



Strategies for Improving Students' Skills in Metalwork Technology in Technical Colleges in Katsina State

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ABSTRACT:

This study examined the strategies for improving students' skills acquisition in metalwork technology in technical colleges for economic development in Katsina State. Descriptive research design was adopted for the study. The population was one hundred and eighty (180) respondents comprised of all metalwork teachers and students in technical colleges in Katsina State. Questionnaire was used for data collection. Validation of the questionnaire was carried out by three experts in the department of technical education Isa Kaita College of Education, Dutsin-ma. Using Cronbach-Alpha, the reliability of the instrument was determined. Two research assistance were employed to assist the researcher in administering the questionnaire. Data collected were analyzed using mean ratings. Results revealed among others, that there are no sufficient tools and equipments in the metalwork shops in the technical colleges and the course was not properly funded. It was therefore recommended among others, that the students practical classes should be funded by the schools, exhibition shows should be organized to motivate the students and to encourage parents on the school fees they are paying.

Keywords: Skills, Metalwork, Technology, Strategies

استراتيجيات تحسين مهارات الطلاب في تكنولوجيا الصناعات المعدنية بكليات التقنية للتنمية الاقتصادية في ولاية كاتسينا

المستخلص

تناولت هذه الدراسة الاستراتيجيات لتحسين المهارات الطلابية في تكنولوجيا الصناعات المعدنية بالكليات التقنية للتطور الاقتصادي في ولاية كاتسينا. استخدم البحث تصميم المنهج الوصفي. كان مجتمع البحث هو مائة وثمانون (180) فردا هم معلموا وطلاب تكنولوجيا الصناعات المعدنية في الكلية التقنية في ولاية كاتسينا. استخدم الاستبيانات لجمع البيانات. تم الحصول على صدق الاستبيانات بواسطة ثلاثة من المختصين في قسم التربية التقنية في كلية تربية عيسى كابتادوتسين ما باستخدام كرونباخ ألفا وتم الحصول على ثبات الأداة. تم تعيين اثنان من الأفراد لمساعدة الدارس في إدارة توزيع وجمع الاستبيانات. تم تحليل البيانات المتحصل عليها باستخدام المتوسط. أوضحت النتائج بأنه لا توجد أدوات ومعدات كافية في ورش الصناعات المعدنية في الكليات التقنية وأن البرنامج لا يصرف عليه بطريقة كافية. لذلك يقترح أن توفر الاعتمادات المالية للجانب العلمي بواسطة المدارس وإقامة المعارض لتفيز الطلاب وتشجيع الآباء في دفع الرسوم الدراسية لأبنائهم.

الكلمات المفتاحية: المهارات ، الصناعات المعدنية ، التكنولوجيا ، الاستراتيجيات.

Introduction

The survival of any industry is largely dependent on the quality of its craftsmen. Abdullahi (2014) affirmed that for any industry, to remain in production, it would require the services of the competent metalwork craftsmen who actualize the plans and design of the mechanical engineer. They do this by producing spare parts to specifications and carryout daily maintenance of tools and equipment. It is very clear that effective training in theory, practical and effective work skills in metalwork trades has immensely contributed to the technological excellence and self-reliance of individuals and industrialized nations.

This made Ezeji (2012) while stressing the importance of technical competencies, such as applied skills, knowledge and attitudes said that proper and adequate skill acquisition is a means of increasing the productive power of a nation.

Metalwork is an integral part of technical education as it entails the process of manipulating metal for the usefulness of mankind. Aladeta (2012), asserted that no one certainly knows where and when metalwork began, but archeologists assume that metalworking preceded the emergence of the first civilization. The metalworkers depend on the extraction and manipulation of metal for the production of precision components for industrial and technological applications that range from construction, transportation (rail, road, air and water), industrial application etc.

The importance of metalwork cannot be overemphasized because without metal, goods and services would cease to move around the globe on the scale we know today. Many individual have been trained and still receiving training on metalwork to become craftsmen, technicians, technologists and engineers in the modern world of today.

However, skills of metalwork at the technical college level are intended to produce competent craftsmen with sound theoretical and practical skills. Hence such can be subdivided as shown in the figure below:

In all these areas of metalwork defined, Idjawa (2003) is of the opinion that it required the application of sciences, mathematics, sound knowledge of the interpretation of engineering, drawing manipulative skills and functioning machines to be able to accomplish these skills and knowledge. Agogo (2011) therefore asserted that without intensive practical work, the theory will only be like a number of ideas in a textbook that lack proper technical anchorage.

However, lack of practical skills for metalwork students at this level of our educational sector will be a set back to the quest for quality technological development and no doubt will bring about negative national transformation. To this end, this study is, however, designed to find out the strategies for improving students' skills in metalwork in technical colleges in Katsina State.

Statement of the Problem

Technical colleges are regarded as principal vocational institutions in Nigeria, as they offer full vocational training intended to prepare students for entry into various occupational trades as craftsmen (Okoro, 1993). However, despite the supply of metalwork machines and equipment to technical colleges decades of years ago, it appears recently that graduate of technical colleges lack practical skills. Therefore, it has become necessary to find the strategies for improving students' skills in metalwork and the problems hindering or facing the students to gain skills.

Purpose of the study

The major purpose of this study is to find out the strategies for improving students skills in metalwork technology in technical colleges in Katsina State. Specifically, the study intended to:

- Find out the strategies for improving students skills in metalwork technology
- Identify the problems hindering the students to gain skills in metalwork.

Study Questions

The following study questions were raised to guide the study:

1. What are the problems hindering students to gain skills acquisition in metalwork technology course in technical colleges in Katsina State?
2. What are the strategies for enhancing students' skills in metalwork technology course in technical colleges Katsina State?

Literature Review

Metalwork Technology Education Skills

Metalwork technology education mandates the training of middle level technical manpower in maintenance and repairs works for the metallurgical, oil, gas, petrochemical, agricultural and agro industrial sectors of the Nigerian economy, creating a pool of indigenous technical work force that can erect, commission, operate and maintain metallurgical industries thereby reducing Nigerian dependence on foreign technical workforce. Such metallurgical training includes fabrication of machines for Agricultural/ industrial, pharmaceutical, water treatment, cottage industrial machines. (Lukeman, 2018).

Metalwork trades are various areas (units) of specialization in metal technology which consists of many activities which centers experience toward the performance of certain task characterized by actions such as repairing, constructing machining, designing, maintaining, experimenting or solving some technical problems. These motor skills are concerned with the psychomotor domain of educational objectives. Some of these areas according to (Lukeman, 2018) include the following:

Fabrication: This is an area where sheet metals are used to construct and produce components and articles such as water cans, funnels, metal boxes, sheet metal pipes and other metal - made containers by cutting, folding, bending and assembling process.

Welding: This is the process of joining pieces of metals together using electric arc welding transformer or oxygen – acetylene cylinders. Technologies produced include iron gates, lockers, metal beds, metal chairs, tables, burglary proofs, steel- bridges and steel structures and other heavy constructions.

Casting: This manufacturing process by which a molten metal is poured into a mould which contains a hollowed cavity of the desired shape, and then allowed to solidify using sand or die-casting mould. Technologies produced in this area include aluminum cooking pot, plates, spoons, praying pans, machine parts and some intricate shaped components.

Forging: This is an area where piece of metal is heated up to a required temperature and immediately hammered to a desired shape. Technologies produced here include assorted hammers, spanners, and some heavy-duty machinery accessories.

Fitting and Manufacturing: This is an area that deals with the production of mechanical and metal components using machine tools and hand tools like lathe machine, drilling machines, grinding machines, shaping machines, milling machines etc. The operations formed include boring, screw cutting, straight turning, step turning, tapering, drilling,

grooving, grinding and sharpening. Technologies produced include assorted gears, splines, industrial keys and key ways, metal discs, cylindrical shaped objects, bolts and nuts. The machinist also repairs and machines spare parts are able to use any tool in the shop.

Assembling: This is an area where pieces of metals are joined together. This is done by welding, riveting, brazing soldering, screw and pin fasteners, etc.

Metal finishing: This an area where metals are given treatment in order to improve their appearances, make it wear less in a long period of time, protect it from corrosion or rust, surface coating of less expensive metal of expensive one and wearing quality of surfaces.

Maintenance: This area renders services in the form of maintenance out fit to private and public sectors. (Lukeman, 2018)

Strategies for skill Acquisition

Science and technology are indispensable as far self reliant is concerned. There is a global recognition of their importance as pre-requisites for human development. In fact it is the bedrock of any progressive society. Individuals would be required to acquire technological skills training to survive. There is need for competence in basic practical metalwork skills acquisition that can promote job creation opportunities among Nigerian youths so as to improve their standard of living. (Baba and Bello, 2018) Skills acquisition is willingness and ability of an individual to seek out investment opportunities or to establish and run a skill that will be suitable. Acquiring skills like agriculture, architecture, automobile, building, computer, electrical electronics, metalwork, woodwork, etc. (Baba and Bello, 2018).

Skill is seen as learned responses which afford someone the ability to perform a particular task and achieve a particular objective. Uzor and Ike (2010) defined skill as one's personal competencies in the performance of specific task acquired after a period of training or experience. Skill therefore is the rapidity, precision, expertise, dexterity and proficiency exhibited through mental and manual repetition of performance of an operation. Okey and Ugo (2017) opined that skill is a capacity of a person to accomplish a task within desired precision and certainty.

Strategies, according to Onyesom and Umoeshiet (2013), are the technique or mechanism put in place to maintain the degree of excellence of a product or service. Strategy is a broad and basic plan of action by which an organization intends to reach its goals.

Previous Studies

Study of Bello A. (2015) Skills Needed in Metalwork in Technical Colleges. The researcher used survey research used survey research method and the data was collected using questionnaires. The sample method used for the study is random sampling method.

The results are

- 1 – No availability of machines for conducting practicals in technical colleges.
- 2 – Insufficient power
- 3 – The available machines in schools some not functional

Methodology

The research design adopted for this study is a descriptive survey. This study involves the collection of data from the population of teachers and student from four technical colleges in Katsina State. The questionnaires were used for data collection. The lecturers in technical education department, Isa Kaita College of education Dutsin-ma, validated

the instrument, Cronbach Alpha method was used in determining the internal consistency of the instrument and it yielded reliability coefficient of 0.92. One hundred and eighty copies of the questionnaire were distributed to the respondents showing 100% return. Data were analyzed using mean rating with a cutoff point of 2.50.

Design of the study: The design of the study was a survey. A survey research design has been the most suitable design when an investigation centers on individual opinions, attitudes and perception (Okala, 2004). Survey research design appropriate for this study because it involves gathering of opinions and information on strategies for improving students skills in metalwork technology.

Area of the study: There were four technical colleges offering metalwork in Katsina State. These are; Government Technical College Mashi, Government Technical College Ingawa, Government Technical College Funtua and Government Technical College Charanchi.

Population of the study: The population of the study is made of 180 students and teachers from technical colleges in Katsina State. There was no sampling because the population was manageable.

Results

Table 1 Shows that the respondents agreed with all the items except items 4 and 7 as problems that hinders students' skills in metalwork technology.

Table No. (1): Mean responses on the problems hindering students skills in metalwork technology in technical colleges in Katsina State (N = 180)

S/N	Item	X	Decision
1.	Method of teaching demotivate students' performance	3.50	Agreed
2.	Inadequate facilities and infrastructures affect students' performance	3.75	Agreed
3.	Inadequate time for practical affect students' performance	3.38	Agreed
4.	Lack of learning materials not affect students' performance	2.00	Disagreed
5.	Inadequate tools and equipment makes it difficult for students to acquire skills and perform better	3.50	Agreed
6.	Inadequate laboratories, workshops demotivate students' performance in metalwork technology	3.60	Agreed
7.	Inadequate qualified teachers could motivate students' interest in metalwork technology	2.00	Disagreed

Discussion

The study revealed that the problems hindering students' skills needed in metalwork technology include inadequate tools and equipment which makes it difficult for students to acquire the needed skills in metalwork technology. This is in line with Ogbu (2014) who mentioned that the major problem impending skills acquisition in metalwork technology is poor equipped workshops. This implies that if students are to be taught they acquire the basic skills needed. The researcher asserted that the use of specialized laboratories workshops, tools and other equipments are essential in teaching skills in metalwork technology. However in support of this finding, Nura (2014) stated that metalwork technology is characteristically skill and activity oriented when properly taught with relevant tools and equipment will equip the learner with needed skills in various trades.

The metalwork graduate with such skills needed can make and supply customized metal branches, desk, gates, windows, fittings and machine parts to mention but few to Nigerian people. In line with the finding, Igweh (2014), define skills as an act of having practical knowledge acquired through learning. Even though skills depends on especially on essentially on learning, it is thought of as a quality of performance which does not depend solely a person's fundamental innate capacities but must be developed through positive training, practice and experience. The lasting solution is effective needed skills can only take place when learners are taught with adequate needed tools and equipments. To beautify this finding , Ahmed (2013) mentioned that teachers teaching metalwork technology are expected equip students with major skills and knowledge that will make their graduate students employable and self-reliance.

Result

Table (2) reveals that the respondents agreed with 16 strategies that would help to improve students' skills needed in metalwork technology course, however, the respondents disagreed with item (Lack of instructional material may not affect students' skills rate in metalwork technology) as strategy for enhancing students' skills in metalwork technology in technical colleges in Katsina State

Table No. (2): Mean responses on strategies for improving students' skills in metalwork technology in technical colleges in Katsina state (N = 180)

S/N	Item	X	Decision
1.	Teachers should adopt teaching methods that can impart the needed skills and knowledge to the students.	3.70	Agreed
2.	Inadequate facilities and infrastructure may affect students skills rate.	3.77	Agreed
3.	Inadequate practical will affect students' skills acquisition rates in metalwork technology.	3.50	Agreed
4.	Lack of instructional material may not affect students' needed skills rate.	2.20	Disagreed
5.	Inadequate tools and equipment makes it difficult for students to acquire the needed skills.	3.76	Agreed
6.	Poor equipped workshops will demotivate students and improve their performance.	3.50	Agreed
7.	Provision of functional tools and equipments would motivate students and improve their performance.	3.60	Agreed
8.	Exhibition (show) the objects produced by the students would help to encourage and motivate students.	3.70	Agreed
9.	In-service training should be provided for teachers to update their knowledge	3.75	Agreed
10.	Professionally trained metalwork technology personnel should be employed to teach course.	3.40	Agreed
11.	Teachers should take students out on field trips to metal industries to motivate and encourage students.	3.00	Agreed
12.	Practicals must be held always to support the theoretical aspect for better skill needed.	3.60	Agreed
13.	Students should be encouraged to develop interest in metalwork technology through positive reinforcement.	3.50	Agreed
14.	Students exhibitions should be organized in technical colleges to arouse students' interest in the course.	3.60	Agreed
15.	Teachers should always make their lessons learner-centered.	3.00	Agreed
16.	Student should have free access to metalwork shops after normal classes and weekends for practice.	3.45	Agreed
17.	Government should fund metalwork practical classes to motivate students and increase their skills.	3.70	Agreed

Discussion

Findings revealed that there are no modern metalwork technology machines in technical colleges. These machines include Computer Aided Designing machine (CAD), Automatic Lathe, internal grinder, polishing machine, ship-roll forming machine, modern melting furnace (mini), metal enameling kiln power saw machine among others. The metalwork machines are needed to equip students with metalworking skills needed in this contemporary society. The researcher observed that upgrading of metalwork workshops is a priority especially in modern technology tools and equipment. If metalwork technology is to meet the national goals as stipulated in Federal Ministry of Education (2000), the program should be properly funded. For quality assurance in TVET, Danjuma (2018) conclude that funds are required for the provision of facilities such as classrooms, libraries, laboratories, workshops, furniture and maintenance of these facilities. The needed workshop equipment suitable for the skills to be acquired in such workshops.

The study revealed that methods of teaching may demotivate students skills needed in metalwork technology course. This findings are in consonant with Danjuma (2018). Who stated that the teacher has enormous role to play in enhancing and imparting knowledge in metalwork technology to students. The effectiveness of the teacher depends on the application and transfer of technical skills, knowledge and competencies to the learner and the management of the learning environment. The researcher view that based on the findings, the method of teaching, lack of utilization of instructional materials constitutes problems to the teaching and learning of metalwork technology course. It is clearly known, metalwork technology is a skill-oriented course is capital intensive. However, when there is proper funding and provision of adequate tools and equipment, students interest and skills needed rates would properly be increased.

In support of this finding, Arubayi (2014) mentioned that funding is the life-wire of any educational program and the bedrock for any effective acquisition of practical skills. No practical skills can be acquired without provision of funds for procurement of consumables and non- consumables materials.

Conclusion

Metalwork is a practically oriented course with much emphasis on skills needed in modern world. Skill is the ability to perform some tasks with credit. Skills acquisition depends on learning which must developed through (TPE) training, practice and experience. The goals and objectives of metalwork technology trades cannot be achieved or succeeds without making concrete provision for basic technology resources necessary for skills needed. Technical teachers need to expose students to strategies and techniques that will assist them to acquired life skills and competences optimize their potentials for successful skills.

Recommendations

1. The Katsina State Government should provide well-equipped functional workshops with metalwork tools and equipment in all the technical colleges.
2. Teachers teaching metalwork technology courses should use teaching methods that can impart the needed skills and knowledge to the students.
3. Metalwork objects/articles produced by the students should be exhibited to encouraged parents/guidance and motivate the students'.
4. Practical classes should be funded by the school to motivate the students.

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