EFFECTS OF VIDEOTAPED AND TEXT–BASED COMPUTER ASSISTED INSTRUCTION ON STUDENTS' PERFORMANCE IN BLOCKLAYING, BRICKLAYING AND CONCRETING IN TECHNICAL COLLEGES IN NIGER STATE, NIGERIA

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Abstract

The study investigated the effects of videotaped and text-based computer assisted instruction on students' Performance and interest in Blocklaying, Bricklaying and Concreting (BBC) in technical colleges in Niger state. The study adopted quasi-experimental research design of pretest posttest non-equivalent control group design. The population of the study comprised all the 190 NTC II students of BBC in the seven technical colleges in Niger state for 2016/2017 session. The total population of the students was used for the study. The instruments for data collection were; Blocklaying, Bricklaying and Concreting Performance Test (BBCPT) and Blocklaying, Bricklaying and Concreting Interest Inventory (BBCII). The BBCPT was drawn based on a table of specification that covered six levels of Taxonomy of cognitive Domain. The BBCPT and BBCII were subjected to face and content validation by three experts. Test re-test reliability technique was carried out to determine the reliability coefficient of the BBCPT which was found to be 0.96 while Cronbach Alpha was used to determine the internal consistency of the BBCII items and the result obtained was 0.83. Mean and standard deviation were used to answer research questions, while Analysis of Covariance (ANCOVA) was employed to test the hypotheses at .05 level of significance. The study discovered that Videotaped and text-based computer assisted instruction were effective in improving students' Performance in BBC but, videotaped computer assisted instruction was found to be more effective in improving students Performance than the text-based computer assisted instruction. Based on the findings, it was recommended among others that Videotaped and text-based computer assisted instruction should be adopted and used by BBC teachers for teaching and learning of BBC in technical colleges. National Board for Technical Education (NBTE) and Science and Technical Schools Board (STSB) should consider it necessary in the curriculum content adaptation to computer assisted instructional strategies for teaching BBC at technical college level in the next review of the curriculum.

Blocklaying, Bricklaying and Concreting (BBC) is one of the technical and vocational education courses offered in technical colleges in Nigeria. The goals of BBC according to National Board for Technical Education (NBTE) (2001) include: to introduce the trainee in the building trades to the basic construction principles, materials and methods, so that the trainee may be able to appreciate the roles of the various trades in the building industry; to introduce the trainee to the basic principles of residential

building design and to enable the trainee make and interpret buildings with facility; to provide the trainee with essential knowledge and skills that will enable the trainee perform competently in all aspects of brick work, block work and concreting; to provide the trainee with the basic knowledge of the properties and application of concrete as well as the skill in the production of sound concrete structures and to provide the trainee with the basic knowledge of finishing materials related to the builders work and to enable the trainee apply such finish competently. Unfortunately, graduates of this programme cannot perform the basic tasks of BBC. The Chief Examiner's Report (2016) indicated that the National Business and Technical Examination Board (NABTEB) has repeatedly recorded poor performance of students in BBC trade courses. According to the report, 1325 candidates registered for NABTEB examination in 2010. Out of these candidates, 239 (18.04%) got A1-C6, 380 (28.68%) got Passed while, 706 (53.28%) failed the examinations. Also in 2015, 3938 candidates registered for the examination. 469 (11.9%) had A1-C6, 682 (173%) had passed but 2787 (70.77%) failed the examination.

The poor performance of students, particularly in BBC is quite disturbing. This situation will have negative effects on the employability skills of graduates of the programme. This is because employability skills are identified as the most important skills in the current global job market especially in a fast-growing era of technological advancement. This occurrence, particularly in BBC, has been a source of worry to all stakeholders in education and has resulted in many researches into looking for ways of improving teaching and learning of BBC. One way of improving teaching and learning of BBC may be the use of videotaped and text-based computer assisted instruction.

Computer Assisted Instruction (CAI) is a design instructional package used for teaching and learning in educational set up. The use of videotaped and text-based may be of importance in improving teaching and learning and to overcome the limitations of lecture method. Mosby (2009) pointed out that, Computer Assisted Instruction can be of great help in presenting concepts to enhance teaching and learning for better performance. Akinbola and Afolabi (2010), stated that students' performance is a measure of the students' standing in knowledge in relation to that of other students of the same group.

Academic performance of students indicates good performances of those students in that area of specialization by a score or mark on a performance test based on the bench mark or grading system. Gali (2003) defined performance as measures of the assessment of terminal or criterion behaviour involving the determination of characteristics of students' with respect to specific standard. Students' academic standing with respect to those other students' of his/her cognitive level can be a measure to determine the academic performance of the students. Indeed students' academic performance has attracted lots of research work. Several of these studies such as Raymond (2013), Rabab et, al (2013) among others have sought to find out what factors influence it, how it is measured and how it can be enhanced. Students' performance is determined by several factors among which are instructional method, teaching and learning environment, students' interest and attitude, teachers' attitude and willingness as well as the facilities. Raymond (2013) stated that student's performance in a course depend on several factors among which include learning environment and

instruction method. According to Raymond (2013), one of the most overbearing factors is the effect that teaching methods can have on the student's academic performance.

The performance of students in BBC has been dwindling for the past 5 years. This may be partly due to the teaching methods employed by teachers. Oguz-Unver and Yurumezoglu (2011) reported that videotaped CAI enhances students' attention and thus improves academic performance. Reiser and Dempsey (2007) had earlier stated that the videotaped and text-based CAI can assist in the acquisition of content learning, or what has been referred to as "cognitive processing". Teaching and learning of BBC require the use of clear and accurate instructions that will assist the learner to follow up the process and thereafter be able to repeat the process as thus acquiring the knowledge and skills that has become important globally. This implies that, knowledge and skills in Blocklaying, Bricklaying and Concreting are essentials in meeting up with the present day challenges in building construction sectors.

Students' performance is the translation of teacher/students effort in a course of learning. Raymond (2013) stated that student's performance in examinations is also a product of the quality of teaching personnel, the teaching processes and the methods adopted for teaching and learning experiences. Thus, teacher's method of teaching should be reviewed continuously as this can affect students learning experiences. Effective teaching and learning is characterized by the teacher's use of appropriate instructional methods and resources. The question here is, can the teacher use videotaped and text-based CAI in teaching subject matter like Blocklaying, Bricklaying and Concreting to stimulate and improve students' performance? Gambari (2004) stated that the use of videotaped and text-based CAI has been purported to improve teaching and learning in Physics. Israel (2007) reported that, students taught with video-taped instruction performed better than those taught with the conventional method. Similarly, Mudashiru (1998) also reported that, students taught using videotape and those taught using slide-tape performed significantly better than their counterparts taught using the normal classroom instruction. Similarly, Rabab, Hassan, Samar and Abdel-Raouf (2013) reported that video-based lecture offers more successes and reduces failure in the immediate and follow-up measures as compared with the traditional method of teaching human anatomy and physiology.

Literature reviewed on CAI, shows that learning BBC has not been captured previously using videotaped and text-based CAI as studies on the effects of videotaped and text-based CAI were reviewed from which it was found that there is no literature known to the researcher on the effects of videotaped and text-based CAI on students performance in BBC in technical colleges in Niger state. Consequently, it is hoped that the use of videotaped and text-based CAI for teaching and learning of BBC may provide an evident to whether the videotaped and text-based method may have the potentials to facilitate better influence on students' performance in BBC. The problem of this study therefore, was to determine the effects of videotaped and text-based computer assisted instruction on students' performance in Blocklaying, Bricklaying and Concreting in technical colleges. Specifically, the study sought to determine the following objectives to:

1. find out the effect of videotaped and text-based computer assisted instruction on students' performance in BBC.

2. determine the effects of gender on students' performance in BBC when taught using videotaped and text-based CAI.

Methodology

Quasi-Experimental research design specifically the pretest, posttest, 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 study was conducted in all the technical colleges in Niger State offering BBC at National Technical Certificate (level). Niger state Technical Colleges are accredited by National Board for Technical Education (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 three technical colleges of NTC II BBC students to treatment group A and four 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 developed instructional package (videotaped and text-based CAI) was used to teach group A and B for the period of six weeks. The instrument for data collection was Blocklaying, Bricklaying and Concreting Performance Test (BBCPT) and Blocklaying, Bricklaying and Concreting Interest Inventory (BBCII) developed by the researcher based on the topic treated. The BBCPT 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 BBCPT 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 BBCPT and BBCII was pilot tested to determine its stability using the test-retest reliability coefficient of 0.96 and 0.83 on randomly sampled population of 30 students in Federal Science and Technical College, Orozo, Abuja. The test-retest was carried out in two separate administrations within a period of two weeks. The reliability coefficient of the BBCPT and BBCII items obtained was determined using Pearson Product Moment Correlation and found to be good enough for the study.

The BBCPT and BBCII were administered by BBC teachers as pre-test and posttest 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 BBCPT and BBCII to obtained student's scores on performance before the treatment. The exercise provided the baseline data on the dependent variables (performance and gender) before the treatment and a post treatment data for each of the dependent variables (performance and gender) of each of the groups after the treatment.

Mean scores was used to answer the research questions to determine the effects of videotaped and text-based CAI on student's performance 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.

RESULTS

Research Question 1

What is the effect of videotaped and text-based computer assisted instruction on students' performance in BBC?

Table 1: Pre-test and Posttest Mean Scores of Treatment Groups A and B Taught with Videotaped CAI and Text-based CAI on Students' Performance in Blocklaying, Bricklaying and Concreting

GROUP	N	PRE-TEST $\bar{x}$	POSTTEST $\bar{x}$	MEAN GAIN $\bar{x}$
VIDEOTAPED CAI	93	44.01	63.79	19.78
TEXT-BASED CAI	97	44.82	58.23	13.41

N = Number of students. $\bar{x}$ = Mean scores

The result presented in Table 1, revealed that the treatment group taught BBC with videotaped CAI had a mean score of 44.01 in the pre-test and a mean score of 63.79 in the posttest making a mean gain of 19.78. The treatment group taught BBC with text-based CAI had a mean score of 44.82 in the pre-test and a posttest mean score of 58.23 making a mean gain of 13.41. The analysis of this result shows that the videotaped CAI performance score is higher than the performance score of students in the Text-based CAI. Therefore, videotaped CAI is more effective than the text-based CAI in enhancing students' performance in BBC.

Research Question 2

2. What is effects of gender on students' performance in BBC when taught using videotaped and text-based CAI?

Table 2: Pre-test and Posttest Mean Scores of Male and Female Students Taught BBC using Videotaped and Text-based CAI.

		Videotaped CAI				Text-based CAI		
	N	Pre-test $\overline{X}$	Posttest $\overline{X}$	Mean Gain $\overline{X}$	N	Pre-test $\overline{X}$	Posttest $\overline{X}$	Mean Gain $\overline{X}$
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. $\overline{X}$ = Mean scores

Result presented in Table 2 reveals that the male as well as female students taught BBC with videotaped CAI had a Pre-test average score of 43.83 and a posttest average score of 59.62 making the average gain of 15.79. Similarly, female trainees tutored BBC with videotaped CAI had a Pre-test average score of 43.00 and a posttest mean score of 54.14 making the average gain of 11.14. Meanwhile, the male students taught BBC with text-based CAI had a Pre-test average score of 58.02 as well as a posttest average score of 62.01 making the average gain of 3.99. Also, female students taught BBC using text-based CAI had a Pre-test average score of 58.88 and a posttest average score of 69.00 making mean gain of 10.12.

Result unveils that male students taught BBC with videotaped CAI had higher mean scores than female students taught with videotaped CAI in BBCPT. However, female students taught BBC with text-based CAI had higher mean scores than male students taught with text-based CAI in BBCPT. Thus there exist an effect related to sex type on Achievement of trainees taught BBC with videotaped and text-based CAI.

Null Hypotheses One, Two and Three

1. There is no significant difference between the mean Performance scores of students taught BBC with videotaped CAI and those taught with text – based CAI

2. There is no significant difference between the Performance mean score of male and female students in BBC.

3. There is no significant interaction effect of treatment given to students and their gender with respect to their mean scores in the Blocklaying, Bricklaying and Concreting Performance Test.

Table 3: Analysis of Covariance (ANCOVA) for Test of Significance of Treatment, Gender and Interaction on Students Performance in BBC

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 Result in Table 3 shows the f - calculated values for treatments, gender and interaction on students' performance in BBC. The F - calculated value for treatment is 8.98 with a significance of F at .003 which is less than .05. This result shows that there was significant difference between the mean scores of students in BBCPT when taught using videotaped CAI and those taught with text-based CAI. The null-hypothesis was therefore rejected at 0.05 level of significance. Hence, there was a significant difference between the Performance of students taught BBC with videotaped CAI and those taught with text-based CAI.

Table 3 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 differences between the performances mean scores of male and female students when taught using videotaped and text-based CAI in BBCPT. The null-hypothesis is therefore, accepted at .05 level of significance. Hence, there is no significant effect of gender on the mean performance scores of students taught with text-based CAI.

Result on Table 3 also shows the interaction effect 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 effect of treatment and gender. Therefore, the null hypothesis was rejected. Hence, there was significant interaction effect of scores on BBCPT. This implies that there was an effect of treatment attributed to gender on the performance of students taught BBC with videotaped and text-based CAI.

Discussion

The findings on the effect of videotaped and text-based computer assisted instruction on students Performance in BBC revealed that videotaped and text-based CAI is effective in improving students' Performance in BBC but the effect of videotaped CAI is higher than the effect of text-based CAI. The result showed that those students taught with videotaped CAI had higher posttest mean scores than those taught with text-based CAI. Analysis of covariance was used to test the first hypothesis; on the significant difference between the mean Performance scores of students taught BBC

with videotaped CAI and those taught with text-based CAI, this revealed a statical significant difference between the effect of treatment (videotaped and text-based CAI) on student's Performance in BBC. The finding confirmed that the difference between the effect of videotaped and text-based CAI was statistically significant. The implication of this finding is that videotaped CAI is more effective than text-based CAI in improving students' performance in BBC. The reason being that, the effectiveness of videotaped CAI might be due to the fact that visual is involved.

This finding is in line with the views of Israel (2007) who reported that, students taught with video-taped instruction performed better than those taught with the conventional method. Mudashiru (1998) also reported that, students taught using videotape and those taught using slide-tape performed significantly better than their counterparts taught using the normal classroom instruction. Similarly, Rabab et al. (2013) reported that video-based lecture offers more successes and reduces failures in the immediate and follow-up measures as compared with the traditional method of teaching human anatomy and physiology.

An explanation to this finding could be that videotaped CAI is one of the technologies that offer a great deal of flexibility in imparting knowledge which help to meet the challenges of not only representing the events, but also offering the viewer a functional equivalence of the experience. Olarewaju and Jimoh (1995) stated that video package gives the learner the ability to see and hear an instructor, offer opportunity for behaviour modeling, demonstration and instruction of abstract concepts. Supporting this view, Ayogu (2000) stated that, when video package is used to compliment instruction, they can; reduce abstraction in class lesson; reduce boredom among students and teachers; conserve the teachers energy; restructure the learning environment; make learning more interesting and motivating to students; minimize the problems of large class size; promote students participation in Science, Technology and Mathematics (STM) lesson; reduces the problem of insufficiency of learning resources and encouraged individualized learning.

Though videotaped CAI is more effective than text-based CAI in improving students' performance, both videotaped and text-based CAI have positive effect on students' performance. Therefore, the greater effect of videotaped and text-based CAI is accredited to the fact that videotaped and text-based CAI developed of a more detailed analysis facilitated a better performance of the treatment group assigned to both groups. The increase in the performance in videotaped CAI and text-based CAI treatment groups uphold the cognitivism and behaviourism learning theories as behaviourism emphasizes that learning only takes place based on observable changes in the behaviour while cognitivism concentrates on the thought process; and these are the major components of videotaped and text-based CAI. Analysis of covariance was used to test the third hypothesis, the result implies that there was a significant interaction effect of treatment given to students taught with text-based CAI and their gender with respect to their mean scores on BBCT. This result indicated that the effectiveness of text-based CAI depend on the level of gender. Hence, there was differential effect of treatments over the level of gender (male and female) which implies that videotaped CAI

is more effective than text-based CAI in improving students' Performance in Blocklaying, Bricklaying and Concreting in spite of gender level.

Conclusion

The need to discover the most appropriate instructional method in teaching and learning of BBC that will enhance students' performance is of vital importance. This is because appropriate instructional method in teaching and learning is an essential ingredient for improving students' performance in higher academic pursuit especially in industrial and technology education. This study established the effects of videotaped and text-based computer assisted instruction on students' performance in BBC at technical colleges in Niger state, Nigeria. The study found out that videotaped CAI is more effective in improving students' performance in BBC than text-based CAI. The results therefore, show that videotaped CAI is an effective instructional teaching technique for BBC at technical college level.

Recommendations

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

1. Videotaped and text-based computer assisted instruction should be adopted and used by BBC teachers for teaching and learning of BBC in technical colleges
2. National Board for Technical Education (NBTE) and Science and Technical Schools Board (STSB) should consider it necessary in the curriculum content adaptation to computer assisted instructional strategies for teaching BBC at technical college level in the next review of the curriculum.
3. Federal and State Ministry of Education should organized a training and retraining programme, workshops, seminars and conferences for capacity building of BBC teachers and other technology education teachers in the use of videotaped and text-based CAI for effective teaching and learning with a view to improving the knowledge and skills of the students at technical colleges.

References

Akinbola, A. O. & Afolabi, F. (2010). Constructivist Practices through guided discovery approach: The effect on students' cognitive Performance in Nigeria secondary school physics. *Eurasian Journal of Physics and chemistry Education, 2(1). 16-25.*

Ayogu, Z. U. (2000). Enriching Science Technology and Mathematics Education. The role of New Media: *Journal of Science Teachers Association of Nigeria 10* (5), 18 – 20.

Chief Examiners' report (2016). May/June NBC/NTC Examinations

Gali, S. T. (2003). *Modern Method in Science Education in Africa.* Zaria; Dandolo publisher

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.

Israel, O. O. (2007). Effects of Video-taped Instruction on Secondary School Students' Performance in History *International Journal of African & African American Studies, 1(1),* 45 - 49

Mosby's S. (2009). *Computer – assisted learning.* Medical Dictionary, (8th ed), Elsevier.

Mudashiru, A. (1998). Effect of videotape and slide tape instruction on students' performance in junior secondary school social studies. *Journal of Multimedia and Interdisciplinary Studies, 4 (1),* 30-35

National Board for Technical Education (NBTE), (2001). *National Technical Certificate and Advanced National Technical Certificate curriculum and course specifications* UNESCO – Nigeria project

Okoro, O. M. (1999). *Principles and Methods of Vocational and teachers Education* Nsukka: University Trust Publishers,

Oguz – Unver, S. A. & Yurumezoglu, K. (2011). The Effective Presentation of Inquiry-based Classrom experiment using teaching strategies that employ video and demonstration methods. *Australian Journal of Education Technology, 3,* 29-34 Retrieved August 24th 2014 from http://www.ascilite.org.au/ajet/

Olanrewaju, A. & Jimoh, M. (1995). Effects of Media of Instruction on Students Performance in Genetics. *Journal of the Science Teachers Association of Nigeria. 30,* (1 & 2), 155-159

Rabab, M., Hassan, S., Samar, Y. & Abdel-Raouf, A. (2013). Video-based and lecture method on the emerging paradigm for teaching human anatomy and physiology to student nurses. *International Journal of Human Anatomy and Physiology. 2* (1), 75-79

Raymond, E. (2013). *Comparative effect of cognitive and traditional task analysis-based instructional guides on students' performance and interest in electronic work at technical college in North Central, Nigeria.* Unpublished PhD thesis. University of Nigeria, Nsukka

Reiser, R. A. & Dempsey, J. V. (2007). *Trends and issues in instructional design* (2nd ed.). Upper Saddle River, NJ: Pearson Education, Inc