



Mastery Learning Instructional Strategy And Students' Academic Achievement In Motor Vehicle Mechanics Works In Technical Colleges In Akwa Ibom State, Nigeria

Abstract

The study determined the effects of mastery learning instructional strategy on students' academic achievement in Motor Vehicle Mechanics Works in Technical Colleges in Akwa Ibom State. Two specific purposes and their corresponding research questions and hypotheses guided the study. The quasi-experimental, pre-test, post-test research design was used. The population of the study comprised 177 senior technical two students from the nine public technical colleges in the state from which 68 students (60 males and 8 females) were sampled from two intact classes using purposive and random sampling techniques. Two instruments were used namely Mastery Learning Instructional Packages (MLIP) and Motor Vehicle Mechanics Works Achievement Test (MVMWAT). The mastery learning instructional packages constituted the treatment for the experimental group while the control group was taught with the conventional lesson plans. The instruments were face validated by three lecturers from University of Uyo, Akwa Ibom State. The reliability of the MVMWAT obtained through test-retest method was 0.84. The experiment lasted for four weeks covering four lessons. The mean and standard deviation were used to answer the research questions while the hypotheses were tested using Analysis of Covariance (ANCOVA) at 0.05 level of significance. It was found that there was a significant difference between the mean post-test scores of students in the two groups in favour of the experimental group. There was no significant difference in the mean achievement scores of male and female students in Motor Vehicle Mechanics Works when exposed to Mastery Learning instructional strategy and lecture method. It is recommended, among others, that teachers of Motor Vehicle Mechanics Works in Akwa Ibom state technical colleges should henceforth adopt the mastery learning instructional strategy in conjunction with the conventional methods in teaching Motor Vehicle Mechanics Works.

Keywords: Mastery learning instructional Strategy, academic achievement, Motor Vehicle Mechanics Works, Gender.

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Date Received: 27th May, 2026

Date Accepted: 12th June, 2026

Introduction

Motor Vehicle Mechanics Works is one of the technical trade courses offered in Nigerian Technical Colleges which is

concerned with the study of the automobile, its design, construction, maintenance and repairs. The major goal of Motor Vehicle Mechanics Works

programme is to produce competent craftsmen and technicians in auto mechanics trade for Nigeria's technological and industrial development. Graduates of Motor Vehicle Mechanics Works are expected to test, diagnose, service and completely repair any fault relating to the conventional vehicles and also assemble main units and systems by following the manufacturers' specifications. Considering the importance of Motor Vehicle Mechanics Works in facilitating Nigeria's technological development, there is need for the use of appropriate teaching and learning strategies in the teaching of the subject. One of the teaching strategies that is of interest in this study is mastery learning instructional strategy.

Mastery learning instructional strategy is an instructional approach where students need to demonstrate a deep level of understanding of a topic or unit before progressing into another topic or unit. It is an instructional approach where students are allowed unlimited opportunities to demonstrate mastery of content taught. The strategy allows students to repeatedly study the course material until they master it. Mastery of each unit is shown when the student acquires competencies evident by the set pass mark of a diagnostic test (Salihu and Francis, 2018). Mastery learning strategy helps the students to acquire prerequisite skills before moving to the next unit. The teacher also is required to do task analysis and state the objectives clearly and explicitly before designating the activities.

The Mastery learning instructional strategy was developed by Benjamin Bloom and it consists of several steps which include the following: distribution of lesson content into smaller parts, formulation of objectives related to each subdivision, organization of teaching for realizing objectives of each subdivision, administering formative test to evaluate the mastery level and diagnosing the knotty areas, giving remedial instructions to remove the ambiguities and finally, attainment of mastery level by every student (Oginni, *et al*, 2021). Udo, Ovute and Udoudo (2025) pointed out that in using Mastery Learning instructional strategy, the teacher first set the acceptable mastery level for each task and then organizes a variety of individual or group-based instructional techniques to fulfil the requirements of all students. Formative assessment with regular feedback are used to diagnose the weak areas and to improve the instructional process rather than to measure achievement. Corrective assignments are also used to ensure the optimum achievement of learning objectives. Finally, at the end of each unit, criterion referenced tests are used for the evaluation of students' performance.

There are two major models of mastery learning strategies namely individualized or personalized model (also known as Keller's model) and group-based model (otherwise known as Bloom's model). Udo, Madu and Udo (2025) posited that both models adopt the same procedure except that while the

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individualized model seeks to promote mastery learning of a pre-specified set of objectives for each learner in a subject or course, the Group-Based model seeks to promote mastery learning of a unit of instruction for all members of a class or group in a subject or course. Also, both models use the system of reading and studying prepared study guides. The study guide may take different forms from print-based, to computer-based and internet-based instruction. Proctors (classmates or seniors who have successfully completed the course or an undergraduate who have been chosen for his mastery of the course content), are sometimes provided to give immediate feedback to the students and to assist them in their areas of difficulty. This study used the group based model of mastery learning for the experimental group and lecture method for the control group in order to compare the effectiveness of the two methods on the students' academic achievement in Motor Vehicle Mechanics Works.

Academic achievement refers to the learning outcomes of students which include the knowledge, skills and ideas acquired and retained through a course of study within and outside the classroom situation (Hassan, *et al*, 2021). Academic achievement is an indication of how well an individual student has done his cognitive tasks. It is an expression of the general ability of students in their subjects/ courses compared to a specified standard called "Pass Marks". Eze, et al (2016) stressed that the pass mark is

usually relative and can be arbitrarily defined as 40% or 50% and it defines whether the academic achievement is high, average or low/poor. When the score is above the pass mark, it is described as a high academic achievement while the one below the pass mark is designated as a poor academic achievement. A high academic achievement can lead to better retention of the subject matter by the students. Students' academic achievement and retention in a subject can be influenced by the students' gender.

Gender is the socially constructed differences between males and females (Iserameiyaa and Ibeneme, 2018). Studies abound on gender differences and students' achievement in science and technology subjects but their findings are conflicting. While some studies such as Iserameiyaa and Ibeneme (2018) and Nkok (2022) reported that there was no significant difference in students' academic achievement and retention in Basic technology with respect to their gender, others like Onuaha, Obionu and Njoku (2025) reported that there was significant difference between males and females in their academic achievement and retention of learning in Radio, Television and Electronic works. In view of these controversial findings, there is need for more investigation with respect to mastery learning strategy and students' academic achievement in Motor Vehicle Mechanics works.

Several studies have been conducted to examine the effects of

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mastery learning instructional strategy on students' academic achievement in many science and technology subjects such as Chemistry (Amos and Mkpa, 2023; Udo, Madu and Udo, 2025; Udo, Ovute and Udoudo, 2025), mathematics (Toheed & Ali, 2019; Oginni, *et al*, 2021), Basic technology (Iserameiyaa and Ibeneme, 2018) and Radio, Television and Electronic works (Onuaha, *et al*, 2025). However, not much work has been done with respect to Motor Vehicle Mechanics works in Akwa Ibom State technical colleges. It therefore becomes imperative to explore the efficacy or otherwise of mastery learning instructional strategy on technical college students' academic achievement in Motor Vehicle Mechanics works in Akwa Ibom State.

Statement of the Problem

Students of Motor Vehicle Mechanics works are expected to be proficient and to perform creditably in both internal and external examinations. It is however disheartening to observe that students' academic achievement and retention in MVMW in the NABTEB examinations are below expectation as indicated by chief examiners reports from examination bodies like the National Business and Technical Examinations Board (NABTEB) and West African Examinations Council (WAEC). This has been an issue of great concern to technical educators considering the relevance of MVMW to the nations' technological and industrial development. Despite much concerted efforts by teachers to improve

students learning outcomes in Motor Vehicle Mechanics Works, many students still struggle to understand and retain the concepts taught. Most researchers have attributed the poor students' achievement and retention in Motor Vehicle Mechanics works to the use of poor instructional strategies by most teachers. It is observed that the most commonly used teaching method by teachers of Motor Vehicle Mechanics works in Akwa Ibom State is the lecture method which is a teacher-centred method that does not emphasize mastery of previous lessons before going to a new one. Thus, it may not be effective in facilitating deep learning and understanding among students. On this basis, there is need to explore a new instructional strategy such as mastery learning instructional strategy.

Several studies have shown that the use of mastery learning instructional strategy considerably improve students' academic achievement, in many science and technology subjects such as Mathematics, Chemistry, Basic Science and Technology and Radio, Television and Electronic works. However, there is dearth of empirical evidences on its effectiveness in Motor Vehicle Mechanics works in Technical Colleges in Akwa Ibom State. The absence of research studies that address these issues therefore solicits a study to answer the question: What are the effects of mastery learning instructional strategy on students' academic achievement in Motor Vehicle Mechanics works in Technical Colleges in Akwa Ibom State?

Citation: Udoudo, Namkere John. "Mastery Learning Instructional Strategy And Students' Academic Achievement In Motor Vehicle Mechanics Works In Technical Colleges In Akwa Ibom State, Nigeria". *Journal of People and Worldviews (JPW)*, 2026: pp13-23.

Purpose of the Study

The main purpose of the study was to determine the effects of mastery learning instructional strategy on technical college students' achievement in Motor Vehicle Mechanics Works in Akwa Ibom State. Specifically, the study sought to achieve the following objectives:

1. to find out the difference in the mean achievement scores of students in Motor Vehicle Mechanics Works when taught using Mastery Learning instructional strategy and lecture method.
2. to ascertain the difference in the mean achievement scores of male and female students in Motor Vehicle Mechanics Works when exposed to Mastery Learning instructional strategy and lecture method

Research Questions

The following research questions guided the study:-

1. What is the difference in the mean achievement scores of students in Motor Vehicle Mechanics Works when taught using Mastery Learning instructional strategy and lecture method?
2. What is the difference between the mean achievement scores of male and female students in Motor Vehicle Mechanics Works when taught using Mastery Learning instructional strategy and lecture method?

Hypotheses: The following null hypotheses formulated to guide the study were tested at 0.05 level of significance:

HO₁: There is no significant difference in the mean achievement scores of students in Motor Vehicle Mechanics Works when taught using Mastery Learning instructional strategy and lecture method
HO₂: There is no significant difference between the mean achievement scores of male and female students in Motor Vehicle Mechanics Works when taught using Mastery Learning instructional strategy and lecture method

Research Methodology

The quasi-experimental research design, specifically, pre-test - post-test non-equivalent control group design was adopted in the study. This implies that intact classes were used for the study. This research was conducted in Akwa Ibom State which is one of the 36 states in Nigeria. The State has nine state owned technical colleges and one federal technical college. The population of the study consisted of 177 Senior Technical Two (ST 2) students offering Motor Vehicle Mechanics Works from the nine state owned Technical Colleges in Akwa Ibom State during the 2023/2024 academic session. The sample of the study consisted of 68 students (62 males and 6 females). The sample came from two intact classes in two selected Technical Colleges. Purposive sampling technique was first used to select two out of the nine technical colleges in the state.

The selection was based on schools with a higher number of ST 2 students offering Motor Vehicle Mechanics Works. Based on this criteria, two schools were purposively selected for the study. Thereafter, one intact ST 2 class with 50 students was randomly selected from one of the schools and assigned to experimental group while one intact class with 18 students was selected from the other school and randomly assigned to the control group.

Two researcher made instruments were used in the study. They were: Mastery Learning Instructional Packages (MLIP) and Motor Vehicle Mechanics Works Achievement Test (MVMWAT). The Motor Vehicle Mechanics Works Achievement Test comprised 30 multiple choice items on the relevant topics taught to the students with four options lettered A- D with only one correct answer. Each question was scored 2 points and the total score was 60 marks. The test was first used as pre-test to determine the baseline knowledge of the students in the two groups before the experiment. It was also used as post-test after the treatment and as retention test after being reshuffled after each administration. The instruments used in the study were subjected to face and content validation. The face validation was done by three research experts in the University of Uyo.

The reliability coefficient of the Motor Vehicle Mechanics Works Achievement Test (MVMWAT) was 0.89 obtained using test-retest method.

The experiment was conducted in three phases as follows: Pre-treatment phase, Treatment phase and Post treatment phase. In the pre-treatment phase, students in the selected intact classes were randomly assigned by the researcher to either of the two study groups after which they were given the pretest. In the treatment phase, four lessons were covered in four weeks as follows: Automobile lubrication system (Week 1), Water cooling system (Week 2), Automobile ignition system (Week 3) and Automobile fuel system (Week 4). The post treatment phase involved the administration of the post test immediately after the treatment. Data collected from the students were analyzed using mean and standard deviation to answer the research questions raised whereas the hypotheses formulated were tested using Analysis of Covariance (ANCOVA) at 0.05 level of significance.

Results

Research Question 1: What is the difference in the mean achievement scores of students in Motor Vehicle Mechanics Works when taught using mastery learning instructional strategy and lecture method?

Table 1: Mean Pre-test and Post-test scores of students in Motor Vehicle Mechanics Works when taught using Mastery Learning Strategy and lecture method

S/n	Group/ Method	n	Pre Test		Post Test		Mean
			X	SD	X	SD	Difference
1	Mastery Learning	50	33.84	1.24	50.68	1.73	16.84
2.	Lecture Method	18	34.50	1.25	42.44	1.22	7.94

The result in Table 1 shows that the mean pre-test and post-test scores of students in the experimental group who were taught using mastery learning were 34.50 and 50.68 respectively with standard deviations of 1.24 and 1.17. The corresponding mean pre-test and post-test scores for those in group 2 are 34.50 and 42.44 respectively with standard deviations of 1.25 and 1.22. It could be observed that students who were taught using mastery learning instructional strategy obtained a higher mean difference of 16.84 as against 7.94

obtained by those taught using lecture method.

This result suggests that teaching Motor Vehicle Mechanics Works using mastery learning instructional strategy enhances students' achievement in the subject than using the lecture method.

Research Question 2: What is the difference between the mean achievement scores of male and female students in Motor Vehicle Mechanics Works when taught using mastery learning instructional strategy and lecture method?

Table 2: Mean Pre-test and Post-test scores of male and female students in Motor Vehicle Mechanics Works when taught using Mastery Learning Strategy and Lecture method

Group/ Method	Gender	N	Pre Test		Post Test	Mean	
			X	SD	X	Difference	SD
Mastery Learning	Male	45	33.20	2.10	50.62	3.77	17.42
	Female	5	39.60	2.19	51.20	3.84	11.60
Lecture	Male	15	34.93	3.28	42.53	2.06	7.60
	Female	3	32.33	2.51	42.00	3.46	9.67

The result in Table 2 shows that the mean pre-test and post-test scores of male students in the experimental group were 33.20 and 50.62 respectively with standard deviations of 2.10 and 3.77. It

could be observed that male students in the experimental group obtained a higher mean difference of 17.42 as against 11.60 obtained by their female colleagues. Also, female students in the control group

obtained a higher mean difference of 9.67 as against 7.60 obtained by their male colleagues. This result suggests that teaching Motor Vehicle Mechanics Works using mastery learning instructional strategy enhances male students' achievement in the subject more than the female students.

Hypothesis 1 (HO₁): There is no significant difference between the mean achievement scores of students in Motor Vehicle Mechanics Works when taught

using mastery learning instructional strategy and lecture method

Hypothesis 2 (HO₂): There is no significant difference between the mean achievement scores of male and female students in Motor Vehicle Mechanics Works when taught using mastery learning instructional strategy and lecture method

Data relating to hypothesis 1 and 2 is presented in Table 5

Table 3: Analysis of Covariance test for significant difference in the mean post-test scores of students in Motor Vehicle Mechanics Works when taught with Mastery Learning Strategy and Lecture method

Source	Sum of Squares	Df	Mean Square	F	Sig.	Decision
Corrected Model	908.612	4	227.15	18.87	0.00	
Intercept	2539.07	1	2539.07	210.93	0.00	
PRESTEST	8.73	1	8.73	0.73	0.40	
GROUP	487.57	1	487.57	40.50	0.00	S
GENDER	.19	1	.19	0.016	0.90	NS
GROUP * GENDER	4.96	1	4.96	0.412	0.52	
Error	758.38	63	12.04			
Total	161620.00	68				
Corrected Total	1667.00	67				

*S = Significant at 0.05 level of significance; *NS = Not Significant at 0.05 level of significance

The data in Table 3 shows that the f-value for group or teaching method is 40.50 with p-value (probability value) being 0.00. Since the obtained p-value is less than the stipulated probability level of 0.05, it implies that the value of f is significant at 0.05 level of significance. On this basis, the null hypothesis one is rejected implying that there is significant difference between the mean post test

scores of students in Motor Vehicle Mechanics Works when taught using mastery learning instructional strategy and lecture method.

Table 3 shows that the f-value for gender is 0.016 with p-value (probability value) being 0.90. Since the obtained p-value is greater than the stipulated probability level of 0.05, it implies that the value of f is not significant at 0.05 level of

significance. On this basis, the null hypothesis is accepted implying that there is no significant difference in the mean achievement scores of male and female students in Motor Vehicle Mechanics Works when exposed to mastery learning instructional strategy and lecture method.

Findings of the Study

The following findings were made in the study

- i. There was a significant difference between the mean post test scores of students in Motor Vehicle Mechanics Works when taught using mastery learning instructional strategy and lecture method.
- ii. There was no significant difference in the mean achievement scores of male and female students in Motor Vehicle Mechanics Works when exposed to mastery learning instructional strategy and lecture method.

Discussion of Findings

In the study, it was found that students taught Motor Vehicle Mechanics Works using mastery learning instructional strategy performed better than those taught using lecture method. Testing of the corresponding hypothesis confirmed that there was significant difference between the mean post test scores of students in the two groups. The difference was in favour of those in the experimental group who were taught using mastery learning instructional strategy. This result could be attributed to the fact that mastery learning instructional strategy enables students to

understand a unit of instruction very well before proceeding to the next unit. This finding agrees with that of Amos and Mkpa (2023) and Udo, Madu and Udo (2025) who in their separate studies found that mastery learning strategy enhance students' academic achievement more than the lecture method.

It was also found in the study that there is no significant difference in male and female students' mean achievement scores in Motor Vehicle Mechanics Works when taught using Mastery Learning strategy and lecture method. This finding support that of Onuaha, Obionu and Njoku, (2025) who found that there is no significant difference in students' achievement in Radio and Television works when taught using Mastery Learning and lecture method. The present finding however contradicted that of Amos and Mkpa (2023) who reported that male students performed better than their female counterparts in Chemistry when taught using the mastery learning strategy.

Conclusion

Based on the findings of the study, it is concluded that teaching Motor Vehicle Mechanics Works using mastery learning instructional strategy enhances students' academic achievement better than using the lecture method. Also, the Mastery Learning strategy is gender friendly as it does not favour one gender than the other.

Recommendations

The following recommendations are made based on the findings of the study.

- i. Teachers of Motor Vehicle Mechanics Works in Akwa Ibom state technical colleges should henceforth adopt the mastery learning instructional strategy in teaching Motor Vehicle Mechanics Works
- ii. Motor Vehicle Mechanics Works teachers should de-emphasize the use of the traditional methods of teaching.
- iii. The Akwa Ibom State Technical Schools Board and the National Board for Technical Education should recommend Mastery learning instructional strategy as one of the instructional strategies for teaching Motor Vehicle Mechanics Works in order to improve students' achievement and retention in the subject.

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