GENDER DIFFERENCE IN ACHIEVEMENT AND INTEREST OF STUDENTS EXPOSED TO CONCEPTS IN BLOCKLAYING, BRICKLAYING AND CONCRETING USING VIDEOTAPED AND TEXT-BASED COMPUTER ASSISTED INSTRUCTION

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Abstract: *This study was designed to investigate gender difference in the achievement and interest of students in Blocklaying, Bricklaying and Concreting using Videotaped and Text-based Computer Assisted Instruction (CAI). Quasi-experimental design of pre-test, post-test group was adopted. 190 students from Niger state constituted the population specifically, 93 students from treatment group A (Videotaped CAI) while 97 students constituted the treatment for group B (Text-based CAI). Two research questions and two null hypotheses were developed to guide the study. The instruments for data collection were Blocklaying, Bricklaying and Concreting Achievement Test (BBCAT) and Blocklaying, Bricklaying and Concreting Interest Inventory (BBCII). The instrument was validated by five expert from Industrial and Technology Education Department, Federal University of Technology, Minna. The reliability coefficient of BBCAT was found to be 0.96 using Pearson Product Moment Correlation while, the internal consistency of the BBCII items was found to be 0.83 using Cronbach Alpha. Mean and standard deviation was used to answer the research questions while Analysis of Covariance (ANCOVA) was used to test the hypotheses at 0.05 level of significance. The study revealed that male students taught BBC with videotaped CAI had higher mean scores than female students taught with Videotaped CAI in BBCAT. The study also revealed that, female students taught BBC with text-based CAI had higher mean scores than male students taught with Text-based CAI in BBCAT. However, female students taught BBC with Videotaped CAI had higher mean scores than male students taught with Videotaped CAI in BBCII. Consequently, the researcher recommended that the National Board for Technical Education should consider it necessary in the curriculum content adaptation to computer assisted instructional strategies for teaching BBC at technical colleges in the next review of the curriculum.*

Keywords: *Achievement, Computer-Assisted, Gender, Instruction, Video*

1. INTRODUCTION

Gender difference has been an increasing issue over the year. The difference in academic achievement of male and female is a crucial matter to the educationists. Over the years, there has been a growing concern about the role of women in the, economic, scientific and technological development of the nations. This concern has been expressed to assume the prominent role of women in vocational and technical education in Nigeria today. The term gender according Owodunni and Ogundola (2014) is socio-cultural and is built based on the biological expectations of the individual on the basis of being a male or female. Wall (1997) viewed gender as the natural difference between men and women, which dictates on their occupational choice. Based on the foregoing therefore, gender could be defined as a cultural or societal way of ascribing attribute which differentiates feminine from masculine. Gender can be seen or

identified as one of the factors that may influence students' academic success in a subject. Thus, gender of students could be a contributory factor to their achievement and interest. In the last two decades, tremendous efforts have been expended in the study of the personal factors affecting academic achievement especially in sciences, technology and social sciences. Notably among these is the study of the phenomenon of sex or sex-equity in education.

Onuebunwa (2000) observed that sex-related problems have contributed greatly to the creation of sex impotence in the society by providing unequal opportunities for males and females from childhood to adulthood. As such, the subordination can be changed or ended. Nikolaenko (2005) stated that the boys are better at mental manipulation of images which may benefit problem – solving, design and construction skills. But Natalie (2006) noted that the gender psychological difference at birth for male and female are the same and that it is a way they are treated that gives them what we consider as typical male and female characteristics. Ash, (2005), Basturk, (2005) and Gambari, (2010) reported that gender has no significant influence on achievement. Contrarily, Fagbemi, Gambari, Oyedum and Gbodi (2004), and Osokoya (2007), reported otherwise. However, gender difference in academic achievement among students in schools is one of the issues in the current debate all over the world as it has been documented that differences exist between male and female students' achievements. This may perhaps be attributed to proportion of male and female intake in technical colleges.

Though the use of computer assisted instruction has help in developing students' interest in other field of study, very little or no consistent result has emerged from the study on gender difference in the achievement and interest in BBC with videotaped and text-based computer assisted instruction. Menn (1993) stated that provision of adequate instructional techniques for teaching and learning will have a greater difference that will stimulate both male and female achievement and interest scores; and these are important aspects of the videotaped and text-based CAI. However, Bolarin (1998) maintained that learners will learn better in subjects or courses if they have some degree of interest in such subjects. According to Bolarin, teachers have to facilitate and sustain interest in learning with the use of appropriate teaching approaches. To this end, ways of improving teaching and learning that will facilitate greater achievement and interest of the students is paramount. Gambari, (2004) maintained that the use of videotaped and text based CAI has been found to have the potential of improving learning in Physics. It is hoped that the use of videotaped and text-based CAI will also improve the teaching and learning of BBC. The problem of this study therefore, is to determine the gender difference in achievement and interest of students in BBC programme using videotaped and text-based computer assisted instruction in technical colleges.

1.1 Purpose of the Study

1. To determine the difference of gender on students' achievement in BBC when taught using videotaped and text-based CAI.
2. To determine the difference of gender on students' interest in BBC when taught using videotaped and text-based CAI.

1.2 Research Questions

1. What is the difference in the achievement of male and female students in BBC when taught using videotaped and text-based computer assisted instruction?

2. What is the difference in the interest of male and female students in BBC when taught using videotaped and text-based computer assisted instruction?

METHODOLOGY

Quasi-Experimental research design specifically the pre-test, post-test, non-equivalent control group design was adopted for the study. Quasi-Experimental research design was considered appropriate because it establishes the difference between the independent and dependent variables of a study. Intact classes were assigned to treatment group A and B in order not to disrupt the normal classes. The design of the study is as shown:

Videotaped CAI: O_1 X_1 O_2
Text-based CAI: O_1 X_2 O_2

Where:
O_1 – Pre-test for both groups
O_2 – Post-test for both groups
X_1 – Treatment for videotaped computer assisted instruction
X_2 – Treatment for text-based computer assisted instruction

The independent variables consisted of videotaped and text-based computer assisted instructions while, the dependent variables were achievement and interest.

The study was conducted in all the technical colleges in Niger State. Niger state Technical Colleges are accredited by NBTE and have the necessary facilities for the research work.

The target population for the study comprised of 190 National Technical Certificate (NTC) II (159 Male and 31 Female) of BBC students for 2014/2015 session in all the seven (7) technical colleges in Niger State, Nigeria.

Simple random sampling technique was used to assign 3 technical colleges of NTC II BBC students to treatment group A and 4 technical colleges of NTC II BBC students to treatment group B. Schools in treatment group A include: Suleiman Barau Technical College, Suleja; Government Technical College, Minna and Government Technical College, Kontagora while Government Technical College, Eyagi Bida; Federal Science and Technical College, Kuta; Mamman Kontagora Technical College, Pandogari; and Government Technical College, New Bussa were school in treatment group B. Each class comprised the number of students in that class (male and female). The total number of students in treatment group A (Videotaped CAI) comprised 93 NTC II (79 Male and 14 Female) Blocklaying, Bricklaying and Concreting students while, the total number of students for treatment group B (Text-based CAI) comprised 97 NTC II (80 Male and 17 Female) BBC students.

The instrument for data collection was Blocklaying, Bricklaying and Concreting Achievement Test (BBAT) and Blocklaying, Bricklaying and Concreting Interest Inventory (BBCII) developed by the researcher based on the topic treated. The BBCAT consisted of 40 multiple choice questions while the BBCII consisted of 27 items developed by the researcher based on five point rating scales. This includes Strongly Agreed (SA) = 4, Agreed (A) = 3,

Disagreed (D) = 2, Strongly Disagreed (SD) = 1 and Undecided (UD) = 0. The BBCAT and BBCII was validated by five lecturers from Industrial and Technology Education Department, Federal University of Technology, Minna and Ministry of Education Minna. The validators were requested to check for the suitability, clarity and ambiguity of statement or items and to restructured or add any items that are relevant but were not included in the instrument. These lecturers were considered experts because they hold Doctor of Philosophy (PhD) degree and have supervised different research studies in Technical Vocational Education and Training (TVET). Their comments and suggestions were used in the final modification of the instrument.

The lesson plan was subjected to face validation by the three lecturers from the Departments of Industrial and Technology Education and the Department of Science Education respectively. The expert ensured that the procedure/format of the lesson plan was followed, to ascertained the lesson plans, duration of the lesson, the age of the students was in line with the topics and content selected.

The BBCAT and BBCII was pilot tested on BBC NTC II students of Federal Science and Technical College, Orozo, Abuja which did not form part of the study. This was to determine its stability using the test-retest reliability coefficient on randomly sampled population of 30 students in the school. The test-retest was carried out in two separate administrations within a period of two weeks. The reliability coefficient of the BBCAT and BBCII items obtained was 0.96 and 0.83 respectively. This signifies that the items were good enough for the study

The BBACT and BBCII were administered by BBC teachers as pre-test and post-test to both treatment groups in their respective schools. The students indicated the degree to which they agreed or disagreed with items in BBCII. The researcher then marked the answer sheets of the BBCAT and BBCII to obtained students scores on gender difference on achievement and interest before the treatment. The exercise provided the baseline data on the dependent variables (achievement and interest) before the treatment and a post treatment data for each of the dependent variables (achievement and interest) of each of the groups after the treatment.

Mean scores was used to answer the research questions to determine the gender difference on students' achievement and interest in BBC using videotaped and text-based CAI, while Analysis of Covariance (ANCOVA) was used to test the hypotheses formulated at 0.05 level of significance. The results obtained were analyzed using Statistical Package for Social Science (SPSS) Software version 20. The f value and probability level (p 0.05) was used for decision. Therefore, any f value that was less than probability level (p 0.05) was considered rejected and any f value that was greater than probability level (p 0.05) was accepted.

3. RESULTS AND DISCUSSION

What is the difference in the achievement of male and female students in BBC when taught using videotaped and text-based CAI?

Table 1: Pre-test and Post-test Mean Scores of Male and Female Students Taught with Videotaped CAI and Text-based CAI in the Achievement test in Blocklaying, Bricklaying and Concreting.

Videotaped CAI		Text-based CAI	

	N	Pre-test $\bar{X}$	Post-test $\bar{x}$	Mean Gain $\bar{x}$	N	Pre-test $\bar{X}$	Post-test $\bar{x}$	Mean Gain $\bar{X}$
Male	79	43.83	59.62	15.79	80	58.02	62.01	3.99
Female	14	43.00	54.14	11.14	17	58.88	69.00	10.12

N = Number of students. x = Mean scores

Result presented in Table 1 shows that the male students taught BBC with videotaped CAI had a mean gain of 15.79 while, the female students taught BBC with videotaped CAI had a mean gain of 11.14. Meanwhile, male students taught BBC with text-based CAI had a mean gain of 3.99 while the female students taught BBC with text-based CAI had a mean gain of 10.12. The result indicates that the male perform better than female in BBCAT using videotaped CAI While, female students perform better than the male in BBCAT using ext-based CAI. Hence, there is a difference attributed to gender on Achievement of students taught Blocklaying, Bricklaying and Concreting with videotaped and text-based CAI.

What is the difference in the interest of male and female students in BBC when taught using videotaped and text-based CAI

Table 2: Pre-test and Post-test Mean Scores of Male and Female Students Taught BBC Videotaped CAI and Text-based CAI in Blocklaying, Bricklaying and Concreting Interest Inventory

	VIDEOTAPED CAI				**TEXT-BASED CAI**			
Gender	**N**	**Pre-test** $\bar{x}$	**Post-test** $\bar{x}$	**Mean Gain** $\bar{x}$	**N**	**Pre-test** $\bar{x}$	**Post-test** $\bar{x}$	**Mean Gain** $\bar{x}$
Male	79	90.60	90.40	-0.20	**80**	86.00	91.61	5.61
Female	**14**	89.57	92.50	2.93	**17**	77.76	86.35	8.59

N = Number of students. x = Mean scores

The result presented in Table 2, shows that the male students taught BBC with videotaped CAI had the mean negative gain in the male students' interest inventory of -0.20 while, female students taught BBC with videotaped CAI had a mean gain in the female student's interest inventory of 2.93. Meanwhile, the male students taught BBC with text-based CAI had a mean gain in the male interest inventory of 5.61. Also, female students taught BBC with text-based CAI had a mean gain to be 8.59 in the interest inventory. The result shows that female students perform better than the male students taught BBC with videotaped CAI in BBCII. The result further indicated that female students perform better than the male students' taught BBC with text-based CAI in BBCII. Hence, there was significant difference attributed to gender on the interest of students taught BBC with videotaped and text-based CAI in favour of female.

3.1 Hypotheses

Ho_1: There is no significant difference between the achievement mean score of male and female students in BBC taught with videotaped and text-based CAI.

Ho_2: There is no significant interaction difference of treatment given to students and their gender with respect to their mean scores in the Blocklaying, Bricklaying and Concreting Achievement Test

Table 3 Analysis of Covariance (ANCOVA) for Test of Significance of Treatment, Gender and Interaction on Students Achievement in Blocklaying, Bricklaying and Concreting

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2102.208[a]	4	525.552	3.253	.013
Intercept	46245.504	1	46245.504	286.239	.000
Pre-test	124.276	1	124.276	.769	.382
Gender	14.650	1	14.650	.091	.764
Treatment	1451.087	1	1451.087	8.982	.003
Treatment*Gender	1019.495	1	1019.495	6.310	.013
Error	29889.034	185	161.562		
Total	740446.000	190			
Corrected Total	31991.242	189			

*Significant at sig. of F < .05

The Data in Table 3 shows the F-calculated values for treatments, gender and interaction on students' achievement in BBC. The Table revealed that the F-calculated value for gender is .091 with a significance of F at .76 which is greater than .05. The result on table 3 shows that there is no significant gender differences between the achievements mean scores of male and female students when taught using videotaped and text-based CAI in BBCAT. The null-hypothesis is therefore, accepted at .05 level of significance. Hence, there is no significant difference of gender on the mean achievement scores of students taught with text-based CAI.

Result on Table 3 shows the interaction difference of treatments and gender has F-calculated value of 6.31 with significance of F at .013 which is less than .05. This result implies that there was a significant interaction difference of treatment and gender. Therefore, the null hypothesis was rejected. Hence, there was significant interaction difference of scores on BBCAT. This implies that there was a difference of treatment attributed to gender on the achievement of students taught BBC with videotaped and text-based CAI.

Ho_3: There is no significant difference between the difference of gender (male and female) on students interest in BBC.

Ho_4: There is no significant interaction difference of treatments given to students' and their gender with respect to mean scores on Blocklaying, Bricklaying and Concreting Interest Inventory.

The result in Table 4 shows the F-calculated values for treatments, gender and interaction on students' interest in BBC. The Table revealed that F-calculated value for gender is .022 with a significance of F at .882 which was greater than .05. This result shows that there was no significant difference between the mean scores of male and female students when taught BBC using videotaped and text-based CAI in BBCII. The null-hypothesis was therefore accepted at 0.05 level of significance

Table 4: Analysis of Covariance (ANCOVA) for Test of Significance of Treatment, Gender and Interaction on Students Interest in Blocklaying, Bricklaying and Concreting.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2642.362[a]	4	660.590	6.133	.000
Intercept	22083.030	1	22083.030	205.015	.000
PreInterest	2202.275	1	2202.275	20.446	.790
Gender	2.395	1	2.395	.022	.882
Treatment	7.667	1	7.667	.071	.000
Treatment*Gender	216.177	1	216.177	2.007	.158
Error	19927.133	185	107.714		
Total	1585784.000	190			
Corrected Total	22569.495	189			

*Significant at sig. of F < .05

Hence, gender has no significant differences on students' interest in BBC. The result on Table 4 also shows that interaction difference of treatments and gender has F-calculated value of 2.00 with significance of F at .158 which was greater than .05. Hence, there was no significant interaction difference of treatments given to students on their gender with respect to their mean scores on BBCII. The null-hypothesis was therefore accepted at 0.05 level of significance. Hence, there was no significant interaction difference of treatments and gender given to students on their gender with respect to their mean scores on BBCII

3.2 Discussion of the Findings

Findings on the difference of gender in students' achievement in BBC when taught using videotaped and text-based CAI revealed that male students taught BBC with videotaped CAI had higher mean scores than female students taught BBC with videotaped CAI in BBCAT. However, female student taught BBC with text-based CAI had higher mean scores than male students in BBCAT. Analysis of covariance was employed to test the hypothesis on the significant difference between the mean achievement scores of male and female students in BBC, which revealed no significant difference between the main difference of gender (male and female) on students' achievement in BBC. This finding confirmed that there was statistically no significant difference between the videotaped CAI achievement of male and female students in BBC. Hence, there was no difference attributable to gender on student achievement in BBC. This result is in line with findings of Fagbemi, Gambari, Oyedum, Gbodi (2004) who reported that their was no significant difference between the mean scores of male and female students taught social studies with the self – instructional computer – based package, implying that the instructional package was gender friendly. Also, finding of Nakaka and Okwo (2013) show no gender difference in the performance of students that were exposed to CAI package ($t=0.34$, $df=58$, $p<0.05$). This is in line with the opinion of Ash (2005), Basturk (2005) and Gambari (2010) who noted that gender has no significant influence on achievement. Although, this was not in videotaped and text-based but however, the finding was on computer assisted instruction.

Findings on the difference in gender on students' interest in BBC when taught using videotaped and text-based CAI revealed that male students taught BBC with videotaped CAI had higher mean scores than female students in BBCII. This indicates that there is a difference attributable to gender on the interest of students taught BBC with videotaped CAI. However, analysis of covariance was used to test the hypothesis on the significant difference in the difference of gender (male and female) students' interest in BBC. The result revealed no significant difference between the difference of gender (male and female) on students' interest in BBC. This implies that the observed difference in the mean interest scores of male and female students was not statistically significant. This finding may be so because Gambari (2010) noted that, any good teaching approach adopted in the teaching a course will not discriminate between sexes which BBC is one of it.

Therefore, this finding might be due to the fact that both male and female students were in the same way motivated by the computer based instruction which may have lead to increased interest in both sexes. This finding confirmed the view of Menn (1993) that provision of adequate instructional techniques for teaching and learning will have a greater difference that will stimulate both male and female interest; and these are important aspects of the videotaped and text-based CAI. Therefore, the use of videotaped and text-based CAI had help in developing students' interest in studying BBC. Bolarin (1998) maintained that learners will learn better in subjects or courses if they have some degree of interest in such subjects, therefore, teachers have to facilitate and sustain interest in learning with the use of appropriate teaching approaches such as the computer assisted instruction. Even though the academic achievement of male was higher than that of female in both treatment groups, the achievement of both sexes improved significantly. Therefore, utilizing videotaped and text-based CAI may be favourable in BBC as it facilitates active learning which leads to academic achievement and interest of students in BBC.

4. CONCLUSION

The study revealed that there was no significant gender difference in achievement and interest of students in blocklaying, bricklaying and concreting using videotaped and text-based computer assisted instruction. This implies that videotaped and text-based CAI are not gender bias. The study further revealed that text-based CAI is more effective in enhancing students' interest in BBC than videotaped CAI.

5. RECOMMENDATIONS

The following recommendations are made based on the content of the paper.

1. BBC teachers should adopt the appropriate teaching approaches such as the videotaped and text-based computer assisted instruction that will facilitate and sustain achievement and interest in learning BBC.
2. Equal opportunity should be provided for males and females from childhood to adulthood to curtail the differences in achievement and interest in course of study.
3. State Ministries of Education (SME) should equip the schools with necessary computer assisted instructional applications that will facilitate effective and efficient teaching and learning of BBC using videotaped and text-based CAI at technical college level.

REFERENCES

Ash, J. E. (2005) the effectiveness of computer assisted instruction on middle School Mathematics Performance. Retrieved on 30th March, 2014 from http://www.researchEnstae.edu/dissertation/ AA13187984.

Bolarin, A. O. (1998).' "Primary School Pupils Liked and Disliked Teaching Subject" , Journal of Research in Curriculum, Vol. 6 (1), p 103-109.

Basturk, R. (2005)' "The effectiveness of computer assisted instruction in teaching introductory Statistics", Educational Technology and Society Vol. 8 (2), p 170 -178

Fagbemi, P. O.; Gambari, A. I; Oyedum, N. A. & Gbodi, E. B. (2004)' "Effects of Self Instructional Computer – Based Package on Social Studies Performance Among Senior Primary School Pupils in Niger State, Nigeria

Gambari, A. I. (2004)' "The Development of computer aided learning software for individualized instruction of physics in senior secondary schools in Niger State, Nigeria" , Unpublished M.Tech thesis, Department of Science Education, Federal University of Technology, Minna.

Gambari, I. A. (2010)' " Effects of Computer-Assisted Instructional Package on Social Studies Performance Among Senior Primary School Pupils in Niger State, Nigeria" , Journal of Science, Technology, Mathematics and Education (JOSTMED) Vol. 1 (2) p 11 - 16

Menn, D. (1993)' "Multimedia in Education: Arming our Kids for the Future" , PC world. Vol. 11 (10) p 52-60.

Nakaka, M. D. & Okwo, C. (2013)' "Effects of computer assisted instructional package on the performance of senior secondary school students in history" , Journal of Science, Technology, Mathematics and Education (JOSTMED) Vol. 4 p 34- 39

Onuebunwa, B. N. (2000)' "Sex Barriers, challenges and opportunities in Technical and scientific Advancement: A Challenge to women in the 21st Century", Journal of women in colleges of Education (JOWICE) Vol. 4 p 159-163.

Osokoya, I. O. (1996)' "A Path-analytic Study of Teacher Quality Variables as determinants of Performance in secondary school history" , Journal of business, management and training Vol. 7 p 15-21

Owodunni, A. S. & Ogundola, I. P. (2014)' "Gender Difference in the Achievement and Retention of Nigeria Students Exposed to Concept in Electronic Works Trade through Reflective Inquiry Instructional Technique" , Australian Journal of Scientific Research Vol. 2, (6) p 446-459

Wall, M. S. (1997)' "Occupational Self-Selection: A Human Capital Approach to Sex Differences in Occupational Structure", the Review of Economics and Statistics, Vol. 63 p 60-69.