



ASSESSMENT OF SKILLS ACQUISITION OF METALWORK TECHNOLOGY STUDENTS OF NIGERIA CERTIFICATE IN EDUCATION (TECHNICAL)

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ABSTRACT

The study designed to determine the level of technical skills attained Metalwork Technology students of Nigeria Certificate in Education (Technical) and factors that affect the level of technical skills. A total of 38 Metalwork students and 16 lecturers/instructors served as the respondents for the research. In order to determine the reliability of the instrument a test re-test was employed while to compute the reliability coefficient instrument used to determine that moment the reliability

coefficient used in calculating Pearson product moment correlation coefficient was employed. The reliability was 0.73 while the hypothesis was significant at .05 level. The study found that metalwork technology students demonstrated low level of technical skills. The study recommended that Computer Numerical Control and modernize tools and equipment, should be available to teach students in the colleges.

KEYWORDS: Metalwork Technology, skills acquisition, technical skills.

INTRODUCTION

It is widely recognized that the quality of teachers and trainers has a great impact on the effectiveness of technical and vocational education and training institutions (TVET) in creating qualified personnel. Since no educational system can exceed the quality of its teachers, the technical teacher education will continue to place great emphasis on all plans

and the development of education. In Nigeria the minimum requirement for teaching is the Nigeria Certificate in Education (NCE) Federal Republic of Nigeria, (2013). This qualification is obtained at the Colleges of Education.

Technical teacher education involves the acquisition of strategies, techniques and competencies that can help the teacher to impart knowledge to students, which will lead the production of technician, technologies, engineers as well as skilled personnel who will function in small, medium and large-scale industrial enterprises. The philosophy of technical teacher education emphasised the importance of a well-trained and qualified technical teacher who possessed adequate intellectual and professional background. Since, quality assurance is always emphasis by TVET stake holders but still there is an alarming rate about the quality of technical college graduates employers have shown dissatisfaction concerning the practical skill competency (Inti, Azlan, & Rufai, 2014). The study explores among other things, the competency of the students in terms of knowledge and skills in metalwork technology, as well as their ability as a qualified technical teacher to start the very anticipated of 4.0 industrial revolution rightly from the Nigerian institutions of learning.

Statement of the problem

Several efforts were made towards improving system as well as the growing and evolving pressure for the achievement of increasing the skills and academic performance of the students in terms of admission, good learning and teaching, skills acquisition and training and so on, thus, such and numerous issues are still unanswered. UNESCO International Project on Technical and Vocational Education (1997) categorized TVET teachers into three models in which the metalwork student of NCE (Technical) falls in the second model whereby a Simultaneous training is provided to the learner through whom the learner receives the technical knowledge and skills necessary to teach and at the same time pedagogical training. It further, argued that this type of personnel has no industrial experience, so that they may have difficulty to modify their teaching to the actual labour market.

In the same vein, (Legg-Jack, 2014) observed that many technical teachers possess virtually no practical experience of what they learnt theoretically.

Significance of the study

The evaluation of skills acquisition of metalwork technology students of NCE, will provide information to policy makers regarding the performance of the graduates as technical

teachers. This information will give a better picture of the effective implementation of TVET programme. The study unveils the capacity of NCE (Technical) so that the quality of skills acquisition should be improved to graduate students who are capable to contribute immensely in the modern labour market.

Research Questions (RQ)

RQ 1

What is the extent of technical skills acquired by metalwork technology students of NCE (Technical) in fitting and machining?

RQ 2

What are the factors poignant the extent of the technical skills acquired by metalwork students of NCE (Technical) in fitting and machining?

Research Hypothesis

H1

There is no significant difference between the Mean response of metalwork technology lectures (MWTL) and the students on the extent of technical skills acquired by the (MWTS) in fitting and machining.

H2

There is no significant difference between the Mean responses of MWTL and the students on factors affecting/Influencing the technical skills acquired by the MWTS in fitting and machining.

RESEARCH DESIGN AND METHOD

This research applied descriptive design research; data was collected through survey instrument. A survey design is a quantitative explanation of tendencies, attitudes, or views of a population when examining a sample of that population. Based on the results of the sample, the researcher generalizes or affirms the population (Creswell, 2009). The area of the study was Kano state of Nigeria whereby students and teachers from Federal Colleges of Education (Technical) Bichi and Kano State Polytechnic were the population of the study. Cluster sampling was used as sampling technique for the selection of the respondents. Structured questionnaire was developed by the researcher as the instrument for data collection in the study. A 5-point Likert scale was used to develop the questionnaire items.

The 5-point Likert-type scale used in this study was interpreted as: Very High 5; High 4; Average 3; Low 2; Not Competent 1. The instrument was validated and it had a reliability of 0.72. Mean and total mean statistics were used to answer the two research questions. The decision rule in this study was built on mean of ≤ 3.50 , (Inti, Azlan & Rufai, 2014). Therefore, the study consists two research questions and were answered by the mean and total mean statistics. While the reliability of the study was 0.72. consequently, the hypotheses were tested using paired sample t-test at $\alpha 0.05$ significant. The values of the t-test calculated were collated with the critical value achieved from the t-test table. The hypotheses were rejected with a t-test calculated value equal to or greater than the t-test critical value and hypotheses were accepted if t-test calculated value less than the t-test critical value.

RESULTS OF THE STUDY

Tables 1 to 4 presented the results of this study as follow:

RQ 1

What is the extent of technical skills acquired by metalwork technology students of NCE (Technical) in fitting and machining exercise?

Table 1: Total mean responses of MWT lecturers on the extent of technical skills acquired by the MWT students

S/N	Practical tasks Related to Fitting and Machining Exercise	N ₁ =16 X ₁	N ₂ =38 X ₂	N _T =54 GX
1.	Knowledge of workshop safety rules and regulation	4.44	4.11	4.08
2.	Selection of metals	4.38	3.76	3.68
3.	Interpretation of working drawing	4.19	3.18	3.41
4.	Selection of basic hand tools	3.25	3.05	3.15
5.	Ability to use different files for various fitting job	2.38	2.39	2.38
6.	Chiselling operation skill	3.25	1.92	2.58
7.	Ability to use scrapers appropriately	2.44	2.18	2.31
8.	Be able to operate and use drilling machine	2.19	2.68	2.44
9.	Marking out process	1.88	2.58	2.22
10.	Parallel turning operation	2.06	1.76	1.91
11.	Step turning operation	1.69	1.71	1.69
12.	Ability to perform taper turning	1.50	1.47	1.48
13.	Be able to perform screw cutting on the lathe	1.44	1.26	1.34
14.	Use of right coolant to the appropriate material	1.56	1.84	1.70

X₁ = Mean ratings of MWT Lecturers/Instructors,

X₂ = Mean ratings of MWT Students,

GX = Total Mean ratings of MWT Students and Lecturers/Instructors,

N₁ = Number of Lecturers/Instructors,

N₂ = Number of MWT Students and

N_T = Total number of respondents.

Table 1 indicates that in fitting and machining exercise, MWT students had high level of technical skills in items 1 and 2, with total means between 3.68 and 4.08. 2 items had average level of technical skills i.e. item 3 and 4 had total means of 3.41 and 3.15 correspondingly while 10 practical tasks maintained low level of technical skills in items 5, 6, 7, 8, 9, 10, 11, 12, 13, and 14 with total means ranging from 1.34 to 2.58. This indicates that MWT students are highly incompetent in practical skills associated to fitting and machining exercises.

RQ 2

What are the factors influence the level of the technical skills acquired by metalwork students of NCE (Technical) in fitting and machining exercise?

Table 2: Factors poignant the extent of technical skills acquired by MWT Students of NCE (Technical)

S/N	ITEMS	N ₁ =16	N ₂ =38	N _T =54
		X ₁	X ₂	G _X
1.	Curriculum over loaded	4.62	4.71	4.67
2.	Difference between learning environment (school workshop) and work place environment	4.94	4.79	4.85
3.	Inadequacy of practical periods	4.62	4.68	4.65
4.	Use of out-dated and obsolete equipment in training	4.88	4.39	4.64
5.	Insufficient electricity supply	4.81	4.32	4.57

X₁ =Mean ratings of MWT Lecturers, **X₂**= Mean of MWT Students, **G_X**=Total Mean of MWT Students and Lecturers/Instructors, **N₁**=Number of Lecturers/Instructors, **N₂**=Number of MWT Students and **N_T**= Respondents total number

Table 2 shows that all the five items 1, 2,3,4 and 5, were accepted as factors affecting the practical skills performance of metalwork students of NCE (Technical) with grand means ranging from 4.57 to 4.85.

H1

There is no significant variation between mean response of metalwork technology lectures (MWTL) and the students on the extent of technical skills acquired by the (MWTS) in fitting and machining.

Table 3: Paired sample t-Test study of the responses of MWT lecturers and the students on the extent of technical skills in practical work associated to Fitting and Machining

S/N	Practical tasks Related to Fitting and Machining Exercise	N ₁ =1	N ₂ =3	SD ₁	SD ₂	Cal. T
		6	8			
		X ₁	X ₂			
1.	Knowledge of workshop safety rules and regulation	4.44	4.11	.814	1.410	1.10
2.	Selection of metals	4.38	3.76	.806	1.584	2.06
3.	Interpretation of working drawing	4.19	3.18	.911	1.504	3.06
4.	Selection of basic hand tools	3.25	3.05	1.00	1.469	0.60
5.	Ability to use different files for various fitting job	2.38	2.39	.806	1.128	0.05
6.	Chiselling operation skill	3.25	1.92	.856	1.024	6.65
7.	Ability to use scrapers appropriately	2.44	2.18	1.094	1.010	0.80
8.	Be able to operate and use drilling machine	2.19	2.68	.981	1.233	1.6
9.	Marking out process	1.88	2.58	.885	1.177	-3.5
10.	Parallel turning operation	2.06	1.76	.854	.542	0.30
11.	Step turning operation	1.69	1.71	.793	.460	0.10
12.	Ability to perform taper turning	1.50	1.47	.516	.506	0.30
13.	Be able to perform screw cutting on the lathe	1.44	1.26	.512	.446	1.80
14.	Use of right coolant to the appropriate material	1.56	1.84	.629	.855	2.80

X₁=Mean ratings of Lectures

X₂= Mean ratings of MWS,

N₁=Number of Lectures,

N₂=Number of MWTS,

SD₁=Standard Deviation of Lectures,

SD₂= Standard Deviation of the Students,

df = 52,

t-crit = 1.984, and **S**= Significant (α 0.05)

Table 3 indicates that items 1, 4, 5, 7, 8, 9, 10, 11, 12, and 13, the calculated t-value was less than the table t-value of 1.984 at 0.05 significance. Hence, no significant variation between the mean responses of lecturers and students on the extent of the practical achievement of the MWTS on these items. Though, items 2, 3, 6, and 14, acquired calculate t-value more than the table t-value. These show that there was a significant variation between the mean responses of the lecturers and students on the extent of technical skill of MWTS.

Hypothesis: 2

No significant variation between the mean responses of MWTL and the students on factors poignant the technical skills acquired by the MWTS in fitting and machining.

Table 4: Factors poignant the extent of technical skills acquired by MWT students of NCE (Technical)

S/N	ITEMS	n ₁ =16		n ₂ =38		Cal. t
		X ₁	SD ₁	X ₂	SD ₂	
1.	Curriculum over loaded	4.62	.719	4.67	.611	0.50
2.	Difference between learning environment (school workshop) and work place environment	4.94	.250	4.79	.413	1.80
3.	Inadequacy of practical periods	4.62	.719	4.68	.620	0.30
4.	Use of out-dated and obsolete equipment in training	4.88	.342	4.39	.755	0.49
5.	Insufficient electricity supply	4.81	.403	4.32	.809	0.49

X₁=Mean ratings of Lectures

X₂= Mean ratings of MWTS,

n₁=Number of Lectures,

n₂=Number of MWTS,

SD₁=Standard Deviation of Lectures,

SD₂= Students' Standard Deviation

df = 52,

t-crit = 1.984, and S= Significant (α 0.05)

Table 4 shows that calculated t-value of items 1, 2, 3 and 5 were less than the t- table value of 1.984, hence, the hypothesis is that there was no significant difference in the responses in the mean between the lecturers and students in term of factors poignant work achievement of MWT students.

STUDY FINDINGS

1. The study shows Metalwork Technology students possess low level i.e. their performance is below average in term of fitting and machining; therefore, they have deficiency in practical skills.

2. The following were recognised as factors poignant the extent of technical skills in metalwork technology: (i) Curriculum over loaded (ii) Difference between learning environment (school workshop) and work place environment (iii) Inadequacy of practical periods (iv) Use of out-dated and obsolete equipment in training (v) Insufficient electricity supply.

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

The study findings showed that MWT students were incompetent in the fitting and machining competencies. Most of the students find it difficult to perform the given practical task during the study. This is in agreement with (Afeti, 2007); (Yusuff & Soyemi, 2012) who decried

that, the quality of training received by technical education students is quite low with much more emphasis on theory and certification rather than on the development of competent and skilled graduates. The next finding was ascribed due to the incompetency in fitting and machining practical skills due to the curriculum over load. This in agreement with Abubakar (2009) who observed that NCE (Technical) is fully saturated especially at levels one and two where students operate a tight lecture and practical schedule for whole week. The third finding attributed to the skills deficiency of MWT students is the gap between the school domain and the place of work, the result is in line with Inti, (2009) who argued that technical education would be proportionally effective, if the environment in which the student is teach is an image of the expected future place of work of that student. The fourth finding exposed that the inadequacy of practical periods in the NCE (Technical) time table influence the quality of technical competencies acquired by MWT students. The result was in contract with the principles of TVE: theoretical knowledge is only valuable with adequate practical work (Isma'il, 2009). The fifth finding divulged that using out of date tools and equipment in the colleges influence extent of the skills acquisition of MWT students. It is also in line with the principles of TVE that efficient TVE training can only take place if the training tasks are done in the same approach, with the same processes, using the same tools, the same machines and equipment in same profession (Inti, 2009). Consequently, the weakness of MWT students was accredited due to the insufficient electricity supply to in the country. This is in agreement with Rotimi, (2010); (Edmond, Stephen & Obed, 2016) who argued that it is sad to note that some available equipment are not installed and those installed have no electricity to operate them.

RECOMMENDATIONS

The following recommendations were made according to the findings of the study

1. Numerical Control Machine and modernize tools and equipment, should be available to teach students in the colleges.
2. Teacher should use their initiative in teaching and learning process more especially in term of practical skills. Since we are in 21st century whereby internet is in everyday life, teachers should use this medium to show the real practical process via internet.
3. The colleges should have collaboration with industries to come in for the training of the students in the real situation. Therefore, the learning environment should be a replica of working environment. The learning environment must be a replica of the work environment.

4. To be achieve qualitative technical skills time table should be re-shuffled such that practical hours would be inclusive separate from lectures hours.
5. Pedagogical courses should be rationalized into single teaching unit.

CONCLUSIONS

The purpose of technical teacher education is to prepare the teacher adequately for successful training of the students from Junior Secondary School (JSS) to higher level of education. The inability of Metalwork NCE (Technical) students apply the knowledge acquired by the school in real work situations derives from the lack of skills necessary for actual work, which represents a challenge both for the government and for the teachers involved in the training. Measures must be taken to reverse this unpleasant situation to properly prepare NCE students (technicians) to teach basic technology in our JSS.

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