

## ASSESSMENT OF SKILLS NEEDS OF INDUSTRIAL TECHNOLOGY EDUCATION STUDENTS TOWARDS SELF- RELIANCE AND SUSTAINABLE DEVELOPMENT IN NIGERIA

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**Abstract:** *The paper identified the skills required and skills possessed by industrial technology education students of the Federal University of Technology, Minna, Nigeria. Three research questions and a hypothesis was used for the study. The data were analyzed using mean and z-test statistics. The hypothesis was tested at 0.05 level of significance. The findings of the study revealed that the students possessed forty-three (43) skills and did not possess twenty (20) skills. Some of the skills students didn't possess include servicing diesel engines (vehicle), using of concrete mixing machine, using cathode ray oscilloscope, using a milling machine, and tenoning machine. It is recommended that the university should endeavour to procure modern equipment for the department, generating plant should be provided for the department as there is always epileptic power supply and students should be advised to undertake their internship (SIWES) in relevant industries to complement what has been taught in the school.*

**Keywords:** *Industrial Technology Education, Skills Needs, Self-Reliance, Sustainable Development*

### Introduction

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. It is offered at the post-secondary institution. The learners are expected to construct, repair and carry out maintenance related to their areas of specialization. The International Technology and Engineering Educators Association (ITEA) (2000) defined technology education as the study of technology in which students learn about the processes and knowledge related to technology. As a field of study, it facilitates shaping and changing the physical world to meet the needs of people by manipulating materials and tools with techniques. Technology Education is offered in Universities, Monotechnics, Polytechnics and Colleges of Education (Technical) and other specialized institutions. According to FRN (2014), the specific goals of technology education include:

- (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 imparts 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 to professional studies in the technologies.

Federal University of Technology, Minna, Nigeria (2019) has the objectives of Industrial and Technology Education as follows:

1. Develop a department of repute for training graduate and postgraduate students that are employable, enterprising and self-reliant.
2. Equip students with appropriate techniques to solve problems affecting Industrial and Technology Education and Technological innovations.
3. Provide specialized training for technical teachers, curriculum developers and supervisors of technology education at all school levels.

4. Enable students to acquire additional professional knowledge, skills and experience to be able to relate to others meaningfully.
5. Acquaint students with creative teaching strategies at the elementary, secondary and tertiary levels of education.
6. Contribute meaningfully to the multidisciplinary nature of Industrial and Technology Education.
7. Equip students with design and research skills.
8. Vigorously promote quality consultancy for excellent service delivery and generate funds.
9. Encourage staff and students of the Department to be ICT compliant and for the programme to be ICT driven.

These goals can only be achieved when students acquire the appropriate skill while in school. Skill is the ability to carry out various tasks in a trade or occupation effectively. Skill is the capability of accomplishing a job with the precision of certainty, practical knowledge in combination with ability, cleverness and expertness (Abdullahi, 2010). While 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. Ogundeji further stressed that the above situation is attributed to a lack of skills on the part of technical teachers because they are weak in teaching practical skills during practical lessons. The researchers believe that students can practice effectively after graduation when the appropriate skills and attitude are acquired. Self-reliance is only guaranteed when students are properly trained. This means they must acquire theory and adequate practical skills necessary for self-reliance and sustainable development in Nigeria.

Sustainable means being able to carry out various operations relating to technology, agriculture etc without causing damage to the environment while development connotes the process of gradually becoming better, stronger or more advanced (Quirk, 2003). Similarly, Kessara (2016) posited that sustainable development is a continuous and progressive increase and expansion of the volume of goods and services provided in a given economy with improvement in the social, political and economic life of present as well as the future generation. Sustainable development is concerned with the development of an individual, society, environment and as well as considering the future of the young ones. If industrial technology education is properly taught with an emphasis on skills acquisition then it is the graduates will be self-reliant and as well contribute effectively to economic and sustainable development in Nigeria.

### **Statement of the problem**

Industrial Technology Education has a great role to play in the technological and economic development of the country. This can only take place when students acquire the appropriate skill that can enable them to develop, innovate or modernize the existing items useful to the society but this is difficult to achieve with obsolete tools and equipment available in most school workshops. Seyi (2014) postulated that vocational and technical education has a vital role to play in the technological advancement of any country. It is a known fact that the training, acquisition and utilization of relevant skills by people is indispensable for economic growth and national development. Apart from lack of consumables, obsolete tools and equipment, epileptic power supply hinders practical skills acquisition by students. To train students properly in the acquisition of skills for effective participation in the world of work, the skills of teachers also need to be improved for effective teaching and learning of the trades.

### **Purpose of the study**

The study is designed to determine the skills needs of industrial technology education students of the Federal University of Technology, Minna, Nigeria. Specifically, the objectives of the study are to determine:

1. Skills required by industrial technology education students of Federal University of Technology, Minna, Nigeria
2. Skills possessed by industrial technology education students of Federal University of Technology, Minna, Nigeria
3. Skills needs of industrial technology education students of Federal University of Technology, Minna, Nigeria

### Research questions

1. What are the skills required by industrial technology education students of Federal University of Technology, Minna, Nigeria?
2. What are the skills possessed by industrial technology education students of Federal University of Technology, Minna, Nigeria?
3. What are the skills needs of industrial technology education students of Federal University of Technology, Minna, Nigeria?

### Methodology

Case study research design was adopted for the study. The entire population of 500 level ITE students was used as they were not so many. The total population was one hundred and fifty-two (152). Hence, there was no sampling. A structured questionnaire was developed by the researchers titled 'Skills needs of industrial technology education students of the Federal University of Technology, Minna, Nigeria (SNITEFUTMN) Questionnaire'. Five points rating scale of measurement was used for the respondents to express their views on the items of the instrument. Section "A" of the instrument consists of 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 the two results correlated using 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 questionnaires given out, 148 was retrieved that is 97.37 % return rate. Data collected was analyzed using mean and standard deviation to answer the research questions. Decision rule on respondents' mean was based on the true class limit of numbers.

### Results

**Table 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 <sub>1</sub>	Remarks	$\bar{X}_2$	SD <sub>2</sub>	Remarks
<b>Automobile Technology</b>							
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 a car	4.16	0.56	R	1.88	0.69	NP
4.	Ability to use an air compressor	1.85	0.67	NR	4.13	0.52	P

S/N	Items	$\bar{X}_1$	SD <sub>1</sub>	Remarks	$\bar{X}_2$	SD <sub>2</sub>	Remarks
5.	Ability to use wheel balancer	1.77	0.63	NR	4.18	0.70	P
6.	Ability to use a 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 a battery charger.	1.66	0.61	NR	4.01	0.69	P
9.	Ability to use a 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 a digital wheel alignment gauge.	4.15	0.55	R	1.87	0.69	NP
<b>Building Technology</b>							
13.	Using spirit level effectively.	1.73	0.65	NR	4.11	0.52	P
14.	Ability to use a hand trowel	1.87	0.69	NR	4.15	0.54	P
15.	Ability to use a shovel	1.79	0.63	NR	4.20	0.72	P
16.	Ability to use builders' /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 a trowel	1.62	0.49	NR	3.92	0.42	P
19.	Ability to use a tyrolean machine and maintain after use.	4.42	0.55	R	2.19	0.67	NP
20.	Mastering sequence of operations in a 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 a 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 a 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 a slump cone apparatus.	1.87	0.68	NR	4.32	0.52	P
<b>Electrical/Electronics Technology</b>							
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	1.76	0.69	NR	4.32	0.54	P

S/N	Items	$\bar{X}_1$	SD <sub>1</sub>	Remarks	$\bar{X}_2$	SD <sub>2</sub>	Remarks
	fixing sockets/switches.						
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 a universal adaptor.	4.55	0.51	HR	1.79	0.65	NP
34.	Ability to use a 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 us 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
	<b>Metalwork Technology</b>						
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 vernier calliper.	1.90	0.69	NR	4.32	0.54	P
42.	Ability to take a measurement using a measuring steel rule.	1.21	0.71	NR	4.39	0.56	P
43.	Ability to remove use of 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 a rolling machine (Manual)	4.26	0.61	R	1.76	0.69	NP
52.	Ability to use a folding machine (Manual)	4.20	0.72	R	1.70	0.63	NP
53.	Ability to remove dust using an air blower	2.21	0.59	NR	3.42	0.52	P

S/N	Items	$\bar{X}_1$	SD <sub>1</sub>	Remarks	$\bar{X}_2$	SD <sub>2</sub>	Remarks
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
<b>Woodwork Technology</b>							
58.	Ability to use a thickening 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 a 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 a 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 a 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

**Keys:** N= Number of Industrial technology Education students  $\bar{X}_1$ = Mean responses of skills required, SD<sub>1</sub>= Standard deviation of skills required,  $\bar{X}_2$ = Mean responses of skills possessed, SD<sub>2</sub>= Standard deviation of skills possessed

The data in Table 1 showed the skills required and the skills possessed by ITE students for self-reliance and sustainable development in Nigeria. The students possessed forty-four (44) skills while twenty-three (23) skills were not possessed.

**Table 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	$\bar{X}$	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  $P \leq 0.05$

The result of the analysis in Table 2 shows that the P-value is less than 0.05 ( $P \leq 0.05$ ). This means there is a significant difference. Therefore, there is a skill gap. There is a need for more skills to be acquired for self-reliance and sustainable development by Industrial Technology Education Students in especially in the area of use of machines.

## Discussion

The findings in table 1 revealed that ITE students require skills for servicing diesel engine and the use of digital wheel alignment gauge. In the same opinion, Bakare and Fadairo (2010) pointed out that when the required skills are given to learners, they will be competent to work efficiently with little or no supervision so the skills required should be taken very serious during the training of students. The study also identified that ITE students require skills on the use of concrete mixing machine, cathode ray oscilloscope and milling machine. In support of this finding, Erewari (2004) opined that technical college graduates possessed low technical skills and competencies for self-employment; therefore, the need for technology education graduates to possess relevant technical skills, knowledge and competencies is essential. It was discovered from the findings of the study that ITE Students lack the skill to use a wood lathe and spray gun in finishing a cabinet. Similarly, Kareem and Okwori (2018) revealed that there is a need for modern equipment in school workshop since lack of skills in the use of some of the machines may be attributed to the absence of that equipment in the school workshop. The hypothesis tested at 0.05 using Z-test statistic was significant which means there was a skill gap. This is evident as many students lack the skill of using machines. Okwori (2008) opined that the problem of the lack of equipment in technical education programme is a serious issue. When students are not properly trained, they find it difficult to practice on their own and as well can't compete with others in the labour market. This means the issue of discoveries and innovations in technology will be difficult to come by.

## Conclusion

The study identified the skills possessed and skills required by ITE students for self-reliance and sustainable development in Nigeria. It was discovered that the skills possessed are not adequate in the use of machines. Therefore, ITE students need to possess twenty-three (23) skills to be self-reliant and contribute effectively to sustainable development in Nigeria.

## Recommendations

1. It was recommended that modern equipment should be procured for the ITE department.
2. ITE lecturers should be sent on industrial training in relevant industries during long vacation to improve their skills in the use of the modern machine and hand tools.
3. ITE lecturers should be encouraged to attend professional courses and workshops to enhance the teaching of students skills that can facilitate self-reliance and contribute to sustainable development in Nigeria.
4. ITE students should be advised to undertake their internship (SIWES) in relevant industries.
5. Generating plant should be provided for ITE department because of epileptic power supply as the power supply is very essential for students' workshop practice.

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