on the poor achievement in basic technology is the notion of some male students that basic technology is a subject for the males and not for the females. Some research works have shown contradictory evidence in students' academic achievement in science due to gender (Ogbaga, 2016). Ifeakor (2013) found that there was no statistical significant difference in the achievement of male and female students in biology and chemistry respectively. The teaching methods adopted for teaching basic technology have been observed to be gender biased. Therefore, one can emphatically state that by the virtue of the importance of basic technology as a school subject, there is need for its effective teaching and learning to bring about good achievement and retention in both male and female students. Students' performance in basic technology depends on many factors and stands out to show how well a student is doing. Slee (2014) encapsulated that students' retention and interest could play substantial role among students studying basic technology.

Gender is an important variable in educational research and it has continued to be an issue of concern to educators and researchers. Ezirim (2016), Longe and Adedeji (2013); Yoloye (2014), noted in their studies that gender has impact on basic technology. Gender can be considered to be sexual classification into male and female. Gender issues in the context of education is referred to as the differences, both real and perceived between boys and girls and their relative achievements and opportunities (West Minister Institute of Education, 2016). Gender-related issues have attracted the attention of many researchers in basic technology for male and female in secondary schools. Agommush and Nzewi (2013); Babajide (2010); Danladi (2013), found that gender has no influence on students' achievement in basic technology and their retention ability. Also, Sema, Seda and Nilda (2014) in their study found no significant difference between male and female students' achievement. The influence of gender on achievement and in retention ability is therefore still a controversial issue among basic technology researchers. While some findings indicated no significant effect of gender in basic technology achievement (Adekoya, 2010), some researchers reported significant influence of gender on academic achievement with boys having better scores than girls in the study. This study therefore sought to examine the influence of gender on the achievement of students. These

contradictive evidences in academic achievement and lack of clear trend on gender influence in the study of basic technology has resulted in the need to carry out a study with a view to determine the effect of computer media instruction on secondary school male and female basic technology students' academic achievement.

Statement of the Problem

There is a consensus among researchers and educators that basic technology is an important and useful subject for development in every country. Despite the importance and popularity of basic technology among Nigerian students, it is very disappointing to note that students' achievement in the subject at both internal and external examinations has remained consistently poor. Some researchers asserted that for some years the percentage of students who obtained credit pass in basic technology at Basic Education Certificate Examination (BECE) in Nigeria has been low and their achievement is poor. However, BECE Chief Examiner's report 2021 stated that there is an improvement in the subject but the achievement of students is still not at its' best which is in line with the BECE statistic evidence from Obollo-Afor Education Zone of Enugu State.

Many research works have been carried out as regards students' poor academic achievement, yet the problem persists even after some interventions by the education stakeholders. The students' poor achievement in basic technology which is noted in BECE Chief Examiners' report (2017-2021) is often attributed to a number of other factors. These include: method of instruction, lack of practical activities, under-equipped laboratories, and lack of enough instructional materials. It is thought that recourse to an instructional strategy that could ensure sufficient interaction among students, with teacher and instructional materials as well as giving students enough time at their own pace could improve students' basic technology achievement. In recent years, researchers' attention has turned to investigating the effect of some innovative teaching methods that will enhance students' achievement in basic technology without investigating if there is a way the previous methods we had can be combined or manipulated to enhance students' achievement in basic technology. Based on the forgoing, the researcher chooses to apply the use of computer media instruction in teaching some concepts in basic technology in order to observe its effect on students' achievement. Most research studies conducted in these areas in basic technology have not been carried out in the Local Government Area under study. Although the method have been compared to other methods. To this background, it is imperative to investigate effect of computer media instruction on secondary school students' academic achievement in Basic Technology in Awgu Local Government Area of Enugu State.

Research Questions

The following research questions guided the study:

1. What are the achievement mean scores of secondary school students taught basic technology using computer media

instruction and those taught with conventional lecture method?

2. What are the achievement mean scores of secondary school male and female students taught basic technology using computer media instruction?

Hypotheses

The following null hypotheses were tested at 0.05 significant levels

1. Achievement mean scores of secondary school students taught basic technology using computer media instruction and those taught with conventional lecture method do not differ significantly.
2. Achievement scores of secondary school male and female students taught basic technology using computer media instruction do not differ significantly.
3. Interaction effect of gender and teaching method on the academic achievement of senior secondary school students in basic technology do not differ significantly.

Materials and Methods

The study adopted a factorial research design using intact classes. A 2x3 factorial model was employed in the study. A sample of 118 Junior Secondary School two (SSS2) Basic Technology students from Awgu Education Zone of Enugu state was used in the study. The instrument for data collection was Basic Technology Achievement Test (BTAT) validated by four experts. The reliability of the instrument was established using Kudder-Richardson formula 20 which yielded coefficient of internal consistency of 0.92. Teachers were trained as research assistants and they administered the treatment on the students using the designed lesson plans. The method of data collection was by administering the BTAT as pretest and posttest. The data obtained were analyzed using mean gain and Analysis of Covariance (ANCOVA).

Results

Research Questions 1: What are the achievement mean scores of secondary school students taught basic technology using computer media instruction and those taught with conventional lecture method?

Table 1: Achievement Mean Scores of Secondary School Students taught Basic Technology using Computer Media Instruction and Conventional Lecture Method

Source of variation	N	Pretest Mean	Posttest Mean	Gain Mean	Pretest SD	Posttest SD	Remark
Computer Media Instruction	38	29.47	80.92	51.45	10.95	12.78	Effective
Conventional method	41	27.07	62.80	35.74	11.29	14.14	

Table 1 reveals that the students taught basic technology with computer media instruction had pretest mean score of 29.47 and posttest mean score of 80.92 with gained mean 51.45 in basic technology, while those in the control group taught with conventional method had pretest mean score of 27.07 and posttest mean score of 62.81

AJEMATES
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with gained mean 35.74. With posttest mean gain score of 51.45, computer media instruction is effective in enhancing students' achievement in basic technology. Table 1 showed from the standard deviation scores that the spread of scores increased in both groups in moving from the pretest to the posttest with the conventional method group having the highest standard deviation.

Research Questions 2: What are the achievement mean scores of secondary school male and female students taught basic technology using computer media instruction?

Table 2: Influence of Gender on Basic Technology Achievement of Secondary School Students Taught Using Computer Media Instruction

Source of variation	Gender	N	Pretest Mean	Posttest Mean	Gain Mean	Pretest SD	Posttest SD	Remark
Computer Media	Male	18	29.17	81.39	52.22	10.06	11.61	Effective
Instruction	Female	20	29.75	80.50	50.75	11.97	14.04	Effective

Table 2 indicates that computer media instruction is effective in enhancing both male and female students' achievements in basic technology with the male students having better achievement mean of 81.39 than their female counterparts with mean of 80.50. Table 2 shows from the standard deviation scores that the spread of scores increased in both male and female in moving from the pretest to the posttest with the females having the highest spread of scores.

Hypothesis 1: Achievement mean scores of secondary school students taught basic technology using computer media instruction and those taught with conventional lecture method do not differ significantly.

Table 3: ANCOVA on the Achievement Mean Scores of Secondary School Students Taught Basic technology Using Computer Media Instruction and Those Taught with Conventional Lecture Method

Source	SS	df	Mean Square	F	Sig.	Decision
Corrected Model	6682.488[a]	4	1670.622			
Intercept	56664.322	1	56664.322			
Pretest	47.870	1	47.870			
Method	6310.553	1	6310.553	33.753	.000	S
Gender	46.481	1	46.481	.249	.620	NS
Method * Gender	111.647	1	111.647	.597	.442	NS
Error	13835.234	113	186.963			
Total	424600.000	118				
Corrected Total	20517.722	117				

AJEMATES
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Table 3 shows that at 0.05 level of significance, 1df numerator and 117df denominator, the calculated F is 33.753 with P-value of 0.000 which is less than 0.05. Therefore, the null hypothesis one is rejected. So, the effect of computer media instruction on the Basic technology achievement scores of secondary school students is significant.

Hypothesis 2: Achievement mean scores of secondary school male and female students taught basic technology using computer media instruction and those taught with conventional lecture method do not differ significantly.

Table 2 also reveals that at 0.05 level of significance, 1df numerator and 117df denominator, the calculated F is 0.249 with P-value of 0.620 which is greater than 0.05. Therefore, the null hypothesis four is accepted. So, gender had no significant influence of the achievement of the students taught using computer media instruction and conventional method.

Hypothesis 3: There is no significant interaction effect of teaching method and gender on the achievement of the students in basic technology.

Table 4: ANCOVA on the Interaction Effect of Teaching Methods and Gender on Achievement

Source	SS	df	Mean Square	F	Sig.	Decision
Corrected Model	6971.185[a]	6	1161.864			
Intercept	84534.222	1	84534.222			
Pretest	293.235	1	293.235			
Method	6489.434	2	3244.717			
Gender	12.211	1	12.211			
Method * Gender	163.386	2	81.693	.480	.620	NS
Error	18874.789	113	170.043			
Total	635975.000	118				
Corrected Total	25845.975	117				

Table 4 indicates that at 0.05 level of significance, 1df numerator and 117df denominator, the calculated F is 0.480 with P-value of 0.620 which is greater than 0.05. Therefore, the null hypothesis seven is accepted. So, there is no significant interaction effect of teaching method and gender on the achievement of the students in basic technology.

Discussion of Findings

The findings of the study revealed that computer media instruction significantly improved the students' basic technology achievement. The students in the computer media instruction group had mean gain significantly higher than their counterparts in the conventional group. Computer media instruction was also more effective than cooperative as shown by the mean gain. This improvement in the achievement of basic

technology students through the use of computer media instruction can be explained from the fact that computer media instruction increased personal, social and intellectual development, academic attainment and positive interaction among students; computer media instruction engage students in group and thereby increase learning, education, knowledge and skills. The findings of this study is supported by Nnamani and Oyibe (2016) who reported that students taught using computer media instruction outperformed those taught using conventional methods of teaching. The findings of the study is further supported by the findings of Awofala and Nneji (2013) who examined the effects of computer media instruction on the academic achievement, social interaction, behaviour, and effect on secondary school English and Social Studies students. Agah and Semseddin (2011) reported that students of mixed ability engaged in computer media instruction improve not only in their achievement but also in their group interactions. The findings of this study revealed no significant differences in the mean achievement scores of male and female students taught using computer media instruction. These findings further consolidate the positive effect of computer media instruction as it tends to improve students' achievement.

Conclusion

The findings of this study revealed a significant positive effect of computer media instruction on students' achievement in basic technology. This led to the conclusion that computer media instruction significantly and positively enhanced the students' achievement in basic technology. Also, there was no significant difference in the achievement mean scores of male and female students taught using computer media instruction. Thus, computer media instruction significantly improved the students' basic technology achievement regardless of their gender. More so, there are no significant interaction effects of gender and teaching method as measured from the basic technology achievement test.

Recommendations

The following recommendations are made in the light of the above findings:

1. More attention should be accorded computer literacy and operation in the secondary school and relevant computer assisted instructional packages should be developed for use within the Nigerian school system. In addition, Nigerian public schools should be equipped with necessary ICT facilities to reiterate the potential of ICT in Nigerian schools.
2. Curriculum planners such as Nigerian Educational researches and developments council (NERDC) school consider review of curriculum for basic technology for secondary schools with a view to incorporating the computer tutorials.
3. Basic technology teachers should adopt the use of computer media instruction to involve students in the learning process actively and make them take more responsibility for their own learning.

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