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**EFFECTS OF MODELLING AND COACHING INSTRUCTIONAL STRATEGIES ON ACHIEVEMENTS AND INTEREST OF GENERAL METALWORK STUDENTS IN KADUNA STATE, NIGERIA.**

**JOLLY CHARLES NAIRI, I Y UMAR, IBRAHIM DAUDA, MUSA GARBA, APPOLLOS SIMON & EMMANUEL JOSEPH TUKURA**

*Nuhu Bamali Polytechnic Zaria, Departments of Technical Education.*

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**ABSTRACT**

*The study investigated the Effect of Modeling and Coaching instructional strategy on achievement and interest of General metalwork students in Kaduna state. The study adopted quasi experimental research design of pretest, posttest and non-group design. The population of the study comprises of 171 NTC II students offering General metalwork in two technical colleges in Kaduna state for 2018/2019 session, the total population was used for the study. The instrument used for data collection were General Metalwork Achievement Test (GMWAT) and General Metalwork Interest Inventory (GMWII). The GMWAT was validated by test developer in National Business and Technical Examination Board with the addition of three validate, that validate the (GMWAT) and (GMWII). A trial testing of the two sets of instruments was carried using 30 randomly selected on TC II students of Government Technical Minna, Niger state. Kuder Richardson 21 (KR 21) was used for the General Metalwork Achievement Test (GMWAT) and a coefficient of 0.71 was obtained. On the other hand, Cronbach Alpha reliability technique was used for obtaining the internal consistency of the General Metalwork Interest Inventory (GMWII) instrument and a coefficient of 0.94 was obtained. The data collected were analyzed using mean while the hypotheses were tested using Analysis of Covariance (ANCOVA) at  $p < 0.05$  level of significant. The findings of the study reveals that, all the instructional strategies modeling and coaching significantly increased academic achievement; interest and retention of learning of the students but the group that were taught with modelling instructional strategy had the highest achievements. Based on the findings, the study therefore recommended among others things that more attention should be given to inclusion of modern instructional strategies such as*

*modelling and coaching in technical colleges in teaching Technical and vocational trade subject such as General metalwork.*

**Keywords:** *Modelling, Coaching, Achievements, Metalwork*

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## INTRODUCTION

### Background to the Study

Metalwork trade is among the skilled subject studied in technical colleges, and it is a course offered by all mechanical engineering related trade. Metalwork trade programme in technical colleges involve the application of basic scientific knowledge in the design, selection of materials, construction, operation of machines and fabrication of metal products. "It is a mechanical trade offered as general metalwork in Nigeria Technical Colleges", [ Federal Republic of Nigeria (FRN 2013)]. According to National Board for Technical Education NBTE (2013) "General metalwork trade programme/training in Nigerian technical college education was planned to produce craftsmen and master craftsmen who should be competent and skillful to carryout fabrication and machining of metal products and services". [National Business and Technical Examination Board (NABTEB) (2006)] The goals of metalwork according to (N B T E 2001) includes: To introduce the trainee to the physical properties of metals and outline manufacturing processes as related to ferrous and non-ferrous metals, Provide the trainee with the basic knowledge to maintain and describe various types of instrument used in metalwork, their various function, their grade, applications and state the safety precautions to be observed,

Regrettably the performance of metalwork students appears unsatisfactory, as graduate of this programme cannot display their practical skills of metalwork trade, Ogbuanya and Usoro (2009) noted that at graduation most of technical students are deficient of employability skills, work place skills, and job generation competencies. Egwu (2009) also asserted that, good technicians are difficult to come by in Nigeria, expatriates working in the country bring in their manpower from abroad due to dearth of competent skill personnel. The National Business and Technical Education Board (NABTEB) reported poor performance of students in metalwork trade courses (Chief Examiner's Report, 2016). This is at a time when new innovations, developments and sophisticated metalwork equipment are being used for construction.

Issues like this has become a cause of worry to all stakeholders in education and has led to many researches. Aina (2004), states that high failure rates in main

trade subjects in technical colleges have been associated with factors like: quality and quantity of teaching facilities and techniques". "the traditional teaching methods adopted by most teachers in teaching metalwork in technical colleges do not allow teachers to adequately cater for the diverse learning styles of most students" (Neekpoa, 2007). the traditional apprenticeship methods have some of its shorts coming. However, an important corollary of apprenticeship is that learning is situated in the actual subculture in which the student is involved, making it easier for the student to transfer knowledge to the real world. Oriol and etal (2010) states that Cognitive apprenticeship differs from traditional apprenticeship learning in that it focuses on the development of cognitive and metacognitive knowledge rather than the development of physical skills. When apprenticeship learning is applied to the development of cognitive skills, it requires that thinking processes that often remain implicit become explicit.

Accordingly, the use of cognitive apprenticeship as a framework for presenting complex concepts and applications provides a venue where (the expert) and student (the apprentice) collaborate and interact in a virtual setting, actively supporting the progressive process of learning (Ding, 2005).

Six teaching strategies are adopted from the cognitive apprenticeship framework to support students in the development of strategic thinking to learn, acquire and apply complex concepts in the environment. Modelling, Coaching, Scaffolding, Reflection, Articulation, Exploration. This research work is tied to the use of Modeling and coaching instructional strategies.

Smith (2005) defined modelling as "performing a mental task in front of students in such a way that they are able to observe the processes needed to perform it and thus form a conceptual model of their own." The researcher view modelling as an instructional strategy in which the teacher illustrate a new concept or approach to learning and students learn by observing what the teacher has done. Some features of modelling are teaching for understanding which,students are directly involved and invested in the discovery of their own knowledge.

Coaching according to Jervela (2003)" is the process of helping a student work through an activity". Coaching as instructional strategy, is one of the many techniques used by the teacher in guiding an expert to assist the (learner) for meaningful learning. Enkenberg, (2001) "also sees coaching as the monitoring of student's activities, assisting and supporting them where necessary in their academic work". Coaching have some characteristics such as its gives every conversation their full attention, its help creates a coaching culture. its help learners develop themselves.

The goal of effective teaching strategy is to enhance academic achievement and skill acquisition. Achievement is quantified by a measure of the student's academic standing in relation to those of other students of his age (Anne, 2005). Students' achievement connotes academic performance in school subject as symbolized by a score or mark on an achievement test. Poroye (1981) and Atherson (2003) contended that students' achievement in teaching and learning is determined by several factors among which are teachers' attitude and enthusiasm, instructional methods, learning environment as well as students' attitude and background. Teachers with good teaching techniques challenge students to improve their knowledge and thinking towards the trade so as to develop their interest in the study.

Therefore, to facilitate teaching and learning in metalwork, interest of the students is also a relevant factor. According to Osuafor (2001), the affective disposition of a student has direct relevance to his/her interest in learning. Osuafor further stressed that interest is that attraction which forces or compels a student to respond to a particular stimulus. Therefore, interest is an affective behaviour that can be aroused and sustained in teaching and learning of metalwork through appropriate teaching strategy. Modelling and Coaching instructional strategies may facilitate students interest in both practical and theoretical aspect of metalwork as a subject in technical college.

### **Statement of the Research Problem**

There is a great concern over the apparent low performance of technical college graduates, most especially those of metalwork Trade who cannot cope with the world of work. Technical college graduates have prospects of either being employed in the industries or setup their own metal workshop and become self-employed (FRN 2013). However, contrary to achieving the above goal, Bakare (2012) confirmed that most graduates often cause more damage to metal components, items or work contracted to them. Ogwo (2004) noted the pitiable situation where in Technical and Vocational Education and training (TVET), technical college products are neither good in liberal education nor technically skillful. This decline in students' performance has been associated to number of factors, among which is the method employed in imparting knowledge to the learners by the teacher (Raymond, 2013, in Ibrahim 2016). NABTEB (2016) chief examiner's report observed that there is decline over the years in the performance of the students in National Technical Certificate (NTC) examination in recent years, this poor performance of students particularly in metalwork has

negative effects on the number of qualified skilled and self-reliant graduates of the programme.

### **Aim and Objectives of the Study**

The main aim of this study is to determine the effects of modelling and coaching strategies on the achievements and interest of general metalwork students in technical colleges. Specifically, the objectives of the study are to determine:

1. Effects of modelling and coaching strategies on students' achievement in general metalwork.
2. What are the effects of gender on students' achievements when taught general metalwork using modelling and coaching strategies?

### **Research Questions 1**

The following research questions were formulated to guide the study:

1. What is the effect of modelling and coaching strategies on students' achievements in general metalwork?
2. What are the effects of gender on students' achievements when taught general metalwork using modelling and coaching strategies?

### **Hypotheses**

The following null hypotheses were tested at 0.05 level of significance;

**H<sub>01</sub>:** There is no significant difference in the achievement of students taught general metalwork with modelling and coaching strategies.

**H<sub>02</sub>:** There is no significant difference on the effect of gender on students' achievement in general metalwork.

### **Design of the Study**

The study adopted quasi-experimental design. Specifically, the pre-test, post-test, non-equivalent control group design was used. The experimental treatments of group one and two start with pre-test observation which is common to both groups, then treatments of the various groups using modelling and coaching instructional strategy then posttest observation which is common to both.

E<sub>1</sub>: O<sub>1</sub> X<sub>1</sub> O<sub>2</sub>

E<sub>2</sub>: O<sub>1</sub> X<sub>2</sub> O<sub>2</sub>

The study was carried out in Kaduna State, two among the five were randomly sampled and used for the study, Government Technical college malali and Government Technical college kajuru. The population for this study comprised

all 171 second year students (TC II) offering general metalwork in the two Technical Colleges in Kaduna State.

The two technical colleges consist of 156 boys and 15 girls in TC II that are offering General metalwork. The instruments for data collection was a General Metalwork Achievement Test (GMWAT) and General Metalwork Interest Inventory (GMWII). The General metalwork interest inventory, the items are based on four points scale worded as follows: Strongly Agree (SA) 4 points, agree (A) 3 points, disagreed (D) 2 points, Strongly Disagreed (SD) 1point,

The General metalwork achievement test (GMWAT) has been validated by the National Business and Technical Examination Board, On the other hand, the interest inventory (GMWII), General metalwork achievements test (GMWAT) items and lesson plan was face validated by three experts. The three validates were from the Departments of Education Technical Kaduna polytechnic, the expert's correction and the suggestion was used to produce the final copy of the instrument.

A trial testing of the two sets of instruments was carried out using 30 randomly selected TC II students from Government Technical College(GTC) Minna. The choice of G.T.C Minna for the trial testing is because it is not part of the study area, but uses the same entry qualification and same National Board for Technical Education (NBTE) curriculum and also Niger state is close to the study area and believe to have the similar characteristics. For the purpose of ascertaining the internal consistencies of the instruments, Kuder Richardson 21 (K-R21) was used for General Metalwork Achievement Test, (GMWAT) is a multiple choice item in which the items were dichotomously scored. General Metalwork Achievement Test, (GMWAT) had a coefficient of 0.71.

The GMWAT was administered using test-retest reliability technique. On the other hand, Cronbach Alpha reliability technique was used for obtaining the internal consistency of the General Metalwork Interest Inventory (GMWII) was 0.94.

The experimental instructional materials for this study consisted of six weeks' instructional units in metalwork Trade which the student were taught with. The second phase On the fourth week of the study, achievement post-test was administered to generate post-test data of the study.

The data collected from the pre-test and post-test on the instruments (Achievement test and interest inventory) was used in answering the research questions and testing the null hypotheses at 0.05 level of significance.

Meanwhile, the null Hypotheses formulated for the study was tested at 0.05 level of significance using Analysis of Covariance (ANCOVA). f value and probability

level  $p$  at 0.05 level was used for decision when  $f \leq p$  at 0.05 the hypothesis was rejected, when  $f \geq p$  at 0.05 the hypothesis was accepted SPSS Version (23) was used.

## Results and Discussion

### Research Question 1

What is the effect of modelling and coaching strategies on student's achievements in general metalwork?

#### Mean of Pre-test and Post-Test Scores of Modelling and Coaching Instructional Strategies on students Achievement Test in General Metalwork.

Treatments	N	Pre-Test	Post-Test	Mean Gain
Modelling	110	6.718	10.66	3.945
Coaching	61	6.393	8.869	2.476

The result presented on the Table above revealed the achievement score mean of students taught General metalwork using the instructional strategies. Data on modelling strategy had achievement scores (pre-test 6.718 and post-test 10.66) with achievement difference of mean gain 3.945. Data on coaching instructional strategy had achievement scores (pre-test 6.393 and post-test 8.8689) with achievement difference of mean gain 2.476. From these results each instructional strategy indicated significant increase of academic achievement of the students, modelling instructional strategy had the highest achievements score. Therefore, modelling instructional strategy is much efficient than coaching instructional strategy in improving students' achievements in General metalwork.

### Research Question 2

What is the effects of gender on student's achievements when taught general metalwork using modelling and coaching strategies?

#### Pre-Test and Post-Test Achievements Mean score of Male and Female Students Taught General Metalwork Using Modelling and Coaching Instructional Strategies.

Treatments	Gender	N	Pre-Test	Post-Test	Mean Gain
Modelling	Male	100	6.530	10.46	3.93
	Female	10	8.600	12.70	4.1

Coaching	Male	56	6.375	8.912	2.536
	Female	5	6.600	8.400	1.8

Results presented on the Table above reveals that Data on modelling instructional strategy had achievement scores Males (pre-test 6.530 and post-test 10.46) with achievement difference of 3.93, females (pre-test 8.600 and post-test 12.70) with mean difference of 4.1. Students taught General metalwork using coaching instructional strategy had a pre-test mean of 6.3934 and a post-test mean of 8.8689, with a mean gain of 2.476. achievement scores of males (pre-test 6.375 and post-test 8.912) with achievement difference of 2.5357, females (pre-test 6.600 and post-test 8.400) with achievement difference of 1.8. From these results, each instructional strategy indicates a significant increase in academic achievement of both gender in General metalwork trade, thus there exist an effect related to sex type on achievements of students taught General metalwork trade using Modelling and Coaching Instructional strategies.

### Null Hypothesis One and Two

**Ho<sub>1</sub>:** There is no significant difference in the achievement of students taught general metalwork with modelling and coaching strategies.

**Ho<sub>3</sub>:** There is no significant difference on the effect of gender on students' achievement in general metalwork.

### ANCOVA for Treatment, Gender and Interaction on students' performance in General metalwork

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	973.656 <sup>a</sup>	4	243.414	101.973	.000
Intercept	326.377	1	326.377	136.728	.000
Pre-Test	800.443	1	800.443	335.327	.000
Treatments	50.951	1	50.951	21.345	.000
Gender	.045	1	.045	.019	.891
Treatments * Gender	4.818	1	4.818	2.018	.157
Error	396.251	166	2.387		
Total	18550.000	171			



Corrected Total 1369.906

170

The result presented above shows that F- computed figure for treatments, gender as well as achievements score of students in General metalwork, The F-computed figure from the experiments is 21.35 with a value of F at 0.000 which is below 0.05. The outcome shows that there is significant difference in the mean scores of students taught General metalwork with modelling and coaching instructional strategies, the intelligent guess was thus not upheld at 0.05 alpha.

F- calculated value for gender is 0.91 with a statistical value of P at 0.89 that is greater than 0.05. The results reveals that there exists a difference in the achievements mean score of male and female students taught General metalwork using modelling and coaching instructional strategies. The null hypothesis therefore, is accepted at 0.05.

### **Discussion of the Research findings**

The study on the effect of modelling and coaching instructional strategies on student's cognitive attainment shows that modelling and coaching is effective in improving students' achievements in General metalwork, but modelling is higher than coaching effects. The results reveal students taught with modelling instructional strategy had greater posttest mean than coaching. ANCOVA was used to test the hypothesis one, the outcome shows that there is significant difference in the mean scores of students taught General metalwork with modelling and coaching instructional strategies, which confirms to the study of Wells, David & Gregg (2009) modelling instructional strategy move students systematically through all phases of model development, evaluation, and application in concrete situations thus developing skill and insight in the procedural aspects of scientific knowledge, Objective evidence shows that the modeling method produce much larger gains in student understanding than alternative methods of instruction. In addition, Jane, David & Larry (2007) Data on some 20,000 students show that those who have been through the Modeling instructional strategy program typically achieve twice the gains on a standard test of conceptual understanding as students than those taught with conventionally methods. Further, the Modelling method is successful with students who have not traditionally done well in physics. Experienced modelers report increased enrollments in physics classes, parental satisfaction, and enhanced achievement in college courses across the curriculum.

The findings of this study on research question showed that the two instructional strategies significantly increased academic achievement of both gender while

males and females in modelling instructional strategy are almost the same while the males performed slightly higher than their females' counterpart in General metalwork achievement test with the use of coaching instructional strategy. Onabanjo (2000) conducted a study with senior secondary school students in problem-solving activity and found that male students excel over females both in achievement and the acquisition of problem solving skills. Therefore, differences in the attitude of students to cooperative learning strategies and to technical education in relation to gender stereotypes should be expected.

For the interaction effect, comparing Group Gender, the F-calculated (F-cal) value of 0.19 and the p-value is 0.89 which is greater than 0.05 level of significance shows that there is no significant interaction effect of the treatment given to students and their gender with respect to mean ratings in studying General metalwork trade.

The study of Okebukola (1999) revealed that there was no significant difference in achievement between male and female students in cooperative, competitive and individualistic learning groups. It was further found that mixed sex groups for intrinsic or extrinsic rewards were better motivated than other groups and they performed better than all male and all female groups. In addition, the findings of this study conform with that of Ogwo (1999) who conducted a study on the effects of meta-learning instructional strategies on student achievement in metal-work technology and reported that male students had slightly higher mean scores than the female, which was not considered significant.

### **Conclusion**

The research reveals that modelling instructional strategy has much effects in increasing students' achievements in General metalwork than coaching instructional strategy, the research shows that gender difference has no effects on students' knowledge and achievements in General metalwork, this signifies the two are not gender bias.

### **Recommendations**

The following recommendations were made:

1. Modelling and Coaching instructional strategies should be used by metalwork teachers for knowledge delivery and skill acquisition in technical colleges.
2. The teachers of General metalwork in technical colleges should be made to undergo an in-service training in the effective use of interactive

instructional strategies such as modelling and coaching for efficient performance in skill acquisition.

3. The government at federal and state levels should ensure adequate and relevant instructional materials and facilities for effective use on modelling and coaching instructional strategies for teaching General metalwork.

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