FEDERAL UNIVERSITY OF TECHNOLOGY MINNA

LEVERAGING ADVANCES IN INDUSTRIAL TECHNOLOGY EDUCATION FOR SKILLS DEVELOPMENT

By

PROF. ROBERT OGBANJE OKWORI, *ftepan*
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INAUGURAL LECTURE SERIES 83

16TH JUNE, 2021

ISSN 2550 - 7087

global links communications
+234 805 6074 844, +234 703 6446 818

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16TH JUNE, 2021

University Seminar and Colloquium Committee

This 83rd Inaugural Lecture was delivered under
the Distinguished Chairmanship of:

Professor Abdullahi Bala, FSSSN
Vice-Chancellor
Federal University of Technology, Minna

ISSN 2550 - 7087

Published by:
University Seminar and Colloquium Committee,
Federal University of Technology, Minna.

16th June, 2021

Design + Print:
Global Links Communications, Nigeria
✆: 08056074844, 07036446818

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PREAMBLE

I thank Almighty God for this special day by making it possible for me to deliver my inaugural lecture titled: "**Leveraging Advances in Industrial Technology Education for Skills Development.**" It is a special day because I am delivering my inaugural lecture as a member of the academia who has reached the peak of his carrier.

Mr. Vice-Chancellor Sir, I wish to inform you that through skills development, my life has changed positively. Today, we are to discuss the topic titled: "**Leveraging Advances in Industrial Technology Education for Skills Development .**" This inaugural lecture covers an area of my research interest which is skills development in Industrial Technology Education. The work covers four major related areas. These areas are:

- Vocational and Technical Education
- Industrial Technology Education
- Skills Development
- Researches on Industrial Technology Education and Skills Development by the inaugural lecturer and his contributions.

1.0 VOCATIONAL AND TECHNICAL EDUCATION

Vocational and Technical Education (VTE) is an aspect of education that enables development of knowledge and skills in learners towards gainful employment in a particular occupation.

It covers areas such as Automobile, Electrical/Electronics, Building Construction, Woodwork, Metalwork, Home Management, Food and Nutrition, Computer Craft, Book Keeping and Accounting, Clothing and Textiles, Fine Arts etc. Osuala (1999) stated that vocational and technical education means vocational or technical training or retraining which is given in schools or classes under public supervision and control. It refers to systematic learning experiences which are designed to fit individuals for gainful employment in recognized occupations as semi-skilled workers, technicians or sub-professionals. Osuala disclosed that the major areas of vocational and technical education include vocational agriculture, distributive education, home economics education, health occupation, trade and industrial education, business and office education. The programmes are offered at secondary, post-secondary and adult level. While FRN (2013) defined vocational and technical education as a comprehensive term referring to those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupation in various sectors of economic and social life.

2.0 HISTORICAL DEVELOPMENT OF INDUSTRIAL TECHNOLOGY EDUCATION IN NIGERIA

Industrial Technology Education originated from technical education. The only difference is that Industrial Technology Education involves more of science than technical education. Industrial Technology Education is that aspect of education that emphasizes skill acquisition towards preparation of learners for a particular occupation. Technology is the application of scientific knowledge for practical purposes in response to human needs. Similarly, Hornby (2000) defined technology as the set of knowledge, skills, experience and technique through which humans change, transform and use the environment in

order to create tools, products and services that meet our needs and desires. Technical education started late in Nigeria compared to other aspects of education such as arts, science and social science. In 1925, a class of apprentice master was established on a part-time basis for a few selected Nigerians who were already in regular employment with the marine department. In1929, a technical training scheme began on a permanent basis. However, it was in 1946 that planning of technical education started (Osuala, 1999). While Oroge (1989) explained that technical education started during the colonial period. He said that during this period technical training institutes were established in response to meeting the peculiar needs of artisans and craftsmen for the public services. Thus, Railway Training Institute, the Post and Telegraph, Marine and Public Works training schools were established between 1901 and 1931. Establishment of these schools marked the beginning of organized technical education in Nigeria. In 1932, the Yaba Higher College was established. The College was to cater for the manpower needs of the country in engineering, medicine, agriculture, survey, forestry, teacher training for secondary schools and commercial services mostly in the civil service. These objectives could not reasonably be achieved due to the transfer of the College to Ibadan in 1948 to become the University College, Ibadan. In 1944, the ten-year development plan led to the establishment of three technical institutes at Kaduna, Enugu and Lagos. The Yaba Institute changed its name in 1963 to Yaba College of Technology, and in 1948 the first trade center became Federal Technical College, Yaba. In 1950, government established crafts schools in the North. Trade centers, technical schools and farm centres were also established and scattered all over the region.

With the attainment of independence in 1960, there was a gradual re-orientation of the national priorities with the realization that technological advancement is not achieved by

importation of wares and recruitment of experts from industrialized nations to man such wares. In line with this thinking, some technical institutions were established across the country as a follow up of Ashby Commission in 1960. Some of these technical colleges later developed into polytechnics such as Kaduna, Auchi and Ibadan while trade centres were re-named technical colleges (Ogunwole, 2000). Similarly, between 1983 and 1987, Universities of Technology and Colleges of Education (Technical) were established to meet the technological needs of the country and to provide manpower for the 6-3-3-4 system of education. The federal government as well imported tools and equipment to cater for the 6-3-3-4 system of education.

2.1 Technical Evolution of Machine Tool and other Industrial Technology Education Equipment used during the Colonial Era

The machine tool and other Industrial Technology Education equipment used by the ancient Egypt and other people during the colonial period.

Plate i: 1939 RCA San Francisco Vacuum Tube Radio
***Source**: www.pinterest.com>pamtayor*

Plate iii: Press rocker of Nicholas Briot, manufactured by Leonardo Da Vinci (1626)

Plate ii: The ancient Egyptian hand saw, plane and axle

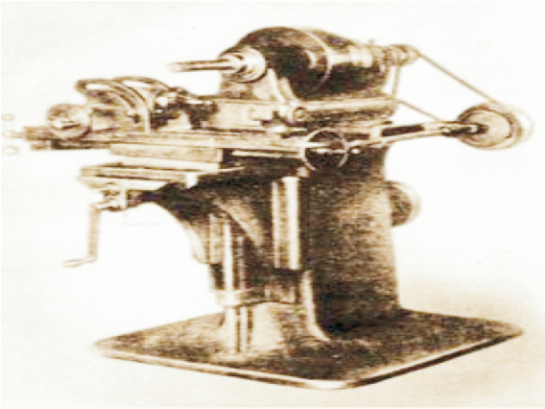

Plate iv: First universal milling, manufactured by Joseph R. Brown in 1862

2.2 Industrial Technology Education Tools and Equipment used in the 21st Century

Industrial Technology Education is a programme offered at the post-secondary education level. The objectives of the programme are to acquaint learners with creative teaching strategies and appropriate technique for solving problems affecting industries and technological innovation. The specific goals of technology education, according to Federal Republic of Nigeria (2014), are to: (a) Provide courses of instruction and training in engineering, other technologies, applied sciences, business and management leading to the production of trained manpower, (b) provide the technical knowledge and skills necessary for agricultural, industrial, commercial, and economic development of Nigeria, (c) give training that impart the necessary skills for the production of technicians, technologists and other skilled personnel who shall be enterprising and self-reliant, (d) train people who can apply scientific knowledge to solve environmental problems for the convenience of man and, (e) give exposure on professional studies in the technologies. The above goals will be difficult to achieve without tools and equipment. Here are some of the modern tools and equipment currently in use for teaching Industrial Technology Education practical.

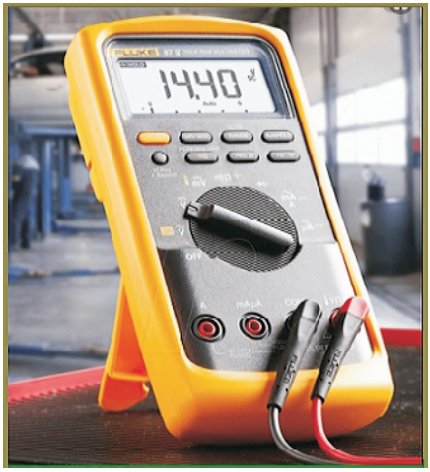

Plate v: Automobile digital multimeter or multitester

***Source**: https://www.autolovins.com /auto*

Plate vi: Air Compressor

Source: *https://www.autolovins.com /auto*

Plate vii: Medium type of automatic block making machine

***Source**: http://www.okbrickmachine.com/en/block*

Plate viii: Centre lathe

***Source**: www.pinterest.com >pamtayor*

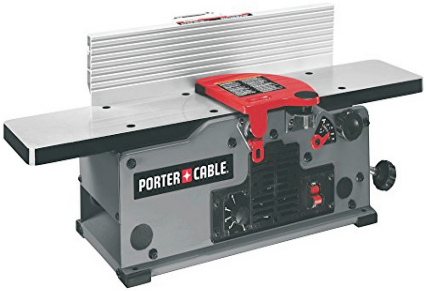

Plate ix: Jointer

Source:
https://www.woodworkingtrade.com/

Plate x: Milling machine

Source:
https://www.woodworkingtrade.com/

3.0 ARTICLES CONSTRUCTED OR ASSEMBLED IN INDUSTRIAL AND TECHNOLOGY EDUCATION DEPARTMENT OF FUT, MINNA, NIGERIA AS A RESULT OF SKILLS DEVELOPMENT

Technological advancement is not achieved by importation of goods and recruitment of experts from industrialized nation. The students of Industrial and Technology Education, FUT, Minna, Nigeria had to use their skills to assemble or construct the following articles:

Plate xi: A motor car assembled by 500 level Automobile Technology students of 2016/2017 Academic session

Plate xii: Tricycle using solar system assembled by 500 level Automobile Technology students of 2018/2019 academic session.

Plate xiii: Motorized door constructed by 500 level Metalwork Technology students of 2018/2019 academic session.

Plate xiv: Convertible room divider constructed by 500 level Woodwork Technology students of 2018/2019 academic session.

Plate xv: FUT, Minna collapsed fence re-built by 500 level Building Technology students of 2018/2019 academic session.

Plate xvi: Inverter and solar panel constructed by 500 level Electrical/Electronics of 2018/2019 academic session.

4.0 SKILL

Skill refers to a craftsman's dexterity in a trade which enables him to perform or carry out various operations relating to the trade. Skill is the ability to perform in an activity in a competent manner (Horby, 2000). Similarly, Abdullahi (2010) pointed out that skill is the capability of accomplishing a job with precision of certainty, practical knowledge in combination with ability, cleverness and expertness. Sharing the same opinion, Jibril, Okwori, Hassan and Jatau (2018) revealed that to increase the chance of self-reliance and employability, woodwork teachers must help students to acquire skills that are relevant to the needs of 21st century.

4.1 SKILLS DEVELOPMENT

Development brings about things that improve condition of life of every human being on the planet. Skills development is the process of identifying skill gap and strives to develop these skills. It is essential because the skill acquired by a person determines his ability to execute a particular job given to him/her. According to Kenneth and Robert (2013), skills development refers to the acquisition of practical competencies, know-how and attitudes necessary to perform in a trade or occupation in the labour market. Okwori, Adamu and Odo (2013) disclosed that skills development is vital for industrial development but these skills cannot be obtained in a vacuum. Okwori, Kareem and Abutu (2019) disclosed that skills development connotes the trends in skills usage by professionals in relation to the current practice in industrial and school workshop setting. Skills development in industrial technology education is neglected in many organizations in the country. In Japan, for example, after each major curriculum revision, the Ministry of Education plans and implements in-service training programmes for technology education teachers. In-service training at the district level continued for four years to all technology education teachers (Murata, 1990). It is not an understatement to say that when

National Commission for Colleges of Education (NCCE), Abuja and National Universities Commission (NUC), Abuja reviewed their minimum standards and benchmark in the areas of technology education, lecturers were not sent for up-skilling in some of the machines included in the minimum standards or bench mark which is not proper. When we see others succeeding, it means they spent countless hours building their skills. What we see in others as talent is a result of re-training (Skills development). Okwori and Mustapha (2018) observed that one of the challenges to practical skills acquisition in both post primary and secondary schools in Nigeria is lack of equipment in the school workshops.

5.0 FORMS OF SKILLS DEVELOPMENT

For skills development to take place there are different types of training and re-training required. Training and re-training is very essential for skills development. It can be used to develop mental ability, dexterity and renew or update workers' knowledge and skills. Momoh (2012) classified types of skills development into three categories. These are on-the- job techniques, off-the job techniques and formal training.

5.1 On-the-job training

The training is giving at the place of work. It is the type of training given to new employees either on individual basis or in a small or large group by the organization irrespective of the previous experience. Orientation or induction training is part of on-the-job training given to new employees to familiarize with the new work environment and operations of the establishment (Olomukoro & Mabel, 2012).

5..2 Off-the-job training

This type of training takes place outside the work environment and it is provided by the established training institutions. This type of training is necessary when some employees need to

acquire a specific knowledge, skills and attitudes and it is best provided through series of courses (Okwori & Alawode, 2015). Employees are provided with opportunities for continuous learning, acquisition of knowledge and skills essential for effective performance in their jobs and increases productivity. It also involves regular attendance and participation in seminars, conferences and workshops.

5.3 Formal training

Formal training is the type of training received in formal institutions. It spans from primary to tertiary institutions. Schools are the conventional places for acquiring knowledge and skills. It provides conducive atmosphere for learning which makes assimilation of knowledge easier and faster. It is a place for upgrading or advancing in career and perfects skills in line with the best global practices. This type of training is provided to a worker depending on the training needs of the worker and the objectives of the organization.

6.0 MY CONTRIBUTIONS

I conducted several researches that support the need for skills development in Industrial Technology Education. The need for skills development in Industrial Technology Education is demonstrated from different perspectives as shown below:

6.1 Assessment of Skills Needs of Industrial Technology Education Students towards Self-Reliance and Sustainable Development in Nigeria

Industrial Technology Education (ITE) prepares learners for employment in a particular occupation or field. Students are required to complete a series of laboratory classes related to the technological systems such as construction technology, mechanical technology and electrical/electronic technology etc. Ogundeji (2002) opined that the problem facing technical institution in Nigeria is that of production of unskilled technical

personnel who cannot function effectively in the society. Similarly, Adulkadir, Ma'aji, Okwori and Salami (2017) recommended that National Automotive Council of Nigeria should be charged with the responsibility of organizing training and re-training programmes for motor mechanics and graduates of automobile technology education in collaboration with the Federal Ministry of Labour and Productivity to incorporate the identified entrepreneurial skills into the programme. This can make them acquire the needed entrepreneurial management skills that will enable them sustain and secure their employment. Okwori and Abutu (2020) suggested that individuals and private sector should be encouraged to participate in the provision of Technical and Vocational Education and Training (TVET) facilities for effective skills acquisition.

Okwori and Mustapha (2020) conducted a research on assessment of skills needs of Industrial Technology Education students towards self- reliance and sustainable development in Nigeria. The study determined the skills required and skills possessed by industrial technology education students of Federal University of Technology, Minna, Nigeria. A Case study research design was adopted for the study. The entire population of 500 level ITE students of 2018/2019 academic session was used as they were not so many. The total population was one hundred and fifty two (152) copies of the questionnaire. Hence, there was no sampling. A structured questionnaire was developed by the researchers. Five points rating scale of measurement was used for the respondents to express their views on the item. Section ''A'' of the instrument had 63 items and it sought information on skills required by industrial technology education students with response options of Highly Required (HR) - 5, Required (R) - 4, Moderately Required (MR) - 3, Not Required (NR) - 2 and Undecided (U) - 1. Section ''B'' contained 63 items and it dealt with skills possessed by industrial technology education students with response options of Highly

Possessed (HP) – 5, Possessed (P) - 4, Moderately Possessed (MP) - 3, Not Possessed (NP) - 2 and Undecided (U) - 1. The instrument for data collection was validated by three experts in Industrial and Technology Education and pilot tested on 62 students of technology education section, Benue State University, Makurdi which is not part of the study. The researcher adopted a test-retest technique and Pearson's Product Moment Correlation Coefficient (PPMC). The reliability coefficient of the instrument was found to be 0.86. The questionnaire was administered on the respondents by the researchers. Out of 152 copies of questionnaire give given out, 148 were retrieved i.e. 97.37 % return rate. Data collected were analyzed using mean and standard deviation to answer the research questions. Decision rule on respondents' mean was based on theory of true class limit of numbers. The z-test was utilized in testing the hypothesis at .05 level of significance such that item with significant difference between skills required and skills possessed were identified as area of need. The result of the analysis is shown in tables 6.1.1 and 6.1.2.

Table 6.1.1: Mean responses of skills required and skills possessed by Industrial Technology Education students for self-reliance and sustainable development in Nigeria

N=148

S/N	ITEMS	$\bar{x}_1$	SD_1	Remarks	$\bar{x}_2$	SD_2	Remarks
	Automobile Technology						
1	Ability to service petrol engine (vehicle)	1.74	0.66	NR	4.12	0.53	P
2	Ability to service diesel engine (vehicle)	4.13	0.53	R	1.78	0.65	NP
3	Proficient in driving car	4.16	0.56	R	1.88	0.69	NP
4	Ability to use air compressor	1.85	0.67	NR	4.13	0.52	P
5	Ability to use wheel balancer	1.77	0.63	NR	4.18	0.70	P
6	Ability to use hydraulic lift.	2.02	0.50	NR	4.41	0.54	P
7	Ability to use tyre changing machine	1.74	0.68	NR	4.37	0.48	P
8	Detecting acid level in the battery using battery charger.	1.66	0.61	NR	4.01	0.69	P
9	Ability to use bench grinder.	1.59	0.51	NR	4.15	0.55	P

10	Ability to use table and hand drilling machines.	2.23	0.43	NR	4.20	0.72	p
11	Ability to use laser wheel alignment gauge.	2.21	0.68	NR	4.44	0.68	P
12	Ability to use digital wheel alignment gauge.	4.15	0.55	R	1.87	0.69	NP
	Building Technology						
13	Using spirit level effectively.	1.73	0.65	NR	4.11	0.52	P
14	Ability to use hand trowel	1.87	0.69	NR	4.15	0.54	P
15	Ability to use shovel	1.79	0.63	NR	4.20	0.72	P
16	Ability to use builders square/steel square.	1.81	0.65	NR	4.22	0.74	NP
17	Ability to use plumb.	1.60	0.48	NR	3.81	0.40	P
18	Ability to Lay sandcrete block using trowel	1.62	0.49	NR	3.92	0.42	P
19	Ability to use tyrolean machine and maintain after use.	4.42	0.55	R	2.19	0.67	NP
20	Mastering sequence of operations in building site.	1.72	0.51	NR	3.19	0.41	P
21	Ability to use rammer.	1.82	0.68	NR	4.28	0.76	P
22	Ability to use concrete mixing machine and maintain after use.	4.30	0.60	R	1.82	0.67	NP
23	Ability to use try square in checking the squareness of the sandcrete block.	1.92	0.69	NR	3.91	0.74	P
24	Ability to use lister/block Moulding Machine.	4.12	0.59	R	2.38	0.49	NP
25	Ability to use manual block mould and maintain after use.	1.94	0.70	NR	4.33	0.77	P
26	Ability to use slump cone apparatus.	1.87	0.68	NR	4.32	0.52	P
	Electrical/Electronics Technology						
27	Ability to carry out serial/ parallel connection using wiring board.	1.79	0.65	NR	4.33	0.77	P
28	Ability to carry out conduit wiring using wiring board.	2.05	0.52	NR	4.01	0.68	P
29	Ability to use chisel and mallet with correct force to remove waste when fixing sockets/switches.	1.76	0.69	NR	4.32	0.54	P
30	Ability to joint wires at the appropriate place.	1.69	0.63	NR	4.15	0.53	P
31	Ability to fix lamp holders and fluorescent tubes	1.59	0.52	NR	4.20	0.72	P
32	Ability to fix ceiling fans.	4.05	0.82	R	1.87	0.69	NP
33	Ability to use universal adaptor.	4.55	0.51	HR	1.79	0.65	NP
34	Ability to use cathode ray oscilloscope.	3.87	0.49	R	2.32	0.59	NP

35	Ability to use 5000VA voltage regulator.	4.43	0.51	R	1.76	0.70	NP
36	Ability to identify and use 2000VA voltage regulator.	4.02	0.73	R	1.70	0.63	NP
37	Ability to use battery charger 12V/24V	1.79	0.62	NR	4.20	0.72	P
38	Ability to choose and use amplifier mono/ amplifier stereo.	4.28	0.51	R	2.14	0.35	NP
	Metalwork Technology						
39	Ability to select and use correct hand tools for various operations in the workshop.	2.04	0.52	NR	4.43	0.56	P
40	Ability to select and use correct cramps.	2.02	0.50	NR	4.03	0.51	NP
41	Ability to select and use inside/ outside venier caliper.	1.90	0.69	NR	4.32	0.54	P
42	Ability to take measurement using measuring steel rule.	1.21	0.71	NR	4.39	0.56	P
43	Ability to remove used coolant from machines after use.	1.80	0.53	NR	4.35	0.69	P
44	Ability to test the squareness of the work before final cramping.	2.09	0.48	NR	4.01	0.69	P
45	Ability to observe safety in the workshop when using hand tools and machines.	2.17	0.59	NR	4.38	0.62	P
46	Ability to use lathe machine	4.32	0.51	R	2.32	0.47	NP
47	Ability to use milling machine (Horizontal)	4.05	0.62	R	2.18	0.65	NP
48	Ability to use Power Guillotine	4.20	0.72	R	1.88	0.69	NP
49	Ability to use foot shear (Treadle guillotine)	2.18	0.60	NR	4.39	0.63	P
50	Ability to use power hacksaw	2.16	0.58	NR	3.40	0.51	P
51	Ability to use rolling machine (Manual)	4.26	0.61	R	1.76	0.69	NP
52	Ability to use folding machine (Manual)	4.20	0.72	R	1.70	0.63	NP
53	Ability to remove dust using air blower	2.21	0.59	NR	3.42	0.52	P
54	Ability to use table and hand drilling machine effectively.	1.67	0.59	NR	3.53	0.48	P
55	Ability to use bench grinder (750W)	1.71	0.64	NR	4.01	0.50	P
56	Ability to use DC Arc Welder (Europl65)	1.88	0.69	NR	4.12	0.53	P
57	Ability to use AC Arc Welder (315 Amp)	1.74	0.65	NR	4.11	0.48	P

	Woodwork Technology						
58	Ability to use thicknessing machine.	1.53	0.43	NR	4.16	0.48	P
59	Ability to select and use different hand tools for various operations	1.69	0.46	NR	3.78	0.44	P
60	Ability to select and sand articles using different grades of glasspaper	1.58	0.41	NR	4.12	0.49	P
61	Ability to operate and use circular saw Machine	1.59	0.46	NR	4.18	0.47	P
62	Ability to use tenoning machine with the accessories	4.69	0.68	R	2.41	0.51	NP
63	Ability to use chain and chisel Mortiser	4.39	0.55	R	2.39	0.49	NP
64	Ability to use wood lathe	4.47	0.65	R	2.33	0.68	NP
65	Ability to trial assembly projects	1.58	0.41	NR	4.13	0.49	P
66	Ability to use spray gun for finishing	4.41	0.56	R	2.40	0.50	NP
67	Ability to select different types of finish based on the use of article	1.57	0.44	NR	4.17	0.47	P

Key: N= Number of Industrial Technology Education students, $_1$= Mean responses of skills required, SD_1= Standard deviation of skills required, $_2$= Mean responses of skills possessed, SD_2= Standard deviation of skills possessed.

The result of the z-test analysis is shown in Table 6.1.2

Table 6.1. 2: z-test analysis of the mean responses of skills required and skills possessed by Industrial Technology Education students for self-reliance and sustainable development in Nigeria

Skills	N		SD	df	Z-value	P-value	Alpha	Decision
Skills Possessed	63	3.78	0.97	64	8.51	0.00	0.05	significant
Skills Required	63	2.41	0.92					

Significant at P=0.05

The results of the mean presented in tables 6.1.1 and 6.1. 2 showed:

1. ITE students required 23 skills for self- reliance and sustainable development in Nigeria.

2. ITE students possessed forty four (44) skills for self-reliance and sustainable development.

3. The result of the z-test statistics analysis shows that the P-value is less than 0.05 (P=0.05). This means there is significance difference. Therefore, there is skill gap. There is a need for more skills to be acquired for self- reliance and sustainable development by Industrial Technology Education Students especially in the area of use of machines.

6.2 Assessment of Woodwork Technologists' Up-Skilling Needs Using Discrepancy Model in Tertiary Institutions in North- Central, Nigeria

Skills development has a great impact on the performance of workers and the overall productivity of the organization. Lack of organisation's investment on skill development can affect workers' productivity and hence will not compete favourably with the international communities or know the latest trends in technology and therefore will not meet the best global practices. Involving staff in skills development through on-the-job training or in-service training serves as motivation thereby improves efficiency, boost staff moral and increases the productivity, reduces waste, cost of operation and minimizes error. Therefore, skills development is very essential to organisations. Establishing skills development needs require utilization of needs assessment model. According to MCillip (2000), needs assessment models are of various types. These are Discrepancy Model (DM), the Marketing Model (MM) and Decision Making Model (DMM). The appropriate model for this type of study is the Discrepancy Model because it helps to determine the difference between skills required and the skills possessed and this can be

used in developing skills needs of employees in Nigeria. The Discrepancy Model (DM) is presented in Figure 1.

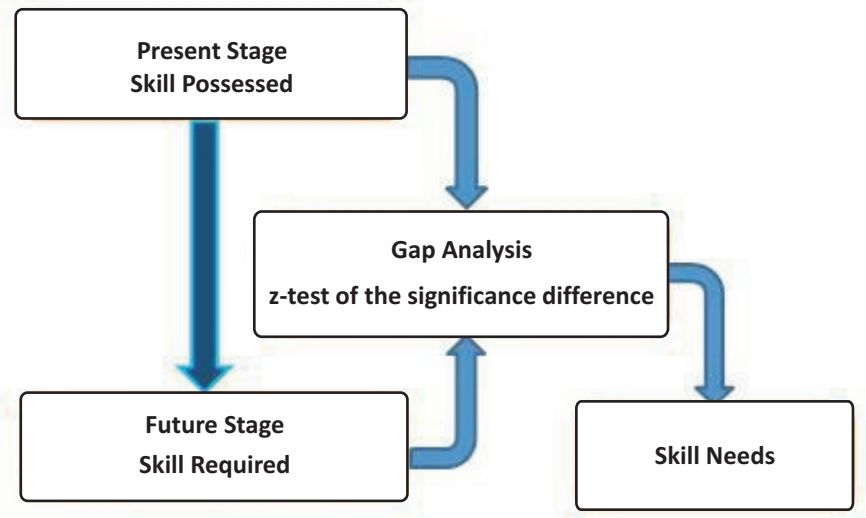

Figure 1: Up-Skilling Needs Assessment Model Showing Difference between the Mean of Skill Required and Skill Possessed using z-test (Discrepancy) (*Kaufman & English, 1979*).

Kareem and Okwori (2018) conducted a study using Discrepancy Model to assess the up-skilling needs of woodwork technologists in tertiary institutions in North Central, Nigeria. A cross-sectional survey research design was adopted. The study was carried out in 31 tertiary institutions, universities, polytechnics and colleges of education which are located in the six states and Federal Capital Territory in North Central, Nigeria. This population comprised all wood technologists drawn from the 31 tertiary institutions (universities, polytechnics and colleges of education). There was no sampling; therefore, all the 101 technologists were used for the study. The research instrument used for this study was a structured questionnaire.

The questionnaire contained information on skill required and possessed by woodwork technologists with 55 items. The questionnaire was administered by the researchers with the help of three research assistants. The retrieval of the questionnaire yielded 100% return rate. Descriptive statistics (mean and standard deviation) were utilized in answering research questions 1and 2. To determine the skill required and possessed by woodwork technologists, the resultant mean scores were translated using real lower and upper limits of number 1 – 5. The response modes for skill required were; Highly Required (HR) = 4.50 – 5.00, Required (R) = 3.50 – 4.49, Moderately Required (MR) = 2.50 – 3.49, Slightly Required (SR) = 1.50 – 2.49) and Not Required (NR) = 1.50 – 2.49). While the response mode for skill possessed were Highly possessed (HP) = 4.50 – 5.00), Possessed (P) = 3.50 – 4.49, Moderately possessed (MP) = 2.50 – 3.49), Slightly possessed (SP) = 1.50 – 2.49, Not possessed (NP) = 1.50 – 2.49.

The z-test statistics was utilized in testing the hypothesis at .05 level of significance such that item with significant difference between skills required and possessed were identified as area of need. The result of the z-test analysis is shown in Table 6.2.1

Table 6. 2.1: Mean and z-test of skill required and possessed by the woodwork technologists for optimal performance in woodwork technology in tertiary institutions in the North-Central, Nigeria

S/N	ITEMS	$?\times_1$ N=101	$?\times_2$ N=101	SD_1	SD_2	Sig	Rem
	Skills in General Woodworking						
1	State the process of manufacturing board	3.62	2.35	1.27	1.15	0.07	NS
2	Classifying of wood into hard and softwood	3.62	2.96	1.35	1.44	0.01	S
3	Identification of both physical and mechanical properties of timber and its characteristics	3.60	2.59	1.13	1.39	0.09	NS
4	State technical names for marketing wood	3.71	2.59	1.13	1.39	0.09	NS
5	Identification of wood defects both natural and artificial defect.	3.62	2.62	1.26	1.24	0.38	NS
6	Identification of types of wood preservative	3.62	2.62	1.27	1.16	0.11	NS

7	Treat wood with relevant preservative	3.83	2.50	1.18	1.27	0.37	NS
8	Produce detailed drawing and transfer to a full Size set up	3.86	2.65	1.13	1.14	0.01	S
9	Sharpen saws and other cutting tools	3.71	2.74	1.28	1.35	0.09	S
10	Read and interpret drawings to determine material required for construction	3.74	2.51	1.15	1.19	0.11	NS
11	Design based on elements and principles of design	3.66	2.35	1.10	1.09	0.02	S
12.	Mix pigments, oils and other ingredients to obtain the required colour	3.69	2.53	1.14	1.30	0.32	NS
	Skills in Cabinet Making						
13	Design and construct simple living room furniture with emphasis on skill disposition on good finishing and maintenance	3.79	2.41	1.18	1.24	0.02	S
14	Select appropriate tools, materials, process and products	3.47	2.72	1.20	1.28	0.02	S
15	Finish or refinish damaged, worn, used or renew furniture to high grade using specified colour of finish	3.29	2.51	1.30	1.17	0.09	NS
16	Utilize knowledge of wood properties, finishes and furniture styles	3.16	2.36	1.13	1.18	0.12	NS
17	Connect electrical portable sander and control operation	3.73	2.50	1.17	1.17	0.04	S
18	Select types of gauge and different sizes of screws and the correct drill to use	3.62	2.48	1.27	1.33	0.36	NS
19	Carry out veneer work for aesthetic value	3.74	2.22	1.14	0.17	0.10	NS
20	Construct wardrobe and storage chest	3.48	2.67	1.32	1.31	1.37	NS
21	Operate spray gun in spraying operations	3.60	2.52	1.18	1.28	0.35	NS
22	Construct and assemble baby cot	3.36	2.74	1.22	1.28	0.05	NS
23	Prepare surface and apply paint, varnish and enamel	3.58	2.72	1.18	1.14	0.00	S
	Skills in Joinery Work						
24	Set off and make framed; legged and braced door and framed louver	3.72	2.82	1.21	2.20	0.00	S
25	Identification of various types of wood adhesive, abrasives and wood finishes	3.69	2.62	1.10	1.20	0.00	S
26	Construct wall partition	3.57	2.52	1.17	1.33	0.38	NS
27	Build and dismantle temporary scenery for film making, television and theatre	3.65	2.43	1.33	1.28	0.96	NS
28	Install floor joist, ceiling paneling and interior design	2.83	2.57	1.10	1.22	0.06	NS
29	Make interior finishes such as molding, door, windows. Stairs and cupboards	3.37	2.50	1.17	1.08	0.01	S
30	Erect wood skirting in a new building	3.76	3.13	1.16	1.45	0.00	S
	Skills in carpentry work						
31	Fit and fix in doors; windows and architraves	3.56	2.54	1.27	1.34	0.11	NS
32	Set out and construct straight flight stair	3.71	2.73	1.26	1.30	0.02	S
33	Erect a free standing flight stair	3.72	2.54	1.13	1.13	1.25	NS
34	Ability to frame, nogging for ceilings, wall and the spacing required suiting various material	3.44	2.47	1.24	1,25	0.13	NS
35	Locate and construct building geometry (roof, center for arch, beams and other)	3.90	2.62	1.13	1.17	0.01	S

36	Ability to set out a small buildings using timber	3.70	2.60	1.20	1.19	0.11	NS
37	Timbering for trenches and construct formwork	3.82	2.24	1,17	1.21	0.53	NS
	Skills in ornamental design						
38	Design based on principles of design	3.56	2.67	1.18	1.18	0.01	S
39	Produce ornamental design such as inlay, over lay, marque try, parquetry using hand tools and woodworking machines	3.83	2.25	1.34	1.23	1.15	NS
40	Carve various shapes of objects such as birds and human being	3.82	2.35	1.13	1.20	0.30	NS
41	Produce ornamental designs and patterns using CNC machines	4.47	1.93	1.13	1.21	0.07	NS
	Skill in machine woodworking						
42	Use modern powered method of finishing wood	3.66	2.41	1.22	1.17	0.57	NS
43	Service and repair tools and equipment used in wood laboratory or workshops	3.71	2.61	1.13	1.26	0.02	S
44	Take inventories, replacements, installation and dismantling of equipment	3.65	2.47	1.23	1.19	0.23	NS
45	Install machinery and equipment according to lay out plans, blueprint, and other drawing in industrial establishment or schools	3.89	2.45	1.25	1.20	0.26	NS
46	Operate CNC lathe, router, drilling machines to perform operation such as turning, facing and many others	4.30	1.70	1.11	1.08	0.08	NS
47	Operate glue-sized machines	3.72	2.71	1.26	1.30	0.00	S
48	Operate one or more manual or power – fed woodwork machines for surfacing, sizing, joint construction, cutting tongues, bevels, beads or molding patterns	3.32	2.32	1.21	1.18	0.74	NS
49	Operate band saw machines, circular saws thicknesser and mortiser	3.63	3.02	1.28	1.40	0.02	S
	Skills in Upholstery work						
50	Ability to maintain furniture and use Iron mongery and fittings (hinges, locks, handles and others)	3.74	2.64	1.07	1.24	0.00	S
51	Design and construct full and semi-upholstery	3.48	2.58	1.40	1.41	0.05	NS
52	Identification of upholstery tools and material	3.57	2.73	1.23	1.36	0.29	NS
53	Construct upholstered chair using frame and spring involving padding, stitching, sewing, tacks and staples	3.76	2.56	1.18	1.24	0.09	NS
54	Repair and rebuild upholstered furniture using hand tools and machines.	3.67	2.38	1.20	1.24	0.85	NS
55	Select covering materials considering the colour, pattern and texture	3.72	2.30	1.12	1.14	0.10	NS

Key: N = Number of Respondents, $\bar{x}_1$ = Mean of Skill Required, $\bar{x}_2$ = Mean of Skill Possessed, SD_1 = Standard Deviation of Skill

Required, SD_2 = Standard Deviation of Skill Possessed, Sig. = Level of Significance, S = Significant, NS = Not Significant.

The results of the analysis presented in Table 6.2.1 showed:

1. The skill required showed that the respondents required up-skilling in all 55 items under general woodworking, cabinet making, carpentry works, ornamental design, machine woodworking and upholstery work. However, the mean is within 3.36 to 4.47 as displayed in the table. This is an indication that all the items presented are required skills by woodwork technologists i.e., forty seven (47) items were at required level while eight (8) items were moderately required.

2. The skill possessed by woodwork technologists showed that thirty six (36) items were moderately possessed and nineteen (19) items were slightly possessed. This implies that the respondents possessed some level of skills in woodwork technology that actually made them employable. Though, skills possessed were low.

3. The result of the z-test statistics between the skill required and skill possessed showed that there was significant difference in six (6) items. This implies that the respondents had different opinions in their ratings of the items in terms of needs.

6.3 Application of Instructional System Design (ISD) Model for Training and Re-Training Building Technology Graduates in Building Construction Industry

Human beings are the key elements in any organization as they plan, organize, coordinate and harness all other resources towards the achievement of the organizational goals. The level of skills of individual as a worker is one of the factors that determine the increase or decrease in the output level of any organization. Instruction System Design (ISD) is the use of demonstrated learning procedures to focus on the what, where,

and how of instruction (US Army Field Artillery School, 1984). ISD model has been utilized in design training, education and development programmes for organization to get the most desirable result from its resources. Training and re-training in industries can be carried out by utilizing ISD approach (Learner, 1986). ISD is alluded to as ADDIE and can be adopted for any study. ADDIE is an acronym for the five phase courseware development programme of ''Analysis, Design, Development, Implementation and Evaluation.'' It is also called SAT (System Approach to Training).

Alawode, Okwori, Udoh, Abdulrazaq and Isah (2017) used ISD model for skills development (training and re-training) building technology graduates in building construction industries. Application of ISD model simplified skills development processes. For the new and old building technology graduates to solve current changes in today's building, individuals and the organizations need to source for effective skills development model. The training and re-training of the building technology graduates was carried out in building construction industries in these areas: Construction management, building structures, building services and building maintenance by adopting the ISD model using the phases such as analyze, design, develop, implement and evaluate. Instructional System Design (ISD) Model is presented in Figure 2:

ISD model is an exploratory problem-solving technique that uses evaluation and feedback to improve performance (heuristic) of the trainees. The importance of gathering and distributing information in each of the five phases shows that training process is not static and linear, but rather an iterative flow of activities which is dynamic. This model shows the strategies for training and re-training building technology graduates of universities in building construction industries. The simplicity of the ISD model

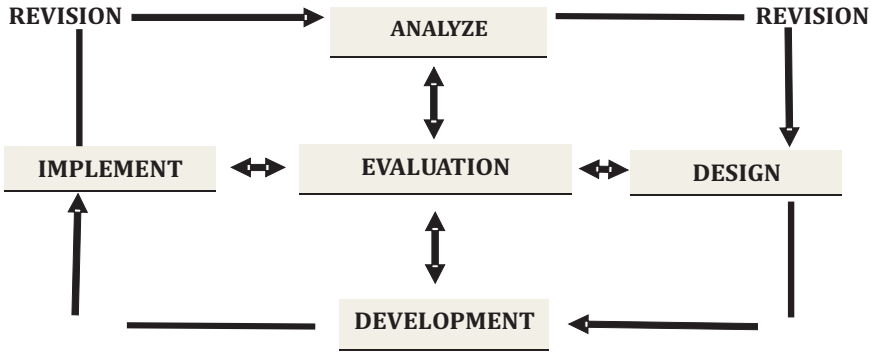

Figure 2: ISD Model
Source: *Morrison, 2010*

actually allows the trainees to focus more on each stage of the construction during the training and re-retraining exercise. This model saves time and money by using it for training and retraining of building technology graduates of universities.

6.4 A Survey of the Challenges to Industrial Development in Nigeria's Skill Development Effort in Technical Vocational Education and Training

A study on skills development revealed that most technical college classrooms and vocational centres in Nigeria are overcrowded with trainees who find it difficult to understand practical sequence due to the pressure involve in learning practical skills (Ogwo, 2004). While Aghenta (2009) noted that Technical and Vocational Education and Training (TVET) graduates, upon graduation, find it difficult to gain employment in the industries because of trial and error methods which are no longer needed by the industries due to technological devices currently used to enhance problem solving. Odigiri and Ogwo (2013) in their study on skills needs of technical college teachers found out that no educational programme can rise above the quality of its teachers and no teacher can teach practical skill which he or she does not possess.

Okwori, Abutu, Chado and Ewuga (2015) studied the challenges to industrial development in Nigeria's skill development effort in technical and vocational education and training. The study adopted descriptive survey research design in which a 32 item questionnaire structured on modified five point Likert scale was used to collect data. The targeted population for the study comprised all master trainers in Government Technical Colleges and vocational training centres in North Central, Nigeria including Federal Capital Territory, Abuja. The questionnaire was rated as Strongly Agree (5), Agree (4), Disagree (3), Strongly Disagree (2) and Undecided (1).The instrument was validated by three lecturers from the Department of Industrial and Technology Education, Federal University of Technology, Minna. The reliability of the instrument was found to be 0.89 using Cronbach Alpha formula. Out 69 copies of questionnaire given out, 66 were returned i.e. 95% return rate. The research questions were answered using mean and standard deviation while z- test statistics was used to test the null hypotheses at 0.05 level of significance. The items with 3.5 and above were regarded as acceptable (Agreed) while items below 3.5 were rejected (Disagreed). The item with 3.5 and above was regarded as acceptable because 3.5 is the lower limit of agree when five (5) points rating scale is used. Hypotheses were accepted when z-calculated (z-cal) value was less than the z-table (z-critical) value of + 1.96 while hypotheses were rejected when z- calculated was more than z-table value of + 1.96 based on the degree of freedom (df) of 96. The result is presented in Table 6.4.2 below:

Table 6.4.2: Mean responses and z-test analysis of respondents on the instructorship challenges to industrial development in Nigeria's skill development effort in TVET

S/N	ITEM STATEMENT	$\bar{X}_1$	SD_1	$\bar{X}_2$	SD_2	$\bar{X}_A$	z-cal	Rem
1.	Inadequate practical training given to instructors affects the practical training of trainees.	3.5	1.2	3.5	1.2	3.5	0.67	A & AC
2.	Lack of industrial attachment for upgrading TVET teachers' skills affects teaching of practical skills.	3.7	0.5	3.2	0.7	3.5	0.81	A & AC
3.	Poor remuneration and lack of motivation discourage TVET instructors from workshop practice.	3.7	0.6	3.2	0.8	3.5	0.74	A & AC
4.	Inappropriate teaching methods affect practical skill training.	3.4	1.2	3.8	1.1	3.6	0.75	A & AC
5.	Inability to control large class size during practical skill training.	3.1	0.1	3.9	0.5	3.5	0.54	A & AC
6.	Instructors find it difficult to teach skills in the absence of adequate modern training facilities.	3.4	1.4	3.6	0.7	3.5	1.43	A& AC
7.	Too much emphasis on theoretical aspect of TVET against practice during instructional delivery.	4.1	0.3	3.9	0.4	4.0	1.34	A & AC
8.	Poor attitude of TVET teachers towards improvisation of training equipment.	4.3	1.2	3.5	1.3	3.9	0.38	A & AC
9.	Poor professional, personal and public image accorded to TVET teachers in the society.	3.6	0.4	3.4	1.1	3.5	0.57	A & AC
10.	Absence of in-service programme for advancement of TVET teachers.	3.2	0.7	3.1	0.8	3.1	1.57	A & AC
11.	Erratic electric power supply to power training tools and machines	3.1	0.3	2.9	0.4	3.0	1.34	A & AC

Key: Rem = Remark; A = Agreed; D = Disagreed; AC = Accepted; $\bar{\times}\mathbf{1}$ = Mean of senior TVET staff; $\bar{\times}\mathbf{2}$ = Mean of Trainees; $\bar{\times}\mathbf{A}$ = Average mean; SD_1 = Standard deviation of TVET staff; SD_2 = Standard deviation of trainees; z-cal = z-test calculated, z- table (z-critical) value = ±1.96.

The following findings emerged from Table 6.4.2 as shown:
1. The instructors agreed with all the challenges to industrial development in Nigeria's skill development effort in TVET.

2. There was no significant difference between the mean

responses of the respondents on the instructorship challenges to industrial development in Nigeria's skill development effort in TVET.

6.5. Enhancing Mastery of Practical Skills in Students of Vocational And Technical Education Through Activity-Based Instruction

Vocational and technical education is type of education received by learners towards self- reliance and as well prepares manpower for the development of the society (Atsumbe, Okwori, Raymond & Igwe, 2013). Activity- based instruction is the form of instruction of class activity where the teacher effectively involves the learner in a task. Activity based instruction can be teacher driven and as well learner driven. The practical period should be adequate to enable learners acquire the necessary practical skill during the course of study (Okwori, Enemali, Kareem, Ogunshola, Abdulkadir & Ibrahim, 2019). Okwori (2005) said that Ministry of Education, National Board for Technical Education and National Universities Commission should endeavour to procure modern facilities for technical institutions. This will enable students to practice effectively after graduation and compete favourably with people from developed countries in the labour market. Similarly, Okwori, Jackden and Nyapson (1999) and Okwori (2012) observed that many vocational and technical education teachers in Nigeria cannot operate modern machines in industries because it is not found in their schools. In the same opinion, Okwori and Oluwasegun (2017) suggested that woodwork technology education workshop should be equipped with modern equipment and woodwork technology education should partner with industries and ministries in order to improve students' practical skill acquisition.

Odo, Okwori and Adenle (2012) conducted a study on enhancing mastery of practical skills in students of vocational and technical

education through activity based instruction. The population consisted of the entire vocational and technical education teachers teaching in the six government owned technical colleges in Lagos State. The number of teachers teaching in these schools was two hundred and forty four (244). Simple random sampling technique was adopted in selecting twenty-five respondents from each of the six schools. One hundred and fifty (150) vocational and technical education teachers were used for the study. A total number of fifteen (15) questionnaire items was generated. Part one addressed the issue of techniques and strategies used by teachers of vocational and technical education in delivering practical lessons while Part two provided information on strategies to be adopted for enhancing mastery practical skills in students. A four point response mode was adopted in the questionnaire. The four points scale was Strongly Agreed (SA) = 4, Agreed (A) = 3, Disagreed (D) = 2, and Strongly Disagreed (SD) = 1. The questionnaire was face-validated by three experts; one from the Department of Science and Technology Education, University of Lagos; Measurement and Evaluation of the Department of Educational Foundation, University of Lagos; and a Curriculum Planner from the State Ministry of Education, Lagos State. Reliability of the instrument was determined using test and re-test method. The Spearman Rank Order Correlation Coefficient was used to determine the reliability of the instrument and it yielded a reliability coefficient of 0.89. A total of 150 copies of the instrument were distributed. They were all completed and returned. Mean and standard deviation were employed in the data analysis. Mean of 2.50 and above interpreted as agreed while below 2.50 were interpreted as disagreed. The result is presented in tables 6.5.1 and 6.5.2:

Table 6.5.1: Mean responses of respondents on the techniques and strategies used by teachers of Vocational and Technical Education in delivering practical lessons

S/No	Item	?×	SD	Remarks
1.	Demonstration method of teaching	3.45	0.75	Agreed
2.	Field trip technique of instruction	2.83	0.89	Agreed
3	Project method of teaching	2.93	0.77	Agreed
4.	Experiment method of teaching	2.94	0.77	Agreed
5	Assignment method of teaching	3.32	0.65	Agreed

Table 6.5.2: Mean responses of respondents on the strategies to be adopted for enhancing students' mastery of practical skills

S/No	Item	?×	SD	Remarks
6	Regular workshop practical	3.59	0.66	Agreed
7	Adequate number of skilled and experienced vocational and technical education teachers	3.47	0.88	Agreed
8	Available and utilization of training materials	3.41	0.85	Agreed
9	Adequate equipped workshops	3.30	0.78	Agreed
10	Training students on the job	3.27	0.68	Agreed
11	Emphasis skill rather than certificate	3.30	0.78	Agreed

The results in tables 6.5.1 and 6.5.2 revealed:
1. VTE teachers agreed with the techniques and strategies used in delivery practical lessons.
2. VTE teachers also agreed with the strategies to be adopted for enhancing students mastering of practical skills.

6.6 Identification of Information And Communication Technology Skills Possessed by Technology Education Lecturers in the North Central Zone of Nigeria

Information and Communication Technology (ICT) deals with acquisition, processing, storage, retrieval and dissemination of information to users. Akindolu (2002) explained information and communication technology as all kinds of electronics that are used for broadcasting, telecommunication and all forms of computer mediated communication.

Okwori and Adenle (2012) conducted a study on identification of information and communication technology skills possessed by technology education lecturers in the North Central Zone of Nigeria. All the technology education lecturers were used for the study (125 technology education lecturers). Out of 125questionnaire distributed, 122 were returned, i.e. 98% return rate. The data were analysed using mean and standard deviation. A modified five point likert scale of Strongly Agreed (SA) 5 points; Agreed (A) 4 points; Moderately Agreed (MA). 3 points; Disagreed (DA) 2 points and Strongly Disagreed (SD) l point was used for the analysis. The items with mean score of 3.0 and above were regarded as acceptable while items with mean score below 3.0 was rejected. Four experts in technology education were used for face and content validation. Spearman rank order correlation coefficient was used to determine the reliability coefficient of the instrument and it was found to be 0.84 while df= 120. Result is presented in Table 6.6.1 below:

Table 6.6.1: Mean and standard deviation of responses of respondents on ICT learning tools used by technology education lecturers

N=122(FCE=12, State C.O.E=110)

S/N	STATEMENT		SD	REMARKS
1.	www.google.com	3.67	1.23	Agreed
2.	www.yahoo.com	3.72	1.35	Agreed
3.	Learning management system (LMS)	2.29	0.19	Disagreed
4.	PB works	1.81	0.17	Disagreed
5.	Youtube	2.83	1.52	Disagreed
6.	www.ask.com	3.00	1.41	Agreed

Table 6.6.1 showed that technology education lecturers agreed with item number 9, 10, 14 and disagreed with item number 11, 12 and 13 (Learning management system (LMS), PB works, Youtube)

7.0 CONCLUSION

Mr. Vice–Chancellor, distinguished ladies and gentlemen, in the course of my lecture, I have discussed my involvement in skills development through my research and other related activities. The idea this lecture gives is that there will be no technological development or advancement in Industrial Technology Education without developing the skills of the lecturers, technologists and students. I consider this topic appropriate as many graduates in Industrial Technology Education are roaming the streets without job and some of those employed cannot perform optimally in their places of work. I developed interest in this research area since twenty six years (26years) a go and I have been conducting researches in it and also served as resource person in workshops relating to this area. It was discovered that the skills possessed by ITE students in the use of machines were not adequate. Therefore, ITE students need to possess twenty three (23) skills and is mostly in the use of machines in order to practice effectively after graduation and contribute meaningfully to sustainable development in Nigeria.

It was revealed that the skills possessed by woodwork technologists in tertiary institutions in Nigeria are low when compared to the level of skills required for optimal performance. This justifies the fact that woodwork technologists in tertiary institutions in the above zone need to be up-skilled.

Vice-Chancellor Sir, emphasis must be placed on skills development of our students in order to make them self-reliant as the population continues to increase and there are no white collar jobs to cater for all ITE graduates. The problem of skills development in some schools and organizations is attributed to lack of machines, consumables in the workshops and even, most of the machines available are obsolete. Therefore, provision of modern equipment is absolutely necessary so that staff and students can meet up with modern trend in Industrial

Technology Education or be in tune with the best global practices. The challenges to industrial development in Nigeria's skills development effort in Technical Vocational Education and Training (TVET) are numerous and bother on challenges relating to instructors. If the Nigeria TVET programme is to gain relevance, achieve its objectives and produce technical manpower to promote industrial development, there is a need for both federal and state governments, industries and other stakeholders to intensify effort to proffer solutions to the challenges confronting skills development in Technical Vocational Education and Training especially the area of epileptic power supply and professional development of instructors.

Industrial technology education is a practical-oriented programme, therefore, requires the right teacher with the right attitude. Such a teacher should be in a better position to transfer practical skills, technical know-how, techniques of production and services to the students as well as teach activity-based practical skills. Similarly, regular workshop practice, adequate number of VTE teachers and workshops adequately equipped with modern tools are very essential for students' skills development.

ICT is very relevant to technology education. It is evident that ICT skills possessed by technology education lecturers at the College of Education system are not encouraging. Majority of them do not possess ICT skills in the use of learning management system, PB works and utube for teaching. This is detrimental to the lecturers, students and the educational system in the North Central zone of Nigeria. Information and communication technology is a necessary tool that can bring positive change to our educational system.

Vice-Chancellor, Sir, based on the findings of studies conducted and the experience of the inaugural lecturer as skills

development expert in Vocational and Technical Education and ITE in particular, it is a fact that many educational institutions lack modern equipment and without these equipment, skills development will be a mirage and there is no way graduates of industrial technology education can be self-reliant or Nigeria can advance technologically. Therefore, there is the need to utilise advances in industrial technology education for skills development in order to promote technological development in Nigeria.

8.0 RECOMMENDATIONS

1. The Federal Ministry of Education and other educational stakeholders, such as NUC, NCCE and NBTE should use the identified up-skilling needs to upgrade the curriculum for universities, polytechnics, colleges of education and other vocational and technical education institutions.

2. UNESCO/Nigeria Project on Technical and Vocational Education in Nigeria should use the identified up-skilling needs to develop skills development programmes for Industrial Technology Education teachers and technologists.

3. Technical teachers should be sent on industrial training and other professional development courses to update and improve their professional competence in techniques/skills for facilitation of teaching of ITE courses.

4. ITE teachers should endeavour to engage themselves in practical activities after school. This will assist in boosting their skills in the production of items (projects) for students to learn.

5. To bridge the gap caused by advancement or changes in building construction industry, training and retraining of Building Technology graduates must be on continuous basis using Instructional System Design (ISD) model. This is very essential as it gives expected result and as well saves time and

money.
6. TVET institutions and training centres should strive to generate fund internally through rendering consultancy services and lunching from time to time to enable them buy consumables for skills development.

7. School administrators should endeavour to provide modern tools, equipment and training materials adequate for students' practice in order to enhance skills development in TVET institutions.

8. Effective instructional techniques and strategies such as demonstration, field trip, project, experiment and assignment should be adopted by teachers of vocational and technical education during practical lessons.

9. TVE Teachers should be involved in practical activities in the workshop to motivate students and also activity-based learning should be regularly utilized in the workshop practice for effective skills development.

10. Qualified and skilled VTE teachers with the right attitude should be employed by state and federal governments to teach since there is acute shortage of technical teachers in many schools.

11. Retired skilled persons that are healthy can be invited to teach practical lessons on part-time basis to impact their wealth of experience to learners.

12. The management of Colleges of Education in Nigeria should organize workshops for the lecturers in the use of ICT tools for teaching and learning technical subjects and trades. This will enable them acquire appropriate ICT skills necessary for teaching technical trades and subjects.

ACKNOWLEDGEMENTS

The Almighty God

I thank Almighty God for allowing me reach the peak of my carrier despite the obstacles faced by technical college graduates of 1980s due to lack of recognition of the certificate (City and Guilds of London Institute) by many tertiary institutions in Nigeria. This certificate was mainly recognized in the labour market in Nigeria until when NABTEB was established by Federal Government of Nigeria.

The University Management

I am very grateful to the immediate past Vice-Chancellor, Prof. M. A. Akanji and the present Vice-Chancellor, Prof. Abdullahi Bala. I got my promotion to Associate professor and as well appointed Head of Department during Prof. M. A. Akanji's tenure. I can not forget to thank Prof. Abdullahi Bala because I got my promotion to Professor and also re-appointed as Head of Department during his tenure. I enjoyed working with the two Vice-Chancellors because they have interest in skills development. The two Vice-Chancellors contributed to skills development of ITE students by involving the Department in the University projects i.e. construction and maintenance work. May God protect and bless both of you. I sincerely thank the immediate past Deputy Vice-Chancellor (Academic), Prof. Y. A. Iyaka and Deputy Vice-Chancellor (Administration), Prof. E. E. Udensi, for their effective supervision and cooperation when the Department was handling University projects. I also appreciate the Management team of this University whom God made it possible for me to present my inaugural lecture during their tenure.

My Late Parents

I am very grateful to my late parents, Chief Ogbanje Okwori and Mrs. Mercy Ogbanje Okwori, for putting me in the path of education despite the fact that they did not receive formal education. I thank them for their foresight and for given me formal education.

My Supervisors/Mentors

My gratitude goes to my lecturers whom I take as my mentors. These are Prof. Joseph D. Enemali (PhD Major Supervisor), Prof. S. M. Yalams (PhD Supervisor), Prof. B. A Ogwo (M.Tech. Edu thesis supervisor) and others.

My Spiritual Father and Members of F.U.T., Minna Chaplaincy

I thank Rev. Father Gabriel N. Onuh of St. Malachy Chaplaincy, Federal University of Technology, Minna for his commitment in the dissemination of God's gospel and also for carrying everybody along in the Church. May God continue to strengthen your efforts and give you good health to enhance effective service delivery in the Chaplaincy. I also extend my appreciation to the Council Chairman and other members of the Chaplaincy for the cordial relationship and love we have for each other.

Colleagues at School of Science and Technology Education

For my colleagues in School of Science and Technology Education, I am very grateful to Prof. (Mrs.) V. I. Ezenwa, the former Dean of the School whom I worked with as Deputy Dean of the School. I thank you for the cooperation and mentoring received in the area of administration and leadership. I thank all the academic staff of the School of Science and Technology Education for my election as Deputy Dean without opposition. I sincerely extend my gratitude to the immediate past Dean of the School, Prof. B. N. Atsumbe and the current Dean, Prof. A. I. Gambari for carrying everybody along in the School and also for regarding everyone as his brother and sister.

Colleagues at the Department of Industrial and Technology Education

My appreciation goes to my Head of Department (Dr. I. Y. Umar) and other colleagues in the Department (lecturers and non-teaching staff) for our cordial relationship which is like brothers and sisters. I am very grateful for your respect and cooperation when I was Head of Department and even after my tenure of office. I say thank you to my elders such as Prof. G. D. Momoh, Prof. Kazeem A. Salami, Prof. S. A. Ma'aji, Prof. B. N. Atsumbe and Prof. E. J. Ohize for their advice and ensuring harmony exists in the Department.

University Seminar and Colloquium Committee

I also appreciate the Chairman and the members of the University Seminar and Colloquium Committee for the encouragement and devotion of time to organize this event. May God continue to give you the strength to discharge your responsibilities effectively.

Research Team

I humbly extend my gratitude to my research team on skills development and without them this inaugural lecture would not have been possible. Therefore, I say thank you to Dr. W. B. Kareem, Mr. F. Abutu and Mal. A. Mustapha.

Idoma General Development Community, Minna and Idoma Forum, Minna Branch

I thank the Och' Idoma (Chief) Mr. Luke Idoko, The President, Idoma General Development Community, Members of Idoma Forum and all the members of the above community for their prayer and support towards this inaugural lecture.

My Students

I am grateful to you all whether at undergraduate or postgraduate level especially those whose work was used for this inaugural lecture. The contribution of your work has made this

inaugural lecture possible.

My Nuclear and Extended Family

I sincerely thank my late brother, Mr. Nathaniel Ogbanje Okwori for his boldness in sponsoring me during my undergraduate programme despite the hardship at that period. May you continue to rest peacefully with the Lord. I also thank my sisters, Mrs. Monica Ochigbo, Mrs. Maria Ajogwu, Mrs. Onyemo Ijoga, Alice Ogbanje Okwori, Mrs. Mary Ojobo and Evangelist (Mrs.) Joy F. Koptroda for all the assistance rendered when I was a student. I equally thank my other brothers and sisters who have contributed in one way or the other towards my study at either undergraduate or postgraduate level. I cannot forget to extend my gratitude to Ai-Okwori Youth Association at home (Okpoga) and branches in other states for their unity as a family. May God continue to enhance the unity among us. I appreciate the presence of some of you here today and I thank God for my being a source of joy and happiness to the family.

My Dear Wife

To my darling, I thank you very much for your advice and encouragement to leave the College of Education system. It was your advice and encouragement that made me to leave Federal College of Education, Pankshin, Plateau State as Chief lecturer to University of Lagos. Your advice and encouragement has paid me today for attaining the rank of Professor. It is a source of joy and blessing to the family, Idoma nation, Benue State and Nigeria at large for being the first Professor of Industrial and Technology Education from Benue State. May God bless you, my sweet heart.

The Audience

You are highly appreciated for taking your time to be here and witness this occasion. Without your presence, this occasion would not have been lively. Your presence has contributed to the success of the inaugural lecture. May Almighty God bless you all.

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BRIEF PROFILE OF THE INAUGURAL LECTURER

Prof. Robert Ogbanje Okwori was born to the family of Chief Ogbanje Okwori in Okpoga, Okpokwu Local Government Area, Benue State more than five decades ago. He started primary school in LGED Primary School, Ugwu Okpoga and obtained First School leaving Certificate in 1977. The same year he proceeded to St. Joseph's Trade Centre, Makurdi (Currently St. Joseph's Technical College, Makurdi). In 1980, he got admission to Government Technical College, Makurdi and had City and Guilds of London Institute in 1983. He worked with Ministry of Agriculture, Agro Service Centre, Ichama, Okpowu Local Government Area, Benue State as craftsman from 1983 to 1984. Because of the zeal he had to pursue further studies, he left for College of Education, Katsina - Ala, Benue State in 1984 and obtained NCE Technical in 1987. He took appointment with Benue State Teaching Service Commission in 1987 as Assistant Education Officer 11. He later proceeded for B.Ed (Technology) Woodwork Technology at Ahmadu Bello University, Zaria (Kaduna Polytechnic campus) in 1988 and graduated in 1991. He also obtained Masters' degree in Library Science (MLS) from Ahmadu Bello University, Zaria in 1998, M.Ed Industrial Technical Education (Building/Woodwork Technology) from University of Nigeria, Nsukka in 2003 and PhD Technology Education from Abubakar Tafawa Balewa University, Bauchi, Bauchi State in 2009.

He taught at Ahmadu Bello University Demonstration Secondary School, Zaria from 1994 to 1995 as Master 11 and thereafter, he joined the services of Federal College of Education, Pankshin, Plateau State in 1995 as Lecturer 11. He rose through the ranks to become Chief Lecturer in 2007. He was the Head of Department

of Technical Education from 2002 to 2006 in the above College. In 2010, he got employment with University of Lagos, Akoka, Lagos in the Department of Science and Technology Education as Lecturer 1 and later transferred his services to Federal University of Technology, Minna as Senior Lecturer in the Department of Industrial and Technology Education in 2011.

He was a Food Committee Member at the Technical College representing his Department (Trade) which he served as the Food Prefect. He was the best NCE graduating student in Woodwork Technology in 1987.

He was the President of Technical Education Students Association, ABU Zaria (Kaduna Polytechnic Campus) in 1990/1991 academic session. Prof. Robert Ogbanje Okwori is a recipient of National Commission for Colleges of Education Research Grant award in the year 2000 and Tertiary Education Trust Fund Research Grant in 2012. He was the National General Secretary of his Professional Association (Technology Education Practitioners Association of Nigeria) between 2010 and 2012, Deputy National President between 2012 and 2016 and elected National President of the Association in 2016, the position he holds till today.

Prof. Okwori is the first Professor of Industrial and Technology Education in Benue State, Nigeria. He is a member of the Committee that drafted Science and Technology Education Policy between 2016 and 2017.

Prof. Okwori was appointed Consultant to International Labour Organization, Geneva in Skills Development in Vocational and Technical Education and Training on 10th February, 2021.

He has held some positions in the University and he is still occupying some.

- Postgraduate Coordinator of Industrial and Technology Education Department between 2011 and 2014.
- Deputy Dean, School of Science and Technology Education, 2014 - 2015.
- Managing Editor, School of Science and Technology Education Journal (*Journal of Information, Education, Science and Technology*) from 2013 to 2017.
- Head of Department, Industrial and Technology Education from 1st October, 2015 - February 28th, 2020.
- Editor-in-Chief, Industrial and Technology Education Departmental Journal (*Journal of Industrial Technology, Science and Education*) from 2017 to date.
- Postgraduate Students Adviser (M.Tech) from 2020 to date.
- Senate Representative in University Ceremonies 2019 to date.
- SSTE Chairman, Quality Assurance and Productivity - 2021.

He has served as a member of Committees at the Department, School and University and as well chaired some of them.

He is a member of many professional associations. Among them are:
- Fellow and member of Technology Education Practitioners Association of Nigeria,
- Fellow and member of Strategic Institute of Natural Resources and Human Development,
- Vocational and Technical Educators Association,
- League of Researchers in Nigeria,
- Society of Wood Science and Technology (USA),
- International Vocational Education and Training Association (USA).

Prof. Robert O. Okwori has ninety three (93) publications in journals and books of proceedings, two (2) textbooks and seven (7) chapters in different books.

He has presented papers in international and local conferences, among them are:

- International Conference of Society of Wood Science and Technology held at Beijing China in 27th to 31st August, 2012,
- International Conference on Research and Capacity building held at University of Accra, Ghana in September 15th to 16th, 2011,
- Served as a keynote speaker at Institute of Research Engineers and Scientists' conference held at Deira, Dubai on 5th December, 2015.

He is a resource person to the following organizations:

- African Development Bank on Vocational and Technical Education,
- Universal Basic Education, Abuja,
- Nigerian Educational Research and Development Council,
- Science and Technology Education Department, Federal Ministry of Education, Abuja,
- Reviewer to many local and international Journals in Wood Technology and Vocational and Technical Education and
- Project Supervisor/Facilitator with National Open University of Nigeria, Minna Study Centre, Bosso.

He is serving as External Examiner to the following institutions:

- Institute of Science and Technology Education (Postgraduate Level), University of South Africa, Pretoria,
- Department of Vocational and Technology Education, Abubakar Tafawa Balewa University, Bauchi, Bauchi State (Undergraduate Programme),
- Department of Science and Technology Education, University of Jos, Plateau State, (Undergraduate and postgraduate programmes),
- Technical Education Department of Niger State College of Education, Minna (NCE Technical Education Programme),

- Department of Technology Education, Modibbo Adama University of Technology, Yola (Undergraduate),
- Department of Technical Education, Delta State University, Abraka (Postgraduate),
- Served as External Examiner to Technical Education Department, Plateau State Polytechnic between 2008 - 2010.

A member of accreditation team to the following organizations:
- National Commission for Colleges of Education (NCCE), Abuja, Nigeria 2004 to date,
- National Board for Technical Education (NBTE), Kaduna 2015 to date,
- National Universities Commission, Abuja 2018 to date,
- Practical Examiner (Woodwork) to National Business and Technical Examination Board 2000 to date.

Served as External Assessor for staff promotion from the rank of Senior Lecturer to Principal Lecturer, Principal Lecturer to Chief Lecturer and also for professorial cadre in the following institutions:
- Niger State College of Education, Minna, Niger State,
- Federal College of Education (Technical), Bichi, Kano State,
- Kaduna Polytechnic, Kaduna,
- University of Lagos, Akoka, Lagos,
- Benue State University, Makurdi and
- Ekiti State University, Ado-Ekiti.

He has successfully supervised and graduated many PhD, M.Tech, and Undergraduate students.

Prof. Robert Ogbanje Okwori is happily married to Elizabeth Okwori and blessed with five children (Athanasius, Mercy, Daniel, Agnes and Pius).