AVAILABILITY AND ADEQUACY OF FACILITIES FOR WORKSHOP PRACTICALS IN METALWORK TECHNOLOGY: IMPLICATIONS FOR SKILL ACQUISITION AMONG UNDERGRADUATES IN CROSS RIVER UNIVERSITY OF TECHNOLOGY, CALABAR.

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Abstract

Technology education is aimed at training undergraduates to gain practical skills relating to occupations capable of making them employable in the public and private sector of the economy. This study was undertaken to assess metalwork technology facilities for skill acquisition through practical activities in the workshop amongst undergraduates in Cross River University of technology. The design of the study was ex-post facto and the population for the study was 23 lecturers and 10 technologists. There was no sampling as the size is manageable. Checklists were used to match the items present in the workshop and compared with NUC minimum requirement for facilities in the workshop to determine the adequacy. The finding of the study revealed that, 35 items were available representing 81.3% but only 19 items were adequately provided representing 44.2% adequacy. This revealed gross inadequacy of workshop facilities available for workshop practicals for skill acquisition amongst undergraduates. It was recommended among others that government at all levels should increase funding to universities in line with the present economic realities in the countries.

Keywords: Metalwork technology, skill acquisition, undergraduates, workshop practicals.

Introduction

Technology advancement of any nation depends largely on its ability to transform its resources into practical reality, which guarantees its self-sustenance and viability. It is evident that most of the developed countries such as China, Japan, USA, France, practiced a unique but home-tailored technology capable of utilizing their resources to meet its socio-economic needs with a view of creating jobs. This enhances the income/revenue disposition of the citizens by making them self-reliant and responsible and invariably reduces poverty (Ogbuanya & Okoye, 2015).

Technology is a comprehensive term that refers to the various aspects of education in addition to general education that study technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic life (UNESCO & ILO, 2002 in Okoli & Uzoagulu, 2018). Technology as defined by Edobor and Maliki (2018) is a systematic and scientific application of practical skills and theoretical knowledge to solve problems,

particularly those problems that can hinder scientific development. A good technology must have the following qualities: must be practicable, scientific and efficient; must be relevant to the needs and aspiration of the nation and relevant to the particular culture, must have local content (Edobor et al, 2018).

Technology has been described as a catalyst for achieving national development. Technology is linked with science. Therefore, the two are inseparable. It is recognized globally as the bedrock of civilization and development. It is the application of scientific and technological knowledge in creating or using tools, techniques, resources and processes to harness human and natural environment for the purpose of individual well-being and societal development.

Education in relation to technology helps in the preservation and transmission of necessary skills, competencies and attitudes required for the achievement of technological objectives of any nations. Technology education is provided at tertiary levels of education, as in colleges of Education (Technical), monotechnics, polytechnics and universities. In the university, Bachelor of Science degree (B.Sc) is obtained by undergraduates on completion of their programmes. B.Sc technology education equip the undergraduates with skills, knowledge and attitude that will enable them enter scientific technical and commercial occupation and progress in it. It is expected that theoretical and practical knowledge of a programme is provided to the undergraduates during training for acquisition of skills and competencies for self-reliant and paid employment.

The term skill has been variously defined and interpreted by experts in the field of technology ranging from simple to complex. Bullon (2008) in Ogumbe (2015) defined skill as ability to do something well, as a result of learning. For Antanwu (2010), skill as the ability to bring about some result with maximum certainty and minimum outlay of time and energy. Skill is seen as ability to do some job successfully usually gain through training or experience. Skilled person is an individual that has undergone some intensive training in a job and has mastered activities that lead to successful performance in the job. Skill is a product of knowledge or experience that is acquired through training or practice. Okoli, et al (2018) comprehensively defines skills as abilities, capacities, aptitude and expertise acquired through deliberate, systematic and sustained training necessary to adaptively perform job functions effectively. These skills are job specific, technical and generic skills that one needs to exhibit to make him perform effectively in any trade condition and for transfer of knowledge in occupations.

Metalwork technology is a trade that provides undergraduates practical proficiency in fitting, threading and machining to the level of good technologists (Ogumbe, 2015). To achieve this practical proficiency, training must be done in a well-equipped workshop.

Workshop practical gives the working knowledge required for the production of various engineering products. Workshop practical helps in the construction, function, use and application of different working tools, equipment, machines as well as the technique of manufacturing a product from the skills and knowledge one acquired (Konnully, 2013). In order to gain a good basic knowledge of production process, a student entering the first year of engineering degree should undergo a course on workshop practice. To further buttress this fact of skill training, Babayo and Abdul (2017) asserted that institutions are expected to focus on workshop practicals instead of classroom lectures without adequate practical demonstration which is generally considered the key for concrete learning. FRN (2004) further states that for effective participation of students in practical work, the teacher-student ratio should be kept at 1:20. Hallack (1997) stressed that the availability and adequacy of facilities in the workshop promote academic achievement in the school

system, which result to the turning out of quality graduates. The practical skills imply the need for the acquisition of technology skills necessary for economic growth and sustenance. Also related to this is the acquisition of fundamental knowledge, skills and attitudes the individual needs to function efficiently in the given society. Learning practical skills can be difficult to achieve without adequate workshop training and utilization of the needed facilities. Similarly, Ndomi (2009) maintain that the provision of adequate workshop facilities would enhance quality practical skills development. Osahon (1998) noted that well equipped workshop are of paramount importance for effective operation of technology education programme. Students are exposed to different equipment, machines and tools for acquisition of skills, preparatory to effective performance in the industries where the equipment are used in production. Adesina (2005) noted that the learning one receives is directly related to overall atmosphere in which the learning takes place. The performance level of metalwork technology undergraduates is a function of available instructional facilities to which students are exposed to during training. Availability and adequacy of workshop facilities would create a balance between theory and practical experience in Cross River University for better performance of its undergraduates in Metalwork Technology.

The National University Commission, (NUC) (2008) in its minimum academic standard provided list of tools, machines and other equipment required in the various programme options. As for Metalwork Technology include: Bench vices, assorted files, hacksaw, hammers, cold chisels, scribers, punches, metal scapers, set of taps and wrench, set of dies and stock, try square, anvil, micrometer, vernier calipers, steel rule, soldering bits, power hacksaw, grinding machine (universal), grinding wheel, centre lathe, surface place, drilling machine, milling machine, milling cutters, blacksmith hearth furnace for heat treatment, among others. The availability and adequacy of these workshop facilities for technology education programme in the universities depend on the various institutional provisions in meeting the minimum standard of its controlling body.

Although, technology is finally being integrated into education, its use for teaching and learning still remains a challenge. Facilities for workshop practicals seem to be lacking in most of the institutions or inadequate where available. This has been attributed to many factors, such as low level funding of university education in Nigeria, surge in the quest for university education and subsequent high number of students being admitted in each department that do not match with the facilities available for instruction. This unsatisfactory state of affairs has led to high rate of unemployment among our graduates due to poor skill acquisition during training. Emeh, Nwanguma and Aboroh (2012) in Okoli, et al (2018) noted that the high rate of unemployment among university graduates is not only as a result of the unavailability of jobs, but also because of lack of employable skills employers of labour are looking for. Uwaifo (2011) noted that facilities provided for workshop practicals in some universities in Nigeria are inadequate.

Although studies have been carried out on availability and adequacy of workshop facilities in B.Sc. Technology Education in Cross River University of Technology but none has been, specifically on metalwork technology for skill acquisition. This study was therefore conceived to fill this gap, the desire to make an in-depth evaluation in this area is to provide direction for improvement of the programme also prompted this research work.

Purpose of the study

The general purpose of the study was to ascertain workshop practicals for skill acquisition among undergraduates in Metalwork Technology. Specifically the study was designed to:

1. Determine the availability of workshop facilities for skill acquisition in Metalwork Technology among undergraduates.
2. Determine the adequacy of workshop facilities for skills acquisition in Metalwork Technology among undergraduates.

Research questions

1. What are the workshop facilities available for skill acquisition?
2. How adequate are the workshop facilities for skill acquisition?

Methodology

The design of the study was ex-post facto. The study was conducted in Cross River University of Technology. Checklist was used to ascertain the availability and adequacy of workshop facilities. The research instrument was a checklist, validated by experts and its reliability established. The checklist was taken to the university and used to match the availability of the different workshop facilities in line with the NUC minimum standard to determine their adequacy in each case. The NUC minimum standard for each facility was indicated in the table showing the results. The items were equated to 100%. Any item of 100% or above was considered adequate and inadequate if less than 100%. Data collected on available work facilities were matched with the NUC minimum standard to determine their adequacy. Summary of the result is shown in the Tables 1 and 2.

Presentation and analysis of data

The presentation follows the sequence of the research questions.

Research question 1: What are the workshop facilities available for skill acquisition?

To answer this question a checklist was used in the metalwork technology workshop as shown in Table 1.

Table 1: Frequency and percentage of facilities available in the metalwork course area of technology in Cross River University of Technology

S/No	Tool, Equipment and Material	NUC Minimum Requirement	Number Available	Percentage Available	Decision
1	Workbench	8	4	50	Available
2	Bench Vice	18	28	156	Available
3	Assorted files	20	12	60	Available
4	Hammers	10	3	30	Available
5	Hacksaw	20	35	175	Available
6	Cold Chisels	15	1	7	Available
7	Scribers	13	12	92	Available
8	Punches	15	4	27	Available
9	Steel rule	20	4	20	Available
10	Anvil	2	2	100	Available
11	Set of taps and wrench	10	12	120	Available
12	Set of dies and stock	10	12	120	Available
13	Caliper (inside and outside)	2	2	100	Available
14	Micrometer	20	1	5	Available

15	Vernier caliper	10	1	10	Available
16	Vee block	1	1	100	Available
17	Angle plate	1	0	0	Not Available
18	Grinding wheel	10	0	0	Not Available
19	Grinding machine (universal)	1	2	200	Available
20	Power hacksaw	1	2	200	Available
21	Soldering bit	20	13	65	Available
22	Blacksmith hearth	1	0	0	Not Available
23	Forging hammer	10	4	40	Available
24	Furnace for heat treatment	2	1	50	Available
25	Electric drill	3	3	100	Available
26	Drill bit	4	1	25	Available
27	Drill gauge	3	3	100	Available
28	Sensitive drilling machine	2	0	0	Not Available
29	Pillar drilling machine	2	2	100	Available
30	Radial drilling machine	2	0	0	Not Available
31	Assorted reamers	10	5	50	Available
32	Counterboring cutter	4	0	0	Not Available
33	Countersinking cutter	4	0	0	Not Available
34	Centre lathe	5	12	240	Available
35	Face plate	2	1	50	Available
36	Driving dog (carrier)	2	1	50	Available
37	Mandrill	2	0	0	Not Available
38	Shaping machine	1	3	300	Available
39	Milling machine	1	4	400	Available
40	Assorted milling cutters	10	10	100	Available
41	Travelling steady	10	8	80	Available
42	Tri-square	11	10	91	Available
43	Pipe cutter	2	1	50	Available

Data in Table 1 show that 43 workshop items in Metalwork Technology in the university were evaluated, 35 items were available while 9 items were not available. Also for the items presented, 16 cases were 100% and above available while 19 were below 100% available.

Table 2: Adequacy of Workshop Facilities in Metalwork Technology in Cross River University of Technology

S/No	Tool, Equipment and Material	NUC Minimum Requirement	Number Available	Percentage Available	Decision
1	Workbench	8	4	50	Not Adequate
2	Bench Vice	18	28	156	Adequate
3	Assorted files	20	12	60	Not adequate
4	Hammers	10	3	30	Not adequate
5	Hacksaw	20	35	175	Adequate
6	Cold Chisels	15	1	7	Not adequate
7	Scribers	13	12	92	Not adequate
8	Punches	15	4	27	Not adequate
9	Steel rule	20	4	20	Not adequate
10	Anvil	2	2	100	Adequate
11	Set of taps and wrench	10	12	120	Adequate
12	Set of dies and stock	10	12	120	Adequate
13	Caliper (inside and outside)	2	2	100	Adequate
14	Micrometer	20	1	5	Not adequate
15	Vernier caliper	10	1	10	Not adequate
16	Vee block	1	1	100	Adequate
17	Angle plate	1	0	0	Not adequate
18	Grinding wheel	10	0	0	Not adequate
19	Grinding machine (universal)	1	2	200	Adequate
20	Power hacksaw	1	2	200	Adequate
21	Soldering bit	20	13	65	Not adequate
22	Blacksmith hearth	1	0	0	Not adequate
23	Forging hammer	10	4	40	Not adequate
24	Furnace for heat treatment	2	1	50	Not adequate
25	Electric drill	3	3	100	Adequate
26	Drill bit	4	1	25	Not adequate
27	Drill gauge	3	3	100	Adequate
28	Sensitive drilling machine	2	0	0	Not adequate
29	Pillar drilling machine	2	2	100	Adequate
30	Radial drilling machine	2	0	0	Not adequate
31	Assorted reamers	10	5	50	Not adequate
32	Counterboring cutter	4	0	0	Not adequate
33	Countersinking cutter	4	0	0	Not adequate
34	Centre lathe	5	12	240	Adequate
35	Face plate	2	1	50	Not adequate
36	Driving dog (carrier)	2	1	50	Not adequate
37	Mandrill	2	0	0	Not adequate
38	Shaping machine	1	3	300	Adequate
39	Milling machine	1	4	400	Adequate
40	Assorted milling cutters	10	10	100	Adequate
41	Travelling steady	10	8	80	Not adequate
42	Tri-square	11	10	91	Not adequate
43	Pipe cutter	2	1	50	Not adequate

Data in Table 2 shows 43 workshop facilities in metalwork technology were evaluated. Using NUC minimum requirement, out of the 35 cases available, 19 cases with 100% and above were regarded as adequate, whereas those cases found to be less than 100% were regarded as inadequate. Other nine cases were not found in the workshop.

Discussion of findings

The finding of this study revealed that some workshop facilities were not available and a great percentage of facilities were inadequate for skill acquisition in Metalwork Technology in the university. The workshop facilities available and adequately provided include, bench vice, hacksaw, Anvil, taps and wrench, calipers, dies and stock, vee block, grinding machine, power hacksaw, electric drill, drill gauge, pillar drilling machine, centre lathe, shaping machine, milling machine and milling cutters. The study also discovered that out of the 43 workshop facilities in the university, 19 items were not adequate, while seven were not provided. These were: angle plate, grinding wheel, blacksmith hearth, sensitive drilling machine, radial drilling machine, counterboring and countersinking cutters and mandrill.

The findings is in line with what Ibrahim (2010) in Ogumbe (2015) pointed out that acquisition of practical skills can be achieved through a well-equipped workshop with relevant training facilities. The use of adequate training facilities enhances training and qualifies graduates for jobs in both public and private sectors of the economy. Availability and proper management of workshop facilities will enable technical institutions to achieve the objective of training students to become skilled in technical occupations as asserted by Anaele and Ishaku (2008). The shortfall in the provision of facilities was attributed to poor funding of university education by government and other stakeholders in the system, resulting to poor students performance after graduation.

This study has implication for all Technical and Vocational Education (TVE) courses that lead to technology education. Technology education being a practical oriented programme cannot achieve its objectives in a situation where facilities required for instruction and skill development amongst undergraduates are grossly inadequate. Under this situation, students cannot acquire the necessary skills required for gainful employment in the modern age without proper training that will expose them to technical equipment and maintenance. Technology education undergraduates therefore, need to be prepared, exposed and made accessible to facilities used in real life situation. Failure to give adequate attention to the shortfalls in the provision of workshop facilities in line with NUC minimum standard will continue to pose threats to quality of technology education graduates produced in the university.

Conclusion

Based on the findings of this study, workshop practicals cannot be effective in the midst of unavailability and inadequacy of workshop facilities. The students will acquire no skills if facilities are lacking. The finding has proved that metal-work technology education were not adequate for instruction in the Cross River University of Technology, Calabar.

Recommendations

1. Government and university management should ensure the provision of adequate workshop/laboratory facilities and materials for workshop practicals in Metalwork Technology.

2. Technology education department in the university should as a matter of priority, source for alternative funds beyond government for adequate provision of workshop facilities for instruction

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