

# ASSESSMENT OF STUDENTS' AREAS OF DIFFICULTY IN TEACHING AND LEARNING OF BASIC TECHNOLOGY IN OSUN STATE.

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## Abstract

*This study determined the students' areas of difficulty in teaching and learning of Basic Technology in Osun State to address poor performance of students in Basic Technology. A descriptive survey research was used to carry out the study with a population of 3,720 (3600 students and 120 Basic Technology teachers). A simple random sampling technique was used to select 600 respondents (540 students and 60 Basic Technology teachers). A structured questionnaire tagged „Students' Areas of Difficulty in Teaching and Learning of Basic Technology (SADTLBT) questionnaire was developed after review of relevant literature to elicit responses from the respondents. The reliability of the instrument was .76 using Cronbach Alpha technique. Two research questions were answered in line with the purpose of the study using mean to analyse them and two null hypotheses were tested at 0.05 level of significance using t-test. The findings of the study revealed that metalwork machines and metal joining; basic electronic devices and emission theory; transmission, distribution and utilization of electricity; basic electric communication, simple electrical wiring tools and materials; simple blue print reading, foundation wall among others are students' areas of difficulty. The study recommended that Basic Technology students should be taught how to improve their self-confidence and conceptualize terms or topics that are perceived difficult. Students should be motivated with adequate quality instructional materials/resources for effective learning and better performance.*

**Key Words:** Assessment, Areas of Difficulty, Teaching and Learning, Basic Technology.

## Introduction

Globally, the development of any nation today depends on the priority given to functional education particularly in science and technology as evident in the high level of awareness and demand for technology education. A functional education in this sense is one that has the potential of bringing about all-round national development. Thus, the quality of technology education in the school system is not unconnected with the scientific and technological development and the extent of economic sustainability needed in Nigeria. In support for advocacy on science and technology at all levels of education, the Federal Republic

of Nigeria (FRN, 2013) in the National Policy on Education stipulated technology for all as a tool for national development. This enhances the teaching and learning of technology at all levels of education including secondary schools where the foundation of Basic Technology education is laid.

The term Technology has been widely defined by different authors. Andy (2016) defined technology as a body of knowledge devoted to creating tools, processing actions and extracting of materials. According to Igberadja (2015),

teaching and learning of Basic Technology exposes students at the junior secondary school level to technology through basic exploratory activities. Also, Ekpenyong (2015) stated that junior secondary school is where students receive three years for basic education in addition to primary school. At the junior secondary school level, it is offered as an integrated pre-vocational subject to equip students with relevant skills and knowledge. Thus, technology is included in the goals of technical and vocational education stated in the National Policy on Education (2013) to: provide trained manpower in the applied sciences, technology and business particularly at craft, advanced craft and technical levels; provide the technical knowledge and vocational skills necessary for agriculture, commercial and economic development; give training and important necessary skills to individuals who shall be self-reliant economically.

Basic Technology was first introduced as Introductory Technology in the curriculum when the 6-3-3-4 educational system came to limelight in 1982 to enhance effective teaching and learning of science and technology at all levels of education starting from primary school. UNESCO (2011) stated that Basic

career exploration. This means that teaching and learning of Basic Technology cannot be over-emphasized in our society as it helps to improve the standard of living by adding value to the quality of life through application of modern facilities embedded in science and technology. It improves the work environment through the use of machines to produce goods and services which have reduced human labour and stress.

Teaching is a systematic activity that involves transferring of knowledge, skills, learning experience from a teacher to learner using appropriate instructional materials, methods and strategies that can facilitate the learning process (Okwelle, 2013). Thus, teaching and learning of Basic Technology enables students to acquire a body of knowledge, attitude and skills that will make them develop competency required to participate and explore all aspects of science and technology. Igberadja (2015) stated that Basic Technology comprises of electrical and electronics technology, metal work technology, mechanical/automobile technology, building technology, woodwork technology and technical drawing. Metal work is aimed at training students on the general properties, materials selection and use of metals. Wood is a hard, tough substance that

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Technology is sustaining the complex structure of modern civilization and socio-economic development.

Also, Amoor and Magaji (2015) opined that Basic Technology is a component of vocational education that provides knowledge and skills needed to perform efficiently and effectively in the world of work. They stated further that Basic Technology involves acquisition of basic skills, knowledge and competencies needed for

forms the trunk of a tree.

Technically, the process of working with wood or the skill of making objects from wood suitable for building and constructional purposes is called woodwork. According to Mohammed (2011), woodwork includes upholstery, carpentry and Joinery, woodwork production and timber technology. Building technology is another integral part of Basic

Technology that deals with domestic and industrial constructions of houses or apartments. Electronics technology refers to the study and application of electrons and devices which operate by controlling the flow of electrons through them. Another aspect of Basic Technology is technical drawing/graphic technology. It is the medium of communicating ideas, thoughts, shapes, sizes, and designs among technologist, engineers, architectures, technicians and is widely used in different professions (Chedi, 2013).

Thus the study of Basic Technology at the junior secondary school level is to achieve all round technological advancement by exposing students to foundational aspects, methods and application of science and technology. Despite the enormous role of technology to national development, it is worrisome that the poor performance of students in Basic Technology at the junior secondary school examination is alarming and needs to be investigated (Ozaji and Chritiana, 2014). It therefore becomes imperative to find out what factors are responsible for the poor performance. Some of the factors that may affect student's performance in examination include interest, learning materials, and influence of qualified teachers, management and parental attitude, teaching method, availability of laboratory and workshop tools, equipment, among others.

Performance of students is a major determinant to measure if teaching and learning is effective and the areas which the students are facing difficulty. Igberadja (2015) opined that Basic technology, like other science subjects, recorded poor students' performance include: inability of the teachers to put across the concepts to the students, lack of skills and competence required for teaching, shortage of

qualified basic technology teachers, lack of teaching materials and necessary equipment. Okolie and Inyiagu (2014) observed that dwindling performance of students in science and technology subjects in secondary schools is a serious challenge which can affect their ability to meet-up with the science and technology courses in tertiary institutions. Okolie and Inyiagu (2014) are of the opinion that the downward academic performance of students in science, technology and mathematics if not arrested, the intended positive outcome derivable from the philosophy of science as stated in the National Policy on Education might not be achieved. Assessment is the act of appraising a person, programme, situation or event. It is also a measure of something with respect to its worth. Bob (2014) stated that assessment is a process by which information is obtained relative to some known objective or goal. Assessment is a broad term that includes testing. This explains why the members of Science Teachers Association of Nigeria (STAN) review and assess the level of progress made from time to time in teaching and learning of science subjects including Basic Technology in junior secondary school. Students' areas of difficulties are in integrating, organizing, synthesizing and analysing content. Azegba (2010) referred to students' areas of difficulty as how students see the development of education and the problem affecting their learning process. Thus, this study is based on the premise that assessment of students' areas of difficulty in teaching and learning of Basic Technology would enable stakeholders to find lasting solution to their learning challenges towards improving the performance of students in Osun State.

### **Statement of the Problem**

Factors that contribute to poor performance of Basic Technology students and the need to find

lasting solution to them have been reiterated in the literature. Hence, a lot of efforts have been made to solve the challenges but students' areas of difficulty particularly in the subject matter that may affect their performance negatively are yet to be addressed. This could be a possible cause of recent poor performance of students in Ife-Ijesha senatorial district of Osun State. For instance, the state PostPrimary School Management Board (PPSMB) in 2015 reported that academic performance of students in Basic Technology has declined greatly despite the efforts of teachers. The need to identify students' areas of difficulty in Basic Technology and proffer solution to them in order to improve their performance creates a gap which this study intended to address.

### **Purpose of the Study**

The main purpose of this study was to assess the students' areas of difficulty in teaching and learning of Basic Technology in Osun State. Specifically, the study sought to:

1. determine the students' areas of difficulty in teaching and learning of Basic Technology;
2. determine the contributions of adequacy of quality instructional materials to solve students' areas of difficulty in teaching and learning of Basic Technology.

### **Research Questions**

The following research questions guided the study as follows:

1. What are the students' areas of difficulty in teaching and learning of Basic Technology?
2. What are the contributions of adequate quality instructional materials to solve students' areas of difficulty in teaching and learning of Basic Technology?

### **Research Hypotheses**

The following null hypotheses were tested at 0.05 probability level of significance:

**Ho<sub>1</sub>:** There is no significant difference in the mean responses of teachers and students on the students' areas of difficulty in the teaching and learning of Basic Technology.

**Ho<sub>2</sub>:** There is no significant difference in the mean responses of teachers and students on the contributions of adequate quality instructional materials to solve students' areas of difficulty in teaching and learning of Basic Technology.

### **Methodology and Results**

The study adopted descriptive survey research design because it is suitable for collection of public opinions on existing phenomena with the intent to determine the current conditions or practices and make better plan for improvement (Ezeh, 2011). The study was carried out in Osun State, Nigeria. The population composed of 3,720 (3600 students and 120 teachers) in public secondary schools offering Basic Technology and a simple random sampling technique was used to select 600 respondents (540 students and 60 teachers). A structured questionnaire tagged —Students' Areas of Difficulty in Teaching and

Learning of Basic Technology (SADTLBT)|| questionnaire was developed by the researchers from the relevant literature as instrument for data collection. A reliability of 0.76 co-efficient was obtained using Cronbach Alpha technique.

The questionnaire contained 39-item to elicit responses from the respondents in line with the research questions. The instrument was structured in four-response options: Strongly Agree (4), Agree (3), Disagree (2) and Strongly

Disagree (1). The researchers engaged the service of two assistants to administer 600 copies of the questionnaire. The data collected were analyzed using mean to answer the research questions. Any questionnaire item with a mean limit ranging from 3.50-5.00 indicated strongly agree, 2.50-3.49 indicated agree, 1.50-2.49 indicated disagree, and 0.50-1.49 indicated strongly disagree. A t-test statistics analysis was used to test the null hypotheses at 0.05 probability level of

significance. The null hypotheses were not rejected if the t-calculated value is less than the table value while they were rejected if t-calculated value is greater than the table value.

**Research Question One:** What are the students' areas of difficulties in the teaching and learning of Basic Technology?

**Table 1: Mean and Standard Deviation on the Students' Areas of Difficulty in Teaching and Learning of Basic Technology.**

S/N	Difficult Areas/Topics	X <sub>1</sub>	SD <sub>1</sub>	X <sub>2</sub>	SD <sub>2</sub>	c	SD <sub>c</sub>	RMK
1.	Identification of metal, its forms and classifications	2.28	1.02	2.56	1.03	2.42	1.02	D
2.	Metal processing and uses	2.70	1.08	2.44	0.92	2.57	1.00	A
3.	Metals work machine and its uses	2.74	0.87	2.40	0.92	2.57	0.90	A
4.	Metal joining (soldering, welding and bracing)							
	Basic electronic devices and emission theory	3.21	0.91	2.85	0.87	3.03	0.89	A
5.	Transmission of electricity							
	Distribution and utilization of electricity	2.95	0.89	2.61	1.04	2.78	0.97	A
	6. Basic electric communication	2.40	0.75	2.67	0.90	2.54	0.83	A
7.	Simple electrical wiring tools and materials	2.45	0.95	2.60	0.90	2.53	0.93	A
8.	Maintenance of electrical and electronic appliances	2.66	0.94	2.16	1.02	2.70	0.98	A
9.	Identification and classification of wood							
	Woodwork and metalwork hand tools	2.23	0.89	2.29	1.09	2.26	0.99	D
	11. Wood processing and uses of wood	2.00	1.03	2.21	1.07	2.11	1.05	D
12.	Woodwork machine and wood work project (joint)	2.10	0.91	2.43	1.08	2.27	0.99	D
13.	Building materials and their uses	2.55	0.95	2.23	1.03	2.39	0.99	D
14.	Uses of simple blue print reading, foundation wall and floor	2.84	0.77	2.52	1.01	2.68	0.89	A
15.	Types and uses of door, windows and roof	2.00	1.08	2.33	1.02	2.16	1.05	D
16.	Urban water supply to building	2.55	1.05	3.08	0.94	2.79	1.00	A
17.	Drawing instrument and materials and board practice	2.15	1.09	2.54	1.01	2.35	1.05	D
18.	Free hand sketching	2.30	1.03	2.53	0.93	2.41	0.98	D
19.	Geometrical construction (lines, angles, circle, bisection, quadrilateral and polygon)	2.15	1.04	2.38	1.06	2.27	1.05	D
20.	Geometrical construction (area of plane figures, dividing straight lines equally)	2.25	1.16	2.52	1.13	2.38	1.15	D
21.	Construction of triangles and equilateral	2.15	1.27	2.33	1.10	2.24	1.19	D
22.								

	Isometric, orthographic drawing and perspective	2.55	1.15	2.31	1.08	2.43	1.12	D
23	drawing	2.35	1.18	2.23	1.11	2.29	1.15	D
24	Belt and chain drive gears and mechanical transmission system)	3.00	1.12	2.83	1.04	2.93	1.08	A
25	Frictions and its effects Working principles of generator and bicycle	2.75	1.07	2.19	1.10	2.47	1.09	D
26	dynamo	2.00	0.87	1.83	0.95	1.92	0.91	D
27	Principle of operating alternate current motors Application of energy based technology	2.80	1.01	.92	0.99	2.86	1.00	A
28	appliances . . . Electro-mechanical devices	3.10	0.85	2.79	0.97	2.95	0.91	A
29								
		2.65	0.86	2.91		2.79	0.87	A
					0.88			
30		2.85	0.93	2.75	0.97	2.80	0.95	A

**Keys:**  $X_1$  = Teachers,  $X_2$  = Students,  $\bar{c}$  = Combine Mean,  $SD_c$  = Combine Standard Deviations, SA = Strongly Agreed, A = Agreed, D = Disagreed, SD = Strongly Disagreed.

The data analysis in Table 1 showed that 14 items had combine mean values ranging from 2.53-3.03 which implies that the respondents agreed that items 2, 3, 4, 5, 6, 7, 8, 14, 16, 24, 27, 28, 29 and 30 were students' areas of difficulty in teaching and learning of Basic Technology. However, the table showed that

items 1, 9, 10, 11, 12, 13, 15, 17, 18 19, 20, 21, 22, 23, 25 and 26 were not students' areas of difficulty.

**Research Question Two:** What are the contributions of adequate quality instructional materials to solve students' areas of difficulties in teaching and learning of Basic Technology?

**Table 2: Mean and Standard Deviation on Contributions of Adequate Quality Instructional Materials to solve Students' Areas of Difficulty in Teaching and Learning of Basic Technology**

S/N	Items	$X_1$	$SD_1$	$X_2$	$SD_2$	c	$SD_c$	RMK
1.	Adequate quality instructional materials and facilities encourage basic technology teacher to solve students' areas of difficulty.	3.50	0.76	3.32	0.81	3.41	0.79	A
2.	Adequate quality instructional materials and facilities enhances quality of technical instructional delivery	3.40	0.88	3.06	0.90	3.23	0.89	A
3.	Inadequate quality instructional materials and facilities make teachers have negative attitude towards students areas of difficulty	3.65	0.93	3.17	0.96	3.41	0.95	A
4.	Inadequate quality instructional materials of Basic Technology abstract and theoretical	3.50	0.61	2.83	0.94	3.17	0.78	A
5.	Inadequate quality instructional materials							

	and facilities reduce teachers motivation to teach well	3.05	0.83	2.87	1.10	2.96	0.97	A
6.	Adequate quality instructional materials and facilities enhance retention of students' attention	3.35	0.93	3.18	1.01	3.27	0.97	A
7.	Adequate quality instructional materials and facilities enhance achievement of instructional objectives in teaching and learning of Basic Technology	3.35	0.99	3.36	0.74	3.36	0.87	A
8.	Adequate quality instructional materials and facilities enhance effective teaching methods to solve students' area difficulty	3.25	0.85	3.26	0.80	3.26	0.83	A
9.	Adequate quality instructional materials and facilities enhance students' active participation in practical,	3.50	0.83	3.23	0.79	3.37	0.81	A

**Keys:**  $X_1$  = Teachers,  $X_2$  = Students,  $\bar{c}$  = Combine Mean,  $SD_C$  = Combine Standard Deviations, SA = Strongly Agreed, A = Agreed, D = Disagreed, SD = Strongly Disagreed.

The data analysis in table 2 showed that all the 9 items had combined mean values ranging from 2.963.41 which implies the respondents agreed that all the items 1-9 are contributions of adequate instructional materials to solve students' areas of difficulty in teaching and learning of Basic Technology.

**H0<sub>1</sub>:** There is no significant difference in the mean responses of teachers and students on the students' areas of difficulty in the teaching and learning of Basic Technology.

**Hypothesis One**

**Table 3: A t-test Analysis on the Students' Areas of Difficulty in teaching and learning of Basic Technology.**

RESPONDENTS	N	X	SD	t-cal	t-tab	RMK
Teachers	60	2.49	0.96	-0.133	1.96	540
Students	1.00			2.52		NS

**Keys:** *N* = Number of Respondents,  $X_1$  = Mean, *SD* = Standard Deviations, *t-cal* = t-test Calculated Value, *t-tab* = t-test Table Value, *RMK* = NS (Not Significant).

The summary of t-test analysis in table 3 shows that the calculated value of -0.133 is less than the table value of 1.96 at 0.05 significance levels and 598 degree of freedom. This implies that there is no significant difference between the mean responses of Basic Technology teachers and students. Therefore, the null hypothesis of no significant difference in the mean responses of teachers and students on the students' areas of difficulty in the teaching and learning of Basic Technology was not rejected.

**Hypothesis Two**

**Ho<sub>2</sub>:** There is no significant difference in the mean responses of teachers and students on the contributions of adequate quality instructional materials to solve students' areas of difficulty in teaching and learning of Basic Technology

**Table 4: A t-test Analysis on Contributions of Adequate Quality Instructional Materials to solve the Areas of Difficulty in Teaching and Learning of Basic Technology.**

RESPONDENTS	N	X	SD	t-cal	t-tab	RMK
Teachers	60	3.38	0.85	1.24	1.96	NS
Students	0.89			540	3.13	

**Keys:** *N* = Number of Respondents,  $X_1$  = Mean, *SD* = Standard Deviations, *t-cal* = t-test Calculated Value, *t-tab*

= *t*-test Table Value, RMK = NS (Not Significant).

The summary of t-test analysis in table 3 shows that the calculated value of 1.24 is less than the table value of 1.96 at 0.05 significance levels and 198 degree of freedom. This implies that there is no significant difference between the mean responses of Basic Technology teachers and students. Therefore, the null hypothesis of no significant difference in the mean responses of teachers and students on the contributions of adequate quality instructional materials to solve students' areas of difficulty in teaching and learning of Basic Technology was not rejected.

### **Discussion of the Findings**

The study revealed that students had difficulty in 14 areas as indicated by both the Basic Technology teachers and students in table 1. This implies that students' areas of difficulty in teaching and learning of Basic Technology in Osun State include: metals work machines and its uses; metal joining; basic electronic devices and emission theory; transmission of electricity, distribution and utilization of electricity; basic electric communication, simple electrical wiring tools and materials; uses of simple blue print reading, foundation wall and floor, Isometric, orthographic drawing and perspective drawing, Belt and chain drive gears and mechanical transmission system; frictions and its effects; working principles of generator and bicycle dynamo; principle of operating alternate current motors; application of energy based technology appliances; and electro-mechanical devices.

The findings of this study are in line with Omiko (2013) observed that a topic is considered difficult if an academically average Basic Technology student performs poorly on it after evaluation even though the teacher has put in his best during the course of instruction. Azegba (2010) observed that in difficult topics, students ask questions and the answers from the teachers do not seem to clarify them. In such topics, the teacher finds it difficult to complete instruction on them within the time limit conclusively. Also, the findings are similar to that of Okolie and Inyagu, (2014) that the areas which students were facing difficulty have negative effects on teaching and learning as well as performance of students.

The result in table 2 showed that the contributions ofadequate instructional materials to solve students' areas of difficulty include: quality instructional delivery of Basic Technology, making teaching and learning of Basic Technology theoretical and practical very easy, enhance attention and retention of students, facilitate achievement of teaching and learning objectives of Basic Technology, effective teaching methods and motivate teachers to solve students' area of difficulty by making students participate actively in practical. The findings of this study are in line with Ogbu (2015) that availability of instructional facilities for vocational and technical education such as basic hand tools, equipment, classrooms, workshops, laboratories, electrical and electronics instruments among others help the learners to learn properly. The findings are similar to that of Azegba (2010) and Odhiambo (2013) that the use of instructional materials would make discovered facts glued firmly to the memory of students for better performance.

The result of the null hypothesis one in table 3 revealed that both Basic Technology teachers and students had similar views. This implies that no significant difference existed in the mean responses of Basic Technology teachers and students on the students' areas of difficulty in the teaching and learning of Basic Technology. Therefore, null hypothesis one was not rejected. Also, the result of the null hypothesis two in table 4 revealed that both Basic Technology teachers and students had similar views. This implies that no significant difference existed in the mean responses of Basic Technology teachers and students on the areas of students' difficulties in the teaching and learning of Basic Technology. Therefore, null hypothesis one was not rejected.

## Conclusion

This study assessed the students' areas of difficulty in teaching and learning of Basic Technology in Osun State to address poor performance of students in Basic Education Certificate Examination (BECE). The findings of the study revealed that metalwork machines and metal joining; basic electronic devices and emission theory; transmission, distribution and utilization of electricity; basic electric communication, simple electrical wiring tools and materials; simple blue print reading, foundation wall and floor, isometric, orthographic and perspective drawing are major students' areas of difficulty.

## Recommendations

Based on the findings of the study, the following recommendations were made;

1. Basic Technology students should be taught how to improve their self-confidence and conceptualize terms or topics that are perceived difficult.
2. Basic Technology students should be motivated with adequate quality instructional resources and environment for effective learning and better performance.
3. Basic Technology teachers should also adopt appropriate teaching methods to teach difficulty topics to enhance effective teaching and learning.

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