

## Capacity Building Needs of Nigeria Certificate in Education (Technical) Woodwork Lecturers in the use of Digital Circular Saw Machine in Northwest Nigeria

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### Abstract

This study was designed to determine the capacity building needs of Woodwork Technology Education Lecturers in using Digital Circular Saw Machine (DCSM) in North-West States, Nigeria. Two research questions were answered while seven null hypotheses formulated to guide the study were tested at 0.05 level of significance. The study adopted descriptive survey research design. The population for the study was 84 subjects comprising of 40 Woodwork Technology Education Lecturers and 21 Woodwork Technology Education Administrators in seven colleges of education/polytechnics offering NCE (Technical) Programme as well as 23 Woodwork Workshops Employers (Master Craftsmen) in the seven North-West States. A 20 items researcher designed questionnaire instrument was used for data collection. The instrument was validated by five woodwork technology education experts. The reliability of the instrument was determined using cronbach alpha reliability method to find the internal consistency that yielded 0.86. The data collected were analyzed using mean and standard deviation to answer the seven research questions while Analysis of Variance (ANOVA) was employed to test the null hypotheses at 0.05 level of significance using SPSS version 23. The findings of the study revealed that Woodwork Technology Education Lecturers teaching NCE (Technical) Woodwork Technology Education Programme need capacity building in Ability to create circumferential exterior profiling on sliding windows and doors with average mean of 3.40 and also, finding on setting-up, programming, operation of computerized DCSM for mitre-cutting operation with average mean value 3.40. There was no significant difference in the mean response between woodwork technology education lecturers and woodwork technology education administrators at the State Colleges of Education/State Polytechnics and Federal Colleges of Education/Federal Polytechnics on the capacity building needs of woodwork technology education lecturers on ripping operation with digital circular saw machine and also, there was no significant difference in the mean response between woodwork technology education lecturers and woodwork technology education administrators at the State Colleges of Education/State Polytechnics and Federal Colleges of Education/Federal Polytechnics on the capacity building needs of woodwork technology education lecturers on mitre-cutting operation with digital circular saw machine. It was concluded that woodwork technology education lecturers need capacity building on setting of DCSM parameters, such as cutting speed, allowance tolerance, programming, operation with computerized DCSM for mitre-cutting operation. Based on the findings, it was recommended that: The National Commission for Colleges of Education (NCCE) and National Board for Technical Education (NBTE) should include grooving and other woodworking operations using Digital Circular Saw Machine (DCSM) in NCE (Technical) Woodwork Technology Education Programme Minimum Standard and also, Woodwork Technology Education Administrators should organize seminars and workshops for Woodwork Technology Education Lecturers on how to use Digital Circular Saw Machine (DCSM) especially, on different woodworking operations.

**Keywords:** Woodwork, Technology, Education, Capacity, Saw, Machine.

### Introduction

Woodwork Technology Education (WTE) Programme in Colleges of Education and Polytechnics is a programme that leads to the award of Nigeria Certificate in Education (NCE) (Technical). Programme cover a wide range of areas of teaching/learning that include machine woodworking, carpentry and joinery, furniture making and other wooden constructions with an aim of producing woodwork trade teachers for technical colleges. A woodwork trade deal is about skills in

production of woodwork articles and other related areas through design, application, constructions, operations and maintenance of woodwork tools and machines. Students who specialized in woodwork trade are expected to acquire knowledge, skills and attitudes in design, apply, construct, manufacture or make woodwork articles as well as to operate and maintain all kinds of woodwork tools and machines for operational efficiency (Hornby, 2000). The National Commission for Colleges of Education designed the woodwork technology education



curriculum for implementation in tertiary institutions offering Woodwork Technology Education Programme for the award of NCE (Technical) certificate in Woodwork Technology Education.

The Philosophy of NCE (Technical) in Woodwork Technology Education according to National Commission for Colleges of Education (NCCE) is to produce technical teachers with the intellectual and professional background adequate for teaching and woodwork technology education courses and to make them adoptable to any changing situation in technological development not only in the country but also in the world at large (NCCE, 2012). Specifically, the objectives of Woodwork Technology Education Programme are:

- (i) To provide qualified Woodwork Technology Education Teachers that will teach Basic Technology at upper basic education level;
- (ii) To provide Woodwork Technology Education Teachers who will be able to inculcate scientific and technological attitudes and values into the society;
- (iii) To provide qualified Woodwork Technology Education Teachers that are motivated to start the desired revolution of technological development in Nigerian Schools;
- (iv) To prepare Woodwork Technology Education Teachers for a post - NCE degree programme in Technical Education.

A Woodwork Technology Education Lecturer is a person who works at different tertiary institutions as an academic staff teaching various woodwork technology education courses. A Woodwork Technology Education Lecturer teaches students and carry-out research activities to solve identified problems in woodwork technology programme. The Woodwork Technology Education lecturer is expected to use Digital Circular Saw Machine (DCSM) competently for teaching students grooving and mitre-cutting. While, the woodwork administrators are Woodwork Head of Department, Sub-Dean and Dean of School of Secondary Education (Technical).

Digital circular saw machine is a computerized machine used in manufacturing technology in the 21<sup>st</sup> century which brought about changes from the old/manual traditional machining process to a new machining process which is more suitable for precision machining of hard and brittle materials including wood (Jan, 2010). That is, the use of digital technology such as digital circular saw

machine in the world in many aspects of human endeavour is to save human labour, time, materials both in the process and products. Digital circular saw offers many advantages over traditional machining processes that include: providing high accuracy and surface finish; prolong tool life; ability to machine very hard and fragile materials that are difficult for traditional machining, can also be carried-out by successful students.

Capacity building is a measurable improvement in an organization's ability to fulfill its mission through a blend of sound management, strong governance, and dedication to assessing and achieving results (Stavrons, 2018). Capacity building is the process of developing competencies and capabilities in individuals, groups, organization sectors or countries which leads to sustainable and self-generating performance improvement. Stavrons further stated that the fundamental goal of capacity building is to enhance or improve the ability of individuals based on perceived needs. Capacity building as a set of activities that expand the scale, reach, efficiency or effectiveness of an individual, organization or a programme. These activities may be expanding services or generate additional resources for the individual or organization. Capacity is the resources necessary to implement your strategy, pursue your mission, and achieve your vision. Therefore, the study needs to determine the level of competencies of woodwork lecturers on how to operate digital circular saw machine, this raise the need for capacity building of woodwork lecturers on how to operate digital circular saw machine in their teaching and learning processes.

Assessment is a form of evaluation that involves collecting data for estimating the work quality or effectiveness of a programme or project. Assessment involves use of empirical data on students learning (Allen, 2004). Assessment is the wide variety of method that evaluators use to evaluate measure and document academic readiness, learning progress, skill acquisition, or educational needs of the students. Valid Assessment of people helps someone to pass judgment correctly. With reference to this study, assessment is the process of evaluating woodwork technology education lecturers in NCE (Technical) through collection of data from them to determine the level of competencies they possess in operating DCSM for effective and efficient instructional delivery, despite the availability of DCSM in workshops in the colleges of education/polytechnics offering NCE (Technical) woodwork technology education programme. Hence, the need to determine the



capacity building needs of woodwork technology education lecturers for NCE (Technical) programme in the use of digital circular saw machine in Colleges of Education/Polytechnics in North-West States, Nigeria.

### Statement of the Problem

The inability of woodwork technology education lecturers to operate the DCSM in delivering practical class lesson could be attributed to inadequate experiences or competencies in using DCSM and woodwork workshops employers (master craftsmen) are also, have lack capability to operate digital circular saw machine in their private woodwork workshops for the production of wooden constructions in mass in order to sell to their customers to get more profits.

Jimoh *et al.*, (2018) was of the view that: effective delivery of technology courses using computer in tertiary institutions in South-Western, Nigeria" need capacity building in for effective delivery. This implies that for woodwork technology education lecturers to be able to utilize DCSM effectively and efficiently, they need capacity building on how to operate digital circular saw machine for effective and efficient delivery of practical class with students, as well as woodwork technology education administrators for managing the digital circular saw machine successfully and also, woodwork workshops employers (master craftsmen) for conducting their many woodworking constructions operations. It is therefore, pertinent to determine the capacity building needs of woodwork technology education lecturers in NCE (Technical) Woodwork Technology Education Programme in the use of Digital Circular Saw Machine (DCSM) for effective and efficient delivery of practical skills lessons with the students in North-West States Zone, Nigeria.

### Purpose of the Study

The study was designed to determine the capacity building needs of woodwork technology education lecturers of NCE (Technical) Woodwork Technology Education Programme in the North-West States, Nigeria. Specifically, the study determined the:

- 1) Capacity building needs of woodwork technology education lecturers on grooving operation with digital circular saw machine.
- 2) Capacity building needs of woodwork technology education lecturers on Mitre-cutting operation with digital circular saw machine.

### Research Questions

The following research questions were formulated to guide the study:

- (1) What are the capacity building needs of woodwork technology education lecturers on grooving operation with digital circular saw machine?
- (2) What are the capacity building needs of woodwork technology education lecturers on mitre-cutting operation with digital circular saw machine?

### Hypotheses

**HO<sub>1</sub>:** There is no significant difference in the mean responses of woodwork technology education lecturers and woodwork technology education administrators in Colleges of Education/Polytechnics on the capacity building needs of woodwork technology education lecturers on grooving operation with digital circular saw machine.

**HO<sub>2</sub>:** There is no significant difference in the mean responses of woodwork technology education lecturers and woodwork technology education administrators in Colleges of Education/Polytechnics on the capacity building needs of woodwork technology education lecturers on mitre-cutting operation with digital circular saw machine.

### Methodology

This research adopted descriptive survey research design. Olaitan *et al.* (2010) stated that the descriptive survey research design is the plan, structure and strategy that the investigator/researcher wants to adopt in order to obtain solution to research problems using questionnaire in collecting, analyzing and interpreting the data. Questionnaire was used to collect the data from woodwork technology education lecturers and woodwork technology education administrators for analyzing and interpreting result for the study.

The study was carried-out in North-Western Zone of Nigeria. Both Federal and State Colleges of Education and Polytechnics offering N.C.E. (Technical) Woodwork Technology Education Programme in the geographical zone were inclusive. The study was conducted in North-West States of Nigeria

The North-West Geographical Zone of Nigeria comprises seven states of the country's 36 states. These are Jigawa, Kaduna, Kano, Katsina, Kebbi,



Sokoto and Zamfara States. The zone covers an area of 216,065 square kilometers or 25.75% of the Nigeria's total land mark. The reasons of choosing North-West States Zones Colleges of Education and Polytechnics for the study is because these institutions have Digital Circular Saw Machine (DCSM) in their woodwork workshops, but are not judiciously utilized in training the students.

The population of the study consists of three groups of 84 subjects that include: 40 Woodwork Lecturers, 21 Woodwork Technology Education Administrators at N.C.E. (Technical) Woodwork Technology Education Programme and 23 Woodwork Workshops Employers (Master Craftsmen) all of them from the seven states in North-West Zone, Nigeria. There was no sampling due to the size of the population for the Woodwork Technology Education Lecturers and Woodwork Technology Education Administrators. But, the purposive sampling were used for the woodwork

workshops employers (master craftsmen) in the seven states in North-West Zone, Nigeria in which woodwork workshops employers from each state were used as a respondents for the instrument for the study. The whole population of the study in the five Colleges of Education offering N.C.E. (Technical) Woodwork Technology Education Programme and two Polytechnics offering N.C.E. (Technical) Woodwork Technology Education Programme and woodwork workshops employers (master craftsmen) from seven states to answer the instrument of the study in the North-West States Zone of Nigeria was used.

A 20-items questionnaire titled: Digital Circular Saw Machine Capacity Building Needs of Woodwork Technology Education Lecturers Questionnaire (DCSMCBNWTELQ) was developed by the researcher based on literature reviewed.

**Table 1: Population Distribution of Woodwork Technology Education Lecturers, Woodwork Technology Education Administrators and Woodwork Workshops Employers**

S/No:	Name of Institutions	States	No: of Woodwork Administrators	No: of Woodwork Lecturers	No: of Workshop Employers
1	Federal College of Education (Technical) Bichi	Kano	3	7	5
2	Federal College of Education (Technical) Gusau	Zamfara	3	7	2
3	Saadatu Rimi College of Education Kumbotso	Kano	3	3	-
4	Isah Kaita College of Education Dutsinma	Katsina	3	3	4
5	Shehu Shagari College of Education Sokoto	Sokoto	3	3	4
6	Kaduna Polytechnic	Kaduna	3	11	4
7	Kano State Polytechnic	Kano	3	5	2
8	-	Jigawa	-	-	3
9	-	Kebbi	-	-	3
	Total		21	39	23

**Source:** Office of the Registrars of the Colleges of Education/Polytechnics, (2020)/Offices of Chairmen of North-West States Woodwork Workshops Employers (2021).

Mean and Standard Deviation was used to answer the research questions. Items with mean value of 2.50 or above were regarded as Needed (N) while items with mean rating less than 2.50 were regarded as Not Needed (NN). The analysis was carried out

using Statistical Package of Social Science/Statistical Product and Service Solutions (SPSS, version 23) while, Analysis of Variance (ANOVA) statistics was used to test the hypotheses at 0.05 level of significance.

Each item of the questionnaire was assigned a four point scale response of Highly Needed (HN) = 4, Needed (N) = 3, Slightly Needed (SN) = 2, Not



Needed (NN) = 1. The instrument was subjected to Face and Content Validity by five woodwork technology education experts, their observations, corrections and suggestions were used to develop the final copy of the instrument.

**Result**

**Research Question 1**

What are the capacity building needs of woodwork technology education lecturers on grooving operation with digital circular saw machine?

**Table 2: Mean and Standard Deviations of respondents on the Capacity Building Needs of Woodwork Technology Education Lecturers on Grooving Operation with Digital Circular Saw Machine.**

S/NO.	ITEMS	$\bar{X}_1$	$\bar{X}_2$	$\bar{X}_3$	$\bar{X}_A$	SD	REM
1.	Switch ON/OFF DCSM computer and machine.	3.23	3.50	3.10	3.30	.61	N
2.	Ability to create circumferential exterior profiling on sliding windows and doors.	3.44	3.60	3.50	2.90	.59	N
3.	Groove with digital circular saw using a straight or groove bit.	3.39	3.40	3.30	3.00	.56	N
4.	Ability to operate digital circular saw equipped with a groove ledge during grooving operation and also used to plane or finish grooves directed by CAD software.	3.28	3.40	3.20	3.20	.48	N
5.	To adjust cutting depth of the saw to the desired length of cut.	3.29	3.20	3.00	3.44	.69	N
6.	Ability to Interpret drawing and data of grooving using DCSM.	3.43	3.30	3.50	3.50	.63	N
7.	Ability to carry -out grooving operation using digital circular saw machine.	3.18	2.80	3.30	3.40	.56	N
8.	Ability to mount dado set in a single pass which is directed by CAM.	3.29	3.20	3.00	3.30	.64	N
9.	Have the skills of operating digital circular saw with multiple passes during grooving operation.	3.24	3.00	3.60	3.40	.72	N
10.	To operate digital circular saw equipped with a groove ledge when grooving.	3.35	3.50	3.50	3.10	.57	N

Source: Field Work

**KEYS:**  $\bar{X}_1$  Mean Responses of Woodwork Technology Education Administrators,  $\bar{X}_2$  = Mean Responses of Woodwork Technology Education Lecturers,  $\bar{X}_3$  Mean Responses of Woodwork Workshops Employers,  $\bar{X}_A$  = Average Mean Responses of all the three Respondents, SD = Standard Deviation, REM = Remark, N = Needed, & NN = Not Needed.

The results in Table 2 revealed that the respondents needed all the ten items (1, 2, 3, 4, 5, 6, 7, 8, 9 & 10) on the extent of need of capacity building on grooving operation of NCE (Technical) programme woodwork lecturers using Digital Circular Saw Machine (DCSM) in North-West, Nigeria average mean ranging from 2.80 to 3.40. Table 1 also showed that the standard deviation of items ranged from 0.58 to 0.78 showing the respondents were close to another.



Table 3: Mean and Standard Deviation on the Capacity Building Needs of Woodwork Technology Education Lecturers on Mitre-Cutting Operation with Digital Circular Saw Machine.

S/NO	ITEMS	$\bar{X}_1$	$\bar{X}_2$	$\bar{X}_3$	$\bar{X}_A$	SD	REM
11.	Switch ON/OFF DCSM computer and machine.	3.23	3.20	3.60	3.30	.79	N
12.	Set the DCSM on up stroke for the mitre -cutting operation.	3.19	2.70	3.20	3.00	.65	N
13.	Use simple Computer Aided Design (CAD)/Computer Aided Manufacturing (CAM) for mitre cutting operation.	3.21	3.50	3.60	3.10	.66	N
14.	Programme cutting list on the DCSM automatically.	3.27	3.10	3.10	2.10	.78	NN
15.	Regulate the volume of stroke to either high or low mode as desired.	3.20	3.70	3.00	2.90	.74	N
16.	Examine finished mitre -cut work piece for conformity with specifications and verify dimensions when using DCSM.	3.21	3.30	3.10	3.00	.68	N
17.	Set-up, programme or operate or tend computerized DCSM or CNC circular saw machine for mitre-cutting operation.	3.23	3.30	3.40	3.40	.73	N
18.	Ability to use a digital circular saw table to accommodate the large piece.	2.25	3.40	2.70	3.00	.56	N
19.	Learn how to start DCSM, adjust controls and make trial and ensure that the machine is properly mitre-cutted.	3.37	3.20	3.10	3.00	.71	N
20.	Ability to monitor mitre-cutting operation of DCSM and make adjustments to correct position and ensure conformity with specifications.	3.48	3.30	3.00	3.60	.55	N

Source: Field Work

**KEYS:**  $\bar{X}_1$  = Mean Responses of Woodwork Technology Education Administrators,  $\bar{X}_2$  = Mean Responses of Woodwork Technology Education Lecturers,  $\bar{X}_3$  = Mean Responses of Woodwork Workshops Employers,  $\bar{X}_A$  = Average Mean Responses of all the three Respondents, SD = Standard Deviation, REM = Remark, N = Needed, & NN = Not Needed

The results in Table 3 revealed that the respondents needed capacity building on items (11, 12, 13, 15, 16, 17, 18, 19 & 20). On the extent of need of

capacity building on mitre-cutting operation of NCE (Technical) programme woodwork technology education lecturers using Digital Circular Saw Machine (DCSM) in North-West, Nigeria average mean ranged 14 of capacity building on mitre-cutting operation of woodwork technology education lecturers using Digital Circular Saw Machine (DCSM) in North-West, Nigeria with mean of 2.10 which is less than mean value of 2.50 needed for acceptance.. Table 3 also showed that the standard deviation of items ranged from 0.55 to 0.79 showing the respondents were close to another in their responses.



**Testing Hypotheses**  
**Table 4: One-Way ANOVA of Mean Scores of Respondents on the Capacity Building Needs of Woodwork Lecturers on Grooving Operation with Digital Circular Saw Machine**

Source	Sum of Squares	df	Mean Square	F	Sig. (P-Value)
Between Groups	0.012	2	0.006	0.177	0.838
Within Groups	2.664	81	0.033		
Total	2.676	84			

**Source:** Field Work

The result of analysis as presented in Table 3 showed that there is no significant difference ( $P < 0.05$ ) in the mean scores of the respondents. The hypothesis one was therefore upheld (Needed). The data supported the one,  $(2, 81) = 0.177$ ,  $P(\text{Sig.}) = 0.838$

**Table 5: One-Way ANOVA of Mean Scores of Respondents on the Capacity Building Needs of Woodwork Technology Education Lecturers on Mitre-Cutting Operation with Digital Circular Saw Machine.**

Source	Sum of Squares	df	Mean Square	F	Sig. (P-Value)
Between Groups	0.361	2	0.181	2.489	0.089
Within Groups	5.881	81	0.073		
Total	6.242	84			

**Source:** Field Work

The result of analysis as presented in Table 5 showed that there is no significant difference ( $P < 0.05$ ) in the mean scores of the respondents. The hypothesis one was therefore upheld (Needed). The data supported the one,  $(2, 81) = 0.703$ ,  $P(\text{Sig.}) = 2.489$

### Discussion

The results of the study revealed that woodwork technology education lecturers needs capacity building on grooving operation using digital circular saw machine (DCSM) for delivery of practical lessons to their students. Mean responses of the respondents are needed as appropriate because in all the items ranges are from 2.70 on average mean responses of all the three groups of respondents, greater than 2.50. Moreover, the responses of woodwork technology education administrators at NCE (Technical) programme as well as woodwork workshops employers (master craftsmen) needs of capacity building are needed as appropriate because there is significant difference in the mean responses as indicated on the hypotheses with p-value less than the level of significance ( $p < 0.05$ ), the no significant level at .0838 ( $p > 0.05$ ).

The results of the study revealed that NCE (Technical) woodwork technology education programme woodwork lecturers are ready to receive capacity building on mitre-cutting operation using digital circular saw machine (DCSM) for delivery of practical class together with their students. Mean responses of the respondents are needed as appropriate because in all the items ranges are from 2.50, only item number 14 average mean response value at: 2.90 greater than 2.50 and above. Moreover, the responses of woodwork administrators at NCE (Technical) programme as well as woodwork workshops employers (master craftsmen) needs of capacity building are needed as appropriate because there is no significant difference in the mean responses as indicated on the hypotheses with p-value greater than the level of significance ( $p > 0.05$ ), the significant level at 0.89. These findings are in line with Jarvis (2003) that capacity building needs of managers is based on identifying appropriate range of experience of 79 applicants, determining the required level of compartment, constituting the right kind of interviewing panel, making reference to religion and determining the right and discipline required for a job vacancy. These findings agreed with findings of Olelewa and Okwor (2017) that using ICT supported strategies for teaching improves learning outcomes of students and make the delivery of



practical class easier for teachers. The implication of this finding is that, woodwork technology education lecturers were deficient in using DCSM approach and relevant facilities that could support DCSM of woodwork technology education courses to students in all tertiary institutions offering NCE (Technical) programme.

### Conclusion

The purpose of the study was to determine the capacity building needs of woodwork technology education lecturers in NCE (Technical) programme in using Digital Circular Saw Machine (DCSM). The two research questions were designed for study on skills of how to operate DCSM as: grooving and mitre-cutting operations for effective and efficient in the practical skills class. Based on the findings of the study, the mean responses of the three groups of respondents shows the needs of capacity building on (that is, for all the two research questions) only one item for the whole instrument at level of not needed for the whole respondents.

On the other hand, there is significant in the research question one indicating the level of significant at 0.084 ( $P < 0.05$ ) on hypothesis testing on the capacity building needs of woodwork lecturers on grooving operation with digital circular saw machine. There is no significant in the research question two indicating the level of significant at 0.89 ( $P > 0.05$ ) on hypothesis testing on the capacity building needs of woodwork technology education lecturers on mitre-cutting operation with digital circular saw machine.

### Recommendations

The study recommended the following based on the findings of the study:

1. The National Commission for Colleges of Education (NCCE) and National Board for Technical Education (NBTE) should include grooving and other woodworking operations using Digital Circular Saw Machine (DCSM) in NCE (Technical) Woodwork Technology Education Programme Minimum Standard.
2. Woodwork Technology Education Administrators should organize seminars and workshops for Woodwork Technology Education Lecturers on how to use Digital Circular Saw Machine (DCSM) especially, on different woodworking operations (including mitre-cutting operation).

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