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Development of Computer Numerical Control Woodworking Machines Operational Task Contents for Inclusion into Technical College Curriculum

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Abstract
The study developed Computer Numerical Control (CNC) woodworking machines operational tasks contents for inclusion into technical college curriculum in Nigeria. Two research questions were answered as well as two null hypotheses were formulated and tested at 0.05 level of significant. Mixed-method (sequential exploratory) research design was adopted for this study. The study was carried-out in Northwest States, Nigeria. For both qualitative and quantitative designs the targeted population for the study was 161 subjects consisting of 70 Woodwork Teachers (WTs), 35 Woodwork Industrial Managers (WIMs) and 56 Woodwork Lecturers (WLs). The study utilized the whole population of the study. The instruments used for data collection includes Computer Numerical Control Woodworking Machines Operational Tasks Objectives Interview Protocol (CNCWMOTOIP), Computer Numerical Control Woodworking Machines Operational Tasks Questionnaire (CNCWMOTQ), and Operational Tasks Validity Index (OTVI). Some of the interview schedules, are: what are the main objectives for introducing CNC woodworking tasks? How can CNC training be effectively introduced into technical college curriculum? among others. Based on the findings, the study recommended among others that: Woodwork lecturers and woodwork teachers should develop instructional strategies for CNC woodworking machines operational tasks for training woodwork craftsmen, and woodwork teachers in technical colleges should adopt appropriate assessment techniques for measuring the achievement of objectives of CNC woodworking machines operational tasks while included into technical college woodwork curriculum by National Board for Technical Education (NBTE).
Keywords: Technical College, Curriculum, Operational Tasks, Contents, Woodworking Machines, Computer Numerical Control (CNC).

Introduction

Technical Colleges (TCs) are post basic institutions where students are giving full technical training that enable them acquire relevant knowledge, skills and attitude in various occupations in the world of work. The trade programmes in technical colleges provide specific practical skills that can offer students the necessary education to begin a career upon completion of the programme and necessary certification. Often, technical colleges focus on hands-on programmes in allied health, constructions, and mechanical trades including medical and dental assisting, welding, and truck driving (National Board for Technical Education, [NBTE, 2021]). The National Policy on Education provides clear guidelines for the programmes and objectives of technical education.

The term curriculum is derived from the Latin word *currus* which means race course or a run-away. Curriculum is viewed as a course through which an individual runs through following right way to reach an end or a goal. Curriculum is a systematic group of courses or sequences of subjects required for graduation or certification in a major field of study. (Bishop, 2020).

Content refers to all the data/information that is contained in something written, said, created or represented in an entity. It could be a list of steps, subjects, topics, competencies, themes, concepts or techniques to be taught by a teacher to students. Kapola & Namusokwe (2021) defined content to include the subject matters, processes, approaches and feelings used in teaching as a curriculum is being implemented. Content

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therefore, is an organized list of skills, knowledge, competencies, steps or tasks in developing the CNC woodworking machines operational tasks. Contents are all the activities that guides the attainment of some specific objectives. Objectives are what a teacher wants students to achieve at the end of a lesson, programme or project. Objectives also refer to expectations or outcomes. Objectives of CNC woodworking machines operational tasks can be stated in behavioural or specific forms. In other words, specific objectives are stated in terms of the behaviour expected by learner/craftsmen in technical colleges after going through some planned experiences implemented by teachers (Wilburn & Wilburn, 2020). The objectives of the CNC woodworking machine operational tasks are achieving by the teacher efforts.

The operational tasks of CNC woodworking machines, includes: Design preparation: creating a design using software like fusion 360, G-code generation: converting the design into G-code instructions that the CNC woodworking machine can read, machine setup: securing the wood material onto the CNC bed and calibrating tools, machining process: the CNC woodworking machine reads the G-code and guides the spindle to cut the wood according to design specifications, quality control: inspecting finished products for accuracy and quality. Computer Numerical Control is a method of controlling woodworking machines by computer. The machine operates to a series of instructions in a data file, a programme that can easily be replaced or changed. The starting point for the programme is usually a Computer Aided Design (CAD) drawing of the part to be manufactured. The drawing is converted into machining data that may include: dimensions, machining direction, feed rates and tool selection. Some of this work is done with the help of tailored Computer Aided Manufacturing (CAM) programmes, but also based on practical experience of the machining properties of different woods (Bjorn, 2020).

A CNC is working on at least three axes X, Y and Z, but machines with four or five axes are also common, and modern joinery becomes increasingly automated. When a machine has four or five axes, it is possible to twist and rotate the table or turn or angle the tool. CNC woodworking machine is used for some woodwork operational tasks.

The operational tasks are the procedural steps involved when using CNC woodworking machines, include: ripping, cross-cutting, mitre-cutting, rebating, grooving, trenching, chamfering, drilling, milling, sawing, sanding, edge gluing, planing, carving, turning, and routing. A task is the ability to perform an action with determined result often within a given amount of time, energy, or both. Tasks can often be divided into domain-general and domain-specific tasks. Domain-general task is a cognitive ability, such as general intelligence or speed of information processing, which influences performance over a wide range of situations and tasks (Eaves *et al*, 2022). Domain-General Tasks (DGT) by definition can be used to solve any problem in any area.

Woodwork teachers in Nigeria are implementing the NBTE curricula in technical colleges in order to equip students/craftsmen with operational tasks contents while many of them still prefer using woodworking machines for producing wooden articles/products. Despite the adequacy of CNC woodworking machines, craftsmen lack the necessary skills and knowledge to operate them effectively. The woodworking industry in Nigeria is experiencing a growing demand for skilled workers who can operate CNC woodworking machines, which offer increased precision, efficiency, and production capabilities. However, current technical college curriculum in Nigeria has provided contents that do not adequately equip graduates with the necessary skills and knowledge to effectively utilize CNC woodworking machines. Lawal (2022) attributed the lack of competency to none inclusion of task contents regarding the CNC woodworking machines knowledge and skills in the (NBTE) curriculum for technical colleges.

The inability of woodwork craftsmen to acquire the relevant CNC woodworking machines especially in the use of computers and Artificial Intelligent (AI), which led to the problem of inability to adopt to the woodwork operational task contents trend. This reason raises the needs for the study to develop the CNC woodworking machines

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operational task contents for inclusion in technical colleges' curriculum in Nigeria. In fact, if this study is not carried-out, it may lead to the shortage of quality or experience woodwork machinists in the profession and may bring negative development to the National economy.

The aim of the study was to develop CNC woodworking machines operational task contents for inclusion into technical colleges' woodwork curriculum in Nigeria. Specifically, the objectives of the study are to:

1. Determine the instructional strategies for developing CNC woodworking machines operational tasks for inclusion into woodwork curriculum in technical colleges; and
2. Determine the appropriate assessment Determine techniques for measuring the objectives of CNC woodworking machines operational tasks for inclusion into woodwork curriculum in technical colleges.

The following research questions were developed for the study:

1. What are the instructional strategies for developing CNC woodworking machines operational tasks for inclusion into woodwork curriculum in technical colleges? and
2. What are the appropriate assessment techniques for measuring the achievement of objectives of CNC woodworking machines operational tasks for inclusion into woodwork curriculum in technical colleges?

The following null hypotheses are postulated to guide the study, were tested a 0.05 level of significance:

H_{O1}: There is no significant difference in the mean responses of woodwork teachers, woodwork lecturers and industrial managers on the instructional strategies for developing the CNC woodworking machines operational tasks for inclusion in technical colleges' curriculum, and

H_{O2}: There is no significant difference in the mean responses of woodwork teachers, woodwork lecturers and industrial managers on the appropriate assessment techniques for measuring the achievement of objectives of the CNC woodworking machines operational tasks for inclusion in technical colleges' curriculum.

The study would be of benefit to the woodwork craftsmen, industrial managers, teachers, students, and woodwork workshop technicians, National Board for Technical Education (NBTE), National Commission for Colleges of Education (NCCE), National Universities Commission (NUC) and National Directorate of Employment (NDE).

This study was delimited to development of CNC woodworking machines operational tasks contents required by craftsmen for inclusion in woodwork curriculum of technical Colleges in Nigeria. The study hope to come with CNC woodworking machines operational tasks contents include: ripping, cross-cutting, mitre-cutting, rebating, grooving, trenching, chamfering, drilling, milling, sawing, sanding, edge gluing, planing, carving, turning, and routing operations in construction of wooden articles using respective CNC woodworking machines would cover. Non-automated or manually operated woodworking machines and hand tools are not part of the study because their operational skills/tasks are already included in existing curriculum (NBTE, 2018).

The Tyler model was propounded by Tyler (1949). This model focuses on the quintessential prototype of curriculum development in the scientific approach. Originally, Tyler wrote down his ideas in a book Basic Principles of Curriculum and instruction for his students to give them an idea about principles for making curriculum. Tyler stated four principles in curriculum design (Aguokogbua, 2000), the rationale for education, learning skills to accomplish the objectives, learning organizing skills, and assessment/evaluation.

Methodology

The study adopted an exploratory research design. Sequential exploratory is a mixed methods research design characterize by an initial qualitative data collection and analysis followed by a quantitative data collection and analysis. According to Creswell, (2019), sequential exploratory research design is functional when developing and testing new

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educational package or curriculum such as CNC woodworking machines operational tasks contents for inclusion in to technical college curriculum. Nevertheless, the study utilized phenomenology to collect qualitative data on Instructional System Design (ISD) using Taba's Model of Curriculum (TMCD) to guide the development of CNC woodworking machines operational tasks contents and descriptive survey research design to collect quantitative data for this study. Therefore, exploratory sequential mixed method research design (qualitative) and descriptive survey (quantitative) were used suitable for this study, to develop CNC woodworking operational tasks contents for inclusion into technical college woodwork curriculum in Nigeria.

The study was carried-out in the northwest geo-political zone of Nigeria. The zone has seven states out of the country's 36 states of Nigeria. The zone covers an area of 216,065 square kilo meters or 25.75% of the Nigeria's total land mass. The states included in the zone are Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto and Zamfara States. The study utilized with 70 WTs identified from accredited TCs by NBTE in north-west states, Nigeria, 35 WIMs and 56 WLs in north-west states, Nigeria through their professional associations from each of seven states in the zone.

The study utilized entire subjects were involved in the study because of their manageable size for the woodwork teachers (WTs) in technical colleges and woodwork lecturers (WLs). While the purposive sampling techniques were used there were large number of woodwork industrial managers' (WIMs) respondents. Purposive sampling refers to intentionally selecting participants based on their characteristics, knowledge, experiences, or some other criteria and also, in terms of the recruitment process, purposive sampling allows for targeted selection based on desired traits, potentially leading to biased results (Bostley, 2019). The purposive sampling allows the researcher to use his judgment to pick participants rather than creating a statistically representative sample and to carefully select participants who can provide insights into these unique groups, which might be difficult to achieve as in this study both woodwork craftsmen and industrial managers. This is because, the study concerned the development of CNC woodworking machines operational tasks required by craftsmen for inclusion into the woodwork curriculum for technical colleges which was affect the whole craftsmen in Nigeria**.**

Four instruments used to collect data for the study. The instruments that include: Computer Numerical Control Woodworking Machines Operational Tasks Objectives Questionnaire (CNCWMOTOQ), Computer Numerical Control Woodworking Machines Operational Task Objectives Interview Protocol (CNCWMOTOIP), Computer Numerical Control Woodworking Machines Operational Tasks Rating Scale (CNCWMOTRS), and Computer Numerical Control Operational Tasks Contents Validity Index (CNCOTCVI) developed by the researcher based on literature reviewed.

The CNCWMOTOQ, CNCWMOTOIP, CNCWMOTPT, CNCWMOTRS and CNCWMOTCV instruments was subjected to content validation by three woodwork experts, one from Industrial and Technology Education Department, Federal University of Technology, Minna, one from Woodwork Technology Education, School of Secondary Education (Technical), Federal College of Education (Technical), Bichi, Kano State and one was expert from Dawaki Wood Industries Nigeria Limited, Kano, to ascertain the suitability, appropriateness and usefulness of the items in relation to the objectives of the study. The experts were requested to identify and correct ambiguous words or terms, missing items, make general comments or suggestions for the enhancement of the research instruments.

The CNCWMOTOQ and CNCWMOTIP instruments were established by pilot tested or trial tested on randomly selected subjects from Minna metropolitan. The pilot test was conducted at Minna metropolitan. The respondents comprised of 3 Woodwork Lecturers (WLs), 5 Woodwork Industrial Managers (WIMs), and 2 Woodwork Teachers (WTs) from Government Technical College, Minna, Niger State, which is outside the area of study were selected and used for the trial test. The internal consistency of the instruments items was established using Cronbach Alpha is to 1, the higher the

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internal consistency (Olelewa and Agomuo, 2016). Data collected analysed using Cronbach's Alpha reliability statistic using the Statistical Packages for Social Sciences (SPSS version 27) was used to determine the reliability indices of CNCWMOTOQ, CNCWMOTOIP and CNCWMOTCVI. The section A, B, C, D, E, F and G of CNCWMOTOQ obtained the reliability coefficient values of: 0.81, 0.83, 0.75, 0.78, 0.77, 0.90 and 0.92 respectively with overall reliability coefficient of 0.84.

Development of CNC Woodworking Machines Operational Tasks Procedures

The development of CNC woodworking machines operational tasks procedures consisted of three main stages that include the following:

a. **Assessment Stage:** Questionnaire and interview were used to ascertain the objectives by the woodwork experts' panel while assessment survey was used to ascertain the contents and resources for CNC woodworking machines operational tasks.
b. **Development Stage:** CNC woodworking machines operational tasks draft copy development done by assembling the ascertained objectives, contents and required resources collected from the assessment stage by the researcher.
c. **Evaluation Stage:** The CNC woodworking machines operational tasks developed in three steps: validation, pilot testing and effectiveness testing.

The Validation Step: During this step, the CNC woodworking machines operational tasks were validated using CNCWMOTCVI by nine woodwork experts in order to establish its contents validity index as requested. Each of the woodwork experts were given a copy of the developed CNC woodworking machines operational tasks, CNCWMOTCVI and woodwork experts' revision form where critique and suggestions by the woodwork experts for the enhancement were recorded. The contents validity index of the developed CNC woodworking machines operational tasks.

The Pilot Testing Step: The reliability coefficient of the developed CNC woodworking machines operational tasks was determined using the data collected with CNCWMOTCVI during the validation step of CNC woodworking machines operational tasks. The reliability index of the developed CNC woodworking machines operational tasks.

Qualitative data were collected by administering CNCWMOTIP of the study through interview delivery to elicit information on the objectives, contents and resources required for CNC woodworking machines operational tasks; the CNCWMOTPT were administered to woodwork craftsmen to measure their performance in CNC woodworking machines operational tasks followed by quantitative data collected questionnaires from respondents for this study using CNCWMOTOQ. The answered questionnaires were distributed to the woodwork experts and give those woodwork experts in two weeks. The two weeks period is considered sufficient durational lowed for the woodwork experts selected for answering the questionnaire. Moreover, the administration of the instruments was achieved with the help of Research Assistants (RAs). Fourteen RAs, two each for each one of the seven northwest states were used by the researcher. The RAs were briefed by the researcher on how and when to effectively administer the instruments in order to achieve high return rate.

The qualitative and quantitative data collected were computed for the using mean and standard deviation and analyze using Analysis of Variance (ANOVA). The validated instruments containing CNC woodworking machines operational tasks that are most often observed and assessed in conducting operational tasks provided the data that used in answering research question one to seven.

The data were computed to answer research questions 1 and 2, while ANOVA were used in testing the null hypotheses 1 and 2. To answer research questions one and two, the mean ($\bar{x}$) value were computed for each item statement and interpreted based on the real limit of numbers. Item statements with mean score of 2.50 or above were accepted (Needed), while items with mean score of 2.49 or below was rejected (Not needed). The

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hypotheses were tested using ANOVA statistics using Statistical Package of Social Sciences (SPSS, version 27). The ANOVA statistics were used for testing the hypotheses to determine the level of significance at 0.05 for the study.

If the level of significant is below or less than ($p \leq 0.05$), the result shows that there is significant difference while, if the level of significant is above or greater than ($p \geq 0.05$), the result shows that: there is no significant difference. This will provide the basis for determining the agreement among respondents on each of the items. Decision on the hypotheses will be taken by comparing the significant value of significant two tailed with 0.05 level of significance. The significant two tailed values will be above 0.05 and considered as there will be no significant difference.

Result

Table 1: Summary of the Qualitative Responses of WTs, WLs and WIMs on the Objectives of CNC Woodworking Machines Operational Task Contents N = 9

S/N	Themes	n	%
1.	Acquire basic knowledge about CNC woodworking machines to carried-out operational task contents	8	89
2.	List various types of CNC woodworking machines for conducting operational task contents.	9	100
3.	Know operational tasks using CNC woodworking machines.	8	89
4.	Acquire knowledge and skills of ripping operational task using CNC woodworking machine.	9	100
5.	Acquire knowledge and skills of cross-cutting operational task using CNC woodworking machine.	8	89
6.	Acquire knowledge and skills of mitre-cutting operational task using CNC woodworking machine.	8	89
7.	Acquire knowledge and skills of rebating operational task using CNC woodworking machine.	9	100
8.	Acquire knowledge and skills of grooving operational task using CNC woodworking machine.	8	89
9.	Acquire knowledge and skills of chamfering operational task using CNC woodworking machine.	8	89
10.	Acquire knowledge and skills of trenching operational task using CNC woodworking machine.	9	100
11.	Acquire knowledge and skills of drilling operational task using CNC woodworking machine.	9	100
12.	Acquire knowledge and skills of milling operational task using CNC woodworking machine.	8	89
13.	Acquire knowledge and skills of sawing operational task using CNC woodworking machine.	8	89
14.	Acquire knowledge and skills of sanding operational task using CNC woodworking machine.	8	89
15.	Acquire knowledge and skills of edge gluing operational task using CNC woodworking machine.	9	100
16.	Acquire knowledge and skills of planing operational task using CNC woodworking machine.	8	89
17.	Acquire knowledge and skills of carving operational task using CNC woodworking machine.	9	100
18.	Acquire knowledge and skills of turning operational task using CNC woodworking machine.	9	100
19.	Acquire knowledge and skills of routing operational task using CNC woodworking machine.	8	89

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Table 1 revealed that using Computer Numerical Control Woodworking Machines Operational Task Contents (CNCWMOTC) about 11 themes had 89% while eight themes had 100%. Based on the stated acceptability criteria of 70% to provide woodwork craftsmen with step-by-step outlines in the CNCWMOT were considered as objectives of CNCWMOT for inclusion into technical college curriculum.

Research Question 1

What are the instructional strategies for developing CNC woodworking machines operational task contents in technical colleges?

Table 2: Mean and Standard Deviation on the Instructional Strategies for Developing CNC Woodworking Machines Operational Task Contents in Technical Colleges

S/N	Items	$\bar{X}_1$	$\bar{X}_2$	$\bar{X}_3$	$\bar{X}_A$	SD	REM
1.	Conducting situational analysis or diagnosis of needs CNC woodworking machines operational tasks.	3.57	3.58	3.59	3.56	.95	N
2.	Formulation of objectives of CNC woodworking machines operational tasks.	3.53	3.51	3.52	3.54	.86	N
3.	Selecting contents of CNC woodworking machines operational tasks, as: ripping, cross-cutting, mitre-cutting, grooving, rebating, planing, chamfering, trenching, routing, carving, sanding, turning, sawing, edge gluing, milling and drilling.	3.50	3.51	3.52	3.53	.96	N
4.	Organizing contents of CNC woodworking machines operational tasks.	3.55	3.56	3.58	3.56	.91	N
5.	Selecting learning experiences of CNC woodworking machines operational tasks.	3.57	3.58	3.56	3.58	.89	N
6.	Organizing learning experiences of CNC woodworking machines operational tasks.	3.56	3.55	3.57	3.58	.89	N
7.	Evaluation of CNC woodworking machines operational tasks for inclusion into technical college curriculum.	3.59	3.60	3.57	3.61	.96	N
8.	Designing the experimental methods for CNC woodworking machines operational tasks.	3.50	3.54	3.52	3.49	.83	N
9.	Developing the experiences that meet the objectives of CNC woodworking operational tasks.	3.56	3.55	3.58	3.57	.91	N
10.	Using teachable Artificial Intelligence (AI) curriculum generator for CNC woodworking machines operational tasks.	3.55	3.56	3.57	3.56	.95	N
11.	Grouping a lesson into sections for CNC woodworking machines operational tasks.	3.40	3.44	3.37	3.38	1.01	N

Keys: *$\bar{X}_1$ = Mean Responses of Woodwork Teachers, $\bar{X}_2$ = Mean Responses of Woodwork Industrial Managers, $\bar{X}_3$ = Mean Responses of Woodwork Lecturers, $\bar{X}_A$ = Average Mean Responses of all the three Respondents, SD = Standard Deviation, REM = Remark, N = Needed & NN = Not Needed.*

The result in Table 2 revealed that the respondents needed all the eleven items (1, 2, 3, 4, 5, 6, 7, 8, 9, 10 & 11) on the extent of need the instructional strategies for developing CNC woodworking machines operational task contents in technical college woodwork curriculum in Nigeria average ranging from 3.38 to 3.61. Table 2 also showed that the standard deviation of items ranges from .83 to 1.01 showing the respondents were close to another.

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Research Question 2

What are the appropriate assessment techniques for measuring the achievement of objectives of CNC woodworking machines operational task contents for inclusion into woodwork curriculum in technical colleges?

Table 3: Assessment Techniques for Measuring the Achievement of Objectives of CNC Woodworking Machines Operational Task Contents for Inclusion into Woodwork Curriculum in Technical Colleges

S/N	Items	$\bar{X}_1$	$\bar{X}_2$	$\bar{X}_3$	$\bar{X}_A$	SD	REM
1.	Adopt summative assessment technique (knowing what already known) about CNC woodworking machines operational tasks.	3.75	3.76	3.78	3.77	.93	N
2.	Apply formative assessment technique (knowing what already unknown) about CNC woodworking machines operational tasks.	3.83	3.81	3.84	3.82	.84	N
3.	Use diagnosis assessment technique (knowing if there is a gap) between CNC and conventional woodworking machines operational tasks.	3.80	3.83	3.79	3.81	.89	N
4.	Adopt benchmarking assessment technique (knowing how to compare) between CNC and conventional woodworking machines operational tasks.	3.65	3.67	3.68	3.66	.87	N
5.	Apply continual assessment technique (knowing how to track) about CNC woodworking machines operational tasks.	3.70	3.73	3.74	3.71	.82	N
6.	Adopt group discussion CNC woodworking machines operational tasks.	3.69	3.71	3.74	3.70	.83	N
7.	Use group projects and peer-based feedbacks about CNC woodworking machines operational tasks.	3.65	3.67	3.66	3.66	.89	N
8.	Scenario-based assessment and case studies about CNC woodworking machines operational tasks.	3.56	3.57	3.58	3.58	.83	N
9.	Design an effective online assessment about CNC woodworking machines operational tasks.	3.64	3.63	3.61	3.62	.89	N
10.	Set clear goals of CNC woodworking machines operational tasks, break them down into manageable tasks, utilizing metric and data, reflecting the achievements and staying accountable.	3.60	3.59	3.55	3.61	.85	N
11.	Use direct measures may include homework, quizzes, exams, reports, essays, research projects, case study analysis, and rubrics for oral and other performances.	3.77	3.79	3.76	3.75	.89	N
12.	Adopt problem-based tutorials for teaching operational task CNC woodworking machines objectives to craftsmen and then conclusion.	3.57	3.56	3.55	3.59	1.03	N

Keys: *$\bar{X}_1$ = Mean Responses of Woodwork Teachers, $\bar{X}_2$ = Mean Responses of Woodwork Industrial Managers, $\bar{X}_3$ = Mean Responses of Woodwork Lecturers, $\bar{X}_A$ = Average Mean Responses of all the three Respondents, SD = Standard Deviation, REM = Remark, N = Needed & NN = Not Needed.*

The result in Table 3 revealed that the respondents needed all the twelve items (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 & 12) on the extent need the appropriate assessment techniques for measuring the achievement of objectives of CNC woodworking machines operational

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task contents for inclusion into woodwork curriculum in technical colleges woodwork curriculum in Nigeria average ranging from 3.58 to 3.82. Table 3 also showed that the standard deviation of items ranges from .82 to 1.03 showing the respondents were close to another.

Table 4: One-Way ANOVA of Instructional Strategies for Developing CNC Woodworking Machines Operational Tasks for Inclusion into Woodwork Curriculum in Technical Colleges

Source	Sum of Squares	df	Mean Square	F	Sig. (P-Value)
Between Groups	159.434	2	.283	.280	.756
Within Groups	160.000	158	1.009		
Total	.532	160			

Source: Field Work

The result of analysis as presented in Table 4 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, 158) = .283, P (Sig.) = .756.

Table 5: One-Way ANOVA of Appropriate Assessment Techniques for Measuring Objectives of CNC Woodworking Machines Operational Tasks for Inclusion into Woodwork Curriculum in Technical Colleges

Source	Sum of Squares	df	Mean Square	F	Sig. (P-Value)
Between Groups	1.815	2	.907	1.049	.353
Within Groups	136.682	158	.865		
Total	138.497	160			

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, 158) = .907, P (Sig.) = .353.

Findings of the Study

The result of the findings revealed that:

Summary of qualitative responses as in Table 1 revealed that using CNCWMOTC about eleven themes had 89% while eight themes had 100%. Based on the stated acceptability criteria stated 70% to provide woodwork craftsmen with step-by-step outlines in the CNCWMOTC were considered as objectives of CNCWMOTC for inclusion into technical college curriculum.

1. Instructional strategies for developing CNC woodwork machines operational tasks for inclusion into technical college woodwork curriculum in Nigeria has no significant because, when tested obtained the level of significance above .05 and also, all the items needed by the woodwork teachers, woodwork industrial managers and woodwork lecturers.
2. Appropriate assessment techniques for measuring the achievement of objectives of CNC woodwork machines operational tasks for inclusion into technical college woodwork curriculum in Nigeria has no significant because, when tested obtained the level of significance above .05 and also, all the items needed by the woodwork teachers, woodwork industrial managers and woodwork lecturers.
3. There was no significant in the research question one indicating the level of significant at .031 (P>0.05) on hypothesis testing on the instructional strategies for developing CNC woodworking machines operational tasks for inclusion into technical colleges woodwork curriculum.
4. There was no significant in the research question two indicating the level of significant at .353 (P>0.05) on hypothesis testing on the appropriate assessment techniques for measuring the achievement

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of objectives of CNC woodworking machines operational tasks for inclusion into technical colleges woodwork curriculum.

The results of the study revealed that woodwork teachers, woodwork industrial managers and woodwork lecturers needs objectives of CNC woodworking machines operational tasks for inclusion into technical college woodwork curriculum for delivery of practical lesson together with their students. Mean responses of the respondents are needed as appropriate because in all items ranges are from 2.50 and above. The results of the study revealed that woodwork teachers, woodwork industrial managers and woodwork lecturers needs instructional strategies for developing CNC woodworking machines operational tasks for inclusion into technical college woodwork curriculum for delivery of practical lesson together with their students. Mean responses of the respondents are needed as appropriate because in all items ranges are from 2.50 and above. Moreover, the responses needed because there was no significant difference in the mean responses as indicated on the hypotheses with p-value less than the level of significance (P>0.05), the significant level at .031.

The results of the study revealed that woodwork teachers, woodwork industrial managers and woodwork lecturers needs appropriate assessment techniques for measuring objectives of CNC woodworking machines operational tasks for inclusion into technical college woodwork curriculum for delivery of practical lesson together with their students. Mean responses of the respondents are needed as appropriate because in all items ranges are from 2.50 and above. Moreover, the responses needed because there was no significant difference in the mean responses as indicated on the hypotheses with p-value less than the level of significance (P>0.05), the significant level at .353.

These findings are in line with Sa'idu (2023) that developed electronic braking systems troubleshooting and maintenance manual for automobile craftsmen in Nigeria. The population for the study was 174 consisting of 56 teaching, non-teaching Subject Matter Experts (SMEs) and 75 automobile craftsmen (48 males and 27 females) consisting the right kind of interviewing protocol, making reference to auto mechanics industries or workshops in using electronic braking systems and troubleshooting for craftsmen.

These findings agreed with findings of Olelewa and Okwor (2017) that using Information and Communication Technology (ICT) supported procedures for teaching enhances learning feedbacks of students and make the delivery of practical lesson simpler for teachers. The implication of the findings is that, woodwork teachers, woodwork industrial managers and woodwork lecturers were deficient in operational tasks using CNC woodworking machines approaches and relevant resources that could support CNC woodworking machines of woodwork courses to students in all technical colleges offering NTC programme.

Conclusion

The aim of this study was to develop the CNC woodworking machines operational tasks for inclusion into technical college woodwork curriculum. The two research questions were designed for study on how to operate CNC woodworking machines as: ripping, cross-cutting, mitre-cutting, rebating, grooving, chamfering, routing, carving, trenching, drilling, and turning, among others for efficient and effective in the practical skills lesson. Based on the findings of the study, the interview criteria shown determine the main objectives of CNCWMOTC in the case of qualitative design, while in the qualitative design, the mean responses of the three groups of respondents shows the need to develop CNC woodworking machines operational tasks (that is, for all the two research questions) all items needed from the whole respondents.

There was no significant in the research question one indicating the level of significant at .031 (P>.05) on hypothesis testing on the instructional strategies for developing of CNC woodworking machines operational tasks. There was no significant in the research question two indicating the level of significant at .353 (P>.05) on hypothesis testing on the appropriate assessment techniques for measuring objectives of CNC woodworking machines operational tasks.

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The study will contribute to the knowledge on how to operate CNC woodworking machines by woodwork teachers, woodwork craftsmen, woodwork teachers, woodwork industrial managers, woodwork lecturers and among others in the process of carrying-out CNC woodworking machines operational tasks as: ripping, cross-cutting, mitre-cutting, rebating, trenching, grooving, chamfering, routing, drilling, turning, carving and among others. Secondly, the study will contribute to the study on how to get accurate and minimize demand of supervision from the woodwork teachers, woodwork industrial managers and woodwork lecturers. Thirdly, the study will contribute on producing quality goods and services using CNC woodworking machines operational tasks. Fourthly, the study will contribute produce competent, confident and reliable woodwork craftsmen, woodwork teachers, and woodwork industrial managers and among others and fifthly, the study will contribute to the woodwork craftsmen, woodwork teachers, woodwork industrial managers and woodwork lecturers that can resolve job-related problems.

Recommendations

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

1. Woodwork teachers should develop instructional strategies for CNC woodworking machines operational tasks for training woodwork craftsmen, and
2. Woodwork teachers should adopt appropriate assessment techniques for measuring the achievement of objectives of CNC woodworking machines operational tasks while included into technical college woodwork curriculum by NBTE.

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