Activity-Based Instructional Approach for Improving Academic Achievement and Interest of Metalwork Technology Students in Technical Colleges in Lagos State

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***Abstract*- The study focused on activity based instructional approach for improving academic achievement and interest of metalwork technology students in technical colleges in Lagos State. A quasi-experimental design was employed with the population of 150 Technical Colleges National Technical Certificate (NTC) Two students. Purposeful sampling technique was used to select two intact classes for sample size of 104, made up of Activity Based Instructional Group of 42 students and conventional Teaching Group of 62 students respectively, which consists of metalwork technology students from the two Technical Colleges. Structured instruments were Metalwork Technology Academic Achievement Test (MTAAT) and Metalwork Technology Interest Inventory (MTII) and consist of 30 multiple choice items with four options drawn from general metalwork module. The reliability co efficient of MTAAT obtained 0.89 using Test-retest and Cronbach Alpha was used to determine the internal consistency of MTII items which yielded the rehabilitee co efficient of 0.81. Two research questions and two hypotheses were formulated respectively. Data obtained from administration of instruments were analyzed using mean and standard deviation to answer the two research questions while Analysis of Covariance (ANCOVA) statistics was used to test the two hypotheses at 0.05 significant differences. The study revealed that the activity-based instructional approach is more effective in improving academic achievement and stimulating students' interest than conventional teaching method. The study also found that there is no significant difference between the post-test academic achievement of students taught metalwork technology using activity-based instructional approach and conventional teaching method and recommendation were made.**

***Keywords*- Academic Achievement, Activity-Based Instructional Approach, Interest, Technical Colleges.**

INTRODUCTION

Metalwork technology is one of the vocational education trades/subjects studied in the technical colleges. It is aimed in studying practical skills and competencies in trade-related areas which include sheet metalwork, forging and foundry, machine shop practice, welding and fabrication among others. The curriculum designed for the technical colleges is to meet requirements necessary to prepare students for employment, self-reliance and business enterprising. The activity based instructional approach {ABIA} is learning approach in which students actively participate in the learning process. In activity based instructional approach, learning activities are based on real life experience. It also helps the students to build mental models to achieve higher – level performance such as application problem-solving and the transfer of information and skills. This may be an important issue in the course of metalwork trade, where it is necessary to transfer and apply information in related fields of chemistry and physics The Federal Ministry of Education (2013) in her report on technical colleges revealed that students in technical colleges are always put-off or not been interested in metalwork technology because of lack of motivating and unchallenging method and approach used by their teachers or instructors.

According to Masimula, Oloyede & Kelly (2020) posed that teachers who are not creative enough are less likely to embark on proper lesson preparations and may also overlook the use of learning experience as the starting point of their teaching. The affective disposition of a student has direct relevance to his interest in learning. This implies, interest is that attraction which forces or compel students to respond to a particular stimulus. It means, interest is affective behaviour that can be aroused and sustain in teaching and learning through the activity based instructional approach. Ibeako, Zokagwa & Hillary (2019) defined metalwork teachers as teachers who studied and specialized on metalwork technology discipline in higher institutions. Metalwork technology teachers focus more on the interest which is described as a social construction developing within the dynamic relationship between the individual and situation. Students' interest in activity based instructional approach is associated with students' anxiety to learn.

The frequent poor performance of most students is fundamentally related to the use of ineffective teaching methods by teacher of the technical colleges to impact knowledge to the students.

Arikpo, Aede, Ogumbe & Otu (2020) assumed that the training of metalwork trade students in technical colleges is very theoretical. Consequently, graduates avoid employment that may be required to demonstrate their practical skills. This is due to the fact that students were not exposed to activity-based skills during their learning activities in technical colleges. These gaps resulted in ill-equipped technical college graduates of metalwork technology who have remained unemployed. The effectiveness of activity based instructional approach indicates that the quality of teaching is often reflected by the achievement and interest of the students. Jenkins (2022) contend that achievement is dependent upon several factors among which are instructional methods, the learning and the students. The use of activity based instructional approach in metalwork technology classroom interaction needs teacher to have interactive instructional materials in metalwork lesson to be taught that could improve students' academic achievement and interest.

Statement of the problem

In spite of the huge investment by successive Nigerian government on technical colleges programme aimed at improving the academic achievement and interest of metalwork technology students. Poor academic achievement of Student is a major problem to the skills acquisition development. It is observed that science and technology education have recorded poor academic achievement of students in various technical courses at external examinations. In view of these deteriorating trends in the performance of metalwork technology students there is need for urgent attention in addressing these challenges.

These challenges are posing serious concern and there is need to save the situation but if these issues are not properly addressed it will come to a stage where metalwork technology will be of no value, seeing that their products are being rejected in the industries, higher institutions of learning, labour market, and are neither self-employable. Poor academic achievement in Metal Work technology could be attributed to the teacher's teaching strategy, lack of interest, instructional facilities among others.

Diraso. Abdullahi & Olive (2021) opined that the mastery of metalwork concepts might not be fully achieved without the use of instructional materials and activity-based teaching approach. This implies that teaching of metalwork technology without the use of instructional materials may certainly result in poor academic performance of the students. The professionally competent technical teachers, no matter how skilfully and well trained, would not be able to put his ideas into practice if the technical college setting lacks the functional tools, equipment and necessary instructional materials and activity-based teaching method for him or her to translate his competence into reality.

The teaching approach currently used in technical colleges are based on the behavioral learning theories basically content oriented, not Activity-based instructional approach. It is a known fact that the behavioural learning does not give students the opportunities to participate in the classroom instruction. These methods are inadequate to prepare the students for challenges of the workforce. The graduates of technical colleges are seen roaming the streets without a job because their quality of training received is inadequate for social needs. Students taught with teaching methods based on the behavioral theories are unable to neither retain their learning nor apply their knowledge to new situations resulting into poor academic achievement cited on the ineffective teaching methods by their teachers. Therefore, this paper intends to critically examine activity based instructional approach for improving academic achievement and interest of metalwork technology Procedure for Paper

Purpose of the study

The main purpose of the study is to examine activity based instructional approach for improving academic achievement and interest of metalwork technology students in technical colleges in Lagos State. Specifically, the study sought to:

i. Determine the mean difference of the pre-test and post-test scores on academic achievement and interest taught metal metalwork technology using Activity-based instructional approach in Technical Colleges in Lagos State.

ii. Determine the mean difference of pre-test and post-test scores on Academic achievement and interest of students taught metalwork technology using Activity-based teaching approach and those taught using conventional teaching method in technical colleges in Lagos State.

Research questions

i. What is the mean difference in pre-test and post-test scores of students' taught metalwork technology using Activity-based instructional approach in Technical Colleges in Lagos State?

ii. What is the mean difference of the pre-test and post-test scores on academic achievement and interest of students taught metalwork technology using activity-based instructional approach and those taught using conventional teaching method in Technical Colleges?

Research Hypothesis

i. There is no significant difference in the pre-test and post-test scores on students' taught metalwork technology using activity-based instructional approach in Technical Colleges in Lagos State.

ii. There is no significant difference of pre-test and post-test scores on academic achievement and interest of students' taught metalwork technology using activity-based instructional approach and those taught using conventional method in Technical Colleges in Lagos State.

METHODOLOGY

The research design of the study is a quasi-experimental design which involves a pre-test, post-test, control and non-equivalent group design. Using technical colleges in Lagos State. The target population size is 150, a purposive sampling technique was employed and the sample size of 42 students using activity based instructional approach and 62 student using conventional teaching methods from two technical colleges out of six State technical colleges in Lagos State. The instruments for data collection in this study were Metalwork Technology Academic Achievement Test (MTAAT) and Metalwork Technology Interest Inventory (MTII) consist of 30 multiple choice items with four options drawn from general metalwork module. The MTAAT and MIIT were validated by three experts from the department of Industrial Technical Education, Tai Solarin University of Education, Ijagun Ogun State. The instruments were trial tested on NTC Two metalwork technology students of Government Technical College Ayetoro Yewa. A research assistant was trained on how to administered the instruments, so as to control variability in the instructional procedure in the study. The reliability co efficient of MTAAT obtained was 0.89 using Test re test, which is very reliable for the purpose of the study while. Cronbach Alpha was used to determine the internal consistency of MTII items. The reliability coefficient computed for the MTII was 0.81. The instrument was administered and data were collected by the researcher with aid of research assistants. The research questions were answered using mean, standard deviation while analysis of covariance (ANCOVA) was used test the hypotheses.

RESULTS

Research Questions One

What is the mean difference in pre-test and post-test scores of students' taught metalwork technology using Activity-based instructional approach in Technical Colleges in Lagos State?

Table 1: *Mean scores of Students' taught metalwork technology using activity based instructional approach.*

Activity–based Instructional Approach	N	X	SD	Mean Difference
Pre-test	42	14.36	6.87	51.28
Post-test		65.64	6.05	

Table 1 shows that 42 students taught metalwork technology using activity-based teaching method had a mean score 14.36 in the pre-test and a mean score of. 65.64 making a pre-test, post-test mean difference in activity based instructional approach to be 51.28. With these results, the activity –based instructional approach is more effective in improving students' academic achievement in metalwork technology.

Research Questions Two

What is the mean difference of the pre-test and post-test scores on academic achievement and interest of students taught metalwork technology using activity-based instructional approach and those taught using conventional teaching method in Technical Colleges?

Table 2: *Mean and Standard Deviation on Academic Achievement and interest of students Taught metalwork technology Using Activity-Based instructional approach and conventional teaching method*

		Pre-test		Post-test		
	N	X	SD	X	SD	Mean Difference
Activity–based Instructional Approach	42	14.36	6.87	65.64	6.05	51.28
Conventional Teaching Method	62	12.89	5.09	8.34	6.02	4.55

Table 2 presented the mean difference of the students taught metalwork technology using activity-based instructional approach and those taught using conventional teaching method. Pre-test of the activity-based instructional approach is 14.36 while the pre-test of the conventional teaching methods is 12.89 their pre-test mean difference is 1.47 which is very significant before the use of the treatment. While the post-test mean score of the activity-based instructional approach group 65.64 and that of conventional teaching method group is 8.34 with a mean difference of 57.3. This implies that the activity-based instructional approach is more effective than conventional teaching methods in a way of improving that academic achievement and interest of metalwork technology students in technical colleges in Lagos State.

Research Hypothesis One

There is no significant difference in the pre-test and post-test scores on students' taught metalwork technology using activity-based instructional approach in Technical Colleges in Lagos State.

Table 3: *T-test scores of students when taught metalwork technology using activity based instructional approach*.

Techniques	N	X	SD	df	T	Sig(p)
Pre-Test Activity–based Instructional Approach	42	14.36	6.89	45	-	0.000
Post-Test Conventional Teaching Method	42	65.64	6.05	45	36.82	

The result in Table 3 shows that there was a significant difference between the pre-test and post-test mean scores of the students taught metalwork using activity based instructional approach {t (42, 45) = n-36.282, p<0.05}. This means that the null hypotheses of no significant difference were rejected.

Research Hypothesis Two

There is no significant difference of pre-test and post-test scores on academic achievement and interest of students' taught metalwork technology using activity-based instructional approach and those taught using conventional method in Technical Colleges in Lagos State.

Table 4: *ANCOVA of students' academic achievement and interest when taught metalwork technology using activity-based instructional approach and conventional teaching methods.*

Source	Type III	Df	F	Sig	p
Corrected model	11268.664	2			
Intercept	24271.618	1	115.164	.000	.651
Pret	54.374	1	466.980	.000	.762
Temods	1024.051	1	1.833	.157	.031
Error	2270.081	72	319.512	.000	.725
Total	280573.00	75			
Corrected Total	27345.871	76			

a. R Squared = .651 (Adjusted R Squared = .725)

The result in Table 3 shows that there was a significant effect of teaching methods on students' academic achievement {F (1, 83) = 319.512, p< 0.05} with a large difference size (partial eta squared = 0.762). This means that null hypothesis was rejected.

FINDINGS OF THE STUDY

The results of the findings for study showed that there was higher improvement in the academic achievement of students in the experimental group in their post-test mean result. The activity-based instructional approach on metalwork technology students in technical colleges shows that their post-test mean performance is 65.64 which revealed that the experimental group performed excellently well in their academic achievement.

The students that were taught metalwork technology using conventional teaching method had a mean score 47.72 which implies that academic achievement could be rated as below average. The result of their pre-test mean score showed that the students scored 31.42 when deducted, the mean score is 16.90, This implies that the conventional teaching method has very low effect on the metalwork technology students' academic achievement.

The results obtained when the students mean scores were compared showed that at their post-test stage, students taught with activity instructional teaching approach obtained a mean score of 75.23 compared with their counterparts in the conventional teaching method group could only had a mean score of 26.56, this indicated that, the activity-based instructional approach is more effective in improving the academic achievement of metalwork technology students.

DISCUSSION OF RESULTS

Research question one revealed the mean score difference of the pre-test and post-test scores of students taught in metalwork technology using activity-based instructional approach in technical colleges in Lagos State where their mean score difference result showed that there was a significant difference of 46.92 in the performance of the students taught metalwork technology using activity based instructional approach. These findings agree with Bede & Haslinda (2012) who observed that to produce trained manpower in technology and be equipped with knowledge in craft, advance craft, with technical knowledge and vocational skills that are necessary for individual who shall be self-reliance in contemporary Nigeria. These individuals or students should be exposed to activity-based practice. It proved that the effect of activity based instructional approach is significantly higher than the use of the conventional teaching method.

With these findings, the use activity based instructional approach by teachers of technical colleges in their teaching will improve more on achievement, interest and retention among students. The findings are also in line with Genevieve, Rian & Portia (2020) who observed that the government science and technology policies have aimed at boosting the interest and performance as well as improving experiential learning such as activity based instructional approach that promotes acquisition of practical skills by providing opportunities for students to work cooperatively and collaboratively.

These findings with regard to research question three revealed that the students taught metalwork technology using conventional teaching method performed below average. The students scored 15.32 in their pre-test mean score, while they scored 26.56 in their post-test result. This result indicates very poor performance without any serious or little effect when compared with activity based instructional approach. This finding is in consonance with Diraso, Abdullahi & Olive (2021) who stated that many technical teachers abandoned the conventional teaching method of executing lessons, partly through demonstration or laboratory work-experience on account of non-existence and non-availability of teaching resources such as workshop tools, materials, equipment among others.

The result of finding with reference to research question three also indicates that the students' academic achievement of students in the experimental group and control group showed that when compared, the experimental group recorded higher improvement in performance. By implication, the activity based instructional approach is better than conventional teaching method. This finding agrees with Ndubisi (2016) who concluded that the discovery strategy and workshop strategy were utilized in improving the students' performance cooperative which are activity based.

The findings with regard to the hypotheses revealed that there was a significance difference in the pre-test and post-test mean scores of the both the activity based instructional approach and conventional teaching method but however, there was a greater and more excellent significant difference in the mean scores of performances of the students taught metalwork trade using activity based instructional approach, this imply that activity based instructional approach has a better advantage in the improvement of the students' academic achievement. The findings are in agreement with Susan (2015) found out that digital instructional method are more effective on mathematics students to be highly significant when compared with same student under tutorial technique.

RECOMMENDATIONS

The following recommendations were made based on the findings;

1. Activity based instructional approach should be applied in classroom situation as a way of improving their teaching strategy
2. Teaching strategy encourages active participation in practical works and adequate funding should be provided
3. Regular seminar, workshop and conference should be organised for teachers in upgrading their strategy
4. The activity-based instructional approach should be adopted by metalwork technology teachers in their teaching to increase academic achievement, interest and motivate the learning styles of the students in their classrooms, and enhance their academic performance and sustainability.
5. Availability of teaching resources for the metalwork technology teachers to demonstrate and perform the basic practical in metalwork technology to the students in technical colleges to perform better in their academics and employable skills.
6. Training on the activity-based instructional approach using innovative technology to enable them to be able to impact the knowledge and thereby by arousing, motivating and sustaining the achievement and interest of the students in metalwork technology.
7. Technical colleges through the Lagos State Vocational and Technical Education Board (LASVEB) should obtain material, tools and equipment that are not available in the workshops for classroom use to enable the students acquire practical skills in metalwork technology.

CONCLUSION

The study examined the effectiveness activity based instructional approach for improving the students' academic achievement and interest in metalwork technology. The findings indicate that the respondents agreed that improving strategies for teaching and learning of metalwork technology. It was shown that there is a significant effect of using activity based instructional approach on students' academic achievement and interest in metalwork technology. It is therefore recommended that a workshop strategy or activity based instructional approach is better than conventional teaching method for better academic achievement attainment and interest of metalwork technology students in technical colleges.

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