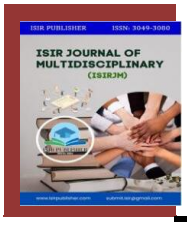

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CONSTRUCTION OF MINI-LATHE MACHINE TO ENHANCE TEACHING AND LEARNING OF WOODWORK TECHNOLOGY IN FEDERAL COLLEGE OF EDUCATION TECHNICAL, EKIADOLOR, EDO STATE.

By

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Abstract

The study examined the construction of mini-lathe machine to enhance teaching and learning of woodwork technology in federal college of education technical, ekiadolor, Edo state. The need for this arose from the inadequacy of modern instructional equipment in technical institutions, which has negatively limits students' hands-on experience, and overall learning outcomes in woodwork technology. Three research questions guided the study and three hypotheses were formulated and tested at 0.05 level of significance. The study adopted research and development (R&D) design and incorporating quasi-experimental research design precisely non-equivalent control group design. The population of the study was all the 26 NCE II students of woodwork technology in FCET, Ekiadolor. Purposive sampling technique was used due to the manageable size of the population. The instrument for data collection was the Lathe Operations in Woodwork technology Achievement Test (LOWAT), which was subjected to face and content validity by three experts. The instrument was subjected to test retest reliability technique and a reliability coefficient was calculated using Crombach Alpha. The data collected were analyzed. Mean and standard deviation were used to answer the research questions and analysis of covariance (ANCOVA) was used to test the hypothesis at 0.05 level of significance. The instrument was administered to 10 NCE II students purposively sampled for tryout basis in FCET, Asaba on two consecutive times in two weeks using classes A and B as control and experimental groups respectively. The findings of the study revealed that students get motivated when they have equipment to work with, particularly when taught lathe operations for wood processing and machining in woodwork technology, their performance also was improved. It was concluded that, fabricated woodwork mini-lathe was apt to enhance teaching and learning in woodwork technology and it recommended that technical institution authorities should sort out ways of training teachers/instructors in technical crafts on how to produce more functional instructional materials to enhance achievement of their students.

Keywords: *College of Education Technical, Lathe machine, woodwork mini-lathe and woodwork technology*

INTRODUCTION

Background of the Study

In addressing issues in woodwork technology, one will not hesitate to talk about its origin, which is Technical, Vocational Education and Training (TVET). Momoh as cited by Okoye and Arimonu (2016), stated that TVET is a form of education whose primary purpose is to prepare persons for employment in recognized occupations. The concept of technical, vocational education and training is used as an all-embracing term in the educational process involving, in addition to general education, the study of technologies and related sciences and acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life (FGN, 2014). TVET, unlike apprenticeship, is studied in schools and the benefactors are equipped with not just skills but with the related sciences and arts of such skills. It is studied in

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technical colleges, Universities of Education, Polytechnics and Colleges of Education Technical.

Colleges of Education Technical are tertiary institutions, where the students are expected to study and at the same time acquire skills that will make them self-reliant, in order to also boast the economy of the nation. Colleges of Education Technical prepare and equip students with skills in woodwork technology amongst other careers. The growing demand for well-trained craftsmen by industries and also the need to produce technical and vocational education graduates with requisite skills to make them self-reliant by being self-employed, employers of labour and also add to the development of a nation have made researchers and policy makers to evaluate the effectiveness of these technical subjects `which woodwork technology is an integral part with regards to functional equipment and infrastructure in Nigeria to ensure quality education and training. Colleges of education can be owned by any of the following; private individual, non-governmental organization, state government or the federal government and can exist either as conventional college of education or college of education technical. Federal college of education technical (FCET) as planned by the federal government originally is to house necessary requirement for the effective running of technical courses like building technology, electrical/electronic technology and installation works, metal work operations, automobile technology, woodwork technology etcetera, such infrastructures include well-equipped workshops, constant electricity for the operation of power tools, amongst others.

Woodwork technology is one of the careers in colleges of education technical whose primary purpose is to prepare individual recipient as a woodwork technology teacher or for employment in recognized building construction firms or to establish woodwork workshop where they can be employer of labour. Woodwork technology is a psychomotor type of course and its method of teaching should include engagement, demonstration, role play and hands on instructional approach for functional teaching and learning and the required equipment put in place. National Board for Technical Education (NBTE 2007) noted that the goal of woodwork technology is to produce competent hands with job knowledge and practical skills for a successful career in carpentry and joinery, while the Objectives are stated as follows; a product of woodwork technology should be able to: Understand the general and specific techniques in woodwork Construct and erect different types of roof model, Draw and interpret constructional drawings, Apply portable hand and machine tools to process wood and wood products, Design and construct floor, wall, and stair framings, including ladders and scaffolds, Construct and install Doors, Windows, Partitions and Cabinets, and Work as a skilled Carpenter, either in Self-employment or in paid employment.

In studying woodwork technology, the required equipment and tools must be put in place and ascertained to be functional. The most frequent and easy part of woodwork technology seem to be the furniture making, which entails the act of turning operations for a finished and aesthetic job, and all these processes are performed with a multi-purpose machine called the lathe.

A lathe is a machine tool used mainly to shape metal or wood, which earned it the name two machines, one for wood, and one for metal. According to Kumar (2021), lathe is a machine tool used to remove metals from a work piece to give a desired shape and size. He added that they are used in metal working, wood turning, metal spinning, thermal spraying, glass working and parts reclamation. Lathe differ from other machines in that they rotate the work piece, while other tools are fixed to the receiving end (stock) of the lathe to work on the spinning work piece to either cut, shape, sand, drill, knurl or reamed, the job is done one after the other as the tools need to be changed to suit the required operation. There are varieties of lathe among which are wood lathe, the woodwork mini-lathe is a locally improvised version of a lathe which is prepared with locally sorted materials, majorly woods and few fixtures that will still do the turning work but in smaller chunks. It consists of several components including the headstock, tailstock, carriage, and bed (Saif, 2014). The headstock houses the spindle and drive mechanism, the tailstock provides support for the work piece during turning operations, while the carriage is responsible for moving the cutting tool along the work piece, and the bed provides a rigid support for the entire machine. It has a live center to hold the far end of the piece, and to steady the piece when held in a chuck (Kumar 2021). Tools for the lathe can be of carbon steel tungsten carbide, and high speed steel.

A comprehensive theoretical study on the classification of lathe machines explains their versatility and functional applications in manufacturing and education, highlighting how different types from engine lathes to bench lathes are used to achieve specific machining tasks depending on design and capability (Ahmmed, 2025). Lathe operates by rotating the work piece around a stationary cutting tool. The main aim is to remove unnecessary parts of the material, leaving behind a nicely formed work piece. The process of working on a lathe is called turning; this is because the work turns round in the chuck. According to Saif (2014), the wood work mini lathe is used to teach woodwork students of the following operations; cutting, shaping, reaming, sanding and so on. In order to satisfactorily attain the objectives of woodwork technology as stated in the NBTE curriculum, functional equipment and facilities must be put in place to encourage student's participation arising from intrinsic interest. Research in Nigeria has shown that the introduction of fabricated woodwork mini-lathes into technical institutions workshops positively influences student achievement in woodwork technology skills, indicating the pedagogical value of accessible, hands-on machining tools in technical education (Vareba & Igweagbara, 2022). The availability of facilities and equipment will go a long way in facilitating the students to quick and better understanding, while the teachers are encouraged to bring in their best in instructional delivery. According to Bassey & Ajie, (2024), integrating practical tools such as mini-lathe machines into teaching frameworks is supported by contemporary educational research that

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emphasizes the importance of experiential learning and technology integration in vocational training to improve student engagement and comprehension of mechanical concepts. According to Akinola & Owolabi (2018), the use of local materials in machine fabrication encourages innovation, enhances students' understanding of machine components, and promotes indigenous technological development. In addition, locally constructed machines can be adapted to suit specific instructional needs and workshop conditions. Hence, the construction of mini-lathe machine to enhance teaching and learning of woodwork technology in federal college of education technical, Ekiadolor, Edo State.

Statement of the Problem

Woodwork Technology is a practical-oriented trade that requires adequate workshop facilities and functional machines to enable effective teaching and learning. One of the essential machines for skill development in woodwork is the lathe machine. Despite its importance, many technical institutions in Nigeria lack sufficient and functional wood-turning machines for instructional purposes.

Presently in Nigeria, the high cost of procuring standard industrial lathe machines and the challenge of maintaining them under limited institutional budgets have continued to hinder effective hands-on training, and productivity in the industry. In most cases, available lathe machines are obsolete, non-functional, too expensive to maintain, or inadequate in number to cater for large class sizes. This situation forces instructors to rely heavily on theoretical teaching with limited hands-on demonstrations, thereby reducing students' hands-on experience and mastery of wood-turning skills.

Therefore, there is a need to design and construct a cost-effective, functional, and locally maintainable mini lathe machine that can be used as an instructional tool to enhance the teaching and learning of Woodwork Technology trade in colleges of education technical.

Purpose of the Study

The main purpose of this study is the construction of mini lathe machine to enhance teaching and learning of Woodwork Technology in Federal College of Education Technical (FCET), Ekiadolor, Edo State. Specifically, the study investigates the extent to which;

1. fabricated wood work mini-lathe enhance students' achievement in turning operations in (FCET), Ekiadolor?
2. fabricated wood work mini-lathe enhance students' achievement in sanding operations in (FCET), Ekiadolor?
3. fabricated wood work mini-lathe enhance students' achievement in reaming operations in (FCET), Ekiadolor?

Research Questions

1. To what extent does fabricated wood work mini-lathe enhance students' achievement in turning operations in (FCET), Ekiadolor?
2. To what extent does fabricated wood work mini-lathe on students' achievement in sanding operations in (FCET), Ekiadolor?
3. To what extent does fabricated wood work mini-lathe on students' achievement in reaming in (FCET), Ekiadolor?

Hypotheses

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

H_O1: There is no significant difference between the achievement mean scores of students taught turning operations using fabricated woodwork mini-lathe and those thought turning with flip chart in (FCET), Ekiadolor.

H_O2: There is no significant difference between the achievements mean scores of students taught sanding operation using fabricated woodwork mini lathe and those taught sanding with flip chart in (FCET), Ekiadolor.

H_O3: There is no significant difference between the achievements mean scores of students taught reaming using teacher fabricated woodwork mini lathe and those taught reaming with flip chart in (FCET), Ekiadolor.

Significance of the Study

This study will be of immense benefit to the following: the students of woodwork technology, lecturers and instructors of woodwork technology, the industries, policy makers and the society as a whole.

The findings will be of immense benefit to the students of woodwork technology craft in colleges of education technical, in the sense that it will help them understand the mode of operation of a lathe ahead of employment time, improve their practical skills in the activities of woodwork technology requiring a lathe. It will enable the students develop interest in woodwork technology, and enhance their performance, The students will also learn the fabrication process along with their lecturers/instructors so as they can produce and work with it for smaller jobs.

To lecturers and instructors in colleges of education technical, it will make ease the delivery of their lessons and improve the effectiveness, they will also have a reliable and activity based instructional material and capture full attention of their students.

The industries will benefit immensely because, as they will not be spending money to train and retrain employees on the usage of lathe, and they will be having a lot of skilled people for employment instead of spending much money in the hire of expatriates.

The policy makers on the other part will benefit by revisiting and restructuring the woodwork technology curriculum to be more functional without expecting the government to provide equipment like lathe which does all turning jobs involving wood, also students will be graduating with enough skills to better their lot.

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The society will benefit by way of improving the economy. This is because, the government can then channel the money meant for buying conventional lathe to other pressing needs in academic institutions, graduates will be self-employed thereby not depending on the government.

METHODOLOGY

Research Design

The study adopted research and development (R&D) which incooperated Quasi-Experimental research design, this is because Quasi- experimental design involved the use of pre-test and post-test design with experimental and control groups (Ogundu, 2011). The Quasi-experimental design was used since it was impossible for the researcher to randomly sample the students without disrupting the classes, hence the classes were intact.

Population for the Study

The population of the study comprised of 26 NCE II woodwork technology students in the federal college of education technical (FCET), Ekliadolor. NCE II students were used because NCE II wood processing and machine woodworking is in their curriculum, of which lathe operation is an integral part (This is not captured in NCE I & III)

Sample and Sampling Techniques

The sample size for this study was all 26 NCE II woodwork technology students in FCET, Ekiadolor. The study adopted a purposive sampling technique because the size is manageable. Black in Wordu (2021) sees it as one in which the researcher relies on his or her own judgment when choosing members of population in the study.

Instrument for Data Collection

The instrument for data collection was the Lathe Operations in woodwork technology Achievement Test (LOWAT) developed by the researcher. The researcher, in developing the LOWAT, prepared two lesson plans (one for the control group and another for the experimental group) to guide the development of the test items.This was used to test for the students' achievement in woodwork technology with woodwork mini-lathe as instructional material to teach the students turning operations, reaming operations and sanding operations.

The LOWAT contained 100 multiple choice items with test divided into part A and part B. pert A was used as pretest and part B was used as posttest. Items in the LOWAT were drawn from the NERDC curriculum for NCE II.

Validation of the Instrument

The researcher subjected the instrument (LOWAT) for the study to both face and content validation. The instrument was validated by a three (3) lecturers, two (2) are of the department of Industrial Technical Education and one (1) from the department of measurement and evaluation, all at the University of Benin. They checked and made some observations which the researcher used to modify and qualify and worthy of use of the instrument.

Reliability of the instruments

The test re-test method was used to establish the reliability of the instrument. The LOWAT test items were administered on 10 NCE II woodwork technology students in federal college of education technical, Asaba, who were not part of the study sample on two different occations. The reliability coefficient was calculated using Crombach Alpha and the reliability coefficient of 0.72 was obtained.

Developmental Procedures

1. Intimating the lectures/instructors: A 5-days woodwork technology lecturers and instructors' marathon training on the fabrication and use woodwork mini lathe in FCET, Ekiadolor.
2. Lectures/instructors: The researcher was assisted by the lecturers and instructors in fabricating woodwork mini lathe.
3. Experimental Condition: The regular lecturers in the department taught their own students to avoid bias in the experimental and control groups. The researcher did interfere.
4. Experimental and control group students were not given prior informed prior to the. Concealing the information made the students to act naturally as to prevent influence that might make the process bias.
5. Experimental group students were only exposed to the fabricated woodwork mini lathe.
6. Pre-test and post-test exercises were conducted on both groups.
7. The experiment lasted for 4 weeks

Experimental Procedure

Materials and Tools Used

The materials used for the construction of the mini lathe machine were selected based on availability, affordability, durability, and suitability for instructional use. They include mild steel, angle iron, shaft, bearings, pulleys, V-belt, electric motor, bolts and nuts, hard wood, and protective covers. The tools used include a welding machine, drilling machine, grinding machine, measuring tape, spanners, hacksaw, and other workshop hand tools.

Design Specification of the Mini-Lathe Machine

The mini lathe machine was designed to perform basic wood-turning operations required for instructional purposes. The design specifications considered include machine size, speed range, power requirement, safety features, and ease of operation. The major components of the machine include the bed, headstock, tailstock, tool rest, electric motor, and power transmission system. The design was done to ensure stability, safety, and effective demonstration of wood-turning operations.

Fabrication Procedure

The fabrication of the mini lathe machine involved the following steps:

1. fabrication of the machine bed using hard wood to provide a rigid base.

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2. fabrication of the machine frame using mild steel to provide a rigid support.
3. construction and installation of the headstock to house the spindle and bearings.
4. fabrication of the tailstock to support the work piece during turning operations.
5. installation of the electric motor and power transmission system using pulleys and V-belt;
6. fabrication and mounting of the tool rest for holding cutting tools;
7. Final assembly, alignment, and finishing of the machine components.

Testing and Evaluation of the Fabricated Mini Lathe Machine

After construction, the mini lathe machine was tested to determine its functionality and performance. The machine was used to carry out basic wood-turning operations such as facing, sanding, tapering, and cylindrical turning. The smoothness of operation, stability of the machine, quality of the turned work piece, and safety of operation were observed and recorded.

Methods of Data Analysis

The data for the study was analyzed using mean and standard deviation and analysis of covariance. The mean and standard deviation were used to analyze the result of the research questions. The null hypotheses were tested using ANCOVA at 0.05 level of significance.

RESULTS

Research Question 1: To what extent does fabricated wood work mini-lathe enhance students' achievement in turning operations in (FCET), Ekiadolor?

Table 1: Pretest and Post Test Means Scores of Fabricated WoodWork Mini-Lathe to Enhance Students' Achievement in Turning Operations.

Groups	No	Pre-test		Post-test		Mean difference	Mean gain
		$\bar{X}$	SD	$\bar{X}$	SD		
Experimental	20	8.83	2.05	15.50	4.00	6.67	3.07
Control	6	9.04	2.02	12.64	2.20	3.6	

Source: Field work 2026.

Table 1 shows the pre-test and post-test mean score of students' achievement of both experimental and control groups on turning operations in FCET, Ekiadolor. The results shows that the students in the experimental group of 20 students had a pre-test mean score of 8.83 with a standard deviation of 2.05 and a post-test mean score of 15.50 with a standard deviation of 4.00. The difference between the pre-test and posttest mean for the experiment group was 6.67. The control group of 6 students had a pre-test mean score of 9.04 with a standard deviation of 2.20 and a post-test mean score of 12.64 and a standard deviation of 2.20; giving the mean gain as 3.07. This results show that the mean score for the experimental group is higher than the control group, indicating that those taught with the fabricated woodwork mini-lathe has greater achievement..

Research Question 2: To what extent does fabricated woodwork mini-lathe on students' achievement in sanding operations in (FCET), Ekiadolor, Benin?

Table 2: Pretest and Post Test Means Scores of Fabricated WoodWork Mini-Lathe to Enhance Students' Achievement in Sanding Operations.

Groups	No	Pre-test		Post-test		Mean difference	Mean gain
		$\bar{X}$	SD	$\bar{X}$	SD		
Experimental	20	9.01	1.78	14.00	1.55	4.99	2.84
Control	6	8.01	1.50	5.86	1.17	2.15	

Source: Field work 2026.

Table 2 shows the pre-test and post-test mean score of students' achievement of both experimental and control groups on sanding operations in FCET, Ekiadolor. The results shows that the students in the experimental group having a number of 20 students had a pre-test mean score of 9.01 with a standard deviation of 1.78 and a post-test mean score of 14.00 with a standard deviation of 1.55. The difference between the pre-test and posttest mean for the experiment group was 4.99. The control group of 6 students had a pre-test mean score of 8.01 with a standard deviation of 1.50 and a post-test mean score of 5.86 and a standard deviation of 1.17; and having a mean gain of 2.84. This results show that the mean score for the experimental group is higher than the control group, indicating that those taught with the fabricated woodwork mini-lathe achieved more in performance.

Research Question 3: To what extent does fabricated wood work mini-lathe on students' achievement in reaming in (FCET), Ekiadolor?

Table 3: Pretest and Post Test Means Scores of Fabricated WoodWork Mini-Lathe to Enhance Students' Achievement in Reaming Operations.

Groups	No	Pre-test		Post-test		Mean difference	Mean gain
		$\bar{X}$	SD	$\bar{X}$	SD		

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Experimental	20	7.16	2.39	15.02	3.14	7.6	1.92
Control	6	9.31	2.20	14.99	2.51	5.68	

Source: Field work 2026.

Table 3 shows the pre-test and post-test mean score of students' achievement of both experimental and control groups on reaming operations in FCET, Ekiadolor. The results shows that the students in the experimental group with number of students 20 which had a pre-test mean score of 7.16 with a standard deviation of 2.39 and a post-test mean score of 15.02 with a standard deviation of 3.14. The difference between the pre-test and posttest mean for the experiment group was 7.6. The control group with 6 students, had a pre-test mean score of 9.31 with a standard deviation of 2.20 and a post-test mean score of 14.99 and a standard deviation of 2.51; giving the mean gain as 1.92. This results show that the mean score for the experimental group is higher than the control group, indicating that those taught with the fabricated woodwork mini-lathe performed better.

Test of Hypotheses:

H_{O1}: There is no significant difference between the achievement mean scores of students taught turning operations using fabricated woodwork mini-lathe and those thought turning with flip chart in (FCET), Ekiadolor.

Table 4: The Analysis of Covariance (ANCOVA) Between Students Taught Turning Operations Using Fabricated Woodwork Mini-Lathe and Those Taught Turning With Demonstration Teaching Approach.

Source	Type III sum of squares	df	Mean Square	F	Sig
Corrected Model	17427.722[a]	2	8713.861	13.167	.000
Intercept	105512.685	1	105512.685	159.438	.000
Postest1	117.320	1	117.320	.177	.676
Group	17262.576	1	17262.576	26.085	.000
Error	31103.658	47	661.780		
Total	7299725.000	26			
Corrected Total	48531.380	25			

a. R Squared = .359 (Adjusted R Squared = .332)

Table 4 above is the result of the analysis of covariance on students taught turning operations using teacher fabricated woodwork mini-lathe and those taught turning with demonstration teaching approach. The result showed that f-calculated ratio in the two groups is 26.085 at 0.000 significant level. It therefore implies that the null hypothesis is rejected since the significant value (P) is less than .05 (P <.05). Thus, there is a significant difference in the mean scores of students taught turning operations using fabricated woodwork mini-lathe and those taught turning with flip chart.

$H0_2$: There is no significant difference between the achievements mean scores of students taught sanding operation using fabricated woodwork mini lathe and those taught sanding with flip chart in (FCET), Ekiadolor.

Table 5: The Analysis of Covariance (ANCOVA) Between Students Taught Sanding Operations Using Fabricated Woodwork Mini-Lathe and Those Taught Sanding With Demonstration Teaching Approach.

Source	Type III sum of squares	Df	Mean Square	F	Sig
Corrected Model	5498.584[a]	2	2749.292	49.112	.000
Intercept	36548.571	1	36548.571	652.892	.000
Postest1	.075	1	.075	.001	.971
Group	5451.202	1	5451.202	97.379	.000
Error	2631.036	47	55.979		
Total	2545233.000	26			
Corrected Total	8129.620	25			

a. R Squared = .676 (Adjusted R Squared = .663)

Table 5 above is the result of the analysis of covariance on students taught sanding operations using teacher fabricated woodwork mini-lathe and those taught sanding with demonstration teaching approach. The result showed that f-calculated ratio in the two groups is 97.379 at 0.000 significant level. It therefore implies that the null hypothesis is rejected since the significant value (P) is less than .05 (P <.05). Thus, there is a significant difference in the mean scores of students taught sanding operations using teacher fabricated woodwork mini-lathe and those taught sanding with flip chart.

H_{O3}: There is no significant difference between the achievements mean scores of students taught reaming using teacher fabricated woodwork mini lathe and those taught reaming with flip chart in (FCET), Ekiadolor.

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Table 6: The Analysis of Covariance (ANCOVA) Between Students Taught Reaming Operations Using Fabricated Woodwork Mini-Lathe and Those Taught Reaming With Demonstration Teaching Approach.

Source	Type III sum of squares	Df	Mean Square	F	Sig
Corrected Model	4748.755[a]	2	2374.378	5.362	.008
Intercept	111603.474	1	111603.474	252.045	.000
Postest1	267.866	1	267.866	.605	.441
Group	4085.989	1	4085.989	9.228	.004
Error	20811.245	47	442.792		
Total	5791968.000	26			
Corrected Total	25560.000	25			

a. R Squared = .186 (Adjusted R Squared = .151

Table 6 above is the result of the analysis of covariance on students taught reaming operations using teacher fabricated woodwork mini-lathe and those taught reaming with demonstration teaching approach. The result showed that f-calculated ratio in the two groups is 9.228 at 0.004 significant level. It therefore implies that the null hypothesis is rejected since the significant value (P) is less than .05 (P <.05). Thus, there is a significant difference in the mean scores of students taught reaming operations using teacher fabricated woodwork mini-lathe and those taught reaming with flip chart.

Discussion of Findings

Research question one dealt extent to which fabricated woodwork mini-lathe enhance students' achievement in sanding operations in (FCET), Ekiadolor. The findings of the study revealed that the students taught turning operations with fabricated wood work mini lathe had higher mean scores in the post Lathe Operations in woodwork technology Achievement Test (LOWAT) than those taught turning operation using flipchart (demonstration method). The findings of the study also revealed that there is a significant difference in the mean scores of students taught turning operations using fabricated woodwork mini-lathe and those taught turning with flipchart. The finding of the study is in harmony with Obodo, Ani & Mfon, (2020) who agreed that students taught using improvised teaching-learning materials performed better than students taught without improvised teaching-learning materials.

Based on the data analyzed, the study revealed in research question two that students taught sanding operations with fabricated woodwork mini lathe had higher mean scores in the post Lathe Operations in Carpentry and Joinery Craft Achievement Test (LOWAT) than those taught sanding using flipchart. The findings of the study also revealed that there is a significant difference in the mean scores of students taught sanding operations using teacher fabricated woodwork mini-lathe and those taught using flipchart. The findings of the study is in agreement with Kabir, Abdullahi & Alhassan, (2020) whose findings also showed that improvised injection molding model is effective in improving students' psychomotor achievement in metalwork, but the impact of improvised injection molding in improving students' psychomotor achievement in carpentry and joinery craft is higher than lecture method.

Also revealed from analysis, research question 3 showed that students taught reaming operations with fabricated wood work mini lathe had higher mean scores in the post Lathe Operations in Carpentry and Joinery Craft Achievement Test (LOWAT) than those taught reaming using flipchart. In addition, the findings of the study revealed that there is a significant difference in the mean scores of students taught reaming operations using teacher fabricated woodwork mini-lathe and those taught reaming with flipchart. The finding of the study is in harmony with the assertion of Makarfi (2014) who maintained that the use of instructional materials such as tools, equipment, machines both real and improvised as well as consumables makes learning of wood work practical projects more meaningful to the students, develop students' ability in some cognitive skills in woodwork, materials arranged in a logical and systematic way assist in the understanding of practical project Knowledge, skills or abilities are developed in woodwork practical projects and veneering to cabinet finishing through instructional materials and teaching aids such as the teacher fabricated wood work mini lathe, facilitates the decision of a person toward taking right action in production of joinery.

Summary

Woodwork technology is veritable part in building construction, it undertakes the study of processing, construction and usage of wooden materials to form objects used in building construction and FCET, Ekiadoloe, being a new college requires a lot of structures which makes its very important. Some of the items produced and used with wood for building construction are; frames, doors, windows, stairs, furniture's and so on. Woodwork technology can also be studied in colleges of education technical and those who acquire the skill are referred to as professional woodworker and their job prospect is high.

Woodwork technology is expected to launch the beneficiary and the society at large into wealth, it is also supposed to be studied with complete and functional equipment, but the reverse had been the case as was pointed out by several researchers. The lack of equipment and functional workshops posed a lot of problems ranging from loss of interest by both teachers and learners and non-achievement of the aim as stipulated in the National policy on education (FGN 2004), these problems add up to reasons why students always hesitate to choose the career.

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In the quest to solving this problem of lack of equipment the researcher was guided by some specific purposes which was formed into questions and were hypothesized accordingly.

To justify the purpose of this study, the researcher improvised a woodwork lathe which was used as an instructional material to teach NCE II woodwork technology students some operations using the lathe. This in line with the curriculum as stipulated in NBTC (2007). The lathe operations taught are; turning, sanding and reaming. The lectures and instructors were taught the fabrication of the wood work mini-lathe and they in turn used it to teach the students under the supervision of the researcher.

The pretest posttest approach was used to gather data for the study; this involved splitting the respondents into control and experimental groups respectively. They were taught the lesson using the demonstration approach with a flip chart as instructional material and the experimental group was taught with the project approach using the fabricated woodwork mini-lathe as the instructional material.

Conclusion

This study focused on the design and construction of a mini-lathe machine to enhance teaching and learning of Woodwork Technology in the Federal College of Education Technical, Ekiadolor. The research was carried out in response to the challenge of inadequate functional wood-turning machines for effective practical instruction in technical institutions like FCET, Ekiadolor.

Findings from the testing and evaluation revealed that the constructed mini lathe machine is functional and capable of performing essential wood-turning operations such as turning, reaming and sanding. The machine operated smoothly, demonstrated adequate stability, and was safe for instructional use when basic workshop safety rules were observed. Responses from lecturers and students also confirmed that the machine is suitable for teaching and learning purposes and enhances students' understanding and practical skill acquisition.

The study further established that the use of locally available and affordable materials makes the mini lathe machine cost-effective, easy to maintain, and appropriate for institutions with limited financial resources. Based on these findings, it can be concluded that the constructed mini lathe machine effectively meets its design objectives and serves as a valuable instructional tool for enhancing practical training in Woodwork Technology.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Technical institutions, especially colleges of education technical, should adopt the use of locally designed and constructed mini lathe machines to enhance effective teaching and learning of Woodwork Technology.
2. Management of the technical institutions should encourage the fabrication of instructional machines using locally available materials to reduce the cost of procuring standard industrial equipment.
3. Woodwork Technology lecturers and instructors should incorporate the use of mini-lathe machines into regular practical lessons to provide students with adequate hands-on experience and improve skill acquisition.
4. Students should be trained on proper operation and safety procedures when using the mini-lathe machine to ensure safe and efficient workshop practices.
5. Government and educational stakeholders should provide funding and technical support for the production and maintenance of instructional workshop equipment in technical institutions.
6. Future researchers should improve on the design of the mini lathe machine by incorporating adjustable speed control, improved safety guards, and enhanced precision features.

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