

## Assessment of Facilities for Teaching of Metalwork in Vocational Technical Colleges in Rivers State of Nigeria

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### Abstract

The main aim of this study was to assess the utilization level of facilities for teaching and learning of metalwork in vocational technical colleges in Rivers State, Nigeria. Three research questions were formulated to guide the study. Survey research design was adopted in conducting the study. The study's sample contained 42 metal-work teachers and 78 metal-work students, for a total population of 120 respondents. A questionnaire based on four point scale was used as the data collection instrument. The analysis was done using percentages, mean scores and standard derivations. It was found that the facilities in the workshop were not effectively utilized for teaching and learning. Instructional materials like, audiocassette tapes, videos, slides, and filmstrips were not utilized for teaching and learning and teachers lack skill for improvisation. It was recommended that (a) facilities like obsolete machines and equipment be replaced and properly maintained through adequate funding (b) institutions training technical teachers should include courses on improvisation in specific trade areas as a mandatory requirement for graduation.

**Keywords:** *Facilities, Metalwork and Vocational Technical Colleges*

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### **Background to the Study**

Since Nigeria became independent in 1960, vocational and technical education has continued to receive attention from both the government and the citizens. The growing understanding that technical education holds the key to the nation's technological development created this awareness.

The National Policy of Education (2004) defined technical and vocational education as a comprehensive term referring to those aspects of the education process involving in addition to general education, the study of technologies and related sciences and the acquisition of practical skill, attitudes, understanding and knowledge relating to occupations in various sectors of economy and social life.

Technical college is an institution for further education that provides courses in technology, art, science, crafts and advanced crafts. It is education for work which prepares an individual to be gainfully employed Nwachukwu (2004). It is also a place of learning where one acquires the knowledge, training and skills. Technical education is education designed to prepare the youths for employment in industry, business, commerce and other occupations (Thompson, 1999). It emphasizes the dignity of labour and proper attitude to work, It stimulates and encourages productivity, Its curricula are based on technical and practical application of knowledge as well as basic mathematics and science to solution of problems (FGN, 2004).

National Policy on Education (2004) stated the objective of technical colleges and metal work courses as follows:

1. To acquire basic skills and knowledge in preparation for further studies.
2. To acquire knowledge and practical skills necessary for self reliance and gainful employment.
3. To acquire basic understanding for functional living in the society and
4. To inculcate safe working habit.

These technical skills are necessary and instrumental to the technological advancement of any nation. The emphasis of the government on skill acquisition has led to the establishment of institutions at all levels of our educational system amongst which is the technical college. Though the technical college has undergone several changes before assuming its present name, the basis for establishing this type of institution has not changed significantly. Technical Colleges in Nigeria are established to produce craftsmen at the craft level and master craftsmen at the advance craft level (Federal Ministry of Education, 2013). The courses offered at the technical colleges leads to the award of National Technical Certificate (NTC) and Advance National Technical Certificate (ANTC). The curriculum programmes of technical colleges according to Federal Government of Nigeria (2004) are grouped into related trades. These include; the computer trades, electrical/electronic trades, building trades, wood trades, and mechanical trades. Mechanical trade is a general name used in describing trades that have direct bearing with metal welding/forming and servicing/repairs of machines or machine related equipment and appliances. The trades in this group include agricultural implement and equipment, mechanics work, auto electrical work, auto mechanics works, auto body building, auto parts merchandising, air-conditioning and

refrigeration mechanics works, mechanical Engineering craft practice, welding and fabrication engineering craft practice, foundry craft practice, instruments mechanics work and metalwork technology.

Accordingly, Metalwork Technology is one of the units that constitute the field of vocational technical education. At the technical colleges, metalwork is offered in trades, such as welding, fabrication, automobile engineering practice, mechanical engineering craft practice, agricultural implements and equipment mechanic work. Air-conditioning and refrigeration, foundry craft practice and instrument mechanic work. According to the National Board for Technical Education (NBTE), (2004), Technical colleges in Nigeria are established to produce craftsmen at the craft (secondary) level and technicians at the advanced craft (post-secondary) level. Metalwork trade is one of the subject that is taught in technical colleges in Nigeria. Metalwork trade comprises a blend of both theory and practical that leads to the production of goods and services by the use of tools, equipment and metalwork materials (NBTE, 2001). At the technical colleges, metalwork comprises other sub-modular trade components such as machine shop practice, welding and fabrication, forging, heat treatment and foundry practices. Oranu, (2003) explained that metalwork involves activities in occupations that entail designing, processing and fabrication of metal products; it includes activities in foundry, forging, machine shop and welding. Considering the various importance of metalwork to everyday life and also the overall objective of vocational and technical education (in which metalwork is one) which offers training in skill for self-reliance, self-sufficiency and employment into the world of work, metalwork becomes an important subject to be taught to students.

Metalwork students upon graduation from technical colleges are presently finding it hard to perform effectively in industries using modern equipment like the computer numerical control (CNC) machines. The introduction of metalwork into the curriculum of technical colleges has given rise to the need for effective use of teaching requirement. According to Osinem (2008) teaching facilities/resources can be considered as any item, which aids, stimulate and motivate the learner as well as simplified the processes of classroom teaching. Osinem (2008) further classified facilities/resources into two, human and material resources. Human resources according to Osinem (2008) are those personnel who aid or assist in imparting knowledge and skill to the learners. While material resources are those that help the teacher to take the world into the classroom, thus making remote an abstract idea concrete and immediate to the experience of the students. Therefore, teaching equipment (facilities) are some of the most effective devices, which both teachers and students can use to enhance the quality of teaching and learning. These equipments include all forms of information carriers that can be used for teaching and learning activities. They include: building, workshop, tools and equipment.

Facilities as described by the federal government guideline for implementation of universal basic education (2000) include classroom, library, laboratory, workshop, play field etc. The National Board for Technical Education (NBTE, 2001) identified the following educational training facilities in technical colleges.

- i. Physical facilities, such as the site for accommodating workshops, laboratories, classrooms and studios.
- ii. Equipment for the workshops, laboratories, classrooms and studios.

These facilities should be appropriate in quality, and should be used to meet the minimum standard for meaningful teaching and learning. One of the goals of vocational education is to give training and impart the necessary skills to individuals who shall be self reliant economically (NPE, 2004). This policy relates to the acquisition of basic knowledge as well as appropriate skills about a trade.

However, the success of this policy depends on the effective utilization of workshops, classrooms, tools and equipment. It is of no use therefore for a student of technical college to learn the theoretical aspect of technical subject without supportive know how. Student must be able to exhibit the expected learning outcome in the world of work. Theoretical information alone cannot guarantee efficient performance of the job skills, it must be accompanied with practical activities. Consequently, the method of teaching technical subjects differ more or less from literary subjects. It can be done more effectively by demonstration; Learning by doing is the emphasis in addition to acquiring basic knowledge of technical subjects for trades such as metalwork technology, wood work, electrical/electronics etc. Practically activity is paramount in developing skills in vocational technical education. According to Okorie (2001) postulated that repetitive training enables the development of right attitude and habit of thinking and doing. It is therefore important to study the utilization level of facilities that will enhance the effective teaching and learning of metal work.

In a related development, facilities on their own cannot promote teaching and learning. Teaching is a systematic transmission of knowledge, skills and ideas (Microsoft 2003). The person who transmits knowledge ideas and skills is the teacher, while the students learn, and this is shown in their ability to perform new tasks successfully. Okwuonu (1996) stated that the teacher is a key factor in the transmission of worthwhile knowledge to the younger generation in every community. The National Policy on Education (2004) recognizes the position of teachers in the implementation of school curriculum. That is why it emphasized that teachers should continue to be trained in order to make them highly motivated, creative and intellectual or enhance effective teaching and learning in our schools. Effectiveness entails achievement of objectives without difficulties. Therefore, the effectiveness of teaching depends on a number of variables, such as the professional training of the teacher, the ability to organise and manage workshop or laboratory, select appropriate instructional methods and ability communicate their ideas to the students. Furthermore, Okwuenu (1996) pointed out that the role of the teacher is to guide, instruct monitor, control and direct learning activities in the school. Accordingly, the teacher as a dispenser of knowledge should be properly trained in utilizing appropriate facilities because unless the teacher is a master of his subject, effective teaching cannot take place.

An effective teacher in metalwork is one who is able to utilize instructional materials such as hacksaw, steel rule, try square, welding equipment, drilling machine, centre lathe, milling machine, shaping machine, grinding machine etc, to demonstrate learning activities

without difficulties. It is believed that students who are exposed to identifying and using such tools and equipment in the workshop will not only recall them effectively but will be able to perform practical with them. For effective training of students in any occupational area like metalwork, the training environment should be a replica of the working environment in industries and factories and in the world of work. The training must make use of the appropriate tools and equipment, which the occupation requires. If the appropriate tools and equipment are not utilized, the teacher will not be effective. In the same way, training done in a different environment that is without the tools and equipment can never achieve its economical and social goals (Okorie, 2001). The individual so produced can hardly fit properly into any industry or factory. The training programme would be graduating students who will definitely be unemployed, thereby being a burden to their families and the society. In addition, training in vocational technical education requires using real materials as on the real jobs. In the same vain industries should take part in the design, planning and implementation of technical college curriculum. The industries could organize vocational courses and seminars as for teacher during holidays. This is one of the ways to update the knowledge of teachers.

Dwelling on students place in the utilization of facilities, it is important that the students be committed to learning to enable them acquire saleable skills. It is because of the commitment on the part of the students who are learner that Okoro (1993) stated that, effective technical education for any profession, trade, occupation or job can only be given to individuals who need it, want it, and are willing to benefit from it. The certificate offered to students by institution of learning only cannot determine effective technical education. Quality in vocational technical education as indicated by Olaitan, Nwachukwu, Igbo, Onyemachie and Ekong (1999) can be measured by the performance of the product of such schools. The performance of the students is an indication of effective utilization of tools and equipment in their training. Similarly, this means that the training received from the school should enable the receiver to think clearly, independently, systematically, and should be able to solve social-problems.

### **Statement of the Problem**

There is a general concern over the low performance of technical college graduates, most especially those of metalwork technology who cannot cope with the world of work. The goal of metal-work technology in technical colleges in Nigeria according to NBTE (2009) is to produce skilled craftsmen with good knowledge of the working principles of metalwork and the techniques and safety practices involved in metalwork maintenance.

The performance of students in this Examination and especially in metalwork is not encouraging. The poor performance is probably due to lack of facilities (NABTEB 2004 chief Examiner's report). Or lack of knowledge of the teacher or the method adopted in teaching learning process. This decline in students performance has been associated to a number of factors, among which is lack of adequate and utilization of teaching learning facilities (Akinyele, 2000). This is in line with the National Technical and Business Examination Board (NABTEB) (2008) chief examiner's report who observed that the poor performance of the students in National Technical Certificate (NTC) examinations in recent years is partly due to the non usage of appropriate facilities in the teaching learning processes employed by the teachers.

This unsatisfactory situation could lead to breakdown in the economy, industrial, technological and educational growth of a nation since the main goal of technical education is to achieve self-reliance. The foregoing therefore underscores the need to assess the utilization of level of facilities for teaching and learning of metal-work. Therefore, the problem of this study is: what are the utilization level of facilities for teaching and learning of metalwork in Rivers state technical colleges?

### **Objectives of the Study**

The main objective the study was to assess the utilization level of facilities for teaching and learning of metalwork. Specifically, the study was determined to explore:

1. The level of classroom and instructional material utilization for teaching and learning of metalwork.
2. The level of workshops utilization for teaching and learning.
3. The level of machines, tools and equipment utilization for teaching and learning of metalwork.

### **Research Questions**

The following research questions were formulated to guided the study.

1. What is the level of classrooms and instructional material utilization for teaching and learning of metalwork?
2. What is the level of workshop utilization for teaching of metalwork?
3. What is the level of machines, tools and equipment utilization for teaching and learning of metalwork?

### **Methodology**

This study adopted a descriptive research design in all the technical colleges in Rivers State. The study's sample contained four technical instructors, 38 metal-work technical teachers and 78 metal-work students, for a total population of 117 respondents. A questionnaire based on four point was used as the data collection instrument. The instrument used for data collection was a structural questionnaire. This developed questionnaire was structured and grouped into five parts. Part1: Seeks personal data of the respondents. Part 2: Contains items which seek information on the level of classroom and instructional material utilization for teaching and learning of metalwork. Part 3: Dealt with items which seek information on the level of workshops utilization for teaching and learning. Part 4: Dealt with items which seek information on the level of machines, tools and equipment utilization teaching and in the learning of metalwork. Section 2 was structured on a four points of Strongly Agreed (SA), Agreed (A), Disagreed (D) and Strongly Disagreed (SD). The questionnaire was validated by three experts from the Department of Industrial Technology (Technical) Education, Ignatius Ajuru University of Education. For the purpose of obtaining the internal consistency of the instrument, Cronbach Alpha reliability method was used which gave a reliability of 0.743 reliability index.

## Results

### Research Question 1

What is the level of classroom and instructional material utilization for teaching and learning of metal work?

**Table 1: Mean and SD of Respondents on the Assessment of Classroom and Instructional Materials for Teaching Metal Work**

S/N	Items	X	SD	Remark
1.	Chalk board	3.88	0.32	utilized
2.	Picture	2.80	0.89	utilized
3.	Models	2.47	0.99	not utilized
4.	Projectors	1.17	0.45	not utilized
5.	Audio tapes	1.33	0.65	not utilized
6.	Sales	1.32	0.65	not utilized
7.	Display board	2.13	1.09	not utilized
8.	Wall charts	2.48	1.06	not utilized
9.	Films	1.33	0.65	not utilized
10.	Computers	1.78	1.07	not utilized

Table 1 revealed that item 1 and 2 had a mean of 3.88 and 2.80. the values of the two items were within the real limit of numbers 2.50-4.00 indicating that the two items are in agreement with the items as level of classroom and instructional material utilization for teaching and learning of metal work. However, item 3, 4, 5, 6, 7, 8, 9 and 10 had a mean that is within the range 1.17-2.48. the values of the 6 items were within the real limit of numbers 0-2.49 indicating that the items are in disagreement with the items as level of classroom and instructional materials for teaching metal work.

### Research Question 2

What is the level of workshop for teaching metal work?

**Table 2: Mean and SD of Level of Workshop for Teaching Metal Work**

S/N	Items	X	SD	Remark
1.	Tool rack	2.67	14	utilized
2.	Stores	3.32	1.02	utilized
3.	Safety devices	2.93	1.01	utilized
4.	Hand truck	1.87	0.88	utilized
5.	First aid kits	2.29	0.95	not utilized
6.	Materials handling	2.58	0.84	utilized
7.	Training material	2.77	0.97	utilized
8.	Lightning	2.95	1.07	utilized

Table 2 revealed that item 1, 2, 3, 4, 6, 7, and 8 had a mean within the real limit of numbers 2.50-4.00 indicating that the two items are in agreement with the items as level of workshop utilization for teaching and learning of metal work. However, item 5 had a mean that is within the range 1.17-2.48. the values of the item was within the real limit of numbers 0-2.49 indicating that the item is in disagreement with the items as level of workshop for teaching metal work.

### Research Question 3

What is the level of machine/ tools and equipment for teaching metal work?

**Table 3: Mean Responses on Machine/ Tools and Equipment**

S/N	Items	X	SD	Remark
1.	Hand cutting tool	3.50	0.79	utilized
2.	Measuring	3.57	0.76	utilized
3.	Driving tool	3.30	0.95	utilized
4.	Forging tool	2.23	0.99	utilized
5.	Boring tool	2.72	1.00	utilized
6.	Moulds	2.03	0.97	not utilized
7.	Work Bench	3.52	0.85	utilized
8.	Making out table	2.43	0.05	not utilized
9.	Blacksmith hearth	2.05	0.94	not utilized
10.	Foundry	2.78	0.88	utilized
11.	Power saw	2.48	1.15	utilized
12.	Welding equipment	2.90	1.75	utilized
13.	Drilling machine	2.83	1.14	not utilized
14.	Lathe machine	2.38	1.13	not utilized
15.	Grinding machine	2.55	1.24	not utilized
16.	Shaping machine	2.12	1.14	not utilized
17.	Folding machine	1.85	1.03	not utilized

Table 3 revealed that item 1, 2, 3, 4, 5, 7, 10, 11 and 12 had a mean within the real limit of numbers 2.50-4.00 indicating that the 9 items are in agreement with the items as level of machine/ tools and equipment utilization for teaching and learning of metal work. However, item 6, 8, 9, 13, 14, 15, 16 and 17 had mean that are within the range 1.17-2.48. The values of the items were within the real limit of numbers 0-2.49 indicating that the items are in disagreement with the items as level of machine/ tools and equipment for teaching metal work.

### Discussion of Finding

The finding from table I reveals the chalkboard is highly utilized in the classroom. This can be seen in item one with a mean of 4.00. Teachers also utilized some other facilities in the classroom for effective teaching of the students. These findings are in line with Osinem, (2008) that the teachers must be able to exercise effective management over their students, the resources at their disposal and the various programmes of learning that are going on in



the classroom to ensure that learning proceed effectively and to maintain the desired standard. On the other hand teachers disagree that all the facilities in the classroom facilitate effective teaching and learning as seen in items 2 4, 5, 6, 7, 8, 9, 10. Ogwo, and Oranu, (2006). maintained the same position with the teachers. He stated that many classrooms were void of charts pictures, drawing, and display boards. There are very essential for demonstration in the classroom and workshop teaching and learning. Students learn better when they see and observe. Therefore these facilities should be utilized by teachers to aid teaching and learning of metalwork in our schools.

The findings from table 3 indicate that tools are utilized for teaching and learning. Equipments like shaping machine, power saw, centre lathe and blacksmith, hearth and welding equipment that are expensive are hardly utilized. This is in line with Olaitan (1999) who observed that vocational educations are capital intensive. Ogundu, (2009) also observed that there is no denying fact that some tools and equipment are theory costly, but their value and contribution to effective teaching and learning will be appropriate to the amount invested on them, since without these facilities, students will find it difficult to acquire skill that can be applied in industries. For proper skill acquisition in metalwork both hand tools and machine tools should be utilized in the workshop for training of the students in all clusters.

### **Conclusion**

Based on the findings of the study, it can be concluded that metalwork teachers are deficient in some technical skills in the use of lathe, milling, grinding, machines and other teaching facilities. Further-more, it was observed that many classrooms were void of charts pictures, drawing, and display boards. These are very essential for demonstration in the classroom and workshop teaching and learning. Students learn better when they see and observe. Therefore these facilities should be utilized by teachers to aid teaching and learning of metalwork in our schools. It was also observed that there is no denying fact that some tools and equipment are theory costly, but their value and contribution to effective teaching and learning will be appropriate to the amount invested on them, since without these facilities, students will find it difficult to acquire skill that can be applied in industries. For proper skill acquisition in metalwork both hand tools and machine tools should be utilized in the workshop for training of the students in all clusters.

### **Recommendations**

The following recommendations were made based on the result of the study.

1. Appropriate and relevant facilities and machines should be provided in the technical colleges by the authorities concerned for practical training of the students.
2. Technical colleges should be adequately funded in order to meet the high cost of training facilities without which quality technical education will not be achieved.
3. Machine should be regularly maintained and obsolete ones replaced to enable students acquire the appropriate skills that will make them self-reliant to be employed in the modern industries.
4. All institutions which are training technical teachers should include courses on improvisation in their curriculum.
5. School principals or representatives of government should support technology teachers financially to attend professional conferences and workshops regularly.

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