EFFECT OF HYPERMEDIA INSTRUCTIONON ACHIEVEMENT AND INTEREST OF GENERAL METALWORK STUDENTS IN SCIENCE ANDTECHNICAL COLLEGES IN FEDERAL CAPITAL TERRITORY (FCT)

BY

ADIO, TAJUDEEN A (MNATT, RMTRCN)

MAMUDA, HAMMA LAKUN

MOHAMMED ISA

DEPARTMENT OF INDUSTRIAL TECHNICAL EDUCATION

UNIVERSITY OF NIGERIA, NSUKKA

Abstract

This study was to determine the effect of hypermediainstruction on technical college students' achievementand interest in General Metalwork in Federal Capital Territory (FCT). The study adopted a pre-test, post-test, non-equivalent control group, quasi-experimental research design which involved groups of students in their intact class assigned to experimental group and control group. The population for the study was 102NTC II General Metalwork students which comprised 74 boys and 28 girls. Two research questions and threenull hypotheses tested at 0.05 level of significance, guided the study. The instrument used for data collection wereGeneral Metalwork Achievement Test (GMWTAT) and General Metalwork Interest Inventory (GMWTII). The result of reliability coefficient of GMWTAT was 0.72 while the measure of internal consistency of GMWII yielded reliability coefficient value of 0.85. Mean was used to answer the research questions, while ANCOVA was employed to test the null hypotheses. The study found out that the use of Hypermedia is more effective in improving students' achievement and interest in General Metalwork than conventional method. Consequently, it was recommended that attention should be accorded information and communication literacy and schools should be equipped with necessary hypermediafacilities to leverage the potentials of ICT in Nigerian schools.

Introduction

Information and Communication Technology (ICT) deals with the handling and processing of information using all kinds of electronic devices (NCET, 1995). These electronic systems can be used for broadcasting, telecommunications, and all forms of computer-mediated communications. (ICT) centered education covers the use of computers, online selflearning packages, interactive CDs, satellites, radio, optical fiber technologies, telepresence system and all types of information technology (IT) hardware and software (Akudolu, 2002; Adebayo, 2002). Bakie (2001) described information technology as the integration of computer technology,

mainly in the form of Internet, and information management systems. It gives users the opportunities to handle text and images, numbers and graphs, instruction, sound and music and to process information by organizing and reorganizing, storing and retrieving, sorting and analyzing, presenting and communicating. In order to attain these skills, there is need for the users to be computer literate (Olagunju, 2002). Hence, the Federal Government of Nigeria incorporated computer education as one of the subjects to be offered at all levels of her educational system. In line with this,Dantala, (2005) explained that The National Policy on Computer Educationhas already spelt out various objectives to be attained at different levels of educational system in Nigeria especially secondary schools.All these happenings in the areas of IT are coming to play as a result of development in science and technology(Crossby&Inding2004).

Science and technology have contributed in no small measure to progress and comfort of the modern world. Science has come to be recognized as the foundation upon which the bulk of the present day technology break through is built. It is no longer in dispute that the prestige and political power of any nation relies on its level of science and technology as a requirement for the development of any country. (Cepri,Tas&Kose2006;Dennen,2003; Jaivis,1998; Knoll, 2004;Kotrilik, 2004 andPreciado, 2004). Technology the world over is dynamic. With advancement in technology, electronic gadgets and other products that are imported or assembled in Nigeria are coming with new devices to such an extent that technological development is in a constant state of flux and change. The influence of technological development in Information and Communication Technology industries has rendered traditional skills inadequate for work while creating the need for new and often sophisticated skills. Capri, Ozseevgec, Sayilkan and Emre (2004) noted that because most students get information via visual content sources like computer which are used in daily life very much, it is more difficult to teach students by conventional means. If principles of how students learn are taken into account, richness of the visual content makes instruction more lasting and effective (Mudasiru and Adedeji, 2010).One possible solution to these challenges is the use of hypermedia which is one of information communication and technology instructional teaching approaches.Hypermedia is a computer based medium combining text, images, audio, video, animation and other devices for instruction typically stored on CD or DVD.Instruction through this media could significantly

improve studentsachievemement and interest rather than using only conventional method involving didatic approach.

Conventional Teaching approaches have resulted in a mismatch between what is taught to the students and what the industry needs. As such, many institutions are moving towards problem based learning as a solution to producing graduates who are creative; think critically and analytically, to solve problems. Likewise, Hypermedia has the potency to improve the students learning and widening their mental horizon to solving problems relating to difficult concepts in General Metalwork (GMW).GMW is a trade related subject offered by the students of Automechanics, Welding and Fabrication, Motor Vehicle Mechanic Works and host of others in Science and Technical Colleges. Students past results (from 2010 to 2015) released by the National Business and Technical Education Board in this subject have not been highly satisfactory. Hence, it on this premise, that the researcher focuses on using hypermedia technology/device as an innovative teaching and learning strategy to improve students' achievement and at the same time arouse their interest in General Metalwork.

Students' achievement refers to performance in a school subject as designated by a score or mark obtained in an achievement test. According to Anene (2005) achievement is quantified by a measure of the student's academic standing in relation to those of other students of his age or level. Interest is a persisting tendency to pay attention and enjoy some activities. Interest has been viewed as emotionally oriented behaviourial trait which determines a student's vim and vigour in tackling educational programmes or other activities (Chukwu, 2002).

The increasing effects of globalization and the rapid rate of technological changes on work places have informed the recommendation by United Nations, Educational, Scientific and Cultural Organization (UNESCO) and International Labour Organization (ILO) (2002) that all technical and vocational education system in the 21st century should be geared towards life-long learning. This requires that schools should in addition to academic skills; inculcate workplace basic skills such as learning to learn, creativity, problem solving skills, collaborative skills and higher order thinking skills in order to increase the students' flexibility and job mobility which will make them adaptable to the present and envisaged changes (Hallak and Poisson, 2000 and Paris, 1998). In this context,

Rojewski (2002) noted that a shift from teacher-centred instruction to learner-centred instruction is needed to enable students acquire the new 21st century knowledge and skills. In order to attain the students-centered method of teaching General Metalwork, hypermedia devicewas to be used.

Purpose of the Study

The purpose of this study is to:

1. Determine the achievement scores of students taught General Metalwork with hypermedia device and those taught using conventionalteaching methods.
2. Find out the interest of thestudents taught General Metalwork with hypermedia deviceand those taught using conventional teaching methods.

Research Questions

The following research questions were formulated to guide this study:

1. What are the mean achievement scores of students taught General Metalwork with hypermedia device and those taught using the conventional teaching methods?
2. What are the mean interest scores of students taught General Metalwork with hypermedia deviceand those taught using the conventional teaching methods?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance :

Ho_1: There is no significant difference between the mean achievement scores of students taught General Metalwork with hypermedia deviceand those taught using conventional teaching methods.

Ho_2:There is no significant difference between the mean scores of male and female students onGeneral Metalwork achievement test.

Ho_3: There is no significant interaction effect of treatments given to students by gender with respect to their mean scores inGeneral Metalwork achievement test.

Methodology

The study was conducted using quasi–experimental design. Specifically, the pre-test, post-test, non-equivalent control group design was used. This study was carried out in Federal Capital Territory**.**The population for the study comprised of 102NTCII general metalworkstudents from science and technical colleges offering General Metalwork at NTC II National Business and Technical Board Examination level. This is made up of 75 boys and 27girls.No sampling technique was used due to manageable size of the population.The twoschools used for the study are of the same equivalent because they have adequate computer sets, qualified general metalwork teachers with ICTknowledge and conducive ICT laboratories needed for the research work. Out of the two schools, one was randomly assigned for experimental group while the other for the control group.Intact class in each school was used ,experimental group consisted 48 subjects while control was 54.The General Metalwork Achievement Test was a forty-five (45) item multiple choice type questions which was developed by the researcher from the eight content areas used for the study. The multiple choice items were drawn using the table of specification. The General Metalwork Achievement Test was face and content validated by 3 experts in the area ofindustrial and technology education from Federal University of Technology, Minna.The reliability of the General Metalwork Achievement Test was estimated using measures of stability method. The scores obtained from the first and second (retest-retest approach) administration of the same test were correlated,the result of the reliability coefficient yielded 0.72. Also, the Cronbach Alpha reliability coefficient method was adopted to determine the internal consistency of General Metalwork Interest Inventory items,reliability coefficient value of 0.85 was obtained.

The test scores generated from the pre-test and post-test were collected using General Metalwork Achievement Test (GMWTAT) and General Metalwork Interest Inventory (GMWTII).Mean was used to answer the research questions while the analysis of covariance (ANCOVA) was used for testing the hypotheses at 0.05 level of significance.

Results

Research Question 1

What are the mean achievement scores of students taught General Metalwork withhypermedia deviceand those taught using the conventional teaching methods?

Table 1

Mean of Pre - test and Post - test Scores of Experimental and Control Groups in the Achievement Test

Group	N	Pre – test $\overline{X}$	Post – test $\overline{X}$	Mean Gain
Experimental	54	25.22	65.51	40.29
Control	48	26.28	48.16	21.88

The data presented in Table 1 showed that the experimental group taught General Metalwork withhypermediahad a mean achievement score of 25.22 in the pre - test and a mean achievement score of 65.51 in the post - test making a pre-test, post-test mean gain in experimental group to be 40.29. The control group taught General Metalwork with conventional teaching method had a mean achievement score of 26.28 in the pre - test and a post - test mean achievement score of 48.16 with a pre-test, post-test mean gain of 21.88. With this result, the students in the experimental group performed better in the achievement test than the students in the control group.

Research Question 2

What are the mean interest scores of students taught General Metalwork withhypermedia device and those taught using the conventional teaching methods?

Table 2

Mean of Pre - test and Post - test Scores of Experimental and Control Groups in the **Interest Inventory Items**

Group	N	Pre – test $\overline{X}$	Post – test $\overline{X}$	Mean Gain
Experimental	54	34.56	73.29	38.73
Control	48	41.10	69.33	28.23

Table 2 shows that the experimental group taught General Metalwork with hypermedia device had a mean interest score of 34.56 in the pre - test and a mean interest score of 73.29 in the post - test making a pre - test, post - test mean gain in experimental group to be 38.73. The control group taught General Metalwork with conventional teaching methods had a mean interest score of 41.10 in the pre - test and a post - test mean interest score of 69.33 with a pre - test, post - test mean gain of 28.23. This result indicates that interest of students in the experimental group is higher than the interest of the students in the control group. Similarly, this revealed that students taught with hypermedia device had a higher mean score than those taught with conventional teaching method in the test inventory.

Hypotheses

Ho_1: There is no significant difference between the mean achievement scores of students taught General Metalwork withhypermediaand those taught using conventional teaching methods.

Ho_2:There is no significant difference between the mean scores of male and female students on General Metalwork achievement test.

Ho_2: There is no significant interaction effect of treatments given to students and their gender with respect to their mean scores in the General Metalwork achievement test.

Table 3

Summary of Analysis of Covariance (ANCOVA) for Test of Significance of Three Effects:Treatments, Gender and Interaction Effect of Treatment and Gender on Students' Achievement in General MetalworkTest

Source	Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	11860.455	4	2965.114	554.841	.000
Intercept	2686.001	1	2686.001	502.613	.000
Pre – test	17.395	1	17.395	3.255	.074
Groups	9925.597	1	9925.597	1857.000*	.000
Gender	34.999	1	34.999	6.549	.012
Groups * Gender	20.171	1	20.171	3.774	.055
Error	598.536	112	5.344		
Total	132203.000	117			
Corrected Total	12458.991	116			

***Significant at sig of F< .05**

The data presented in Table 3 shows F-calculated values for test of significance between the mean scores of experimental and control groups and interaction effect of treatment given to students by their gender with respect to their mean scores in the general metalwork achievement test. F-value for groups is 1857.000 at significance level of F at .000, which is less than .05. The null-hypothesis is therefore rejected at .05 level of significance. With this result, there is a

significance difference between the mean scores of students taught general metalwork withhypermedia deviceand those taught using conventional teaching methods in the achievement test. The F-calculated value for gender is 6.549 with a significance of F at .012 which is less than .05. This means that there is a significant effect of gender on students' achievement in general metalwork. Therefore, the null hypothesis of no significant difference between the effect of gender (male and female) on students' achievement in general metalwork is rejected at .05 level of significance. Hence, there is significant difference between the mean scores of male and female students' on general Metalwork achievement test.The F value for interaction effect (Group Gender) is 3.774 at significance level of F .055 which is greater than .05. Therefore, the null hypothesis is accepted. This indicates that there is no significant interaction effect of treatment given to students and their gender with respect to their mean scores in the Achievement Test.

In taking decision for the research question, any item with mean of 3.50 and above was considered as agreed, while any item with the mean of less than 3.50 was considered as disagreed. For the hypothesis, if the t-cal is more than the t-table, the null hypothesis is rejected but if the t-cal is less than the t-table, the null hypothesis then accepted.

Discussion

The data presented in Table 1 provided answer to research question one. Finding revealed that students taught general metalwork withhypermedia devicehad a higher mean achievement score than those students taught using the conventional teaching method in the achievement test. In the same vein, analysis of covariance was used to test the first hypothesis in Table 3, at the calculated F-value (1857.000), significance of F (.000) and confidence level of .05. There was a statistically significant difference between the mean scores of the group taught with hypermedia device and those students taught using the conventional teaching methods in the achievement test. The implication of this finding therefore is that hypermedia instruction is more effective than conventional teaching methods in enhancing students' achievement in general Metalwork. The finding of hypothesis one is similar to the finding of Odogwu (2002) who found that there was a significant difference in the mathematics achievement of experimental group taught with

Computer Based Learning (CBL) and control group taught with conventional teaching methods in favour of the experimental group.Kulik, Bangert and Williams (1983) in their study on "Effects of Computer – Based Teaching on secondary school students" also found out that the use of Computer Based Learning (CBL) in teaching electronics students improved their achievement in the subject than the students taught electronics with conventional methods. This finding is in-line with the finding of Research Question Onewhich pointed out that the use of hypermedia device produces achievement effects superior to those obtained through conventional instruction. Cotton (2001), explained further that student learning rate is faster with hypermedia device than with conventional instruction. This finding is also in line with the finding of Audu (2007) who carried out a study on effect of constructivist approach on students' performance in building construction trade and found that experimental group had higher mean scores than that of the control group in the pre-test and post-test.This is an indication that treatment has positive effects on students' achievement which is also in agreement with the finding of this study. The difference in the academic achievement of the students in general metalwork is similar with the studies carried out in other fields of learning on students' academic achievement by Demen (2003), Olson and Pratt (2000) Coitman (2002) and Kotrlik (2004) who in their separate studies found that the adoption of any treatment as an instructional framework greatly improves students' academic achievement. The result could be explained by the fact that teachers' adoption of various instructional techniques appeal to the students' various intelligence, address their diverse learning styles and consequently increase their motivation to learning and improve their academic achievement.This support the view of Jarvis (1998) students learn best when information and communication is used for instructional delivery. The research explained further that students learn better and retain more of what is taught in the class.

Analysis of Covariance was used to test hypothesis three in Table 3. At the calculated F-value (3.774), significance of F (.055) and confidence level of 0.05, there was no significant interaction effect of treatment given to students and their gender with respect to their mean scores in the Achievement Test. This result showed that the effectiveness of treatments on students' achievementin Genreral Metalwork does not depend on the type of gender. Hence, there were no differential effects of treatments over levels of gender (male and female), which implies that

hypermedia instruction is more effective than conventional teaching methods in improving students' achievement in Genreral Metalworkregardless of Gender. It has been established that the learner's own feeling toward the subject matter will largely determine how much of the material will be learned and how thoroughly it will be learned. According to Ogwo and Oranu (2006) to facilitate learning, the teacher must secure and sustain the attention and interest of the learner. They emphasized that unless attention is maintained and interest sustained, learning can hardly be accomplished. A state of sustained interest is shown by continued and determined readiness to learn on the part of the student as evidenced by a state of readiness to learn.

Hypermedia device enhances how students learn by supporting four fundamental characteristics of learning: active engagement, participation in groups, connections to real-world contexts, frequent interaction/feedback (Basham, 2007). Owing to the dominance of the teacher in the traditional teaching approaches. Opara (2002) observed that the lecture method hardly increased students' enthusiasm and interest. Teaching methods such as use of hypermedia devices provide students' interaction with the learning environment which invariably provides meaningful learning activities. Meaningful learning activities built on prior knowledge motivate students and foster their interest in their effort to executively control their own cognitive process.

Conclusions

Application of information and communicationtechnology to all aspects of human endeavour coupled with the need to create student-centred classroom to engage learners in their learning tasks, improve learners' interest and consequently achievement in the school subjects has necessitated the use of hypermedia device in teaching. This study has found out thathypermedia deviceimproved students' achievement and interest in General Metalwork than the conventional teaching methods. Also, the study found out that no significant interaction effect of treatments given to students and their gender ingeneral metalworkachievement and interest. This simply means that the effectiveness of hypermedia device on students' achievement and interest in general metalwork does not depend on gender. Hence, irrespective of gender, students studying general metalwork will record improved performance in their achievement and interest in Genearal metalwork whenhypermedia deviceis used for teaching. These results therefore revealed thathypermedia deviceis a viable alternative to the conventional teaching methods in

teaching General Metalwork. Moreover, science and technologyprovides powerful tools to support the shift to student-centred learning and is capable of creating a more interactive and engaging learning environment for teachers and learners.

Recommendations

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

- More attention should be accorded information and communication literacy and operation in the schools and relevant hypermedia instructionsshould be developed for use within the Nigerian school systems. In addition, Nigerian public schools should be equipped with necessary Information and Communication Technology(ICT) facilities to leverage the potentials of ICT in Nigerian schools.
- General metalwork teachers in Federal Capital Territory should adopt the use of the hypermedia instruction in teaching the students.
- Further empirical studies should be carried out on the use of hypermedia devices for instructional purposes, on different subjects and at different levels to provide sound basis for the adoption in Nigerian schools.
- Curriculum planners such as NationalBusiness and Technical Educational Board (NABTEB) should consider review of curriculum for General metalworkfor secondary schools with a view to incorporatinghypermedia devices.
- Since the findings of this study showed that students who were taught on hypermedia deviceperformed better than those who were taughtusing conventional teaching methods, students should be encouraged to develop interest in the use of computer by making enough functional computers available in the laboratory.
- Federal Capital Development Authority should provide relevant equipment for teaching ofGeneral metalworkin all the schools. Federal Capital Development Authority and principals of Schools should always organize seminars, conferences and workshops to sensitize technical teachers on the use and importance hypermedia instructional devices.

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