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**TVET AND LOCAL CONTENT DEVELOPMENT
FOR SUSTAINABLE INDUSTRIALIZATION IN NIGERIA**

specific work and teach them how to utilize the safety rules and regulations in the workshop. In view of the this therefore, occupations in the metal works include fabrication, welding, casting, machining assembling and metal finishing are available and at a higher degree.

Metalwork technology is education aimed at giving the learners skills and knowledge of materials; assist them to be familiar with machine and equipment structures and functions. Graduates of metalwork technology are expected to know how to use hand tools as well as operate machines used in manufacturing and maintenance of machines and equipment. Graduates in this field are expected to know various manufacturing techniques as well as methods used in the assembling and installation of machines, tools and equipment. Also Metalwork technology is an aspect of training, which is designed to enable the learners know how to complete job assignments according to mechanical drawings and work specification, apply the knowledge and skills they have acquired in workplace situations, and be able to work independently in the industry (Anyakoha 2011). Metalwork technology assists students to act in accordance with quality management systems and take excellence control and maintenance measurements. According to Longmans (2011), the aims and objectives of teaching metalwork include among others are to.

1. Helps students to relate what they have learned in the class into actual practical situations.
2. Assist students understand, use and handle tools, equipment and machines properly.
3. Help students to identify different properties of metal which aid in selection of material for a particular job.
4. Help students to cultivate the habit of safety working, thereby securing themselves, tools, equipment and machines and even others (third-party).
5. It helps students to become self-reliant.
6. Provides students with job opportunities after graduation in companies, Industries and government parastatals.

Metalwork technology instructors must possess the requisite qualification of both the manipulative skills and other theoretical knowledge for him to carry out his duties effectively in order to achieve the objectives of the programme. This is because metalwork by nature requires the establishment of uniformity of technical procedures, administrative procedures, working conditions, tools, equipment, work place arrangement, operation and motion sequences, materials (consumables), quality requirements and similar factors which may affect the performance of the work. Graduates of metalwork technology can be gainfully employed in the Industries and other related organization so that they can contribute their quotation in industrial development of the country and for the sustainable development of the Nigeria economy.

Industrialization can be defined as the practice of maintaining processes of producing indefinitely natural or human made by replacing resources used with resources of or greater value without degrading or endangering natural biotic systems. Industrialization is concern with the carrying capacity of natural systems with the political, and economic challenges faced by humanity. Sustainability refers to the of the concepts of sustainable development and environmental science. It has an additional focus on the present generations' responsibility to regenerate, maintain or improve planetary resources for use by future generations. Metalwork technology has an obligation to develop sustainable manufacturing solutions but many metalwork technology still not taking the necessary steps to implement newer proven technologies such as use of laser beam in welding that foster sustainability.

Statement of the problem

Metalwork technology plays significant roles in all fields of human Endeavour. Despite the high expectations of the society on metalwork technology graduates to attain self-reliance, the performance of students in this area of study is on the decline. This is in line with the findings of Njoku (2010) and Anyakoha (2011) that many school offering technology education courses do not have necessary equipment though Government placed emphasis on technology subjects in its policy. Some of the problems being faced in this area may be high cost of tools and equipment needed for setting up metalwork workshops, hence, a high percentage of metal workshops operate on obsolete tools and equipment, inadequately trained technical instructors, inadequate funds for consumables, and workshop facilities. This suggests that for metalwork technology to effectively play the important role of industrialization of any country and development of the infrastructural facilities for the realization of country's transformation there is an urgent need to provide Innovative technologies that will improve the study of metalwork technology in Nigerian higher institutions. This will enable them to improve the performance of the students, enable them acquire necessary skills that will help them enter and succeed in the world of work and for sustainable development of the nation.

Purpose of the Study

The main purpose of this study is to determine innovations in metalwork technology for improving the performance of students in Nigerian higher institutions for sustainable development of the nation. Specifically, the study Determined

1. The adequacy of facilities for teaching metalwork technology in Nigerian higher institutions.
2. Methods used in teaching and learning metalwork technology in Nigerian higher institutions.
3. The innovative technologies for improving student's performance in metalwork technology in Nigerian higher institutions.

Research questions

1. To what extent are the facilities for teaching and learning metalwork technology adequate in Nigerian higher institutions?
2. What are the methods used in teaching and learning of metalwork technology in Nigerian higher institutions?
3. What are the innovative technologies for improved students' performance in metalwork technology in Nigerian higher institution?

Methodology

A descriptive survey research design was used in carrying out the study. According to Olaitan and Nweke (1999), survey research design is one in which a group of people or items is studied by collecting and analyzing data from people or items considered to be representative of the entire group. The study was carried out in Kogi State Colleges of Education Ankpa and Kogi State Colleges of Education (Technical) Kaba are the institutions offering metalwork technology in Kogi State. The populations of the study consist of 106 respondents comprising 94 students of metalwork technology and 12 metalwork instructors teaching in the selected higher institutions in Kogi State. The entire population of students and instructors were used for the study. A 30 items questionnaire was used to collect data for the study. The instrument used for the study was face validated by three experts in Department of Industrial Technology Education Federal University of Technology Minna. The validators' corrections and suggestions were used to produce the final copy of the instrument. Data collected for the study were analysed using mean and standard deviation. A four points rating scale was developed using Strongly Agreed, Agree, Disagree and Strongly Disagree for methods used in teaching/learning and provision of innovative technologies while adequacy of facilities used Highly Adequate, Adequate and Not Adequate. A mean score of 2.50 and above was used as a decision point to accept an item as agreed and those below 2.50 as disagreed.

Results

Table 1: Responses of the Students and Lecturers on the Adequacy of Facilities for Teaching Metalwork Technology in Nigerian Higher Institutions

S/N	Items	\bar{X}_1	SD ₁	\bar{X}_2	SD ₂	\bar{X}_g	Decision
1.	The workshop is equipped with current lathe, shaping and drilling machine	2.42	0.50	2.21	0.97	2.32	N

S/N	Items	\bar{X}_1	SD ₁	\bar{X}_2	SD ₂	\bar{X}_g	Decision
2.	The equipment and tools are sufficient for all number of students	2.20	1.00	2.11	0.85	2.15	A
3.	The machine and equipment are regularly maintained	2.21	0.86	2.42	0.82	2.26	A
4.	The workshop is supplied with adequate training materials	2.34	1.27	2.54	0.91	2.34	A
5.	The workshop facilities are regularly maintained	3.32	1.07	2.22	0.91	2.17	A
6.	Tools are often improvised as a result of non-availability	2.57	0.86	2.68	0.70	2.62	A
7.	Students often levy themselves to procure necessary materials	2.50	1.00	2.73	0.90	2.61	A
8.	Modern equipment are available	2.22	0.81	2.09	1.11	2.14	A
9.	Students of metal work are enlisted into appropriate industrial work experience	2.15	0.12	2.32	2.79	2.24	A
10.	Professionally qualified metalwork instructors are available	2.50	1.00	2.70	0.88	2.60	A

Key: A = Adequate \bar{X}_1 = Mean response of lecturers; SD₁ = Standard Deviation for lecturers; N = Not Adequate \bar{X}_2 = mean response of students; SD₂ = Standard Deviation for students; \bar{X}_g = Grand mean for both lecturers and students; N = 106.

Table 1 shows that out of the 10 questionnaire items generated to answer the research question one, only three was rated above the cut-off point of 2.50, while the remaining seven fell below the cut off point. This suggests that the facilities for teaching metalwork technology are not adequate for students.

Table 2: Lecturers' and Students' Responses on the Methods used in Teaching and Learning of Metalwork Technology in Nigerian Higher Institutions

S/N	Items	\bar{X}_1	SD ₁	\bar{X}_2	SD ₂	\bar{X}_g	Decision
1.	Recurrent workshop practical exercise	2.49	1.09	2.65	0.80	2.57	A
2.	Sufficient theory and practice	2.68	1.18	2.59	1.50	2.63	A
3.	Use of modern method of instruction	2.30	0.85	2.53	1.98	2.41	A

S/N	Items	\bar{X}_1	SD ₁	\bar{X}_2	SD ₂	\bar{X}_g	Decision
4	Use of project method of instruction	2.39	1.04	2.63	1.94	2.51	A
5	Regular maintenance of machines and equipment	2.57	1.20	2.73	0.72	2.65	A
6	Availability of training materials for workshop practice	2.75	0.75	2.62	1.11	2.69	A
7	Opportunity for field trip and excursion	2.60	1.17	2.81	1.00	2.72	A
8	Regular seminar/workshops for metalwork teachers	2.53	0.96	2.71	0.82	2.62	A
9	Enlisting students in appropriate industrial work experience	2.50	0.97	2.66	0.50	2.58	A
10	Use of model and instructional aids in the teaching of metalwork	2.58	1.02	2.61	0.96	2.59	A

Key: A = Adequate \bar{X}_1 = Mean response of lecturers; SD₁ = Standard Deviation for lecturers; N = Not Adequate \bar{X}_2 = mean response of students; SD₂ = Standard Deviation for students; \bar{X}_g = Grand mean for both lecturers and students; N = 106.

Table 2 shows that all the items generated to answer research questions 2 were rated above the decision point of 2.50 except item 13. This suggests that these methods have been in used in teaching and learning of metalwork technology in higher institutions in Nigeria.

Table 3: Lecturers and Students Responses on the Innovative Technologies for Improved Students' Performance in Metalwork Technology in Nigerian Higher Institution

S/N	Items	\bar{X}_1	SD ₁	\bar{X}_2	SD ₂	\bar{X}_g	Decision
1.	The use of laser beam in welding	2.50	1.00	2.70	0.88	2.60	A
2.	The use of robot in welding	2.55	0.12	2.62	1.79	2.58	A
3.	The teachers should be trained on new machine	2.58	1.02	2.61	0.96	0.59	A
4.	the use of overhead projector in teaching	2.50	0.97	2.66	0.50	2.58	A
5.	Students should be expose to advanced practical	2.53	0.96	2.71	0.82	2.62	A
6.	theuse of computer assisted design (CAD) in students design	2.60	1.17	2.85	1.00	2.72	A

S/N	Items	\bar{X}_1	SD ₁	\bar{X}_2	SD ₂	\bar{X}_g
7.	Availability of control system in the workshop	2.75	0.75	2.62	1.37	2.69
8.	Use of current tools and equipment	2.57	1.29	2.75	0.77	2.66
9.	The use of codes, chart in the workshop for identification	2.39	1.64	2.67	1.54	2.53
10.	Employ new teachers with innovative technologies	2.53	1.94	2.36	0.85	2.45

Key: A = Adequate \bar{X}_1 = Mean response of lecturers, SD₁ = Standard Deviation for lecturers; N = Not Adequate \bar{X}_2 = mean response of students; SD₂ = Standard Deviation for students; \bar{X}_g = Grand mean for both lecturers and students; $\bar{X} = 2.5$

Table 3 shows that all the questionnaire items generated to assist research on 3 were rated above the decision point of 2.50 except item 30. This suggests that innovative technologies that could significantly improve the performance of metal technology students in higher institutions in Nigeria.

Discussion

Lack of adequate metal workshop tools and equipment may be due to a number of factors which includes population explosion in the Nigeria higher education culminating in increase of metalwork students, lack of innovative technology teaching and learning of metalwork technology, large number of faulty equipment to mis-use, inadequate funding to replace the old ones or to increase the number of equipment and tools available for use and lack of proper maintenance of metalwork technology in higher institutions in Nigeria and these affect the national development of the nation.

The nature of industrial attachment programme in the technical institutes is of great concern, and the study corroborates the observation by Koeska (2002) that notwithstanding the important role industrial attachment plays in instilling in trainees the practical skills, know-how and understanding necessary for employment in a particular occupation or trade. Many formal training have shown little or no interest in encouraging technical trainees to undertake such attachments. If this situation continues in Nigerian technical education institutions of higher learning, graduates are likely to enter in to the labor market with little or no practical learning experience which are relevant to the world of work or area foundation for entry into work.

education and training for specific occupations (Achadu, 2011). Analysis of the results also revealed that there are lack of supply of work shop equipment and tools in technology education departments of many Nigerian higher institutions. This is in line with the findings of Achadu (2011) that generally, there was a short supply of training materials and basic tools by institutes. Since technical institutes mostly rely on material and tools for training, their short supply would negatively affect practical skills acquisition.

The study also revealed that the students were not able to develop adequate skills for metalwork. This could not be unconnected with the dearth of essential tools and facilities are specially designed to enhance certain skills in students without which such designed skills cannot be acquired. Bamin and Nurudeen (2007) opined that effective training on skills acquisition assures the nation of qualified and competent professionals who are to contribute towards the technological advancement and sustainable development of the nation. Higher institutions offering metalwork candidates who pass the final examination to assessing the efficacy of the training programmes in relation to the expectations to the job market. According to Achadu (2011) formal industry in UK appears to be generally of the view that the theoretical and technical skills provided by technical training need to be complemented by workplace skills.

Conclusion

Generally there is insufficiency in the provision of instructional materials which leads to focusing more on theoretical teaching leading to trainees lacking proficiency in metalwork technology. Unavailability of newer machines and equipment in the institutions, lack of technical knowhow on new machine in the workshop, inadequacies of workshop facilities negatively affect necessary skills for world of work. Also the importance of industrial attachment is relegated and is the main concern as it creates a great gap between classroom and after industrial practical. This seriously affects training with a resulting mismatch with job market prospects. Many higher institutions in Nigeria offering metalwork technology as a technology education course of study do not use appropriate teaching methods for practical teaching.

Recommendations

Efforts should be made by Government in securing more facilities to match the upsurge of student intake into higher institutions offering metalwork technology also large class sizes should be discouraged in higher institutions especially in metalwork technology departments.

2. Teachers should be trained by Government on how to operate these machines in and innovative methods to teaching students in the workshop with teachers with innovative technological skills and competencies in workshop technology in Nigerian higher institutions.
3. Government should encourage in service training for technical education teachers and technical instructors to update their theoretical and practical knowledge in workshop technologies also higher institutions administrations should increase student exposure to enhance acquisition of practical skills in metalwork technology.

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