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Influence of Gender and Institutional Type on the Use of a Computer-Assisted Instructional Package for Teaching Metalwork Technology at Nigerian Certificate in Education (Technical) Level

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Abstract

This study was designed to assess the influence of gender and institutional type on the use of a Computer-Assisted Instructional (CAI) package for teaching Metalwork Technology (MWT) at the Nigerian Certificate in Education (Technical) level. Two research questions and two research hypotheses were formulated to guide the study at 0.05 level of significance. The study used the post- test only type of experimental research design. One hundred and forty students of 200 level NCE (Technical) programme were used as respondents in the study from the six participating institutions in the North-Central geo-political zone of the country. A pilot study was conducted in the study. The data obtained from the pilot study were used to establish the reliability of the research instrument (r=0.89) and conduct item analysis of facility index and discrimination index of the test. The subjects were taught MWT using CAI package and administered with MWTAT as post-test.

The data from the post-test were analyzed using the mean to answer the two research questions and t-test statistics to test the two hypotheses in the study. The study found that, female students performed better than their male counterparts and students in the Polytechnics performed better than those in the Colleges of Education respectively. The study also revealed that, there were no significant differences in the performances of male and female students (t-value=0.83) and between those in the Polytechnics and the Colleges of Education taught MWT with CAI package (t-value=0.08). The study was concluded that, both gender and institutional type does not have influence on the academic performances of students taught MWT with CAI package. Some recommendations made in the study were, institutions offering NCE (Technical) programme should have well equipped computer centers for teaching and learning and should use CAI package for teaching and testing students.

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Keywords

Computer Assisted Instructional Package (CAI), Gender, Institutional type and Academic performance of Students in Metalwork Technology.

1 Introduction

The importance of science and technology in national development characterized the high priority accorded these sectors in the educational system of developed nations of the world. Developing nations like Nigeria have no alternative than to take a cue from the developed nations and accord science and technology education an utmost importance in the educational system.

The Federal Republic of Nigeria [1] in the National Policy on Education defined Technical Education as a comprehensive term referring to those processes involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life. It went further to state the goals of technical education, among others as to provide the technical knowledge and vocational skills necessary for agricultural, industrial, commercial and economic development of the nation. By the above definition and aim, technical education becomes one of the most important paths towards the realization of the industrial, agricultural and economic development strategies of the nation.

This also explains the emphasis and expansions Technical Education sector has witnessed over the years since the take-off of the 6-3-3-4 system of education in 1981. The establishment of Federal Colleges of Education (Technical) at Asaba, Bichi, Gusau, Omoku, Potiskum and Umunze; the expansion of the existing ones at Lagos and Gombe and introduction of Technical Education courses in conventional Colleges of Education and other institutions across the nation are some laudable efforts in this direction. These Colleges of Education and others were established by the Government under the supervision of the National Commission for Colleges of Education (NCCE) for the mass production of technical teachers and at the Nigeria Certificate in Education (NCE) level. The N.C.E. (Technical) is a three- year programme with specializations in one of Automechanics Technology, Building Technology, Electrical/Electronics Technology, Metalwork Technology and Woodwork Technology areas. Students in NCE (Technical) programme specialize in one of the subject areas at the third year, depending on their previous performances and interests [2].

[3] Describes Metalwork Technology as one of the most prominent early technical occupations in the history of human civilization, especially in the areas of art work design, weaponry for wars, tools for farming and hunting, ritualistic objects for worships and others. Metalwork Technology is up to date a popular Technical occupation practiced in

virtually all parts of the Country in different forms. Metalwork Technology is a subject that involves the application of scientific ideas to fabricate and produce objects or items from

metallic materials. These metallic materials possess metallic luster, fusibility, malleability, high heat and electricity conductivity characteristics. Examples of metallic materials are Gold, Tin, Iron, Steels, Silver, lead, Aluminum, copper and others. Metalwork Technology as an area of specialization in the NCE (Technical) programme offers courses in the following areas; Bench and fitting work, Sheet Metal work, Forging, Foundry, Machining, Welding and Metal Fabrications. Forging, being the oldest among these Metalworking areas.

[4] Defined academic performance as the result of education, and the extent to which a student, teacher or institution achieved their educational goals. It is about how students deals with their studies, cope with academic tasks and how they fared in the overall school activities. It is measured in a number of ways, such as oral and written tests, presentations, assignments, class work, projects and continuous Assessment. Metalwork Technology is faced with some problems of teaching and learning in institutions that manifest into poor academic performances by students in the courses and low enrolment into these courses especially by the female gender. The factors that determine academic performances of students are diverse. Some of them are, teachers' preparation, experience, students background, gender, school type, school location, curriculum content, Instructional methods etc.

2 Statement of the Problem

The Nigerian Governments at various levels, individuals and corporate bodies attach great importance to the teaching and learning of technical education courses generally and Metalwork Technology in particular at the NCE (Technical) level. These emphases have been placed on this area of the educational system to meet the scientific and technological objectives of the nation, among others. Yet, these objectives have not been fully achieved over the years due to some problems centrally bordering on teaching and learning, among others at the Colleges of Education and other tertiary institutions in Nigeria. By the views of [5], Vocational Technical Education in this country has come of age, but there is not much to show for it given the level of supports by various governments and organizations worldwide.

Problems of teaching and learning of Metalwork Technology in institutions are multidimensional, prominent among them are those associated with the instructional methods. The lecture method which has become almost a traditional method of instruction in higher institutions in Nigeria is widely being criticized for its failure to meet the demands of students in learning practical skills, among others. [6 and 7]. The failure of this method of instruction has resulted into ineffective teaching, poor academic performances by the students, low learning rate, retention and poor performances on the job and making the realization of the scientific and technological objectives of the educational system a mirage, or very difficult to achieve.

The search for appropriate method of teaching lead to the emergence of development and use of Computer Assisted Instructional (CAI) package for teaching. CAI package is a self-

learning technique, usually offline/online involving interaction of the students/learner with programmed instructional materials with use of computer systems. To support this, [8] in a study on the Effect of Computer Assisted Instructional package for Teaching Metalwork Technology (MWT) at NCE Technical level revealed that, students taught MWT with CAI performed better than those taught with the traditional lecture method. CAI as a teaching strategy is recognized to improve academic performance of students, but other factors also influence the performance of students taught with CAI package.

The desire to identify the influence of some factors on academic performances of students in Colleges of Education and other tertiary institutions when taught with CAI necessitated this study on influence of gender and institutional type on the use of Computer Assisted Instructional package for teaching Metalwork Technology (MWT) at Nigerian Certificate in Education (NCE) Technical level.

3 Purpose of the Study

The main purpose of this study was to assess the influence of gender and institutional type on the use of a Computer - Assisted Instructional Package for teaching Metalwork Technology at NCE (Technical) level. Specifically, the study was designed to: -

1. Compare the academic performances of the students taught Metalwork Technology with the CAI package based on gender.
2. Compare the academic performances of the students taught Metalwork with the CAI package based on the type of institutions (Colleges of Education and Polytechnics).

4 Significance of the Study

The findings of this study will provide empirical data on the influence of gender and institutional type on academic performances of students in the study of Metalwork Technology using CAI package.

5 Research Questions

The study attempts to answer the following questions:-

1. What is the academic performance of male and female students when taught Metalwork Technology with CAI package?
2. What is the academic performance of Colleges of Education and Polytechnics students when taught Metalwork Technology with CAI package?

6 Research Hypotheses

The following null hypotheses were formulated to be tested at 0.05 level of significance in the study: -

1. There is no significant difference in the mean performances of male and female students taught Metalwork Technology with Computer - Assisted Instructional Package.
2. There is no significant difference in the mean performances of students in the Colleges of Education and those in the Polytechnics taught Metalwork Technology with Computer - Assisted Instructional Package.

7 Methodology

The Post-Test only type of experimental research design was used in the study.

The study was carried out in the Colleges of Education and Polytechnics that offer Metalwork Technology at NCE (Technical) level in the North-Central geo-political zone of the country consisting of Benue, Kogi, Kwara, Nassarawa, Niger, Plateau States and Abuja, the Federal Capital Territory.

The population for the study consisted of all the 200 level students of Metalwork Technology of NCE (Technical) programme in all the Colleges of Education and Polytechnics offering Metalwork Technology in the zone. A total of 140 students sampled from the six participating institutions were used as subjects for the study. A pilot test was conducted in the study at Kaduna State College of Education, Gidan Waya, Kafanchan to determine the reliability (r) of the research instrument (MWTAT) and obtained r=0.89 using Pearson Product moment correlation coefficient formular. The research instrument was validated by three (3) lecturers from the Department of Industrial and Technology Education Department of Federal University of Technology, Minna.

8 Methods of Data Collection and Analysis

The subjects were taught Metalwork Technology using CAI package and all data collected from the subjects through the MWTAT in the post test were analyzed using the Mean, Standard Deviation and t-test Statistics to answer the research questions and test the hypotheses at 0.05 level of significance in the study respectively.

To answer the research questions in the study, the Mean score of the group that is higher will be the group that performs better. To test the hypotheses, if the calculated t-value of the items is less than or equal to the critical (table) t-value, the hypotheses will be accepted. If otherwise, then the hypotheses will be rejected. The table t-test value for the study at

0.05 level of significance being 1.96 [9].

9 Results

9.1 Research Question One

What is the academic performance of male and female students when taught MWT with CAI package at NCE (Technical) level?

Table 1 Mean Score and Standard Deviation of Male and Female Students in Post-Test MWTAT.

Groups	No. of Subjects	Mean	Standard Deviation
Males	91	23.69	5.51
Females	49	23.89	5.13
Total	140	47.58	10.64

The analysis required to answer this research question are presented on Table 1. The result presented on Table 1 shows that, the scores of male and female students' academic performances in MWTAT obtained a mean score of 23.69 and standard deviation of 5.51 and a mean of 23.90 and standard deviation of 5.13 respectively. The female students thereby performed better than the male students since they obtained higher mean scores.

9.2 Research Question Two

What is the academic performance of Colleges of Education and Polytechnics students when taught MWT with CAI package at NCE (Technical) level?

Table 2 Mean Score and Standard Deviation of Colleges of Education and Polytechnics Students in Post-Test MWTAT.

Groups	No. of Subjects	Mean	Standard Deviation
Colleges of Education	100	23.26	5.85
Polytechnics	40	25.03	3.64
Total	140	48.29	9.49

The analysis required to answer this research question are presented on Table 2. The result presented on Table 2 shows that, the scores of students' academic performances in MWTAT in the Colleges of Education and the Polytechnics obtained a mean score of 23.26 with a standard deviation of 5.86 and a mean score of 25.03 with a standard deviation of 3.64 respectively. The Polytechnic students thereby performed better than the Colleges of Education students since they obtained higher mean scores.

9.3 Hypothesis One

There is no significant difference in the mean performances of male and female students taught MWT with CAI package.

The analysis required to test this hypothesis in the study are presented on table 3. The results on table 3 show that, the mean performance of male students was 23.69 and standard deviation 5.51.

Table 3 Mean, S.D and t-values of Male and Female Students in Post-Test MWTAT.

Groups	No. of Subjects	Mean	S.D	df	Prob.level	t-test calculated	t-critical value	Decision
Males	100	23.69	5.51	138	0.05	0.83	1.96	Not Significant
Females	40	23.90	5.13					

The female students obtained a mean score of 23.90 and a standard deviation of 5.13. The table also revealed that, the calculated t-value was 0.83 while the t-critical value at 0.05 level of significance was 1.96. Since the calculated t-value of 0.83 is not greater than the t-critical value of 1.96, then there is no significant difference between the performances of male and female students in the MWTAT. This hypothesis is thereby upheld, despite the fact that there is difference in the mean score of the male (23.69) and that of the female students (23.90). This hypothesis is upheld because the difference in the academic performances of male and female students was not statistically significant indicating that gender does not influence academic performance of students taught MWT using CAI package.

9.4 Hypothesis Two

There is no significant difference in the mean performances of students in the College of Education and those in the Polytechnics taught MWT with CAI package.

Table 4 Mean, S.D. and t-values of Students in Colleges of Education and Polytechnics in Post-Test MWTAT.

Groups	No. of Subjects	Mean	S.D	df	Prob. level	t-value calculated	t-critical value	Decision
Colleges of Education	100	23.26	5.86	138	0.05	0.08	1.96	Not Significant
Polytechnics	40	25.03	3.64					

The analysis required to test this hypothesis in the study are presented on Table 4. The result on Table 4 shows that, the mean performance of students in Colleges of Education was 23.26 and standard deviation 5.86. The students in the Polytechnics obtained a mean score of 25.01 and standard deviation 3.64. The table also revealed that, the calculated t-value was 0.08 while the table-t value at 0.05 level of significance was 1.96. Since the calculated t-value of 0.08 is less than the t-critical value of 1.96, then there was no significant difference between the mean performances of students of Colleges of Education and those in the Polytechnics taught MWT with CAI package. This hypothesis is thereby upheld. Even though there is difference in the mean score of the students in Colleges of Education (mean score 23.26) and those in the Polytechnics (mean score 25.01), the difference was not statistically significant indicating that, institutional type does not influence the academic performances of students taught MWT using CAI package.

Discussions of Findings

In research question one; the findings revealed that, the female students performed better than their male counterparts in the MWTAT. This finding was confirmed by the mean score of the performances of the subjects in MWTAT when the females obtained a higher mean score than their male counterparts. This finding revealed an astonishing outcome of the use of CAI package to teach students which was not gender biased in favour of male students. Since MWT is an area of Technical Education that is regarded as a male dominated area, males are expected to perform better than their female counterparts.

This finding was in agreement with the findings of [10] on Effect of CAI package on the performance of Senior secondary School Students in Mathematics in Awka, Anambra State, Nigeria. Their study revealed that, female students performed better than their male counterparts in mathematics using CAI package.

In research question two, the findings revealed that, the students in the Polytechnics performed better in the MWTAT than their counterparts in the Colleges of Education. The findings in this research question revealed an unprecedented better performance by the students in the Polytechnics. Since the Colleges of Education are solely established to run NCE programmes, it is expected that their students will perform better than those in the Polytechnics which, reverse is the case.

This finding was in harmony with the findings of [4] on the impact of CAI and School type on students' academic performance in Basic Technology in Sokoto State, Nigeria. Their study revealed that, differences exist in the academic performances of boarding school students and day school students when taught Basic Technology using CAI. The boarding school students performed better than their day school counterparts which can be attributed to differences in school type factor.

In hypothesis one, the finding revealed that, there was no significant difference in the mean performances of male and female students taught MWT with CAI package. The null

hypothesis was upheld. The finding confirms that, gender has no significant effect on the academic performance of students taught MWT using CAI package.

This finding was in agreement with the study of [11] on Technology Instructional Package Mediated Instruction and Secondary School Students performance in Biology Concept. The study revealed that, gender has no significant influence on the performances of students taught Biology concept using Technology mediated learning package.

This finding was also in agreement with the study of [12] on the Effects of Animation – Based CAMSTUDIO Physics Instruction on Secondary School Students' Performance in Minna, Nigeria. The study revealed that, there was no significant difference between the achievement of male and female students taught Physics using the package.

These findings confirmed that, gender has little or no significant influence on the academic performances of students exposed to Computer-Assisted Instructional lessons. This can be attributed to one of the characteristics of CAI when learners are given the opportunity to learn at their own pace and have provision for repetition until the concept is well understood. In this case, all genders that are involved in the teaching and learning process had equal opportunities to benefit from the learning materials.

In hypothesis two, the findings revealed that, there was no significant difference between the performances of students in Colleges of Education and those in the Polytechnics taught MWT with CAI package at NCE (Technical) level. This hypothesis was upheld. The finding revealed that, type of institution has no significant effect on students' academic performances when taught MWT with CAI package.

This finding was in agreement with the study of [4] on the Impact of CAI and School Type on Students Academic Performances in Basic Technology in Sokoto State, Nigeria. The study revealed that, school type has no significant influence on the academic performances of students taught Basic Technology using CAI.

The performances of students of Colleges of Education and Polytechnics may not differ significantly because they are similar institutions supervised by the same organizations. The NCE (Technical) programme offered by both the Colleges of Education and the Polytechnics are accredited by the same body that is, the National Commission for Colleges of Education (NCCE). The findings of this study on this hypothesis could be attributed to the fact that all the institutions operate under the same or very similar conditions. Any difference in the performances of the students in these institutions could be attributed to other factors, like students' population, facilities, school location and others but not institutional type factor.

10 Summary of Findings of the Study

The following findings were revealed in this study:-

(i) The female students taught MWT with the CAI package performed better than the male students at NCE (Technical) level.
(ii) The students in the Polytechnics taught MWT with the CAI package performed better than their counterparts in the Colleges of Education at NCE (Technical) level.
(iii) There was no significant difference in the mean performances of male and female students taught MWT with CAI package at NCE (Technical) level.
(iv) There was no significant difference in the mean performances of students in Colleges of Education and those in the Polytechnics taught MWT with CAI package at NCE Technical level.

11 Conclusion

Based on the findings of this study, the following conclusions were drawn:-

a. Gender does not have any significant influence on the performances of students taught MWT with CAI package in the study.
b. Type of institutions does not have any significant influence on the performances of students taught MWT with CAI package in the study.

12 Recommendations

The following recommendations are made based on the findings of the study to improve on the academic performances of students at NCE (Technical) level:-

(i) Colleges of Education and Polytechnics offering NCE (Technical) programme should have computer centre equipped with adequate number of functional computer systems for teaching and learning. The centre should also have internet facilities and other Information and Communication Technology (ICT) facilities.
(ii) All students and lecturers of higher institutions should be computer literate adequately to enable them use computers for teaching and learning. Institutions should organize regular seminars, workshops and conferences on teaching and learning with computers for lecturers to keep them abreast current and dynamic needs of the students and the society.
(iii) Institutions should be encouraged to produce and use CAI package for teaching and testing students.
(iv) Adequate fund should be made available for the updating and maintenance of the facilities used for teaching and learning with CAI package.

(v) To ensure gender equality, female students should be encouraged to enroll into NCE (Technical) programme in the institutions.

References

[1]. Federal Republic of Nigeria. National Policy on Education. (4th edition). Lagos: NERDC. (2004).

[2]. National Commission for Colleges of Education, NCCE. "Vocational and Technical Education Minimum Standards for Nigeria Certificate in Education (NCE)" Abuja: NCCE. (2012*).*

[3]. "Encyclopedia Americana International" Danbury*:* Grolier Incorporated. (1989).

[4]. A.K. Tukur, A. A. Yunusa and A. Isyaku. Impact of Computer Assisted Instruction and School Type on Students Academic Performance in Basic Technology in Sokoto State, Nigeria. "A Paper Presenrted at the 35th Annual Workshop and Conference of Nigerian Association of Educational Media and Technology (NAEMT) at University of Port Harcourt Nigeria" (2014). *Retrieved from* www.slideshare.net *on 21/3/17.*

[5]. C. U. Osisioma. Evaluating Vocational Technical Education Programmes for the Technological Development in Nigeria: Another Perspective. "In, T. I. Eze & N. P. M. Esomonu. (Eds). Social and Economic Implications of Vocational and Technical Education for Technological Development in Nigeria" Umunze: FCE (T). (1996).

[6]. A.O. Adigun. "Introduction to Vocational Technical Education (With Principles and Methods of Teaching Skills)". Lagos: Raytel Communication. (1997).

[7]. A. F. Nnaobi. Enhancing Students Performance in Using Computer Assisted Instruction (CAI) in Tertiary Institutions.*"* In Akale, MAG (Ed). Proceedings of the 44th Annual Conference of Science Teachers Association of Nigeria (STAN)" (2003).

[8]. M. I. D.Chado, and R. O. Okwori. The Effect of Computer Assisted Instructional Package for Teaching Metalwork Technology at Nigerian Certificate in Education (Technical) Level. "International Journal of Academic Research in Progressive Education and Development. 4(1). 56-66" (2015). *Retrieved from* www.hrmars.com/journals on 25/3/17.

[9]. B. G. Nworgu. "Educational Research : Basic Issues and Methodology (Second Edition)" Ibadan: Wisdom Publishers Limited. (2006).

[10]. A. Anyemene, C.Nwokolo, F. Anyachebelu and V. C. Anemelu. Effect of Computer Assisted Instructional Package on the Performances of Senior Secondary School Students in Mathematics in Awka, Anambra State. "American Journal of Contemporary Research. 2(7).61-65 " (2012). Retrieved from www.aijcrnet.com on 21/3/17

[11]. A. A. Yaki and M. Babagana Technology Instructional Package Mediated Instruction" and Senior Secondary School Students' Academic performance in Biology Concept. The Malaysian Online Journal of Educational Sciences.4(2).42-48" (2016). *Retrieved from* www.eric.ed/gov on 21/3/17.

[12]. M. V. Adegbijuand C. O. Falode. Effects of Animation-Based CAMSTUDIO Physics Instruction on Secondary School Students' Performance in Minna, Nigeria.

"European Scientific Journal. 10(13).594-604" (2014). Retrieved from www.eujournal.org on 21/3/17