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Research Paper

Optimizing Employable, Technical and Organizational skills in Computer Numerical Control Machining in Northern Nigeria

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Abstract
The paper studied optimizing employable, technical and organizational skills in Computer Numerical Control Machining in Northern Nigeria. The study adopted a survey research design. The study was carried out in Northern Nigeria. The population for this study was 144 Computer Numerical Control Machine operators. The entire population was used. The instruments used for data collection was a structured questionnaire developed by the researcher based on literature. The instrument for data collection was validated by three experts. Two experts were from the Department of Industrial Technical Education, University of Nigeria, Nsukka and one CNC operation supervisor in Scientific Equipment Development Institute (SEDI) Enugu State. The instrument was trial tested on twenty machine tool operators in Industrial Training Fund (ITF) Skills Acquisition Training Centre Jos. The collected data were analyzed using Cronbach Alpha coefficient which yielded 0.87. For answering research questions, any item with a mean response of 2.50 and above was considered as Agree while any item with mean below 2.50 was regarded as Disagree. For testing the null hypothesis, any item with significant level of 0.05 and below was considered significant while any item with significant level above 0.05 was considered not significant. The study found 37 optimizing employable skills in computer numerical control machining and 19 optimizing technical skills in computer numerical control machining. The study also found that there is no significant difference between the mean responses of experienced and less experienced industrial workers on 31 items representing 83.8%, of optimizing employable skills and 17 items representing 89.5% of optimizing technical skills in Computer Numerical Control machining in metalwork industries. The study recommended that, metal machining industrial workers should improve their skills in translation of ideas into actions. Besides the study recommended that: teachers of machining should emphasize skills in computing and verifying dimensions, sizes, shapes, and tolerances of work pieces during instructions.
Keywords: *Optimization, Employable skills, Technical and Organizational skills*

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I. INTRODUCTION

Metal Machining refers to controlled material-removal process in which a material is cut into a desired final shape and size. To change the metal from original shape and size, machining has experienced tremendous changes. These changes have posed serious challenges in metal machining as it strive to achieve its fundamental goal of preparing and processing all aspects of industrial facilities and the world of work. Metal Machining involve the process such as abrading, cutting, drilling, forming, grinding, or shaping of a piece of metal by machine tools such as lathes, power saws, and presses. According to Girsang, Circle, and Dhupia, (2016) machining operations are among the most versatile and accurate manufacturing processes in terms of its capability to produce diverse and complex geometric features for industrial uses. Metal machining is very complicated process for manufacturing shapes with many features; over a large size range, cheaply, quickly by controlling the path of cutting tool. The operation processes avoids investing considerable time and cost in making a dedicated moulding, forming or die casting tool. Leopold, (2014) stated that the most emerging needs

of the modern metal cutting operation is to increase the material removal rate with better surface finish, high machining accuracy and acceptable tool life. Hence, metal machining is an effective, versatile and accurate making of metals for effective optimization.

Optimization refers to the process of making the most effective use of available resource. Das, Nayak and Dbupal (2012) stated that processes of optimization include modeling of input, output method, parameters relationship and determination of optimal cutting conditions. According to Mukherjee and Ray (2016) optimization is a processes of using metal resources considered to be a vital tool for continual improvement of output quality in products. Petkovic and Radovanovic (2013) stated that machining optimization provides best or near-optimal solutions in actual metal cutting process for a perfect finishing of computerized metal product. Optimization has great significance in both human affairs and the laws of nature which is the inherent characteristic to achieve the best from machining situation (Kulkarni and Abraham, 2017). Thus optimization is the process of achieving the best prescribed solutions with application of computer operations.

Computer is a programmable electronic device designed to accept data, perform prescribed mathematical and logical operations accurately at high speed, and display the results of these operations. Computer is an electronic device that accepts user input and processes it under the influence of instructions referred to as programs to produce desired output for workers (Mugivane, 2014). Adebisi (2013) stated that the invention of computer in industries has transformed our simple manual works to meet the global demand for the higher productivity and increased efficiency with high precision. Metal industrial workers are expected to input data use information from the computer to produce better products at commercial quantities with little or no stress skillfully. Metal industrial workers need skills to use computers extensively in all types of manufacturing in product design, logistics, personnel management, and especially automation of machinery in a metal industry. (Andersen, 2016). Computer is a programmable device designed to carry out logical operations and manufacture superior parts by metal industrial workers.

Metal industrial workers are expected to input data and use computer to manufacture superior parts profitably without tension. Adebisi (2013) stated that the invention of computer in industries has transformed our simple manual works to sophisticated life of automated works to meet the global demand for the higher productivity and increased efficiency with high precision. Metal industrial workers lack skills that are used to operate computers in product design, manufacture logistics, personnel management, and automation of machinery. Metalwork industrial workers found themselves redundant in the transformation process in the present days of computer era. (Andersen 2016). Hence, computer as a device is used in industry to transform operations by automation of machinery as in computer numerical control machining.

Computer Numerical Control Machine is reefed to as automated operation of a machine by computer program. According to Innovative Creative (IC) (2009) Computer Numerical Control is a means of operating a machine through the use of discreet numerical values fed into the machine where the required input technical information is stored on kind of input media such as floppy disk, hard disk, CD ROM, DVD flash drive or ram used in computer operations. Sarhan (2014) stated that Computer Numerical Control (CNC) has brought tremendous changes to the metalworking industry. These changes in metal industry necessitate update knowledge and skills. According to Karr, Gill and Smid (2000) the ever-increasing use of CNC in industry has created a need for personnel to acquire knowledge and skills so as to be capable of preparing the programme, graphics and codes which guide the machine tools to produce parts to the required shape and accuracy. Consequently, computer numerical control machine and software programmed that operated machine tool that requires special skills for setting-up of operation in an organization or industry.

Industries are group of productive enterprises or organizations that process and supply goods and services, from unprocessed materials to finish metal products. Metal industries primarily concerned with metallurgy and metalworking. According to the European Commission (2019) metal industries process both ferrous and non-ferrous metals such as aluminum, copper, and zinc, steel which are important to human life. Bamidele and Aladoye (2014) stated that the iron and steel industry is very important and its factors of production incorporate a large proportion of a country's energy, minerals and labors. Despite their importance, metal industries face numerous challenges in the machining process. According to Awale and Inamdar (2015) the challenge of modern machining industries is mainly focused on achieving high commercial quality, in term of component accuracy, high production rate and high metal removal rate. The industries necessitate the improvement of existing technology and development of modern machine tools. Through the use of modern machining, experienced workers produce accurate parts.

Worker refers to a person who does a specified type of work or who works in a specified way. Workers training and experience provide abilities and skills to carryout responsibilities effectively. According to Moir (2015) effective skill is acquired abilities to accomplish action toward achieving a specific goal. Organisation for Economic Co-operation and Development (OECD) (2012) stated that for skills to retain their value, needs to be continuous developed throughout life as individuals lose the skills they do not use. Stephen and Assumpta (2018) also stated that skills are the abilities derived from learning or training which facilitates individual

employability in a metal industry particularly skills in numerical control. Hence, industrial workers need skills training equip them with employable purposes to perform work effectively.

Employable skills refer to skills employers needs for employment purposes. According to Anwar et al., (2018) employable skills are generic and particular skills which employers look for in a potential employee for employment are specific. These specific skills equip the employees to carry out their role to the best of their ability and client satisfaction. Forrier and Sels (2003) stated that employability skills are the ability to maintain employment and make transitions between jobs and roles within the same organization to meet the job requirements. Employable skills are generic in nature rather than job specific and cut across all industries, businesses and job levels (Gurcharan and Garib, 2008). In view of this, employability skills are generic abilities needed by metal industries in employing and developing experienced people with technical skills that are acquired through training and experience.

Technical skills refer to practical experience and knowledge acquired to accomplish particular task. According to Doyle (2019) technical skills are the abilities and knowledge needed to perform specific tasks accurately within a specific time. Petersen (2018) stated that technical skill reflects the ability to understand and carry out a specific task or series of tasks, in the workplace. The technical skills are associated with critical competencies and workers need to develop these skills not at one task by chance but on continuous bases to meet the challenges in the world of work (Accenture, 2017). Hence, technical skills are workers abilities to carry out organized skilled tasks under that aimed at achieving projected goal.

Organization skills mean the abilities to use time, energy and resources in an effective way in order to achieve an intended goal. According to Doyle (2019) organizational skills are the abilities to keep work organized, allows workers to focus on different projects without getting lost, thereby increasing productivity and efficiency in the workplace. The ability to keep the projects not getting lost and to increase productivity and efficiency in the workplace become necessary. Organizational skills are a needed component to ensure success in completing a task (Davis, 2007). Organizational skills are learned before and on the job with specific few organizational patterns that will build employees attitudinal skills over time (Gambill and Christie 2008). Thus, talented employees possessed both organization and attitudinal skills for optimal working abilities in a metal industry.

Optimizing operational skills is the improvement of working abilities of operators which enable them to work with modern machineries. According to Depinet, Mac Alpine and Stone (2014) improvements in optimization processes, remains a challenge. The starting point and seed of optimization is skill learning. Industrial workers skills to operate newer machine tools to produce the specified parts within the required tolerances and accuracy using computerized machines are lacking.

Statement of the Problem

Industrial workers are expected to work in industries to render services and manufacture products, specify parts by shapes and sizes for metal industries. The workers are expected to be skilled, knowledgeable and be organized to stand the test of digital world computerization. The workers are expected to possess current employable, technical and organizational skills which will enable them to perform any type of machining operation including Computer numerical machining in metal industries.

Unfortunately, current rapid technological changes, modern machine tools are computer based operated. Industrial workers in Northern Nigeria lack adequate skills to handle computer let alone Computer Numerical Control machine tools. This is due to the fact that the workers attend different institutions and possessed different skills and experience. Some of the skills possessed by workers at graduating from training institutions became obsolete while others need updating.

The shortage of skills in computer numerical machine tools operation has therefore created a loophole and a huge gap in the execution of machining in the industries. At present, there appears to be obvious incompetence among the industrial workers as they lack optimized skills to operate computer numerical control machine tools effectively and efficiently. This creates a gap in knowledge and poses the problem of this study. Hence there is need to determine, optimizing employable, technical and organizational skills in computer numerical control machining in Northern Nigeria.

Research Questions

The following research questions guided the study:

1. What are the optimizing employable skills in Computer Numerical Control machining in metalwork industries?
2. What are the optimizing technical skills in Computer Numerical Control machining in metalwork industries?
3. What are the optimizing organization skills in Computer Numerical Control machining in metalwork industries?

Hypotheses

The following null hypotheses guided the study:

Ho_1: There is no significant difference between the responses of experienced and less experienced industrial workers on optimizing employable skills in Computer Numerical Control machining in in Northern Nigeria.

Ho_2: There is no significant difference between the responses of experienced and less experienced industrial workers on optimizing technical skills in Computer Numerical Control machining in metalwork industries in in Northern Nigeria.

Ho_3: There is no significant difference between the responses of experienced and less experienced industrial workers on optimizing organization skills in Computer Numerical Control machining in in Northern Nigeria.

II. METHODOLOGY

The study adopted a survey research design. The study was carried out in Northern Nigeria. The population for this study was made of 144 machine tools operators. There was no sampling adopted. The instruments used for data collection was a structured questionnaire developed by the researcher based on literature. The instrument for data collection was validated by three experts. Two experts were from the Department of Industrial Technical Education, University of Nigeria, Nsukka and one CNC operation supervisor in Scientific Equipment Development Institute (SEDI) Enugu State. The instrument was trial tested on twenty machine tool operators in Industrial Training Fund (ITF) Skills Acquisition Training Centre in Kano. The collected data were analyzed using Cronbach Alpha coefficient which yielded 0.87. For answering research questions, any item with a mean response of 2.50 and above was considered as Agree while any item with mean below 2.50 was regarded as Disagree. For testing the null hypothesis, any item with significant level of 0.05 and below was considered significant while any item with significant level above 0.05 was considered not significant.

III. RESULTS

Research Question 1

What are optimizing employable skills in Computer Numerical Control machining in metalwork industries?

The data for answering research question 1 were presented in Table 1

Table 1

Mean and Standard Deviation of Respondents' Responses on Optimizing Employable Skill in Computer Numerical Control machining in Metalwork Industries in Northern Nigeria

S/No.	Optimizing Employable Skills in CNC Machining	$\bar{X}$	SD	Decision
	Ability to:			
1	develop strategic, creative, long term vision	2.94	0.74	Agree
2	establish clear project goals and deliverables	3.10	0.51	Agree
3	evaluate and monitor own performance	2.90	0.77	Agree
4	have knowledge and confidence in own ideas and visions	2.98	0.69	Agree
5	establish and maintain personally challenging, but realistic work goals	3.06	0.72	Agree
6	effectively change plans, goals, actions or priorities to deal with changing situations	2.94	0.66	Agree
7	manage priorities and setting time lines	2.99	0.61	Agree
8	coordinate tasks for self and others	2.99	0.67	Agree
9	predict upcoming risk	3.04	0.64	Agree
10	allocate people and other resources to tasks	2.94	0.66	Agree
11	evaluate alternatives and apply evaluation criteria	2.85	0.76	Agree
12	adapt to new situations	3.04	0.74	Agree
13	demonstrate willingness to work and seek out new work challenges	3.06	0.68	Agree
14	pursue work with energy, drive and effort to accomplish tasks	3.04	0.74	Agree
15	strive to reach standards and expectations	2.91	0.70	Agree
16	be creative and resourceful	3.56	0.56	Agree
17	identify opportunities not obvious to others	3.09	0.67	Agree
18	translate ideas into actions	3.13	0.69	Agree
19	initiate innovative solutions	3.05	0.67	Agree
20	identify and suggest new ideas to get the job done	2.91	0.71	Agree
21	treat others with honesty, fairness and respect	3.00	0.60	Agree
22	demonstrate respect for industry's property	3.22	0.66	Agree
23	accept responsibility for one's decisions and actions	3.05	0.70	Agree
24	behave consistently, predictably and reliably	2.89	0.69	Agree
25	fulfill obligations, complete assignments	2.93	0.73	Agree
26	follow written and verbal instructions	3.02	0.65	Agree
27	comply with organization's rules, policies and procedures	3.07	0.64	Agree
28	demonstrate regular in attendance	3.15	0.66	Agree
29	display the capability to adapt to new, different or changing requirements	3.06	0.56	Agree
30	learn and consider new ways of doing things	3.46	0.62	Agree

31	embrace new approaches when appropriate and discard approaches that are no longer working	3.06	0.50	Agree
32	understand written sentences and paragraphs in work-related documents	3.03	0.72	Agree
33	apply basic scientific principles to solve problems and complete tasks	2.99	0.67	Agree
34	have fundamental knowledge of the organization and the industry	2.97	0.58	Agree
35	understand the significance of maintaining a healthful and safe environment	3.00	0.68	Agree
36	understand and anticipate customer needs	2.92	0.63	Agree
37	evaluate customer or client satisfaction	3.08	0.64	Agree

The data presented in Table 1 revealed that 37 optimizing employable skills in Computer Numerical Control machining have their mean value ranging from 2.85 to 3.56. This showed that the mean value of each item is above 3.50, indicating that the respondents agree with all the 37 skills as optimizing employable skills in metalwork industries. The table also showed that the standard deviations (SD) of the items are within the range of 0.50 to 0.77. This indicated that the respondents were not very far from the mean of one another in their responses.

Research Question 2

What are the optimizing technical skills in Computer Numerical Control machining in metalwork industries?
The data for answering research question 1 were presented in Table 2

Table 1

Mean and Standard Deviation of Respondents' Responses on Optimizing Technical Skills in Computer Numerical Control Machining in Metalwork Industries in Northern Nigeria

S/No	Optimizing Technical Skills in CNC Machining	$\bar{X}$	SD	Decision
	Ability to:			
1	observe workshop safety rules and regulations	2.96	0.69	Agree
2	understand common computer terminology	3.08	0.47	Agree
3	use scroll bars, a mouse and dialog boxes to work within the computer operating systems	3.00	0.69	Agree
4	access and switch between applications and files of interest	2.92	0.57	Agree
5	manage computer software inventory	2.92	0.68	Agree
6	use keyboard appropriately	3.01	0.64	Agree
7	create programs using a manufacturing modeling software Packages	2.99	0.60	Agree
8	recognize the computer numerical control codes	3.06	0.70	Agree
9	programme the code for the CNC machine tool from the data	2.99	0.67	Agree
10	use coding languages to translate instructions into commands that enable the machines to perform the correct function	2.94	0.68	Agree
11	use the principles of cartesian coordinates to develop program for the manufacture of a simple part	3.05	0.63	Agree
12	demonstrate CNC turning operations and operate a CNC lathe machine	3.49	0.54	Agree
13	generate a process and programme with a CAD/CAM system	3.01	0.61	Agree
14	describe the functions and use of basic G and M codes	3.07	0.71	Agree
15	identify coordinates on a blueprint with respect to an origin	2.99	0.68	Agree
16	write NC/CNC program in standard code format	3.03	0.65	Agree
17	use the computer numerical control codes to write programmes	2.97	0.70	Agree
18	edit NC/CNC program checking parts or products for conformance to specifications	2.95	0.62	Agree
19	compute and verify dimensions, sizes, shapes, and tolerances of work pieces	3.18	0.65	Agree

The data presented in Table 2 revealed that 19 optimizing technical skills in Computer Numerical Control machining have their mean values ranging from 2.92 to 3.49. This showed that the mean value of each item is above 2.50, indicating that the respondents agree with all the 19 items as optimizing technical skills in computer numerical control machining in metalwork industries. The table also showed that the standard deviations (SD) of the items are within the range of 0.47 to 0.71. This indicated that the respondents were not very far from the mean of one another in their responses.

Research Question 3

What are the optimizing organization skill needs in Computer Numerical Control machining in metalwork industries?
The data for answering research question 3 were presented in Table 6

Table 3

Mean and Standard Deviation of Respondents' Responses on Optimizing Organization Skills in Computer Numerical Control Machining in Metalwork Industries in Northern Nigeria

S/No	Optimizing Organizational Skills in CNC Machining	$\bar{X}$	SD	Decision
	Ability to:			
58	plan and prioritize work	3.03	0.67	Agree
59	manage time effectively and accomplish assigned tasks	2.96	0.53	Agree
60	plan and schedule tasks for completion of work	2.83	0.75	Agree
61	demonstrate the effective allocation of time and resources efficiently	3.49	0.65	Agree
62	take necessary corrective actions when projects go off track	2.88	0.67	Agree
63	clean work area at the end of each day	3.00	0.67	Agree
64	set up an operating room	3.10	0.71	Agree
65	prepare instruments for an operating list	3.06	0.66	Agree
66	work at a pace that can be sustain	2.97	0.67	Agree
67	do what can be managed	2.99	0.72	Agree
68	be proactive rather than reactive	3.10	0.68	Agree
69	take breaks when needed	3.06	0.74	Agree
70	ask for help when needed	2.94	0.63	Agree
71	manage self always	3.05	0.71	Agree
72	prioritize industrial regulations	3.11	0.68	Agree
73	set goals periodically	2.96	0.82	Agree
74	prepare related tasks	3.07	0.65	Agree
75	be autonomous on personal schedule	2.99	0.68	Agree
76	put back items to their places after use	3.03	0.59	Agree
77	create physical solutions and strategies for facilitating workflow.	3.19	0.64	Agree

The data presented in Table 3 revealed that 20 the optimizing organizational skills in Computer Numerical Control machining have their mean value ranging from 2.83 to 3.49. This showed that the mean value of each item is above 3.50, indicating that the respondents agree with the 26 skills as optimizing organizational skills in metalwork industries. The table also showed that the standard deviations (SD) of the items are within the range of 0.53 to 0.82. This indicated that the respondents were not very far from the mean of one another in their responses.

Hypothesis 1

There is no significant difference between the mean responses of experienced and less experienced metalworkers on optimizing employable skills in Computer Numerical Control machining in metalwork industries in Northern Nigeria.

Table 4

T-test of the Mean Responses of Experienced and Less Experienced Metalworkers on the Optimizing Employable Skills in Computer Numerical Control Machining in Metalwork Industries in Northern Nigeria

$N_1=53$ $N_2=91$

S/No.	Optimizing Employable Skills in CNC Machining	$\bar{X}_1$	SD_1	$\bar{X}_2$	SD_2	Sig.	Decision
	Ability to:						
1	develop strategic, creative, long term vision	3.00	0.73	2.91	0.74	0.49	NS
2	establish clear project goals and deliverables	3.17	0.47	3.01	0.53	0.07	NS
3	evaluate and monitor own performance	3.08	0.73	2.80	0.78	0.04	S
4	have knowledge and confidence in own ideas and visions	3.11	0.64	2.90	0.72	0.08	NS
5	establish and maintain personally challenging, but realistic work goals	3.11	0.72	3.04	0.72	0.52	NS
6	effectively change plans, goals, actions or priorities to deal with changing situations	3.09	0.60	2.86	0.68	0.04	S
7	manage priorities and setting time lines	2.94	0.69	3.01	0.57	0.53	NS
8	coordinate tasks for self and others	2.94	0.60	3.02	0.71	0.50	NS
9	predict upcoming risk	3.04	0.68	3.04	0.61	0.96	NS
10	allocate people and other resources to tasks	3.00	0.55	2.90	0.72	0.36	S
11	evaluate alternatives and apply evaluation criteria	2.91	0.69	2.82	0.80	0.54	NS
12	adapt to new situations	3.04	0.83	3.03	0.69	0.97	NS
13	demonstrate willingness to work and seek out new work challenges	3.19	0.68	2.98	0.67	0.07	NS
14	pursue work with energy, drive and effort to accomplish tasks	3.11	0.80	3.00	0.70	0.38	NS
15	strive to reach standards and expectations	2.96	0.71	2.88	0.71	0.49	NS
16	be creative and resourceful	3.58	0.53	3.54	0.58	0.64	NS
17	identify opportunities not obvious to others	2.98	0.72	3.15	0.63	0.14	NS
18	translate ideas into actions	3.06	0.66	3.18	0.71	0.32	S

19	initiate innovative solutions	3.19	0.65	2.97	0.67	0.06	NS
20	identify and suggest new ideas to get the job done	3.02	0.72	2.85	0.70	0.16	NS
21	treat others with honesty, fairness and respect	3.00	0.62	3.00	0.60	1.00	NS
22	demonstrate respect for industry's property	3.13	0.65	3.27	0.67	0.21	NS
23	accept responsibility for one's decisions and actions	3.09	0.71	3.02	0.70	0.55	NS
24	behave consistently, predictably and reliably	2.91	0.86	2.88	0.57	0.83	NS
25	fulfill obligations, complete assignments	3.11	0.75	2.82	0.69	0.02	S
26	follow written and verbal instructions	2.91	0.63	3.09	0.66	0.11	NS
27	comply with organization's rules, policies and procedures	3.23	0.64	2.98	0.63	0.03	S
28	demonstrate regular in attendance	3.21	0.72	3.12	0.63	0.45	NS
29	display the capability to adapt to new, different or changing requirements	3.09	0.53	3.03	0.59	0.53	NS
30	learn and consider new ways of doing things	3.47	0.72	3.45	0.56	0.85	NS
31	embrace new approaches when appropriate and discard approaches that are no longer working	3.08	0.55	3.04	0.47	0.72	NS
32	understand written sentences and paragraphs in work-related documents	3.00	0.73	3.05	0.72	0.66	NS
33	apply basic scientific principles to solve problems and complete tasks	3.13	0.71	2.90	0.63	0.05	NS
34	have fundamental knowledge of the organization and the industry	3.02	0.57	2.95	0.58	0.46	NS
35	understand the significance of maintaining a healthful and safe environment	3.04	0.73	2.98	0.65	0.61	NS
36	understand and anticipate customer needs	2.89	0.64	2.93	0.63	0.67	NS
37	evaluate customer or client satisfaction	3.17	0.61	3.02	0.65	0.18	NS

Key: $\bar{X}_1$ = Mean of Less Experienced Metal Workers **Sig.** = Sig. (2-tailed)
$\bar{X}_2$= Mean of Experienced Metal Workers **SD_1**=Standard Deviation of Less Experienced Metal Workers **SD_2**=Standard Deviation of Experienced Metal Workers **N_1** = Number of Less Experienced Metal Workers
N_2 = Number of Experienced Metal Workers

Data presented in Table 4 revealed that items 1, 2, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 ,21, 22, 23, 24, 26, 28, 29, 30, 31, 32, 33, 34, 35, 36 and 37 have their Sig. (2-tailed) ranging from 0.05 to 0.85. This indicated that there is no significant difference between the mean responses of experienced and less experienced metal industrial workers on Optimizing Employable Skills in metalwork industries in Northern Nigeria on these items. Items 3, 6, 25 and 27 have their Sig. (2-tailed) less than 0.05. This indicated that, there is significant difference between the mean responses of metalwork industrial workers in those items.

Hypothesis 2
There is no significant difference between the mean responses of experienced and less experienced metalworkers on optimizing technical skills in Computer Numerical Control machining in metalwork industries in Northern Nigeria.

Table 5
T-test of the Mean Responses of Experienced and Less Experienced Metalworkers on the Optimizing Technical Skills in Computer Numerical Control Machining in Metalwork Industries in Northern Nigeria
N_1=53 N_2=91

S/No.	Optimizing Technical Skills in CNC Machining	$\bar{X}_1$	SD_1	$\bar{X}_2$	SD_2	Sig.	Decision
	Ability to:						
1	observe workshop safety rules and regulations	2.87	0.68	3.01	0.69	0.23	NS
2	understand common computer terminology	3.17	0.47	3.02	0.47	0.07	NS
3	use scroll bars, a mouse and dialog boxes to work within the computer operating systems	3.15	0.63	2.91	0.71	0.05	NS
4	access and switch between applications and files of interest	3.00	0.62	2.88	0.53	0.22	NS
5	manage computer software inventory	3.09	0.63	2.82	0.66	0.02	S
6	use keyboard appropriately	3.00	0.62	3.01	0.66	0.92	NS
7	create programs using a manufacturing modeling software Packages	2.87	0.59	3.05	0.60	0.07	NS
8	recognize the computer numerical control codes	3.15	0.69	3.01	0.71	0.25	NS
9	programme the code for the CNC machine tool from the data	2.87	0.65	3.05	0.67	0.11	NS
10	use coding languages to translate instructions into commands that enable the machines to perform the correct function	3.15	0.72	2.82	0.63	0.01	S
11	use the principles of cartesian coordinates to develop program for the manufacture of a simple part	3.13	0.68	3.00	0.60	0.23	NS

12	demonstrate CNC turning operations and operate a CNC lathe machine	3.45	0.61	3.50	0.50	0.58	NS
13	generate a process and programme with a CAD/CAM system	3.09	0.60	2.96	0.61	0.19	NS
14	describe the functions and use of basic G and M codes	3.09	0.69	3.05	0.72	0.75	NS
15	identify coordinates on a blueprint with respect to an origin	2.92	0.65	3.02	0.70	0.41	NS
16	write NC/CNC program in standard code format	2.96	0.68	3.08	0.64	0.31	NS
17	use the computer numerical control codes to write programmes	2.89	0.75	3.02	0.67	0.27	NS
18	edit NC/CNC program checking parts or products for conformance to specifications	3.02	0.69	2.91	0.57	0.32	NS
19	compute and verify dimensions, sizes, shapes, and tolerances of work pieces	3.13	0.68	3.21	0.64	0.50	NS

Key: $\bar{X}_1$ = Mean of Less Experienced Metal Workers **Sig.** = Sig. (2-tailed)
$\bar{X}_2$= Mean of Experienced Metal Workers **SD_1**=Standard Deviation of Less Experienced Metal Workers **SD_2**=Standard Deviation of Experienced Metal Workers **N_1** = Number of Less Experienced Metal Workers
N_2 = Number of Experienced Metal Workers

Data presented in Table 4 revealed that items 1, 2, 3, 4, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18 and 19 have their Sig. (2-tailed) values ranging from 0.05 to 0.92. These values are greater than or equal to 0.05. This indicated that there is no significant difference between the mean responses of less experienced and experienced metal industrial workers on optimizing technical skills in computer numerical control machining in metalwork industries on these items. Items 5 and 10 have their Sig. (2-tailed) values less than 0.05. This indicated that there is significant difference between the mean responses of less experienced and experienced metalwork industrial workers on optimizing technical skills in computer numerical control machining on these items.

Hypothesis 3

There is no significant difference between the mean responses of experienced and less experienced metalworkers on optimizing organization skills in Computer Numerical Control machining in metalwork industries in Northern Nigeria.

Table 6
T-test of the Mean Responses of Experienced and Less Experienced Metalworkers on the Optimizing Organization Skills in Computer Numerical Control Machining in Metalwork Industries in Northern Nigeria

N_1=53 N_2=91

S/No.	Organizational Skills in CNC Machining	$\bar{X}_1$	SD_1	$\bar{X}_2$	SD_2	Sig.	Decision
	Ability to:						
58	plan and prioritize work	3.11	0.72	2.99	0.64	0.29	NS
59	manage time effectively and accomplish assigned tasks	2.91	0.56	2.99	0.51	0.36	NS
60	plan and schedule tasks for completion of work	2.79	0.82	2.85	0.71	0.68	NS
61	demonstrate the effective allocation of time and resources efficiently	3.42	0.80	3.54	0.54	0.27	NS
62	take necessary corrective actions when projects go off track	2.94	0.60	2.85	0.71	0.39	NS
63	clean work area at the end of each day	3.02	0.77	2.99	0.61	0.80	NS
64	set up an operating room	3.25	0.65	3.01	0.74	0.06	NS
65	prepare instruments for an operating list	2.98	0.64	3.11	0.67	0.26	NS
66	work at a pace that can be sustain	3.04	0.68	2.93	0.66	0.37	NS
67	do what can be managed	3.13	0.62	2.90	0.76	0.06	NS
68	be proactive rather than reactive	3.11	0.78	3.09	0.63	0.84	NS
69	take breaks when needed	3.09	0.66	3.03	0.78	0.63	NS
70	ask for help when needed	2.98	0.66	2.91	0.61	0.53	NS
71	manage self always	3.09	0.63	3.02	0.76	0.56	NS
72	prioritize industrial regulations	3.13	0.62	3.10	0.72	0.80	NS
73	set goals periodically	3.15	0.86	2.85	0.77	0.03	S
74	prepare related tasks	3.08	0.73	3.07	0.61	0.93	NS
75	be autonomous on personal schedule	2.96	0.62	3.01	0.72	0.68	NS
76	put back items to their places after use	2.98	0.60	3.05	0.58	0.47	NS
77	create physical solutions and strategies for facilitating workflow	3.17	0.61	3.21	0.65	0.80	NS

Key: $\bar{X}_1$ = Mean of Less Experienced Metal Workers **Sig.** = Sig. (2-tailed)
$\bar{X}_2$= Mean of Experienced Metal Workers **SD_1**=Standard Deviation of Less Experienced Metal Workers **SD_2**=Standard Deviation of Experienced Metal

Workers $\mathbf{N_1}$ = Number of Less Experienced Metal Workers
$\mathbf{N_2}$ = Number of Experienced Metal Workers
Data presented in Table 6 revealed that items 138, 139, 140 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 152 , 154, 155, 156 and 157 have their Sig. (2-tailed) ranging from 0.06 to 0.93. This indicated that there is no significant difference between the mean responses of experienced and less experienced metal industrial workers on optimizing organization skills in metalwork industries in Northern Nigeria on these items. Item 153 have its Sig. (2-tailed) less than 0.05 indicating that there is significant difference between the mean responses of metalwork industrial workers in this item.
Findings of the study based on the data obtained were:
1. List of 37 optimizing employable skills in Computer Numerical Control Machining was identified.
2. The study identified 19 technical skills in Computer Numerical Control Machining.
3. The study identified 19 optimizing organizational skills in Computer Numerical Control machining in metalwork industries.

IV. DISCUSSION OF FINDINGS

The discussion of the findings is organized according to the research questions and the hypotheses that guided the study.

The findings of this research work relating to research question one revealed 37 items relating to optimizing employable skills in computer numerical control machining. These optimizing employable skills include: be creative and resourceful, translate ideas into actions, demonstrate respect for industry's property, demonstrate regular in attendance, and learn consider new ways of doing things. This signifies a consensus of opinion among the experienced and less experienced industrial workers in metal industries. This agreement was an indication that acquisition of these skills will enable the industrial workers to have optimum skills that will empower them to work effectively in the modern industries. These findings are consistent with that of Naanda (2012) that studied the integration of identified employability skills into vocational education and training curriculum and found out that coping with multiple tasks as the most important skills they required from vocational training centre graduates.

The findings relating to research question two revealed that 19 optimizing technical skills in computer numerical control machining. These skills include: demonstrate CNC turning operations and operate a CNC lathe machine, understand common computer terminology, compute and verify dimensions, sizes, shapes, and tolerances of work pieces and observe workshop safety rules and regulations. This means that all experienced and less experienced industrial workers agree with all the items as the optimum technical skills required by industrial workers. These finding are similar with that of Ehimen and Ezeora (2018) who studied metalwork practice skills needed by technical college graduates for sustainable employment and found out that that technical college graduates needed skills to identify symbols, to use measuring instruments and read blue print. The findings are consistent with Sini and Hamzat (2018) that studied safety practice skills required by metalwork students of colleges of education for effective operation in the workshop and identify safety skills as essentials in metal workshops. These findings are in line with Akegbejo (2016) who studied metalwork skills needed by technical college students for self-reliance and found that technical college students needed skills to identify symbols, to use measuring instrument, read blue print in gas joining and arc cutting. Similarly, Abas-Mastura, Imam, and Osman (2013) who carried out a study on employability skills and task performance of employees in government sector and revealed that skill acquisition and skill competence had significant positive relationship to task performance. The acquisition and competence on employability skills valued by employers require continuous enhancement to succeed in job performance. In the same vein, Yahya and Iskandar (2017) carried out a study on technical skills and employability skills of vocational high school students and found out that the technical skills and employability skills can be developed through the implementation of a scientific approach.

The findings relating to research question 3 revealed 19 optimizing organization skills in computer numerical control machining. These organization skills include: demonstrate the effective allocation of time and resources efficiently, be proactive rather than reactive, prioritize industrial regulations and create physical solutions and strategies for facilitating workflow. This means that all experienced and less experienced industrial workers agree with all the items as the optimum organizational skills required by industrial workers. These findings are in line with Marzban et al., (2015) that study personal skills and organizational skills concluded that time management is one principle of management that requires special organizational and individual skills and plays an important role in improving leadership and organizational productivity.

Discussion of Findings With Regards to the Hypotheses

Finding on hypothesis one (HO_1) revealed that there was no significant difference between the mean responses of experienced and less experienced industrial metalworkers on optimizing employable skills in Computer Numerical Control machining in metalwork industries with respect to 31items out of 37 items.

However they differ significantly on 6 items. This means that the null hypothesis was accepted for the 31 items representing 83.8% and rejected for the remaining 6 items representing 16.2%. The high percentage of acceptance of the hypothesis implies that most of the items were considered relevant by the two groups of respondents. The differences observed in the remaining cases suggest that they were viewed from different perspectives since their experiences differ.

Finding on hypothesis two (HO_2) revealed that there was no significant difference between the mean responses of experienced and less experienced industrial metalworkers on optimizing technical skills in Computer Numerical Control machining in metalwork industries with respect to 17 items out of 19 items. However they differ significantly on 2 items. This means that the null hypothesis was accepted for the 31 items representing 89.5% and rejected for the remaining 2 items representing 10.5%. The high percentage of acceptance of the hypothesis implies that most of the items were considered relevant by the two groups of the respondents. The differences observed in the remaining cases suggest that they were viewed from different perspectives since their experiences differ. This is justified by the observation of Sawaba (2016) who stated that teachers and students should be encouraged by providing the needed resources, condition and enabling environment by the authorities for them to be equipped with optimized technical skills for effective utilization of different types of machine tools.

On the whole, the findings of this study revealed high acceptance of the items as the optimizing employable, technical and organizational skills in computer numerical control machining in metal work industries.

V. RECOMMENDATIONS

Based on the findings of this study, the following recommendations have been made:

1. Metal industrial workers should improve their skills by translating ideas into actions.
2. Teachers of machining operation should emphasize skills in computing and verifying dimensions, sizes, shapes, and tolerances of work pieces during instructions.
3. Metal machining supervisors should optimize their skills in creating physical solutions and strategies for facilitating workflow.

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