EFFECT OF SIMULATION TEACHING TECHNIQUE ON STUDENTS' ACHIEVEMENT AND INTEREST IN MOTOR VEHICLE MECHANIC WORK IN TECHNICAL COLLEGES IN NASARAWA STATE.

EBOHON GRACE IHINOSEN KUWANTA

DEPARTMENT OF INDUSTRIAL TECHNICAL EDUCATION NASSARAWA STATE COLLEGE OF EDUCATION, AKWANGA

Abstract

The study was on Effect of Simulation Teaching Technique on Students' Achievement and Interest in Motor vehicle Mechanic Work in Technical Colleges of Nasarawa State in Nigeria. Two research questions and two null hypotheses guided the study. A quasi-experimental design was used for the study. Specifically, the pre-test, post-test, non-equivalent control group design was adopted for the study. The sample size for the study was 57 made up of year two auto mechanic students in Technical Colleges in Nasarawa State, comprising 45 males and 12 female students. The population sample (57) was divided into two: Experimental group (29) and Control group (28). The Motor Vehicle Mechanic Achievement Test (MVMWAT) and Motor Vehicle Mechanic Work Interest Inventory (MVMWII) were instruments used for data collection. The instruments were face validated by three experts from the Department of Industrial Technical Education, University of Nigeria, Nsukka. The reliability of the instruments was established through a trial test on automobile technology students from Government Technical College Bukuru and yielded a reliability co-efficient of 0.69, using Kuder Richardson formula; and 0.98 respectively, using Cronbach Alpha technique. The experimental procedure involved two groups: experimental and control group. The experimental group was taught with Simulation Teaching Technique (STP) while the control group was taught with the conventional teaching technique. Measures for control of extraneous variables were employed. Data generated for the study were analysed using mean and standard deviation to answer the research questions while analysis of covariance and t-test were used to test the hypotheses at 0.05 level of significance. Data analysed revealed better performance of students taught with simulation teaching technique as against students taught with the conventional teaching technique. Thus, there is significant difference in the two teaching techniques with regards to students' interest. Also revealed from the study was students' high degree of interest for Automobile Technology. Based on the findings, it was recommended that administrators of technical colleges should as a matter of fact provide and install what it takes to make simulation teaching technique a success. Also recommended was that the National Board for Technical Education (NBTE) should work on effecting simulation teaching technique as a standardized teaching technique for the implementation of automobile technology and other programmes in technical colleges.

Key Words: Simulation Teaching Technique, Achievement, Interest and Motor Vehicle

Introduction

Technical colleges in Nigeria are established to produce craftsmen at the craft level and master craftsmen at the advance craft level (Federal Ministry of Education, 2013). The courses offered at the technical colleges leads to the award of National Technical Certificate (NTC) and Advance National Technical Certificate (ANTC). The curriculum programmes of technical colleges according to Federal Government of Nigeria (2013) are grouped into related trades. These include the computer trades, electrical/electronic trades, wood trades and mechanical trades. Mechanical trade is a general name used in describing trades that have direct bearing with auto electrical work, auto body building auto parts merchandising, air-conditioning and refrigeration mechanics work, mechanical engineering craft practice, welding and fabrication engineering craft practice, instruments mechanics works and motor vehicle mechanic work.

Motor vehicle mechanic work is one of the units that constitute the field of technical education. Motor vehicle mechanic work is any work done on motor vehicles. Motor vehicle works comprises a blend of both theory and practical. In technical colleges, based on the objective of technical colleges, the National Technical Certificate (NTC) programme was designed to include a multi-dimensional and multi-disciplinary curriculum, which contains various programmes in which learners acquire various technical skills. For the teaching of motor vehicle mechanic work to be effective, simulation teaching techniques has to be adopted.

Simulation teaching techniques are events of instructional activities that are in sequence within an individual lesson necessary to provide a framework for teaching the contents (Ogbuanya and Usoro, 2008). The sequence of content of instruction as found in computer aided design can proceed according to some simulation teaching technique structure such as; good planning of programme, organization of facilities, arrangement of facilities, sequence learning, imparting knowledge before skills and interactive technique. Others are multimedia sensory presentation; relate teaching to work situation, surface modeling, problem solving, competency based evaluation. Others include the gaining of the learners' attention by placing an outline of the lesson plan in the visual form e.g. an illustration, a diagram or a chart. According to Ogbuanya and Usoro (2008), this gives a learner a framework into which they can organize subsequent content of learning.

Chetana (2007) observed that simulation teaching technique is a self-monitoring approach in which learners get involved in the assessment of their own responses and become conscious of errors or answers that do not make sense. Simulation teaching technique creates meaningful learning opportunities, students should find challenges in what they are learning.

It is process that strives for challenging content, high learner interaction and real world use for designing course materials. This suggests that simulation teaching technique is goal oriented. To achieve the desired goal will require the active involvement of the learners in the problem and the development of skills in recognizing incongruities. Adoption of simulation gmes is necessary because of the low performance experienced in technical colleges today. Example many college graduates of motor vehicle maintenance works (MVMW) cannot cope with the world of work. The goal of MVMW in technical colleges in Nigeria according to NBTE (2009) is to produce skilled craftsmen with good working principles. Technical college graduates have prospects of either being employed in the industries or set-up their own workshops and become self-employed. Better still, technical college graduates should have the opportunity of furthering their education in higher institution. Contrary to achieving the above goal, majority of students have been completing the programme with very poor academic performance and inadequate skills which is incapable of earning them a living (Okoro, 2006).

This has resulted in unemployment of technical college graduates especially motor vehicle maintenance works. In this regard, the employers of labour responded by non-demand of the graduates of technical colleges. Employers prefer to develop their own in-house craftsmen instead of employing the half-baked graduates produced in technical colleges. This decline in students performance has been associated to a number of factors, among which is the strategy employed in impacting knowledge to the learners. The poor performance of the students in National Technical Certificate (NTC) examinations in recent years is partly due to the teaching methods employed by the teachers.

Moreover, it has been discovered that the persistent poor academic performance of students is as a result of the inappropriate teaching methods adopted by the teachers (Aina, 2000). The lecture and demonstration methods which are teacher – centred are the main teaching methods employed by technical teachers for implementing the curriculum. Obviously, the adoption of these methods of teaching could lead to un-employed graduates. The foregoing therefore underscores the need to explore other teaching approaches that would enhance and facilitate understanding and acquisition of knowledge. Therefore, the problem of this study is: how can simulation teaching technique affect the performance of motor vehicle maintenance work students as compared to those students taught with the conventional teaching technique.

Purpose of the Study.

1. To determine whether Simulation teaching technique can increase students' achievement and interest in the Engine system of the motor vehicle,

2. To determine whether Simulation teaching technique can increase students' achievement and interest in lubrication system of the motor vehicle.

Research Questions

1. What is the effect of Simulation teaching technique on students' achievement and interest in the Engine system of the motor vehicle?.
2. What is the effect of Simulation teaching technique on students' achievement and interest in lubrication system of the motor vehicle?.

Research hypotheses

1. There is no significant difference in the achievement and interest of students taught Engine system of the motor vehicle through Simulation teaching technique.
2. There is no significant difference in the achievement and interest of students taught lubrication system of the motor vehicle through Simulation teaching technique.

Methodology

The study was on Effect of Simulation Teaching Technique on Students' Achievement and Interest in Motor vehicle Mechanic Work in Technical Colleges of Nasarawa State in Nigeria. Two research questions and two null hypotheses guided the study. A quasi-experimental design was used for the study. Specifically, the pre-test, post-test, non-equivalent control group design was adopted for the study. The sample size for the study was 57 made up of year two auto mechanic students in Technical Colleges in Nasarawa State, comprising 45 males and 12 female students. The population sample (57) was divided into two: Experimental group (29) and Control group (28). The Motor Vehicle Mechanic Achievement Test (MVMWAT) and Motor Vehicle Mechanic Work Interest Inventory (MVMWII) were instruments used for data collection. The instruments were face validated by three experts from the Department of Industrial Technical Education, University of Nigeria, Nsukka. The reliability of the instruments was established through a trial test on automobile technology students from Government Technical College Bukuru and yielded a reliability co-efficient of 0.69, using Kuder Richardson formula; and 0.98 respectively, using Cronbach Alpha technique. The experimental procedure involved two groups: experimental and control group. The experimental group was taught with Simulation Teaching Technique (STP) while the control group was taught with the conventional teaching technique. Measures for control of extraneous variables were employed. Data generated for the study were collected, organized and analysed using mean and standard deviation to answer the research questions while analysis of covariance and t-test were used to test the hypotheses at 0.05 level of significance. Data analysed revealed better performance of students taught with simulation teaching technique against students taught with the conventional teaching technique. Thus, there is significant difference in the two teaching techniques

with regards to students' interest. Also revealed from the study wasstudents' high degree of interest for Automobile Technology. Based on the findings, it was recommended among others that administrators of technical colleges should as a matter of fact procure and install what it takes to make simulation teaching technique a success. Also recommended was that the National Board for Technical Education (NBTE) should work on effecting simulation teaching technique as a standardized teaching technique for the implementation of automobile technology and other programmes in technical colleges.

Research Question 1
What is the effect of Simulation teaching technique on students' achievement and interest in the engine system of the motor vehicle?.

Table 1: Mean Scores of Students' Achievement and interest on Simulation Teaching Technique and Students Taught using the Conventional Teaching Technique in the Engine System of Motor Vehicle

Group	School	N	Pre-test		Post-test		Mean-gain
			$\bar{X}$	SD	$\bar{X}$	SD	
Experimental	GTC Asakio	29	16.60	3.41	32.09	2.98	15.49
Control	GTC Agwada	28	16. 50	3.40	25.50	3.43	9

Table 1 shows the pre-test and post-test mean score of students' achievement and interest in Engine System of Motor Vehicle for both treatment and control groups. Result showed that the students in the treatment group had a pre-test mean score of 16.60 with a standard (SD) deviation of 3.41 and a post-test mean score of 32.09 with SD of 2.98. The difference between the pre-test and post-test mean for the experiment group was 15.49, while the control group had a pre-test score of 16.50 with SD of 3.40 and a post-test mean score of 25.50 and SD of 3.43. This indicated that the mean score for the treatment group was higher than the control group, indicating that those taught with the simulation teaching technique performed better.

Research Question 2
What is the effect of Simulation teaching technique on students' achievement and interest in lubrication system of the motor vehicle?

Table 2: Mean Scores of Students' Achievement and interest on Simulation Teaching Technique and Students Taught using the Conventional Teaching Technique in lubricating system of the motor vehicle

Group	School	N	Pre-test		Post-test		Mean-gain
			$\overline{X}$	SD	$\overline{X}$	SD	
Experimental	GTC Asakio	29	14.21	3.49	31.85	4.48	17.64
Control	GTC Agwada	28	15. 00	3.55	23.71	3.99	8.71

Table 2 showed pre-test and post-test mean score of students' achievement and interest in lubricating system of motor vehicle for both treatment and control groups. Result showed that students in the treatment group had a pre-test mean score of 14.21 with a standard deviation of 3.49 and a post-test mean score of 31.85 with a SD of 4.48. The difference between the pre-test and post-test mean for treatment group was 17.64, while the control group had a pre-test mean score 15.00 with a standard deviation of 3.55 and a post-test mean score of 23.72 and SD of 3.99. This showed that the mean score for the treatment group is higher than the control group, indicating that those taught with the simulation teaching technique performed better.

Hypothesis 1

There is no significant difference in the mean achievement and interest of students taught engine system using simulation teaching technique and those taught using the conventional teaching techniques.

Table 3: Analysis of Covariance (ANCOVA) Showing Difference Between Students Taught Engine System using Simulation Teaching Technique and those Taught with Conventional Teaching Technique

Source	Type III Sum of Square	df	Mean Square	F	Sig.
Corrected Model	495.780	2	247.890	29.113	.000
Intercept	1022.187	1	1022.187	120.050	.000
PRE- TEST	94.637	1	94.637	11.115	.002
GROUP	448.270	1	448.270	52.647	.000
Error	417.220	54	8.515		
Total	46166.000	57			
Corrected Total	913.000	56			

significance at $\alpha \leq 0.05$

The analysis of covariance of students' achievement scores on engine system shown in Table 3 indicated that F-calculated for teaching methods in the two groups using simulation teaching technique and conventional teaching technique was 52.647 at 0.000 significant level. Therefore, the null hypothesis was not accepted.

This implied that there was significant difference in the mean scores of students taught engine system using simulation teaching technique to those taught with conventional teaching technique.

Hypothesis 2

There is no significant difference in the mean achievement and interest of students taught lubricating system using simulation teaching technique and those taught using the conventional teaching techniques.

Table 4: Analysis of Covariance (ANCOVA) Showing Difference Between Students Taught Lubricating System using Simulation Teaching Technique and those Taught with Conventional Teaching Technique

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	691.898[a]	2	345.949	19.1467	.000
Intercept	1671.541	1	1671.541	94.058	.000
PRE- TEST A	39.135	1	39.135	2.202	.144
GROUP	680.757	1	680.757	38.307	.000
Error	870.794	54	17.771		
Total	44028.000	57			
Corrected Total	1562.692	56			

significance at $\alpha \leq 0.05$

The analysis of covariance of students' achievement scores on lubricating system as shown in Table 4 indicated that F-calculated for teaching methods in the two groups using simulation teaching technique and conventional teaching was 38.307 at 0.000 significant level. Therefore, the null hypothesis was not accepted. This implied that there was significant difference in the mean scores of students taught lubricating system using simulation teaching technique to those taught with conventional teaching technique.

Discussion of Findings

The findings of the study are discussed in line with research questions and hypothesis.

Achievement and Interest in the Engine System of Motor Vehicle

The study revealed that students taught using simulation teaching technique performed better than their counterparts taught with conventional teaching technique. The trend of such performance by the treatment group was as a result of the real experience provided by the teacher which helped the students to have good mastery of engine system without much difficult than the conventional lessons. It could be as a result of excitement over the new teaching technique and handling of tools, equipment and machines. The bridging of gap from abstract knowledge to actual performance provided by the simulation technique made the students in the treatment group to perform better than those in the conventional group. Simulation Teaching Technique mode is the most

exciting since it can allow students to use computer as a tool to integrate text, sound and graphics in order to discover and generate new information.

Achievement and Interest in the Lubricating System of Motor Vehicle

The findings on this aspect of the study revealed that the treatment group taught with simulation teaching technique achieved mean score greater than the group thought with the conventional teaching technique. The findings are therefore in line with Abonyi and Ugama (2005) who maintained that when instructional approaches in teaching are poor, they will contribute to poor concept formation, achievement and interest among the students. This implies that the stimulation teaching technique is a richer instructional approach than the conventional and yielded greater achievement and interest in students than those with conventional teaching technique.\

Hypotheses 1 and 2 were all not accepted based on the findings presented in Tables 3 and 4. This was because the hypotheses table showed that there was significant difference in the achievement of students taught using simulation teaching technique against those taught using conventional teaching technique. The significant difference was influenced by the simulation teaching technique and these findings confirmed the assertion of Osagie (1997) that the poor performance of students in practical skills is traceable to the lack of simulation teaching technique. Hypothesis 5 indicated that there was no significant difference in the mean responses of male and female students on their interest in auto mechanics. This implies that both male and female students in the study area have high degree of interest in auto mechanics.

Conclusion

Sequel to the findings of the study, it is concluded that the achievement and interest of students in automobile technology was not by chance, but due to the effectiveness of simulation teaching technique as against the conventional teaching technique. Therefore, the simulation teaching technique is more effective in teaching automobile technology than the conventional teaching technique.

Recommendations

Based on the findings, discussions and conclusions, the following recommendations were made:

1. The National Board for Technical Education (NBTE) should work on effecting simulation teaching technique as a standardized guide for the implementation of blanket teaching strategy for automobile technology and other programmes in technical colleges. This will promote standardization and harmonization of programmes in technical colleges
2. Automobile technology teachers and their likes should be given on-the-job training opportunities such as seminars, workshop and short-term courses to update their knowledge as to keep them afloat with the ever-changing methods of teaching programmes of vocational technology.

3. Administrators of technical colleges should as a matter of fact procure and install what it takes to make simulation teaching technique a success as to maintain and sustain students' achievement and interest in technological courses.
4. Students should always be encouraged to participate actively in class by interacting freely with teachers and colleagues as to improve academic achievement and interest in their programme of study.
5. Grants designed for education sector should be released as expected to enable the purchase of equipment that can foster students' educational achievement and interest.

References

Abonyi, O.S. & Ugama U. I. (2003). *Instrumentation in behavioural research*: a practical approach. Enugu: Falladu Publishing Company.

Aina, O.C. (2005). Technical and vocational educational and training as a strategy for technical development of the Nigerian teacher: *A Journal of Teacher Education 1 (2)*, 36 – 41.

Chetana, H.K. (2007). Development and evaluation of an interactive multimedia simulation on electronics lab activity: Wien bridge Oscillation. Retrived October 6, 2012 from http://www.ysmou-st.com.

Federal Government of Nigeria (2013). National Policy on Education. Lagos: Nigeria Education Research and Development Council.

Ogbuanya, T.C. & Usoro, A.D. (2008). Logical sequence instructional technique on academic achievement and retention of students in technical drawing. *International Journal Of Educational Research*, 8 (1), 35 – 44.

Okoro, O.M. (2006). *Principles and methods in vocational technical education*. Nsukka: University of Trust Publishers.

Osagie, V. A. (1997). *Vocational technical education in primary school in Nigeria:* A myth or reality, 5 (1 & 2). Kaduna: NCCE Press.

National Business & Technical Examination Board (2006). Summated national technical certificate examination result for Technical Colleges 2000–2005. Benin City, Registrar's Office.

Sosnowski, D. & Gardetto, E. (2001). *Performing on-board diagnostic system checks as part of a vehicle inspection and maintenance program*, U.S. Environmental protection Agency EPA 420-01015, June 2001.