EFFECTS OF e-CONTENT ON STUDENTS' ACHIEVEMENT AND RETENTION IN AUTOMOBILE LIGHTING SYSTEM IN TECHNICAL COLLEGES IN NIGER STATE

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Abstract

This study determined the effects of e-content on students' achievement and retention in automobile lighting system in technical colleges in Niger State. Distinctively, the study sought to identify the effect of e-content on students' mean achievement in automobile lighting system based on gender and retention in the automobile lighting system. Three research questions and two null hypotheses tested at (P< .05) level of significance guided the study. A quasi-experimental design was adopted for the study. The population for the study was 203 TC II Motor Vehicle Mechanic (MVM) students; this consists of 197 boys and 6 girls. Two intact class made up of 64 TC II students in GTC Minna conventional teaching method and 139 TC II students in Sulaiman Barau Technical College (SBTC) Suleja were assigned to the e-content instruction method. 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 from Industrial and Technology Education Department, Federal University of Technology Minna. ALSAT was trial-tested to determine their psychometric indices. A total of 20 items of ALSAT had good difficulty and discrimination indices. Kuder-Richardson (KR-20) was used in determining the reliability coefficient of ALSAT and it was found to be 0.86. Mean and the standard deviation were used in answering the research questions while Analysis of Covariance (ANCOVA) was used in testing the null hypotheses. The study found out that e-content instructional strategy is more effective in improving students' achievement and retention in the automobile lighting system. There was no effect of gender on students' achievement in the automobile lighting system. The study also found out that there are no significant interaction effects of methods and gender on technical college students' achievement and retention in the automobile lighting system. This implies that the effectiveness of the methods on technical college students' achievement and retention in automobile lighting system does not depend on gender. It was, therefore, recommended among others that, automobile teachers should adopt the use of e-content instructional strategy in the automobile lighting system. The e-content instructional strategy should be incorporated into the teaching of the automobile by the National Board for Technical Education as the board is responsible for standardization and harmonization of programmes in technical colleges.

Keywords: Automobile, e-Content, Learning, Lighting System, Teaching

Introduction

The standpoint of 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 of work (Idris, Saba & Mustapha, 2014). In accordance with the stated objective, the curriculum placed emphases on field studies, guided discovery among others. To achieve the objectives, the TC, Auto-mechanics is divided into; engine maintenance and refurbishing, and auto-electricity. Auto-electricity is further divided into sensors, battery, ignition, charging, starting and the lighting system. The automobile lighting system syllabus consists of headlights, filament lamps, headlight alignment, lighting circuits, direction

indicators (flashing lights), lighting faults and their remedies. This study provides 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 used for successful teaching of MVM plays a vital role in thrilling the students' creative and critical thinking by persuading teamwork in viewing an event or problem (Jim, 2010). This can only be achieved when a new instructional method enable MVM practitioners to get hold of both cognitive and psychomotor competencies in the automobiles.

Presently, 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 made up of ICTs in education and ICTs for education. ICTs in education deals with the implementation of the general components of ICTs in the teaching-learning process while ICTs for education is the development of ICT for teaching 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 examinations. As such, the applications of ICTs in the school depend on the teacher (Nyika, 2015). Abdullateef (2018) stated that to address the inadequacy of curriculum aligned contents for students and teachers in schools 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 learning experience content in electronic form. Eremias and Subash (2013) defined e-content as digital images and text premeditated for viewing on web pages. Similarly, Olojo, Adewumi and Ajisola (2012) viewed it as any digitalized learning experience that can smoothen the learning process and 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; they include procurement of materials, use of freely available text and images on the internet, the invention of material and swap of available text and images in a network with other institutions of higher education (Eremias & Subash, 2013). According to Urvashi, Sarjoo and Doshi (2017), e-content learning materials focus on the cognitive, emotional, behavioural and contextual perspective of both the teacher and students. The e-content enables a teacher to understand that he or she is changing from a provider of facts to one that facilitates a learning environment while the student will be placed at the centre of the process. As advocated by Akinleye (2010), the information does not become knowledge automatically until learners have been actively involved in its processing. In developing knowledge society, integrating ICT (e-content) at all levels of education is essential.

Aligning the significant demands and preferences of students entails a re-think in the methodology used in teaching. Such a methodology could incorporate the use of e-content. In teaching automobile lighting system via the e-content, the processes of talking and listening, describing and witnessing, help expand horizons and foster a common understanding among the students to gain knowledge when appropriate information is presented and processed. Opdenakker and Alexander (2011) stated that all the decisions and action required of the teacher to manage and organize classroom activities, such as laying down rules and procedures for learning to enable students set personal goals to seek skills that would improve their achievement and retention of learning. Whatever touches consciousness leaves trace or effect and is retained in the brain in the variety of structures. Thus, when teaching is effective, it enhances retention. Mustapha (2016) defined retention as the repeated performance of a learner on the behaviour earlier carried out after an interval of time. Boyle, Duffy and Dunleavy (2003) posited that students' retention in learning is shaped by elements such as the teachers' ability, motivation, interest and mindfulness of subject matter, methods of instruction and memory capacity of the learner among others, especially in vocational and technical courses.

Despite the fundamental function played by Technical Vocational, Education and Training (TVET), the method of teaching automobile lighting system 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 independently so as to conceptualize the subject matter due to inadequate and high excellence instructional strategy in the classroom. Dorgu (2015) stated that the method used by teachers in teaching the students influences learning at all levels of the education system. 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). UNESCO (2005) grieved over the traditional structures and methods of teaching which are less responsive to the challenges of the turbulent times because the instructional delivery system fails to effectively keep pace with the rapid skills obsolete 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 integrated knowledge of affective, cognitive and psychomotor skills required in the work. The aim of this study was to determine the effects of e-content on students' achievement and retention in the automobile lighting system in technical colleges in Niger State. Distinctively, the study determined the effect of;

1. e-content on students' achievement in the automobile lighting system in technical colleges in Niger State.
2. e-content on students' achievement exposed to the automobile lighting system in technical colleges in Niger State based on gender.
3. e-content on students' retention in the automobile lighting system in technical colleges in Niger State.

Hypotheses

The following null hypotheses 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 a quasi-experimental design with a pre-test, post-test nonequivalent comparison group and intact classes assigned to treatment groups. The population for 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 control group assigned to the conventional teaching method while 139 TC II students in Sulaiman Barau Technical College (SBTC) Suleja constituted the treatment group 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 on 86 students in Government Technical College, Bunza to determine their psychometric indices. A total of 20 items of ALSAT had good difficulty and discrimination indices. Kuder-Richardson (KR-20) was used in determining the reliability which gave a coefficient of 0.86.

A pre-test was administered to the students' in their intact classes in the two colleges which lasted for 30 minutes. To achieve the objective of the study, the students' were subjected to 6 weeks of formal instructions. The subject teachers served as a research assistant. The researcher provided written lesson plans validated by experts in MVM. The lesson plans served as guides to the research assistant used for both groups. The research assistants taught all the topics to the control and treatment groups. The method of teaching in the experimental group was e-content while conventional teaching method was used for the control group. The questions administered as pre-test was also given as post-test. The scores obtained from the post-test exercise provided post-treatment data for the study. The ALSAT was re-administered as retention test after two weeks interval. Mean was used in answering the research questions, the standard deviation was used to validate the mean and Analysis of Covariance (ANCOVA) was used in testing the null hypotheses.

Results

The result of the study was obtained from the research questions answered and hypotheses tested and were presented in Table 1-4.

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

Data for answering research question one were presented in Table 1

Table 1: Mean and standard deviation of experimental and control groups on the effects of e-content on students' achievement in automobile lighting system

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

Data in Table 1 showed that the experimental group had a mean of 48.35 with 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 with 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 these results, the two groups were effective in enhancing students' achievement in the automobile lighting system, but the effect of e-content on students' achievement in the automobile lighting system is higher than the effect of the conventional method of teaching.

Research Question 2: What is the effect of e-content on students' achievement exposed to the automobile lighting system in technical colleges in Niger State based on gender?

Data for answering research question two were presented in Table 2

Table 2: Mean and standard deviation of experimental and control groups on the effects of e-content on students' achievement in automobile lighting system based on gender

Achievement						
		Pretest		Post-test		
Gender	N	Mean	SD	Mean	SD	Mean Gain
Female	6	19.68	0.73	42.77	0.73	23.09
Male	197	21.76	0.86	48.81	0.81	27.05

Data in Table 2 indicated that the female had a mean of 19.68 and a standard deviation of 0.73 in the pre-test and mean score of 42.77 and standard deviation of 0.73 in the post-test making the pre-test - post-test mean gain to be 23.09. 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 taught automobile lighting system using e-content.

Research Question 3: What is the effect of e-content on students' retention in the automobile lighting system in technical colleges in Niger State?

Data for answering research question three were presented in Table 3

Table 3: Mean and standard deviation of experimental and control groups on the effects of e-content on students' retention in automobile lighting system

		Students Retention				
		Post-test		Retention test		
Group	N	Mean	SD	Mean	SD	Mean Gain
Experimental	139	29.46	0.71	36.68	0.80	7.22

Control	64	26.83	0.67	33.67	0.63	6.84

Data in Table 3 showed that the experimental group had a mean of 29.46 with a standard deviation of 0.71 in the post-test and retention test score of 36.68 and standard deviation of 0.80 making the post-test - retention test gain in the experimental group to be 7.22. The control group had a mean score of 26.83 with a standard deviation of 0.67 in the post-test and a mean of 33.67 and standard deviation of 0.63 in the retention test, resulting in a gain of 6.84. Therefore, the two groups were effective in enhancing students' retention in the automobile lighting system, but the effect of e-content on students' retention in the automobile lighting system is higher than the effect of the conventional method of teaching.

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 scores in Automobile Lighting System

Source	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Remark**
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	Accepted
Gender	.0020	1	.443	2.936	.106	
Method and Gender	.3270	2	53.446	2.623	.862	Accepted
Error	93.9780	454	.208			
Total	1011.6452	463				
Corrected Total	209.6435					

Data presented in Table 4 showed the F-calculated for method, interaction treatment and gender on students' achievement in the automobile lighting system. The F-calculated value for the method 488.790 with the significance of F at 0.59 which is greater than 0.05 signifies that the null hypothesis of no significant difference in the mean achievement scores of students taught automobile lighting using e-content instructional strategy and conventional method of teaching is accepted at 0.05 level of significance. Therefore, both e-content and the conventional teaching method enhance students' achievement in the automobile lighting system. The interaction effect of method and gender has F-calculated value of 53.446 with the significance of F at 0.862 which is greater than 0.05. Therefore, the hypothesis of no significant interaction effect of treatment given to students and their gender with respect to their mean scores on the automobile lighting system is accepted. This implies that there is no significant interaction effect of the method given to students taught automobile lighting system using the e-content instructional strategy based on gender.

Discussion of Findings

The data presented in Table 1 provided the answer to research question one. The finding revealed that the effect of e-content was higher than the conventional teaching method on students' achievement. This implied that students in the experimental group had a higher mean gain when compared to their

counterparts in the control group. In this connection, there is a significant difference between the treatment group's achievements. The finding supports Mustapha (2016) that the use of technology 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 was used for instructional delivery than the conventional teaching method.

The result in Table 2 revealed that the difference between male and female students' achievement taught e-content in automobile lighting system had no significant difference. Therefore, it can be concluded that the use of e-content based learning package in enhancing student achievement in the automobile lighting system is effective and beneficial to both male and female students. In support this according to Okeke (1999), 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 data presented in Table 3 provided the answer to research question three. The finding revealed that the effect of e-content instructional strategy and the conventional teaching method on students' retention were effective in enhancing students' retention in the automobile lighting system, but the effect of e-content on students' retention in the automobile lighting system is higher than the effect of the conventional method of teaching. The finding concurs with Mustapha (2016) that the use of technology plays a vital role in the teaching and learning process, most especially improving student academic achievement, retention and skill performance in MVM.

The data presented in Table 4 provided the answer to the hypothesis. The finding indicates that there was no significant difference between the mean score of experimental and control groups in the achievement of students in the Automobile lighting system. Therefore, both e-content and the conventional teaching method enhance students' achievement in the automobile lighting system. The results of the study disagree with the study conducted by Chien, Yunus, Wan and Bakr (2008) that there was a significant difference in the students' achievement 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.

Conclusion

The present rapid development in the automobile industry has lead to the intricacy in automobile lighting system experienced by technical college students. This has given rise to the need for e-content based instruction in order to assist graduates in the automobile to acquire adequate skills necessary for employment in the changing workplace. Consequent upon this, the study determined the effects of e-content on students' achievement and retention in the automobile lighting system in technical colleges in Niger

State and found out that e-content instructional strategy is more effective than the conventional method of teaching in enhancing students' achievement and retention in the automobile lighting system. In addition, the study revealed that there was no significant effect attributed to the gender on students' achievement in the automobile lighting system. The study, however, found no significant interaction effect of method and gender on students' achievement in the automobile lighting system. This implies that the effectiveness of the e-content instructional strategy in improving student achievement does not depend on gender. It then, therefore, means that e-content instructional strategy is a dependable option for teaching and learning in the present era of rapid technological development as it promotes active and efficient learning which can lead to the acquisition of necessary skills for employment.

Recommendations

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

1. Automobile teachers should adopt the use of e-content instructional strategy in the automobile lighting system.
2. the e-content instructional strategy should be incorporated into the teaching of the automobile by National Board for Technical Education as the board is responsible for standardization and harmonization of programmes in technical colleges.
3. The National Board for Technical Education should undertake and support the production of e-content instructional strategy for use in technical colleges.
4. More encouragements should be provided to the female students to improve their performance in automobile.

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