EFFECTS OF e-CONTENT ON STUDENTS' ACHIEVEMENT AND INTEREST IN LEARNING OF AUTOMOBILE LIGHTING SYSTEM IN TECHNICAL COLLEGES IN NIGER STATE, NIGERIA

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ABSTRACT

This study determined the effects of e-content on students' achievement and interest in learning of automobile lighting system in technical colleges in Niger State, Nigeria. Distinctively, the study sought to identify the effect of e-content on students' mean achievement in learning automobile lighting system and also based on gender as well as the effect of e-content on students' interest in learning automobile lighting system. Three research questions were raised and two null hypothesis tested at (P< .05) level of significance guided the study. Quasi-experimental design was adopted for the study and intact classes were assigned to treatment groups. The population of the study was 203 TC II Motor Vehicle Mechanic (MVM) students; these consist of 197 boys and 6 girls. 64 TC II students in GTC Minna constituted the treatment group assigned to conventional teaching method while 139 TC II students in Sulaiman Barau Technical College (SBTC) Suleja are assigned to the e-content instruction method. Two sets of instruments; Automobile Lighting System Achievement Test (ALSAT) and 30 items Automobile Lighting System Interest Inventory (ALSII) were used for data collection. The instruments were subjected to face and content validation by five experts. The reliability of the ALSAT was established using Kuder Richardson 21 (KR 21) formula in which a coefficient of 0.98 was obtained while Cronbach Alpha was used in determining the reliability coefficient of ALSII which was found to be 0.86. The data collected from the pretest and posttest using ALSAT and ALSII were analyzed using mean and standard deviation for answering the research questions while analysis for covariance (ANCOVA) was used for testing the hypotheses at 0.05 level of significance. The study found among others, that the e-content and conventional learning modes significantly increased academic achievement of the TC II students in ALSAT. Although, the achievement mean score of students exposed to e-content learning mode was greater than that of conventional learning mode in technical colleges in Niger State and that gender of the students did not have much effect on the student' achievement in automobile lighting system achievement test in relation to the treatments given in technical colleges in Niger State, the interest mean score of students exposed to e-content learning mode was greater than that of conventional learning mode in technical colleges in Niger State. Based on these findings, the study among others, recommended that, The Federal and state ministry of education including professional bodies like the National Board for Technical Education (NBTE) should organize workshop, seminars and conferences on big data analytics for TVET students to improve the efficiency and effectiveness of students' learning.

Keywords: *Automobile Lighting System, e-Content, Gender, Interest and Learning*

Introduction

The standpoint for the vocational institutions in Nigeria is the Technical Colleges (TC). At the TC, the training in Motor Vehicle Mechanic (MVM) is carried out from TC I to TC III. The cardinal objective of the MVM at the TC is to prepare students to acquire appropriate skills and knowledge for employment in the world work (Idris, Saba & Mustapha, 2014). In accordance with the stated objective, the curriculum place emphasis on among others field studies and guided discovery. At the TC, Auto-mechanics is divided into the following departments; engine maintenance and refurbishing, and auto-electricity. The auto-electricity is further divided into the following sensors, battery, ignition, charging, starting and the lighting system. The automobile lighting system syllabus consists of the headlights, filament lamps, headlight alignment, lighting circuits, direction indicators (flashing lights), lighting faults and their remedies. This study is intended to provide the MVM course to meet the needs of the society through relevance and functionality in its content, application, process and method of teaching.

The method employed for successful teaching and learning is an issue of concern to educators, because, the methods of teaching play an important role in thrilling the students' creative and critical thinking by persuading students' teamwork in viewing an event or problem from many standpoints (Jim, 2010). These can only be reached when a proper instructional method that would enable MVM practitioners to get hold of both cognitive and psychomotor competencies in the automobiles. Today, the complexity in the automobile industry is growing exponentially in response to the necessity for technologies to pull off low pollutant discharge and to match and maintain the trail of its development via the Information and Communication Technology (ICT).

ICT is a term that consists of Information Technology (IT) and Communication Technology (CT). Mustapha et.al (2016) defined the terms IT and CT respectively, as a tool to process, manipulate and manage information while the latter is everything linked with the utilization of tools to process and convey data from one gadget to another. Okoro and Ekpo (2016) stated that the application of ICTs in education is divided into two broad categories, namely ICTs in education and ICTs for education. The former deals with the implementation of the general components of ICTs in the teaching-learning process while the latter involves the development of ICT for teaching-learning purposes (Mustapha et.al 2016).

The introduction of ICT into the automobile technology has brought a noteworthy revolution in automobiles students' in the organization of instructions, tests and exams. As such, the applications of ICTs in the school depend on the teacher (Nyika, 2015). On the other hand, mastering and utilizing ICT skills towards creating an improved teaching and learning environment is of utmost importance to teachers in creating a new learning culture (Minnaar, 2013). As a result, Abdullateef (2018) stated that to address the inadequacy of curriculum aligned contents for students and teachers in secondary schools and tertiary institutions in Nigeria to be resourceful, stimulated and creative with the better need for self-learning than relying on handbook and syllabi, the e-content platform is needed.

e-content means content in the electronic form. Eremias and Subash (2013) defined e-content as digital images and text premeditated for put on view on web pages. Similarly, Olojo, Adewumi and Ajisola (2012) viewed it as any digitalized content that can smooth the progress of learning

process and/or outcome. Nachimuthu (2012) viewed it as a blending of animation with audio, video, images and text. Four different channels are needed for the possession of these contents; these include the procurement of materials, use of freely available content on the internet, invention of material and swap of available contents in a network with other institutions of higher education (Eremias & Subash, 2013). According to Urvashi, Sarjoo and Doshi (2017), e-content learning materials focused on cognitive, emotional, behavioural and contextual perspective of both the teacher and student. The future teacher will understand that he or she is changing from a provider of facts to one that facilitates a learning environment and the student will be placed in the centre instead of the educator. As advocated by Akinleye (2010), information does not become knowledge automatically until learners have been actively involved in its processing. In developing a knowledged society, integrating ICT (e-content) at all levels of education is essential.

Aligning the significant demands and preferences of students in higher learning achievement of teachers and students in learning of automobile lighting system in Niger State technical colleges, the method of learning automobile lighting system in technical colleges in Niger State will entail a re-think in the methodology used in teaching automobile trade. Such a methodology should incorporate the use of e-content. In teaching automobile lighting system via the e-content, the processes of giving and taking, talking and listening, describing and witnessing, help expand horizons and foster common understanding among the students to gain knowledge when appropriate information is presented and processed so as to improve students' interest, achievement and interest in automobile lighting system. Teachers' inappropriate teaching method appears to weaken students' interest in learning. The researchers are, therefore, motivated to determine the effect of e-content instruction on technical college students' achievement and interest in learning of automobile lighting system. Woolfolk, Hughes and Walkup (2008) identified individual interest as factor that determines achievement and interest. A most favourable level of students' interest must be preserved and built so as to guarantee effective learning. Harbor-Peters (2002) define interest as the feeling of intentness or curiosity over something. Students listen with rapt attention and deeply attend to a learning activity that catches their interest. Interest can influence how well one learns and what one learns. Woolfolk, Hughes and Walkup (2008) assert that learners attend to, and remember events, images, and readings that are related to their interest. Betiku (2002) asserts that poor achievement is due to students' lack of interest in the subject matter, and attitude of the teachers that teach the students. Similarly, Obodo (2004) stresses that the type of interest a student brings to the classroom determine the student's level of achievement or failure in a particular subject. This implies that if a student has positive interest towards studying a particular subject, that student would also derive satisfaction from the knowledge of the subject irrespective of gender.

Gender is, therefore, another factor that seems to influence pupils' achievement in learning. Oludipe (2001) views gender as a range of characteristics distinguishing males and females, particularly in the masculine and feminine attributes assigned to them. Over the years, education has focused on closing the registration gap between gender while insufficient attention has been yielded to the achievement and retention or the quality and fundamental role played by Technical Vocational, Education and Training (TVET).

Despite the fundamental function played by TVET, the method of teaching it is to a certain extent not highly effective in most of the technical colleges in Nigeria to give the student teachers the prospect to think autonomously and conceptualize the strong point of mind of the subject matter due to inadequate and high excellence instructional strategy in the classroom. For this reason, the method used by teachers in sharing information with students is an aspect influencing learning at all levels of the education system (Paul & Samson, 2013, Dorgu, 2015)

This is because today's society is becoming dependent on digitalized devices and as such become inevitable for students who will live and work in the digital world (Paul & Samson, 2013). As a result of the above-mentioned problems, UNESCO (2005) grieved over that the traditional structures and methods of teaching/ learning come into sight, less responsive to the challenges of the turbulent times because the instructional delivery system fails to effectively keep pace with the rapid skills obsolesce especially in the automobile industry. Hence, this necessitates a change in the instructional methods used in teaching and learning automobile lighting system in technical colleges in Niger State so as to enable the products of these colleges to obtain an incorporated knowledge of affective, cognitive and psychomotor skills required in the work.

Aim and Objectives of the Study

The aim of this study is to determine the effects of e-content on students' achievement and retention in learning of automobile lighting system in technical colleges in Niger State, Nigeria. Distinctively, the study seeks to identify the:

1. The effect of e-content on students' achievement in learning automobile lighting system in technical colleges in Niger State.
2. The effect of e-content on students' achievement in learning automobile lighting system in technical colleges in Niger State based on gender.
3. The effect of e-content on students' interest in learning automobile lighting system in technical colleges in Niger State.

Research Questions

The study provides answers to the following questions:

1. What are the effects of e-content on students' achievement in learning automobile lighting system in technical colleges in Niger State?
2. What are the effects of e-content on students' achievement in learning automobile lighting system in technical colleges in Niger State based on gender?
3. What are the effects of e-content on students' interest in learning automobile lighting system in technical colleges in Niger State?

Hypotheses

The following null hypothesis were formulated and tested at P< .05 level of significance

H_{O1} There is no significant difference in the mean achievement scores of students taught automobile lighting system using the e-content instructional strategy and conventional method of teaching

H_{O2} There is no significant difference in the mean achievement scores of students taught automobile lighting system using the e-content instructional strategy based on gender.

Methodology

The study adopted the quasi-experimental design with a pre-test and post test nonequivalent comparison group and intact classes were assigned to treatment groups. The population of the study was 203 TC II Motor Vehicle Mechanic (MVM) students; these consist of 197 boys and 6 girls. 64 TC II students in GTC Minna constituted the treatment group assigned to conventional teaching method while 139 TC II students in Sulaiman Barau Technical College (SBTC) Suleja are assigned to e-content instruction method. SBTC Suleja was purposively sampled since the study seeks to determine the student's achievement based on gender and SBTC Suleja is the only technical college in Niger State that has female students in the 2017/ 2018 academic session and GTC Minna was randomly selected among the technical colleges in Niger State. The instrument used for data collection was the Automobile Lighting System Achievement Test (ALSAT). ALSAT was subjected to face and content validation by three experts in MVM. ALSAT was trial-tested to determine their psychometric indices. A total of 20 items of ALSAT had good difficulty and discrimination indices. Cronbach Alpha was used in determining the reliability coefficient of ALSAT and it was found to be 0.86.

A pre-test was administered to the sampled students' in their intact classes. This lasted for 30 minutes. To achieve the objective of the study, the students' were subjected to 6 weeks formal instructions. The subject teachers were used as a research assistant. The researcher provides written lesson plan validated by experts in MVM. The lesson plan serves as a guide to the research assistant to be used for the treatment groups. The research assistants taught all the topics in treatment groups. The method of teaching in the treatment groups was the use of e-content and conventional teaching method for the experimental and control groups respectively. The questions administered as pre-test was also given as post test as formal instruction in the class. The scores acquired from the post-test exercise provided post-treatment data for the study. The ALSAT was re-administered as retention test after two weeks interval.

The ALSII was developed based on the objectives of the study and literature reviewed. ALSII consisted of two (2) sections in which the first indicates the introductory part of the respondents and the second part is the questionnaire items. 20 item statements were generated for the study. Mean and the standard deviation are used in answering the research questions while Analysis of Covariance (ANCOVA) was used in answering the null hypotheses.

Results

Research Question 1: What are the effects of e-content on students' achievement in learning automobile lighting system in technical colleges in Niger State?

Table 1: Mean and standard deviation of experimental and control groups on the effects of e-content

		Achievement				
		Pretest		Post-test		
Group	N	Mean	SD	Mean	SD	Mean Gain
Experimental	139	48.35	2.728	88.63	3.912	40.28
Control	64	47.86	2.836	59.88	3.108	12.02

The data in Table 1 show that the experimental group had a mean of 48.35 and a standard deviation of 2.728 in the pre-test and mean score of 47.86 and standard deviation of 2.836 in the post-test making the pre-test - post-test gain in the experimental group to be 40.28. The control group had a mean score of 47.86 and a standard deviation of 2.836 in the pre-test and a mean of 59.88 and standard deviation of 3.108 in the post-test, resulting in a gain of 12.02. With this result, the treatment groups are effective in enhancing students' achievement in automobile lighting system, but the effect of e-content on students' achievement in automobile lighting system is higher than the effect of conventional method of teaching.

Research Question 2: What are the effects of e-content on students' achievement in learning automobile lighting system in technical colleges in Niger State based on gender?

Table 2: Mean and standard deviation of experimental and control groups on the effects of e-content

		Achievement (Gender)				
		Pretest		Post-test		
Gender	N	Mean	SD	Mean	SD	Mean Gain
Female	6	1.68	0.73	2.77	0.73	1.09
Male	197	21.76	0.86	48.81	0.81	27.05

The data in Table 2 indicate that the female had a mean of 1.68 and a standard deviation of 0.73 in the pre-test and mean score of 2.77 and standard deviation of 0.73 in the post-test making the pre-test - post-test gain to be 1.09. The male had a mean score of 21.76 and a standard deviation of 0.86 in the pre-test and a mean of 48.81 and standard deviation of 0.81 in the post-test, resulting in a gain of 27.05. This implies that the male performed better than the female in teaching and learning of automobile lighting system using e-content.

Research Question 3: What are the effects of e-content on students' interest in learning automobile lighting system in technical colleges in Niger State?

Table 3: Mean and Standard Deviation of Respondents on Pre-test and Post-test Interest Scores

		Students Interest				
		Pretest		Post-test		
Group	N	Mean	SD	Mean	SD	Mean Gain
Experimental	139	38.52	2.95	76.49	3.91	37.97
Control	64	35.21	2.84	69.62	3.11	34.41

The data in Table 4.3 show that the experimental group had a mean of 38.52 and a standard deviation of 2.95 in the pre-test and mean score of 76.49 and standard deviation of 3.91 in the post-test making the pre-test and post-test mean gain in the experimental group to be 37.97. The control group had a mean score of 35.21 and a standard deviation of 2.84 in the pre-test and a mean of 69.62 and standard deviation of 3.11 in the post-test, resulting in a mean gain of 34.41. Therefore, the experimental group had a higher interest mean gain of 37.97; this appears to have a greater effect on students' interest in automobile lighting system in the content areas covered than the control group with an interest mean gain of 34.14.

Test of Hypotheses

All the stated hypotheses were tested at 0.05 level of significance:

Table 4: Summary of Analysis of Covariance (ANCOVA) of the Students Achievement and Interest scores in Automobile Lighting System

Source	Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	209.2270	2	17.437	2.432	.000
Intercept	504.2260	1	504.224	84.230	.000
Pre-test	.9500	1	.950	4.589	.003
Method	202.9422	2	488.790	3.768	.059
Gender	.0020	1	.443	2.936	.106
Method and Gender	.3270	2	.446	2.623	.105
Error	93.9780	454	.208		
Total	1011.6452	463			
Corrected Total	209.6435				

The data presented in Table 4 show that e-content as main effect is significant on students' achievement in ALSAT. This is shown by the calculated F-value of 3.768 which is significant at .059 and therefore, equally significant at .05 level of probability. Hence, the null hypothesis of no significant difference is rejected in favour of the alternative. This implies that there is a significant difference in the mean achievement scores of students in the treatment groups. Therefore, e-content is significantly superior to the conventional teaching method in enhancing students' achievement.

It was also revealed that the observed difference in the main achievement scores of students' based on gender was not significant. This is shown by the calculated F-value of 2.936 which is not significant at .106 because it is greater than .05. To this effect, the null hypothesis was accepted. This gives the impetus to conclude that, there was no significant difference on students' achievement in automobile lighting system based on gender.

Findings of the Study

The results of the findings indicated that:

1. e-content has a significant effect on students' achievement in learning of the automobile lighting system
2. The effects of e-content on gender was not significant
3. There is no significant interaction effect of method and gender on students' achievement in learning of automobile lighting system.

Discussion of Findings

The data presented in Table 1 revealed that the effect of e-content on students' achievement is higher than the effect of conventional teaching method on students' achievement. This implies that students in the experimental group had a higher mean gain compared to their counterparts in the control group after treatment. In this connection, there is a significant difference between the treatment group's achievement. The finding supports Lavicza (2006), Obideyi (2012) and Mustapha (2016) who reported that the use of technology in this way plays a vital role in the teaching and learning process, most especially improving student academic achievement, retention and skill performance in MVM. In a similar vein, the resulting findings of Efuwape and Omofonmwan (2015) also revealed that the students' achievements increase when Computer Based Instruction (CBI) technique is used for instructional delivery.

The result in Table 2 revealed that findings on the difference between male and female students' achievement based on the use of e-content in automobile lighting system revealed no significant difference. Therefore, it can be concluded that the use of e-content based learning package in enhancing student achievement in automobile lighting system is effective and beneficial to both male and female students. In support of the findings of this study, Okeke (1999) reported that gender was not a significant factor in the students' achievement in science and technology class when technology is used. Contrary to the findings of this study, Young (2000), Wilkowska, and Ziefle (2010) found significant gender differences in computer attitudes and skill performance of students in the use of technology in classroom activities.

The result in Table 3 revealed that findings on student interest based on the use of e-content in learning automobile lighting system revealed no significant difference. Therefore, it can be concluded that the two learning modes, that is, e-content and conventional learning modes significantly increased academic interest of the TC II students in automobile lighting system achievement test. Although, the interest mean score of students exposed to e-content learning mode was greater than that of conventional learning mode in technical colleges in Niger State. In support of this, Mustapha (2016) acknowledged that students' have better retention of learning when taught with the use of ICT facilities such as the e-content.

In the same vein, analysis of covariance was used to test the hypothesis with the finding in Table 4 indicating that there was a significant difference between the mean score of experimental and control groups in the achievement of students in the Autobile lighting system. Therefore, the experimental group achievement mean scores are notably higher than control group means in the achievement test. This implies that the e-content was significantly more effective than the conventional teaching method on the students' achievement in the learning. The results of the study agree with the study conducted by Chien, Yunus, Wan and Bakr (2008) that there was a significant difference in the students' achievement in algebraic between students who learned with the Computer Assisted Instruction (CAI) + Intelligent Tutoring Systems (ITS) and those who learned with CAI alone. The finding of that study indicated that CAI + ITS was more effective in helping the students to learn as compared to using CAI alone.

Based on findings in this study, there was no interaction effect on the method and gender on influence students' achievement with the use of e-content. This is contrary to the findings of Aremu (2001) who found that pupils of varying ability levels perform differently depending on the types of method and material used for instruction. Therefore, it can be concluded that in the use of technology such as e-content in enhancing students' achievement in automobile lighting system, both method and gender differences are not mediating students' achievement and understanding. This implies that students of varying ability level and both gender are the beneficiaries when this type of technology is used for facilitating students learning.

Conclusion

The results of this study revealed that student achievement and interest of learning was enhanced using e-content. The use of e-content has value as an instructional tool in learning of the automobile lighting system via computer applications. The e-content approach appears to have value as an instructional tool in learning automobile lighting system. The fact that these students achieved better results in the e-content approach indicates that it is a viable instructional option. The one-to-one tutoring function in e-content enables it to adapt tutoring strategies according to the needs of the individual student. Thus, educators can spend more time to guide weaker students while others learn via e-content. It does not attempt to change the process of education in any radical way, but it recognizes the strengths of a human and removes the teacher's and student's burden in teaching and learning.

Recommendations

Based on the findings of the study, the researcher recommends the following:

1. The Federal and state ministry of education including professional bodies like the National Board for Technical Education (NBTE) should organize workshop, seminars and conferences on big data analytics for TVET students to improve the efficiency and effectiveness of students' learning.
2. The NBTE in collaboration with ministries of education at all levels across the country should periodically organize retraining workshop and seminars for TVET teachers in other for them to acquire the competencies that would enable them to make use of the data generated to enhance the students cognitive, psychomotive and affective domain of learning.

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