



Effect of Constructivist Instructional Approach on Academic Performance of Motor Vehicle Mechanic Works Students in Technical Colleges of Gombe State

¹Enoch, B. E.; ²Okuta, S., ³Shehu, I. Y

¹Department of Technology Education, MAUTECH, Yola. Adamawa State, Nigeria

²Department of Automobile Technology, F.C.E (T) Gombe. Gombe State, Nigeria

³Department of Vocational and Technology Education, ATBU, Bauchi. Bauchi State, Nigeria

ABSTRACT

This study was carried out to determine the effect of constructivist instructional approach on academic performance of motor vehicle mechanic works students in technical colleges of Gombe State. Two specific objectives and corresponding research questions and null hypotheses were formulated to guide the study. The study adopted quasi-experimental research design. Specifically, Pre-test, Post-test, non-equivalent control group design. The study area was Gombe State, North East Nigeria. The population of the study was 107 NTC II Motor Vehicle Mechanic Works students. A purposive-convenient sampling technique was used to select two Government Science and Technical Colleges from the study area based on the availability of resources for the study which made them convenient. The instrument for data collection was Motor Vehicle Mechanic Works Achievement Test (MVMWAT) with forty multiple choice objective items drawn from NABTEB past extermination questions. Data collected during the research was analyzed with the help of Microsoft Excel. Mean was used to answer the research questions while z-test was used to test the hypotheses at 0.05 level of significance. Some findings of the study include that the use of constructivist instructional approach for teaching some MVMW topics improve academic performance of students. The study also found that there is a significant difference in the performance of students taught control of camshaft floats using constructivist instructional approach and those taught with lecture method. Based on the findings of the study, these recommendations were made among others: training and re-training of teachers on the use of constructivist instructional approach as an activity-based method and student-centered approach will enhance students' performance and there should be proper instructional supervision to ensure teachers employ the use of constructivist instructional approach in teaching MVMW students as it yields higher performance against the lecture method.

ARTICLE INFO

Article History

Received: March, 2019

Received in revised form: April, 2019

Accepted: May, 2019

Published online: July, 2019

INTRODUCTION

Education is considered the most effective means of bringing about total change that would ensure accelerated economic growth and national development for any country (Eric & Ludger, 2010). It is also a process of acquiring knowledge and experience for personal development and sustainability. The effectiveness of this process has always been the primary objective of the teacher and student as well as other stakeholders in education. Markus (2009) opined that the quality of any educational programme lies on its ability to transform its recipients by equipping them with practical and sellable skills. This practical skill can

best be acquired through students-centered instructional approaches in technical colleges in Nigeria. Technical colleges in Nigeria is saddled with the responsibility of training individuals that will be enterprising, well equipped with skills that will enable them to be employable or self-reliant in order to meet the 21st century workplace needs. The task of training and equipping students with the 21st century workplace basic skills in order to excel both academically and professionally requires the use of instructional approaches rooted in cognitive psychological learning theories (Wayne, 2007). Prominent among these instructional approaches is the constructivist approach.

*Corresponding author: Enoch B. E. ✉ ericborba@yahoo.com ✉ Department of Technology Education, MAUTECH, Yola. Adamawa State © 2019 Faculty of Technology Education, ATBU Bauchi. All rights reserved



According to Royles (2013), constructivism as a learning process is an approach in which learners construct new knowledge and understanding based on what they already know and believe. Royles, affirmed that learning involves mastering authentic tasks in meaningful and realistic situations because mastering enables learners build an internal illustration of knowledge based on personal illustration of experience. This will bridge the gap created by the use of conventional teaching methods such as lecture method which makes learners passive instead of active. This is a major advantage that constructivism has over the conventional teaching method. Albaoni (2010) viewed conventional teaching method as teacher centered because the teacher plays the role of transferring information and directing the students; in this situation students are passive receivers. In contrast, students are active in constructivist learning environment; they carry out the learning activities, build up their knowledge and monitor their own learning. In constructivists learning environment teacher's role is to guide the students in the learning process (Skinkyse, 2012).

Academic performance of students is the skills displayed by students after acquiring learning objectives and experience. In other words, the learning outcome obtained through assessment. The academic performance of students in Motor Vehicle Mechanic Works (MVMW) is often assessed externally by examination bodies such as National Business and Technical Examination Board (NABTEB). It has been observed that the academic performance of MVMW students is on the declined (NABTEB Chief Examiners Report, 2015-2016). International Labor Organization [ILO] (2002) attributed this scenario to the following factors: lack of facilities, poor funding and poor teaching methods which amounts to poor academic performance of students particularly motor vehicle mechanic works students. This was why Ezeugwu in Okoye (2013) decried that automobile industry in Nigeria is fraught with quack auto mechanics that while struggling to repair already diagnosed faults in cars, create more problems or even render the car perpetually irreparable. The reason is associated to their lack of requisite practical skills and training hence they often resort to trial and error approach in order to correct faults. This practice has been an issue of concern because auto mechanic graduates seem to lack the needed competence to operate their own workshops. The situation calls for the use of more

effective teaching methods in teaching motor vehicle mechanic works to technical college students in Nigeria to enable them possess workplace competencies and fit into the industry and compete favorably, among their counterparts elsewhere in the globe.

The rapid growth in technology requires the use of effective teaching and learning method in meeting the work place environmental demands. This could bridge the age long gap in technical education system and in turn produce individuals who are able to flexibly acquire, adapt, apply and transfer their knowledge creatively to various technological needs as against non-productivity in technical college graduates (Bayode, 2010). Such competencies are acquired in technical education institutions where appropriate teaching and learning methods are employed.

Technical college graduates upon graduation are supposed to have three options. These options according to the National Policy on Education (Federal Republic of Nigeria [FRN], 2013) is to either secure employment in the industries, pursue further education in advance craft in higher technical institutions or set up their own business and become self-employed. Unfortunately, despite efforts by State Governments in Nigeria to ensure qualitative education in technical colleges and ensure high quality products both in academics and employability, it is still worrisome to note that the attainment of the objectives of technical colleges still suffers setbacks. Which mean the graduates may not acquire the necessary skills needed like problem solving skills, collaborative skills and higher order thinking skills amongst others. The NABTEB Chief Examiners Report (2015-2016) reported that the academic performance of MVMW students is not encouraging. This was attributed to poor grammatical expression, poor drawing and sketching skills, inability to relate questions to practical skills; most disturbing is the use of inappropriate teaching methods by teachers. The NABTEB Chief Examiner however, calls for extensive use of modern teaching method that would expose students to effective reading habit, drawing skills and practical exercises in the workshop to enhance their ability to comprehend, retain and apply basic concepts in solving problems. Hence, the need to determine the effects of constructivist instructional approach on academic performance of motor vehicle mechanic works students in technical colleges in Gombe State.

*Corresponding author: Enoch B. E. ✉ ericborba@yahoo.com ✉ Department of Technology Education, MAUTECH, Yola. Adamawa State © 2019 Faculty of Technology Education, ATBU Bauchi. All rights reserved



Purpose of the Study

The main purpose of this study was to determine the effect of constructivist instructional approach on academic performance of motor vehicle mechanic works students in technical colleges in Gombe State. Specifically, the study sought to:

1. Determine the mean academic performance of students taught method of locking the drive gear to the camshaft using constructivist instructional approach and those taught with lecture method.
2. Determine the mean academic performance of students taught control of camshaft floats using constructivist instructional approach and those taught with lecture method.

Research Questions

The following research questions guided the study:

1. What is the mean academic performance of students taught method of locking the gear to the camshaft using constructivist instructional approach and those taught with lecture method?
2. What is the mean academic performance of students taught control of camshaft floats using constructivist instructional approach and those taught with lecture method?

Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance.

- HO1 There is no significant difference in the academic performance of students taught method of locking the drive gear to the camshaft using constructivist instructional approach and those taught with lecture method.
- HO2 There is no significant difference in the academic performance of students taught control of camshaft floats using constructivist instructional approach and those taught with lecture method.

METHODOLOGY

The study adopted quasi-experimental research design. Specifically, Pre-test, Post-test, non-equivalent and control group design. Olayiwola (2010), agrees that quasi-experimental design investigates possible cause and effect as well as

relationship between two or more variables by the application of treatment which cannot be resolved by description or observation. This informed the use of the design. Two schools were involved, one was used as control group while the other as the experimental group. The experimental and control groups were pre-tested to determine the groups equivalence at the commencement of the experiment after which treatment was given. In the experimental group, treatment was applied (constructivist instructional approach) while control group was taught using the conventional method of teaching (lecture method). Thereafter, Post-test was administered using the same pre-tested questions but at this time reshuffled to determine students' academic performance.

The study was conducted in Gombe State, Nigeria. Gombe State is located in the North-eastern part of Nigeria. The population of the study was 107 NTC II MVMW students of the seven Government Science and Technical Colleges of Gombe state. A purposive-convenient sampling technique was used to select two Government Science and Technical College from the study area with a total of 56 students. The Science and Technical Colleges were selected because of the availability of resources for the study which make them convenient. They were Government Science and Technical College Gombe and Government Science and Technical College kumo. The researcher used the entire population of NTC II MVMW students of the two schools as sample of the study because the population was manageable. Two intact classes of NTCII MVMW trade students from the two Science and Technical Colleges was used for the study. The instrument for data collection was tagged Motor Vehicle Mechanic Work Achievement Test (MVMWAT). The MVMWAT consisted of forty multiple choice objective items drawn from NABTEB past extermination questions. The test covered two topics namely: method of locking the drive gear to the camshaft and control of camshaft floats. Each correct question carried 2 marks while the total marks was 80 which was later converted to percentage for each student. The test instrument was adapted from NABTEB past MVMW examination question papers. By this, the test instrument was considered to have undergone content validation. However, the instrument was subjected to face validation by three validates: two from the Department of Technology Education, Modibbo Adama University of Technology Yola and one from department of Automobile Technology,

*Corresponding author: Enoch B. E. ✉ ericborba@yahoo.com ✉ Department of Technology Education, MAUTECH, Yola. Adamawa State © 2019 Faculty of Technology Education, ATBU Bauchi. All rights reserved



Federal College of Education (Technical) Gombe. The instrument was standard question adopted from NABTEB, therefore is reliable.

Experimental Procedure

The researchers selected lesson topics which included method of locking the drive gear to the camshaft and control of camshaft float from MVMW 2006/2007 NABTEB syllabus. The researchers designed and produced materials which included lesson plans for conventional learning and constructivist learning approach that were delivered in the colleges sampled. Arrangement of lesson plans, test instrument, teaching aids were made by the researchers and time allocation was negotiated with the teachers involved. The researchers with the help of two trained research assistants administered a pre-test to an intact class for both control and experimental group, which yielded mean of 19.30 and 20.90 respectively hence the classes were adjudged to be equivalent based on their previous knowledge. Thereafter, the experimental group was taught using constructivist instructional approach and control group using lecture method. The researchers administered a post-test to both experimental and control group using the same questions adopted from NABTEB for pre-test but

now reshuffled. Data was collected by the researchers and two other trained research assistants, one from each of the selected colleges. The process was carried out in all the selected colleges through the trained research assistants and supervised by the researchers. The researchers thereafter marked the scripts and the scores generated were used as data for the study. Data collected was analyzed with the help of Microsoft Excel (2010 version). Mean was used to answer the research questions. Z-test was used to test the hypotheses at 0.05 level of significance. Decision rule for research questions was taken in this manner: any mean scores below 40.00 was regarded as fail while mean equal or above was pass. For the hypotheses decision was based on statistical rule as follows: if the z-calculated (z-cal.) is less than z-critical (table value) the null hypothesis was accepted. Conversely, the null hypothesis was not accepted if z-calculated is greater than z-critical.

RESULTS

4.1.1 Research Question One

What is the academic performance of students taught method of locking the gear to the camshaft using constructivist instructional approach and those taught with lecture method?

Table 1: Mean Academic Performance of Students Taught Method of Locking the Gear to the Camshaft Using Constructivist Instructional Approach and those Taught with Lecture Method

Group	N	Mean	Mean Difference	Remarks
Control	26	22.69	39.31	Fail
Experimental	30	62.00		Pass

The result in table 1 shows the mean academic performance of students taught method of locking the gear to the camshaft using constructivist instructional approach and those taught with lecture method. The means are 22.69 and 62.00 respectively. This result indicates that the use of constructivist instructional approach improved academic performance of students. The study yielded a mean difference of 39.31 which is a

significant improvement from the traditional lecture method of teaching MVMW students taught method of locking the gear to the camshaft.

Research Question Two: What is the academic performance of students taught control of camshaft floats using constructivist instructional approach and those taught with lecture method?

Table 2: Mean Academic Performance of Students Taught Control of Camshaft Floats Using Constructivist Instructional Approach and those Taught with Lecture Method

Group	N	Mean	Mean Difference	Remarks
Control	26	22.31	43.02	Fail
Experimental	30	65.33		Pass

*Corresponding author: Enoch B. E. ✉ ericborba@yahoo.com ✉ Department of Technology Education, MAUTECH, Yola. Adamawa State © 2019 Faculty of Technology Education, ATBU Bauchi. All rights reserved



Result of research question two contained in table 2 above presents the mean performance of students taught control of camshaft floats using constructivist instructional approach and those taught with lecture method. The control group has a mean performance scores of 22.31 which is fail while the experimental group has 65.33 mean achievement with a mean difference of 43.02. Base on the result of students' performance, it is obvious

that constructivist instructional approach employed in the experimental group has greatly improved the achievement of MVMW trade students.

Hypothesis One: There is no significant difference in the academic performance of students taught method of locking the drive gear to the camshaft using constructivist instructional approach and those taught with lecture method.

Table 3: z-test of Academic Performance of Students Taught Method of Locking the Gear to the Camshaft Using Constructivist Instructional Approach and those Taught with Lecture Method

Group	Observation	Mean	Know variance	z-cal	z-crit	Remarks
Control	26	22.69	276.46	-9.36	±1.96	Rejected
Experimental	30	62.00	209.66			

Table 3 presents result of hypothesis one which state that there is no significant difference in the performance of students taught method of locking the drive gear to the camshaft using constructivist instructional approach and those taught with lecture method. The result of analysis has z-calculated as -9.36 which is greater than z-critical value of ±1.96 hence, the null hypothesis was rejected. This indicates that there is a significant difference in the performance of students taught

method of locking the drive gear to the camshaft using constructivist instructional approach and those taught with lecture method.

Hypothesis Two: There is no significant difference in the academic performance of students taught control of camshaft floats using constructivist instructional approach and those taught with lecture method.

Table 4: z-test of Academic Performance of Students Taught Control of Camshaft Floats Using Constructivist Instructional Approach and those Taught with Lecture Method

Group	Observation	Mean	Know variance	z-cal	z-crit	Remarks
Control	26	22.31	322.46	-10.45	±1.96	Rejected
Experimental	30	65.33	136.09			

Result of hypothesis two shown Table 4 has z-calculated as -10.45 which is greater than z-critical value of ±1.96 hence, the null hypothesis was rejected. It is therefore concluded that there is a significant difference in the performance of students taught control of camshaft floats using constructivist instructional approach and those taught with lecture method.

2. It was found that the result of students' performance that constructivist instructional approach employed in the experimental group has greatly improved the academic performance of students taught control of camshaft floats compared to those taught using the lecture method.

3. The study found that there is significant difference in the mean performance of students taught method of locking the drive gear to the camshaft using constructivist instructional approach and those taught with lecture method.

4. It was also found that there is a significant difference in the mean performance of students taught control of camshaft floats

FINDINGS OF THE STUDY

The following were findings of the study:

1. The study found that the use of constructivist instructional approach for teaching MVMW students' method of locking the gear to the camshaft improved academic performance of students when compared to lecture method.

*Corresponding author: Enoch B. E. ✉ ericborba@yahoo.com ✉ Department of Technology Education, MAUTECH, Yola. Adamawa State © 2019 Faculty of Technology Education, ATBU Bauchi. All rights reserved



using constructivist instructional approach and those taught with lecture method.

DISCUSSION OF FINDINGS

The study found that the use of constructivist instructional approach for teaching MVMW students method of locking the gear to the camshaft improve academic performance of students. This finding is in consonance with Okoha (2004) who concluded that in conventional teaching environment where the teacher does all the talking does not give the students any opportunity to think or reason out point from the instruction but rather tends to replicate the teacher's view. Karen (2002) also agrees that constructivist instructional approach makes acquisition of creative skills impossible as the students graduate half-baked with poor results.

Related to this study are the findings by Eze, Ezenwafor, and Molokwu (2015) who investigated the effect of meta-learning teaching method on the academic performance of building trades students in technical I colleges. They found that MTM improved students' academic performance in building trades and no interaction effect exists between school ownership and the two methods used. This indicates that constructivist instructional approach is a good approach for teaching MVMW students practical topics like method of locking the gear to the camshaft compared to the traditional lecture method.

On the performance academic of students taught control of camshaft floats, it was revealed that constructivist instructional approach employed in the experimental group has greatly improve the performance of MVMW trade students. This finding is in line with the findings of Shuams (2012) who stated that constructivist instructional approach of teaching improve the ability of students to synthesize, induce and deduce thereby enhancing academic performance. Novak (2001) supporting this conclusion recommends the use of suitable instructional approaches which enables students to find the connection between cause and effect as well as know how to apply theory to practice in practical-oriented learning. These instructional approaches, constructivist inclusive, help learners to overcome their academic challenges.

CONCLUSION

The main purpose of this study is to determine the effect of constructivist instructional approach on academic performance of motor vehicle

mechanic works students in technical colleges of Gombe State. Base on the findings, the study therefore concluded that constructivist instructional approach is better for teaching MVMW at technical colleges. The study clearly reveals that the constructivist instructional approach surpasses the lecture method. The findings of the study indicated that constructivist instructional approach enhances high academic achievement of MVMW students compared to the traditional lecture method.

It is concluded that constructivist instructional approach enables students to think and decide how knowledge can be applied in various situations, also provides learners the opportunity to share their views and ideas. The study findings affirmed that the growing importance of activity-based teaching approaches such as the constructivist is based on the premises that traditional lecture teaching approaches when used in teaching certain technological concepts do not yield improved academic performance. Topics such as method of locking the drive gear to the camshaft control of camshaft float, causes of crankshaft vibration and method of mounting crankshaft damper from MVMW 2006/2007 NABTEB syllabus. It is convincing that the gap on effect of constructivist instructional approach of Motor Vehicle Mechanic Work students in technical colleges is hence filled.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations have been proffered:

1. Training and re-training of teachers on the use of constructivist instructional approach as an activity-based method and student-centered which will enhance academic performance.
2. Having established the effect of constructivist instructional approach on students' academic performance in MVMW trade, it is strongly recommended that teachers should use it.
3. The school administrators should provide every needed support to teacher for the use of constructivist instructional approach as it improves the academic performance of students.
4. There should be proper instructional supervision to ensure teachers employ the use of constructivist instructional approach in teaching MVMW students as yields

*Corresponding author: Enoch B. E. ✉ ericborba@yahoo.com ✉ Department of Technology Education, MAUTECH, Yola. Adamawa State © 2019 Faculty of Technology Education, ATBU Bauchi. All rights reserved



higher performance against the lecture method.

REFERENCES

- Albaoni, T. (2010). *Lifespan Development and the Brain: The Perspective of Bio cultural and Co constructivism*. West Nyack, NY: Cambridge University Press.
- Eric, A. H. & Ludger, W. (2010). How much do educational outcomes matter to OECD countries? A paper presented at the 52nd panel meeting of Economic Policy in Rome
- Eze, T. I., Ezenwafor, J. I. & Molokwu, L. I. (2015). Effect of meta-learning teaching method on the academic performance of building trades students in technical colleges in South-east Nigeria. *International Journal of Vocational and Technical Education*, 7(10), 101-108.
- Federal Republic of Nigeria, (2013). *National Policy on Education*. Lagos: NERDC.
- International Labor Organization (ILO), (2002). Core work skills. Retrieved June 9, 2014 from <http://www.ilo.org/public/english/employment/skills/tpp/index.html>.
- Markus, M. N. (2009). The challenging demand of the 21st century: challenges to technical and vocational education. Retrieved July 4, 2017 from www.education.curtin.edu.au/er7/html.
- National Business and Technical Examination Board (2015). *May/June 2015 NTC/NBC Examination: Chief Examiner's Report*. Benin City: Fiesta Printing Press.
- Novak, G. B. (2001). Constructivism and social constructivism in career field. *Journal of Vocational Behaviors*, 64, 373-388.
- Olayiwola, A. O. (2010). *Procedures in Educational Research*. Kaduna: Hanjam Publishers. E-book Retrieved August 17, 2017. From <http://www.hrdc-drhc.gc/arb/>.
- Royles, P. L. (2013). Effective teaching methods for advancing technological world. *Journal of Innovative Practices*, 3(2), 34-41.
- Skinkyse, R. (2012). *Motor Vehicle Maintenance and Repairs*. USA: Omans Series Incorporated.
- Ukoha, U. A. (2004). Educational Media and Instruction. In Ogwo, B.A. (Ed) *Curriculum Development and Educational Technology*. Makurdi: Onairi Publishing Ltd.