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Effects of group oriented instructional methods on technical college students' interest in auto-electricity in Niger State , Nigeria

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Abstract
This study determined the effect of collaborative and cooperative instructional methods on technical college Auto Electricity students' interest using quasi-experimental design on a sample size of 264 students which comprised of 247 males and 17 females.. *The instrument-Auto Electricity Interest Inventory was validated and the Cronbach Alpha reliability was 0.91. Data collected were analyzed using mean and ANCOVA. The findings revealed that: students taught with cooperative instructional method performed better as they have higher interest scores in Auto Electricity than students taught with collaborative method; gender had an effect in favour of males as male students had higher interest mean gain. There was no significant interaction effect of treatments given to students and their gender with respect to their mean interest scores. The findings imply that cooperative instructional method is a viable group oriented instructional method for stimulating students' interest in Auto Electricity irrespective of gender type. It is recommended that Auto Electricity teachers be trained and equipped with pedagogical skills required to effectively use cooperative instructional method in teaching.*

Keywords: *Technical College, Interest, Auto Electricity, Collaborative and cooperative instructional method.*

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Introduction

Auto Electricity work is one of the Technical and Vocational Education programme which forms a component of Motor Vehicle Mechanics Work in technical colleges in Nigeria. Auto Electricity work involves the acquisition of scientific knowledge and practical skills in the design, selection of materials, construction, operation and maintenance of electrical and electronic aspects of motor vehicles. The National Board for Technical Education (NBTE, 2001) revealed that Auto Electricity trade at the technical college level consists of the following skill areas: charging system, starting system, ignition system, generators and auxiliaries. According to NBTE (2001), Auto Electricity module in technical colleges is designed to produce competent Auto Electrical craftsmen and master craftsmen for Nigeria technological and industrial development. NBTE further stressed that Auto Electricity students are expected to upon completion of their training be able to: test, diagnose faults, service and repair any fault relating

to electrical and electronic system of a motor vehicle. Achieving all these goals however has to be through effective instructional methods.

In recent times group oriented instructional methods are being introduced into the class room to enhance teaching and learning of science subjects. Collaborative Instructional Method (COLIM) and Cooperative Instructional Method (COPIM) are two group-oriented teaching methods used to teach students team work skills. COLIM involves four to six students learning in groups and in which the teacher exercises less control over the learning activity by sitting down to watch, to ensure orderliness as the interactive group learning activity progresses from one stage to the other, based on the stated instructional objectives (Felder & Brent, 2001). COLIM creates an environment for collective interaction among students in a group as they progress from one learning activity to the other.

Cooperative instructional method (COPIM) on the other hand involves students learning in groups and in which the teacher exercises more control over the learning activity, by moving about in the classroom from one group to the other to ensure orderliness and active participation of learners as the interactive group learning activity progresses from one stage to the other based on the stated instructional objectives (Rosser, 2008). In COPIM the teacher observes, listens and intervenes in a group when necessary while in COLIM the activity is less monitored by the instructor as he redirects questions back to the group members (Melinda, 2008). When questions are directed towards the teacher, the teacher guides the students to the information needed. Research reveals that COLIM and COPIM might bring improvement in the teaching and learning of Auto Electricity component of Motor Vehicle Mechanics (MVM), to enable more students pass examinations and also to acquire the needed team work skills in maintenance and repairs of automobiles as well as stimulates interest in learning motor vehicle trade courses.

Unfortunately, recent trend analysis report from Niger State Science and Technical Education Board (NSSTEB, 2014) as well as the NABTEB chief examiners revealed poor students achievement and interest in Auto Electricity. The trend analysis of NABTEB results in the past five years (2010 to 2014) as revealed by Olatunde (2014), showed that the students performance in terms of achievement and interest in Auto Electricity component of MVM are consistently poor and less than 40%. The chief examiners report revealed the trends in performance fluctuations between 12.2%, 28.5%, 38.0%, 29.9% and 33.1% respectively, showing the overall pass rate for the past five years to be consistently poor. This implies that

over 60% of MVM students find it difficult to obtain credit pass or complete result at first sitting, thereby hindering their chances of proceeding to tertiary institution. The recent repeated failure report and the prevailing deficiency in technical knowledge and requisite team work skills among automobile craftsmen show that the goals of Auto Electricity have not been fully achieved in technical colleges and have adverse effect on students' interest in learning.

Students' interest reflects input into the subject, such as attention level in class, zeal in learning the material, perception of a course's intellectual challenge and acquired competence in the field. Interest has been recognized by researchers as a motivational factor that can influence learning and performance. Ainley, Hidi and Berndorf (2002) stated that learners interest need to be considered by educators in the field of teaching as this will create a more favorable learning environment for learners. The NABTEB report on poor students' achievement in Auto electricity is a pointer showing that students' interest in Auto is low because it is believed that high interest in a subject enhances high achievement. The low interest could be a reason for the increasing unemployment among Auto Electricity graduates in Nigeria who finds it difficult to practice their trade upon graduation. Perhaps, adoption of group-oriented instructional methods such as COLIM and COPIM that allows active students' participation may help improve students' interest in Auto Electricity for both gender (male and female).

Gender refers to the status of being male or female. It has been documented that disparity exists between male and female students performance in science and technical subjects. Apart from the NABTEB failure reports in Auto Electricity component of MVM, Ogwo and Odigiri (2013), and Rosser (2008) in separate studies on instructional methods revealed that group oriented instructional method of teaching automobile trade courses has currently gained more relevance in meeting industrial needs because it encourages collaborative effort or team work which is currently a fundamental requirement for effective performance in the automobile maintenance trade in line with global best practice. It appears as if group oriented instructional method of teaching Auto Electricity is needed if the teacher is to expose the students to the transition towards team work skills required in the modern automobile workplace. Due to the positive benefits of both COLIM and COPIM in enhancing instructional delivery, the researcher is not certain as to which is more appropriate for exposing and preparing Auto Electricity students for the team work ability needed in the modern automobile workplace. This calls for an

urgent need to study the effects of group oriented instructional methods on technical college auto electricity students' interest in Niger State, Nigeria.

Aim and Objectives of the study

The aim of this study was to determine the effects of group oriented instructional methods on technical college Auto Electricity students' interest in Niger State, Nigeria. Specifically, the objectives of the study were to determine the:

1. Effect of collaborative and cooperative instructional methods on students' interest in Auto Electricity.
2. Effect of gender on students' interest in Auto Electricity when taught with collaborative and cooperative instructional methods.

Research Questions

The following research questions were raised to guide the study:

1. What is the effect of collaborative and cooperative instructional methods on students' interest in Auto Electricity?
2. What is the effect of gender on students' interest in Auto Electricity when taught with collaborative and cooperative instructional methods?

Research Hypotheses

The following null hypotheses tested at .05 level of significance guided the study.

Ho_1: There is no significant difference in the mean interest scores of students taught Auto Electricity with collaborative instructional method and those taught with cooperative instructional method.

Ho_2: There is no significant difference in the mean interest scores of male and female students taught Auto Electricity with collaborative instructional method and those taught with cooperative instructional method.

Ho_3: There is no significant interaction effect of treatments given to students and their gender with respect to their mean interest scores in Auto Electricity.

Methodology

The study adopted the quasi-experimental research design; specifically the pre-test post-test non-equivalent control group experimental design. This study was conducted in Niger State and covered technical colleges offering Auto Electricity. The target population for this study consisted of 387 Technical College two (TC II) Auto Electricity students which comprised of 367 males and 20 females. Multi stage sampling technique involving three stages was used to arrive at the sample size of 264 which comprised of 247 males and 17 females. The experimental group A had a population of 169 students while experimental group B had a population of 95 students. Two sets of lesson plans were designed and used to teach the different experimental groups (COLIM and COPIM groups). Auto Electricity Interest Inventory (AEII) was the instrument used for data collection. The instrument as well as the lesson plan was validated by three experts in the Department of Industrial and Technology Education of the Federal University of Technology, Minna, Nigeria. A pilot study was conducted and the reliability of the instrument was found to be 0.91 using Cronbach Alpha method. Through the Statistical Package for Social Sciences (SPSS), data collected were analyzed using mean and Analysis of Covariance (ANCOVA). Mean was used to answer the research questions while ANCOVA was used to test the hypotheses at .05 level of significance.

Results

Research Question One

What is the effect of collaborative and cooperative instructional methods on students' interest in Auto Electricity?

Table 1: Pre-test and Post-test Mean Scores of Students' Mean Interest Scores in Auto Electricity in the Interest Inventory

Group	N	Pre-test $\bar{x}$	Post-test $\bar{x}$	Mean Gain $\bar{x}$
COLIM	169	1.56	2.51	0.95
COPIM	95	1.52	3.35	1.83

The result on students' interest in Table 1 revealed that the students in the treatment group taught Auto Electricity using COPIM had higher interest in Auto Electricity than students in the treatment group taught with COLIM. The positive interest mean gain of COLIM (0.95) and COPIM (1.83) shows that both COLIM and COPIM are effective for improving students'

interest in Auto Electricity but COPIM is more effective than the COLIM in stimulating students' interest in Auto Electricity.

Research Question Two

What is the effect of gender on students' interest in Auto Electricity when taught with collaborative and cooperative instructional methods?

Table 2: Pre-test and Post-test Scores of Male and Female Students Mean Interest Scores in Auto Electricity in the Interest Inventory.

Gender	Collaborative Instructional Method				Cooperative Instructional Method			
	N	Pre-test $\bar{x}$	Post-test $\bar{x}$	Mean Gain $\bar{x}$	N	Pre-test $\bar{x}$	Post-test $\bar{x}$	Mean Gain $\bar{x}$
Male	158	1.84	2.90	1.06	89	1.12	3.19	2.07
Female	11	1.08	1.50	0.42	6	1.03	2.94	1.91

Table 2 showed that male and female students taught Auto Electricity using COPIM had a higher mean gain than those taught using COLIM in the interest inventory. In both instructional methods, male students had higher mean gain in the interest inventory. The high achievement of males in Auto Electricity could be attributed to their higher interest towards Motor Vehicle Mechanics as a subject when compared to their female counterpart.

Hypotheses Testing

Ho_1: There is no significant difference in the mean interest scores of students taught Auto Electricity with collaborative instructional method and those taught with cooperative instructional method.

Ho_2: There is no significant difference in the mean interest scores of male and female students taught Auto Electricity with collaborative instructional method and those taught with cooperative instructional method.

Ho_3: There is no significant interaction effect of treatments given to students and their gender with respect to their mean interest scores in Auto Electricity.

Table 3: Summary of Analysis of Covariance (ANCOVA) for test of Significance of Three Effects: Treatments, Gender and Interaction Effects of Treatments and Gender on Students' interest in Auto Electricity

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	129.710[a]	4	32.427	177.570	.000

Intercept	74.087	1	74.087	405.694	.000
Pre-test	.162	1	.162	.887	.347
Gender	1.686	1	1.686	9.233	.003
Treatment	26.849	1	26.849	147.024	.000
Gender*Treatment	.136	1	.136	.744	.389
Error	47.298	259	.183		
Total	1262.653	264			
Corrected Total	177.008	263			

***Significant at sig of F<0.05**

From the result in Table 3, there is a significant difference between the mean interest scores of students taught Auto Electricity with COLIM and those taught with COPIM. The null hypothesis on treatments is therefore rejected at 0.05 level of significance, while the alternative hypothesis is upheld. On the hypothesis on gender, the result presented showed that, there is a significant difference in the mean interest scores of male and female students taught Auto Electricity with COLIM and those taught with COPIM. Therefore, the null hypothesis on gender effect was rejected, while the alternative form of the hypothesis is upheld. Also the result on Table 3 revealed that, there is no significant interaction effect of treatments given to students and their gender with respect to their mean interest scores in Auto Electricity. Therefore the null hypothesis for interaction effect of treatment and gender with respect to students' interest is upheld.

Findings of the Study

Based on the data collected and analyzed, the following findings were made:

1. Collaborative and cooperative instructional methods are both effective for improving students' interest in Auto Electricity. However, cooperative instructional method is more effective than the collaborative instructional method in stimulating students' interest in Auto Electricity.
2. There was an effect of gender in favour of males in the interest inventory as male students taught Auto Electricity using both instructional methods had higher mean interest scores than their female counterparts. However the male students taught Auto Electricity using cooperative instructional method had higher mean interest scores than those taught with collaborative instructional method.

3. There was a significant difference between the mean interest scores of students taught Auto Electricity with collaborative instructional method and those taught with cooperative instructional method, in favour of cooperative instructional method.
4. There was a significant difference in the mean interest scores of male and female students taught Auto Electricity with collaborative instructional method and those taught with cooperative instructional method.
5. There was no significant interaction effect of treatments given to students and their gender with respect to their mean interest scores in Auto Electricity.

Discussion of Findings

The data presented in Table 1 provided answers to research question one. The finding in this study is in agreement with the opinions of Daniel and Joanthan (2010) that carried out a study on effect of cooperative learning teaching strategy on the reduction of students' anxiety for learning Chemistry and found out that cooperative instructional method is more effective in stimulating students' interest and reduction of students' anxiety for learning Chemistry. This finding could possibly be as a result of the greater control exercise by the teacher in cooperative instructional method which promotes positive interaction and stimulate interest as the students encourage and facilitate each other's effort to achieve stated instructional objectives. This corroborate the theory of social interdependence by Morton Deutsch and Kurt Lewin which according to Martins and Fidelia (2009) is centered on the believe that learners perform better and show more interest to learn when they are allow to interact to achieve stated instructional objectives.

Similarly, Johnson and Johnson (1995) in a study on active learning discovered that, the rotation of team leader role by the teacher among students in cooperative lesson classroom stimulates students' interest a lot. As the students being eager and willing to exhibit leadership role within the cooperative study groups develops more interest towards learning. In the same vein, Ngozi and Aphonsus (2014) in a study on cooperation in college classroom revealed that students working alone may tend to delay completing assignments or skip them altogether but when they know that others are counting on them, they are interested to do the work in a timely manner.

The data presented in Table 2 provided answers to research question two. There was an effect of gender in favour of males in the interest inventory as male students taught Auto

Electricity using both instructional methods had higher mean interest scores than their female counterparts. However the male students taught Auto Electricity using cooperative instructional method had higher mean interest scores than those taught with collaborative instructional method. The findings on the interaction effect of treatment and gender on students' interest as presented in Table 3 is an indicator that both collaborative and cooperative instructional methods are not gender bias in teaching of Auto Electricity. This finding is in agreement with the findings of several other studies that have been conducted on interaction effect of gender on interest. For instance, Akanwa and Ovute (2014) in a study on the effect of constructivist teaching model on Physics students' achievement and interest affirmed that there was no significant interaction effect between male and female students' interest in Physics.

This view was reiterated by Ogundola , Popoola and Oke (2010) who in a study on the effects of constructivist instructional approach on teaching practical skills to mechanical trade students in western Nigeria technical colleges, found no significant interaction effect in students' interest in mechanical trade subjects between male and female students. Similarly, Ogbuanya and Owodunni (2013) in a study on the effects of reflective inquiry instructional technique on students' achievement and interest in radio television and electronics works in technical colleges also supported this when they revealed that gender has no significant interaction effect in the enhancing interest between male and female students.

In another view, Melinda (2008) in a study on how to construct knowledge together, attributed the periodic decline in students' interest in mechanical engineering trades at college level to poor motivation of students and inappropriateness of method of instruction which limit students' participation. The higher interest statistically displayed by male students is also in agreement with the findings of Zafran and Zawitz (1997), and Popoola (2002) who in separate studies on the effect of gender difference in education, discovered that male students displayed higher interest in mechanical engineering courses than their female counterpart. On the contrary, Onibokun (1990), Kolawole and Philips (2004) in separate studies on gender revealed that gender difference has no effect on students' interest and are of the opinion that both male and female students' have the potentials of demonstrating higher interest in science and technical related subjects. If the teacher is to expose the students to the transition towards team work ability required in the modern automobile workplace, then there is need to adopt cooperative

instructional method which researches revealed is more effective in teaching Auto Electricity in technical colleges.

Conclusion

Stimulating students' interest to learn a course or subject is a vital goal of any instructional process. If an instructional method does not stimulate students' interest to learn and acquire the needed theoretical knowledge and practical skills, then it is ineffective. It is very vital for Auto Electricity teachers to find out and adopt the most appropriate instructional method that would greatly stimulate students' interest towards better understanding of Auto Electricity. This is because interest is an important factor for attaining high achievement in any subject or course.

Recommendations

Based on the findings from this study, the following recommendations were made:

1. Auto Electricity teachers should adopt cooperative instructional method to stimulate students interest in learning Auto Electricity.
2. The National Board for Technical Education, National Business and Technical Examinations Board as well as Niger State Technical Education Board should periodically organize retraining programmes in form of workshops, seminars and conferences to update the technical teachers on the skills and procedures for teaching using cooperative instructional method.
3. At regular intervals the teachers at technical colleges should be given orientation to create awareness on the relevance and need to prepare the automobile craftsman for the world of work by adopting cooperative instructional method that teaches team work ability.
4. Cooperative instructional method should be adopted at technical teacher training programmes in tertiary institutions to prepare the teacher for cooperative teaching task needed for effective teaching and learning in schools.
5. The curriculum planners and developers should carry out curriculum improvement to capture cooperative learning activities and experiences.

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