



AN APPRAISAL OF WORKSHOP FACILITIES AND EQUIPMENT UTILIZATION FOR TEACHING AND LEARNING OF METAL WORK IN TECHNICAL EDUCATION OF KANO STATE, NIGERIA

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Abstract

The study was carried out to assess the utilization level of workshop facilities and equipment for teaching and learning of metal work in technical education of Kano state, Nigeria. A survey research design was employed for the study. The population of the study was 183 metal work teachers and metal work students. The sample of the study comprised 32 metal work teachers and 77 metal work students which make the total of 109 respondents. Structured questionnaire which contains 29 items was used for data collection. Likert was used: Strongly Agree (SA)=5, Agree (A)=4, Undecided (U)=3, Disagree (D)=2, and Strongly Disagree (SD)1. The questionnaire was validated by three experts from the department of metalwork, school of vocational and technical education, Kano state polytechnic. For the purpose of instrument, cronbach Alpha reliability method was used which gave a reliability index of 0.85. It was observed that the facilities and equipment in the work shop were not utilized for effective teaching and learning. Instructional material such as audio videos slides, and film were not utilized for teaching and learning and teacher lack inadequate skills for improvisation. It was also observed that facilities such as machines and equipments will be changed and properly maintained through available funding. Training institute technical teachers should include courses on improvisation in all the trade areas as a mandatory requirement for graduation in Nigeria.

Keywords: Workshop Facilities, Equipment, Utilization, Teaching and Learning Technical Education



Introduction

Technical Education refers to post-secondary education that focuses on practical skills and knowledge in areas like engineering, business and technology. According to Adebayo et al. (2021), Technical Education is crucial for Nigeria's economic growth and technological advancement, providing equal opportunities and employment for its workforce. According to Okonduba et al (2021), Technical Education equips students with practical skills, enhancing employability and entrepreneurship. According to UNESCO (2022). Technical education refers to vocational and educational programs that provide individuals with the knowledge and practical skills needed for a specific career in a particular industry or trade. It typically involves hands-on training, industry-relevant certifications, and a curriculum that emphasizes the application of technology and technical skills in professional contexts.

Technical and Vocational Education and training (TVET) refers to the education and training programs that emphasis on practical skills and knowledge required for specific trades, occupations, or careers. TVET plays crucial role in enhancing employability, supporting economic development, reducing skills gaps in industries (Yusvana, 2024). According federal republic of Nigeria's National on education (NPE) (2020 edition), Technical and Vocational Education and training (TVET) is define as a comprehensive form of education, training and learning designed to equip learners with practical skills, applied knowledge, attitudes and values needed for employment, self-reliance, and productivity in the world of work. Nyataya (2019) Stated that TVET programs is design to prepare individuals for labour market by equipping them with technical competencies and hands-on experience in

the field such as agriculture, building, electrical/electronic, metalwork, woodwork, and Automobile Technology.

Metalwork technology refers to shaping, and reshaping metals to create useful object, parts, assemblies, and large-scale structures. This technology encompasses various techniques, including cutting, welding, casting and molding. Lehmhus, (2022). In Nigerian Technical Colleges, metal work is defined as a trade subject under Technical and Vocational Education and Training (TVET) designed to equip students with knowledge and practical skills in shaping, joining, machining and finishing metals, using tools, machines, and fabrication techniques for industrials and vocational purposes (NABTEB, 2022). According (John Hattie and Klaus Zierer,2018) Teaching refers to the act of facilitating learning by guiding, instructing and providing resources to students. It involves a planned interaction where by the teacher imparts knowledge, skills and values to learners through various methods and practices. According to (Jung O'Neill, 2020).

Learning is the process through which individuals acquire knowledge, skills, attitudes, or competencies. It involves cognitive processes and it can occur through various means, including experience, study or instruction. According to Oviawe, Omoh, & Uwameiye (2019), technical education refers to the physical infrastructure, equipment and resources necessary for hands-on training and practical skills development. These include modern workshop, laboratories, libraries, and technology-enabled learning spaces, which are crucial for effective teaching and learning in Technical and Vocational Education and Training (TVET) institutions.



Equipment refers to the tools, machinery and technological systems used within the facilities to facilitate various functions and task. This can include HVAC system, elevators, plumbing equipment, security systems and many more (Malkawi, Ali & Al-Hussein, 2015). Utilization generally refer to the degree to which a resource, service or asset is used relative to its maximum potential. It is also the extent to which a resource or service is used effectively or efficiently, often measured against its capacity or potential. Educationally, utilization refers to how effective educational resources such as textbooks and technology are employed in the learning process (Harris, & Sedlis, 2021).

According to Ghosh & Rabichandran (2024) state that in context of Technical Vocational Education and Training (TVET), Workshops are crucial for hands-on training and practical skills development. Researchers further emphasize the important of emerging technologies in Vocational education, which often involve workshops for practical training.

Statement of the problem

The researcher observed that from 2020 to 2025, there is general concern over the low performance of technical college graduates, more especially those from metal work technology who cannot cope with the world of work. Many graduates of metal work technology from technical colleges in Kano state, lack of practical skills therefore found it difficult to attract employment. The researcher's experience with the students of technical colleges in Nigeria. Teacher often fails to facilitate skills in to the students. Due to the fact that instructional aids such as posters, bulletin boards and film are not provided. According to Ezeani (2022) inadequate facilities and equipment are major challenges facing technical education

institution in Nigeria, hindering students' ability. Poor performance Ugege et al. (2024), highlighted that outdated facilities and insufficient equipment, affect the quality of technical education and limits students' practical experience.

The general performance of candidates in metalwork was not encouraging. Many candidates lacked adequate exposure to practical work due insufficient tools and workshop facilities. Some were ill-equipped, and this contributed to poor performance. Teachers are advised to make use of available resources and improvised where necessary. Therefore, the problems of this study are; what are the level of artificial intelligence utilization of facilities and equipments by teachers for teaching and learning of metal work in technical colleges of Kano state.

Objective of the study

The main objectives of the study were to assess the utilization of facilities and equipments for teaching and learning of metal work. Specifically, the study was to determine:

- i. The utilization level of classroom and instructional material for teaching and learning of metal work.
- ii. The utilization level of workshops for teaching and learning of metal work.
- iii. The utilization level of machines, tools and equipment utilization for teaching and learning of metal work.

Research questions

The following research questions were formulated to guide the study.

1. What are the utilization level of classroom and instructional material for teaching and learning of metal work?



2. What are the utilization level of workshops for teaching and learning of metal work?
3. What are the utilization level of machines, tools and equipment utilization for teaching and learning of metal work?

Methodology

This study adopted a descriptive survey research design in the technical colleges of Kano state. The population of the study was 183 metal work teachers and metal work students. The sample of the study comprised 32 metal work teachers and 77 metal work students which make the total of 109 respondents. A structured questionnaire which contains 29 items was used for data collection. These questionnaires were group in to four parts. Part 1: was design to seek for personal data of the respondents. Part 2: was design to seek information on the level of classroom and instructional material utilization for teaching and learning of metal work. Part 3: was design to seek information on the level of workshop utilization for teaching and learning of metal work. And Part 4: was design to seek information on the level of

machines, tools and equipment utilization of teaching and learning of metal work. The instruments used for data collection was structure questionnaire based, on five points scale was used: Strongly Agree (SA)=5, Agree (A)=4, Undecided (U)=3, Disagree (D)=2, and Strongly Disagree (SD)=1. The questionnaire was validated by three experts from the department of metalwork, school of vocational and technical education, Kano state polytechnic. For the purpose of instrument, Cranach Alpha reliability method was used which gave a reliability 0.85 reliability index. According to Taber, (2023), a Cronbach’s alpha of 0.7 or above is typically regarded as acceptable, suggesting strong internal consistency. This level of reliability makes the instrument more appropriates for decision-making in applied research setting.

Results

Research question 1

1. What are the utilization level of classroom and instructional material for teaching and learning of metal work?

Table 1: mean and standard deviation of the respondents on the assessment of classroom and instructional materials for teaching metal work.

| S/N | Item | X | SD | Remarks |
|-----|-------------|------|------|--------------|
| 1. | Chalk board | 3.09 | 0.70 | utilized |
| 2. | Pictures | 3.12 | 0.61 | utilized |
| 3. | Projector | 2.33 | 0.59 | not utilized |
| 4. | Audio tape | 2.11 | 0.75 | not utilized |
| 5. | Wall charts | 2.25 | 0.99 | not utilized |
| 6. | Film | 2.37 | 0.72 | not utilized |
| 7. | Computer | 2.34 | 0.68 | not utilized |

X = Mean, SD = Standard Deviation



In table 1: the overall mean responses of the respondents on items 1 and 2 had a mean score ranged from 2.50 to 3.50 indicating that the mean score of the respondents were agreed with two items as utilization level of classroom and instructional materials for teaching and learning of metal work. However, in the case of items 3,4,5,6 and 7 had a mean score ranged from 2.00 to 2.49.

This shows that the five items were not accepted as the level of utilization of the classroom and instructional materials for teaching and learning of metal work.

Research question 2

1. What are the utilization level of workshops for teaching and learning of metal work?

Table 2: mean and standard deviations of the utilization level of workshop for teaching and learning metalwork.

| S/N | Items | X | SD | Remarks |
|-----|--------------------|------|------|----------|
| 1. | Tool rack | 3.09 | 0.99 | utilizes |
| 2. | Stores | 3.23 | 0.87 | utilized |
| 3. | Safety device | 3.08 | 0.79 | utilized |
| 4. | First aid box | 3.17 | 0.65 | utilized |
| 5. | Materials handling | 2.97 | 0.69 | utilized |
| 6. | Lightening | 2.99 | 0.82 | utilized |

X = Mean, SD = Standard Deviation

Table 2: the overall mean responses of the respondents on items 1, 2,3,4,5 and 6 have their mean score ranged 2.50 to 3.50 indicating that, the mean values of the respondents were agreed with the all items as utilization level of work shop for teaching and learning of metal work.

Research question 3

- What are the level of machines, tools and equipment for teaching and learning metal work?

Table 3: mean and standard deviation of the respondents on machines, tools and equipments

| S/N | Items | X | SD | Remark |
|-----|--------------------|------|------|--------------|
| 1. | Hand cutting tools | 3.07 | 0.72 | utilized |
| 2. | Measuring tools | 2.95 | 0.87 | utilized |
| 3. | Driving tools | 2.96 | 0.86 | utilized |
| 4. | Boring tool | 3.12 | 0.71 | utilized |
| 5. | Forging tools | 3.04 | 0.74 | utilized |
| 6. | Foundry tools | 2.99 | 0.61 | utilized |
| 7. | Work bench | 3.22 | 0.83 | utilized |
| 8. | Marking out table | 2.99 | 0.91 | not utilized |
| 9. | Power hacksaw | 3.01 | 0.83 | utilized |
| 10. | Welding equipment | 3.23 | 0.91 | utilized |
| 11. | Drilling machine | 2.42 | 0.92 | not utilized |
| 12. | Lathe machine | 2.32 | 0.94 | not utilized |
| 13. | Grinding machine | 2.24 | 0.76 | not utilized |
| 14. | Shaping machine | 2.29 | 0.89 | not utilized |
| 15. | Folding machine | 2.41 | 0.32 | not utilized |
| 16. | Milling machine | 2.23 | 0.36 | not utilized |

X = Mean, SD = Standard Deviation



Table 3 the overall mean responses of the respondents on items number 1,2,3,4,5,6,7,9 and 10 have their mean values ranged from 2.50 to 3.50, indicating that the mean score of the respondents are agreed with the items as level of machines, tools and equipments utilization for teaching and learning of metal work. However, items number 8, 11, 12,13,14,15, and 16 have their mean score ranged from 1.50 to 2.49, indicating that the items are in the level of disagreement of the machines, tools and equipments for teaching and learning of metal work.

Discussion of finding

The finding of this study from table 1 shows that the chalk board and pictures are really utilized in the classroom. This can be reflected in item one and two with mean score of 3.09 for chalk board and 3.12 for picture. Some other facilities and equipment also utilized by the teachers in the classroom, for effective teaching and learning of the students. The finding of this study are in the same way with Oladosu et al. (2023), teacher is an individual who facilitates learning, imparts knowledge, and guides students in their educational journey. Furthermore, a teacher is a professional responsible for creating a supportive learning environment, planning and delivering lessons, and assessing student progress. Moreover, on the other side teachers disagreed that classroom facilities enhance the teaching and learning, as reflected in items 3,4,5,6, and 7. Rushda et al. (2023): Visual aids are tools that help make lessons clearer and easier to understand, such as pictures, models, charts, and videos. They enhance learning by pairing visual elements with text, making content more accessible and easier to grasp. The finding of the study in table 2; indicates that the workshop is really utilized. This can be reflected in items 1,2,3,4,5 and 6

The utilization of the workshop by the teachers should assist teaching and learning of metal work in the school.

The finding from table 3 indicate that tools are utilized for teaching and learning equipments like shaping machine, power saw, center lathe, and black Smith, heart, and welding equipment that are expensive are hardly utilized. Okorie and Eze (2022) examined the challenges affecting the acquisition of practical skills among students and teachers in Nigerian technical colleges, with emphasis on mechanical and metalwork trades. Their study reported that many technical college teachers lack adequate hands-on competence in operating workshop equipment such as lathe machines, drilling machines, grinding machines, and milling machines. This deficiency was attributed to insufficient industrial exposure, obsolete training equipment, inadequate workshop facilities, and limited opportunities for in-service training.

Conclusion

In conclusion, the appraisal of workshop facilities and equipment utilization for teaching and learning of metal work in technical education in Kano State, Nigeria, reveals a concerning situation. The lack of modern equipment, inadequate facilities, and poor maintenance practices hinder students' skill acquisition and effective learning. To address this, government and stakeholders must prioritize technical education by providing adequate funding, infrastructure, and industry partnerships. This will enhance the quality of metal work education, equip students with industry-relevant skills, and contribute to Nigeria's economic development.

Recommendation

The following recommendations were made:



- 1 Government Funding: Increase budget allocation for technical education to upgrade workshop facilities and equipment.
- 2 Staff Training: Provide professional development opportunities for instructors to enhance their skills and knowledge.
- 3 Curriculum Review: Update metal work curriculum to align with industry needs and incorporate modern technologies.

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