Strategies for Managing Electrical Workshops for Effective Teaching of Basic Electricity in Nigeria Technical Colleges

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Abstract - This paper looked at strategies for managing electrical workshops for effective teaching of Basic electricity in technical colleges in Nigeria. The researcher also focused attention on the technical colleges and other issues as it relates to managing, utilization and applications for workshop equipment and facilities in technical colleges. The paper addressed problems associated with technical education, strategies for managing electrical workshops, workshop planning and physical layout in technical colleges, philosophy and goals, students and teachers activities in workshops and methods of instruction in workshops. Some of the recommendations are: the government should provide fund, materials, laboratories, equipment, workshops and machines in technical colleges to aid teaching and learning. It has also recommended that the government should rehabilitate the technical college buildings, procure necessary tools, train teachers in technical education and experts in the fields of electronics technology and organize, monitors, supervise technical college programme for effective implementation and so on.

Keywords - Basic Electricity, Electrical, Effective Teaching, Strategies, Managing Workshops.

I. Introduction

The most essential role expected of the school is the provision of such training for youth that could meet the demand for human resource needs of the nation. The training of youths in the schools aims at equipping them with useful skills and at improving their knowledge in their desired areas of study at the end of training. Basic Electricity is one of the vocational subjects in technical college curriculum in Nigeria that can provide the youth with such training. The Basic Electricity subject is designed for students in year one, two and three of the technical college. The electricity subject comprises of areas like electrical installation work, cable joining, and battery charging and winding of electrical machines. The subjects in the technical colleges as stipulated by the national policy on education [1] are aimed at:

a) Providing trained manpower in applied technology, particularly at craft, advanced craft and technical levels.
b) Providing the technical knowledge and vocational skills necessary for agricultural, commercial and economic development.
c) Giving training and impart the necessary skills to individuals who shall be self-reliant economically.

The actualization of the objectives of technical education programme depends to a large extent on a number of factors. These factors include the adequate supply of qualified teachers, provision and management of electrical workshops, equipment and facilities, provision of books and proper implementation of programme.

There has been an indication especially from the industrial sectors concerning the limited number of workers with adequate technological expertise. As he emphasized in [2] that the situation when he/she observed that growth of economy has far outstripped the availability of trained personnel.

Higher productivity would result when there are skilled people to operate sophisticated machines, as well as those to maintain them efficiently. According to a consultative paper on vocational preparation for employment of young people in Great Britain, there is much that people need to learn in order to do their jobs well. Vocationally planned and integrated programme of education and training can give them a better start in working life and improve their jobs and must be planned as a whole.

These goals of vocational education in general and electricity subjects specifically are laudable and carefully selected, and if adequately implemented will bring about the much desired revolution in technological development in Nigeria. It is imperative to note that United States of America and Japan that are economically powerful and self-reliant acquired their success from investing huge amount on vocational education [3]. Effective training of students cannot be accomplished in the absence of some ingredients which include creating a conducive environment for teaching and learning by providing the right quality and quantity of teachers, well equipped workshops and laboratories with up-to-date materials, provision of adequate tools, machines and equipment.

Furthermore, [3] stated that in spite of the efforts made by the government to introduce and encourage vocational education in the country, the approach does not seem to have yielded the desired results. He added that the graduates of the technical colleges are half-baked. [4] was of the opinion that using the alternative to practical in technical college workshops is an impediment to acquiring competence in electricity. He identified non-utilization of workshop equipment for teaching electricity in technical colleges as the cause of insufficient competence and skills and these places the students in a disadvantaged position.

II. PROBLEMS ASSOCIATED WITH TECHNICAL EDUCATION

Technical education in technical colleges in Nigeria is faced with a lot of challenges. For instance, the instructional facilities in consonance with industrial development in the country are grossly inadequate. [5] pointed out that the facilities which include workshop building, equipment, tools and school materials available are inadequate for effective teaching and use in technical
colleges. One of the problems in our school system of education in Nigeria is lack of workshop materials and equipment. [6] Stipulated that lack of physical facilities is the problem of vocational and technical education in Nigeria. It is lack of materials and equipment in workshops for effective teaching of vocational and technical education subjects that is responsibility for the setback in technical education [7]. Not only that the equipment are few in numbers, but also, most of those installed are out of date and need replacement. Broken down machines are not repaired because of lack of spare parts [8]. Technical education involves practical training with the use of tools, machines and training materials. [9] revealed that the degree of contributions to national economy made by educated people on the job was dependent upon the degree of appropriateness of practical training acquired. The emphasis laid on the appropriateness of technical training is based on the fact that it leads to job performance.

Furthermore, hand tools, machines and training materials are lacking in most of our technical college workshops. [10] warned that if lack of equipment was allowed to prevail anywhere, the national goals of promoting vocational and technical education would not be realized. So it follows that where hard and software facilities are lacking, some research techniques that will encourage initiative cannot be applied. Thus, the research activity will suffer. This lack of equipment and materials will eventually result in some setback in the practical acquisition of skills by technical college students. The reasons why there is shortage of equipment and materials is partly due to high cost of technical education and recently to economic recession coupled with high inflation rates in the country [11]. It therefore becomes a very difficult subject. The impact of training of the students becomes impeded and they end up not acquiring enough skills to go into the labour markets.

It was reported in [12] that there is a high rate of failure in the National Business and Technical Examination Board (NABTEB) Certificate Examination conducted in May 2000 as: Engineering Trades 48%, Construction Trades 41 % and Electrical Trades 25%. A close examination of the factors for this terrible wastage indicates that technical college education has become unattractive to youths because of poor teaching, lack of workshops, infrastructure facilities, poor and uncommitted teachers, low esteem and inadequate preparation on the parts of students.

[3] Further added that it could be highlighted that the situation of human and material resources available for the teaching and learning of technical programmes in the technical college had direct relationship with the quality of graduates they produce. There is also a major concern for the products or graduates of technical colleges particularly with respect to employment. There is no gain-saying that curriculum without adequate human and material resources backup would fail to produce the required results [12].

The importance of human resources and infrastructure facilities in the development of technical education cannot be overemphasized. Infrastructural facilities in technical colleges are inadequate for effective teaching and learning. Even the existing ones are already dilapidated. Practical work constitutes an essential part of technical education and therefore needs suitable workshop space for programme implementation and structuring.

Unfortunately, the workshops are not there,[11] opined that government should fund the building of workshops. The deprivation of technical college students from participating in Students Industrial Work Experience Scheme (SIWES) is an issue that has to be looked into very seriously by the government. The involvement of technical college students in industrial training would solve the problems of poor skills acquisition due to staffing situation, insufficient funding and facilities [8].

In addition, the administration of technical education which is left in the hands of those in general education has been a source of problem. [13] attempted to provide a solution when he stated that administrators managing the affairs of technical education are those in general education. Obviously, the goals of technical education are not the same as that of general education. It is our opinion that technical education should have separate planning, separate administration and operating arrangements. Administrators of technical education should be those in the field of technical education to enable them understand what is involved in planning, administration and operating arrangement of technical education.

III. STRATEGIES FOR MANAGING ELECTRICITY WORKSHOPS

[14] Highlighted this strategy as a theory. They stated that effective and appropriate vocational education can only be given where training jobs are carried out in the same way, with the same operations, the same tools and same machines as the occupation itself. They further explained that the school workshops, laboratories and the total environment where vocational education is given must be adequately equipped to reflect the actual working environment. [15] pointed out his own strategies in line with [14]. He believed that for a successful implementation of the educational policy in Nigeria, the school workshops, laboratoraries and the total environment where vocational education is given must be adequately equipped to reflect the actual working environment, which is the replica of the working environment.

For proper implementation, there is need to emphasis the use of workshops, equipment and facilities. Workshop equipment and facilities for teaching can assist technical educators in transmitting organised knowledge and skills. The knowledge and skills may improve student's acquisition of competence during training, which is directed towards learning and acquisition of skills for practical work in technical college workshops.

In handling the issues of managing electrical workshop, it appears that the teachers and the government have some roles to play, in that the government should be able to provide the necessary equipment and workshop. Teachers on their own part should be able to install the machines
and equipment for effective teaching in the technical colleges. [17] made his contribution towards the promotion of vocational, technical and science equipment utilization and technology management of materials in Nigeria. In this regards, in collaboration with UNESCO, he hosted the international workshop on the management of science equipment and technology in Africa in February 1990. The workshop recommended the establishment of an Africa network of training institutions in science, vocational and technology equipment management and utilization in workshops.

[18] stated that idle equipment should be reactivated while those still in crates should be installed and put into effective use in the workshops. These should be maintained and serviced regularly and be utilized to teach the students for effective workshop management by the teachers.

The Federal and State government made some frantic effort towards the provision of some equipment in workshop and the success of electricity as a subject by providing some tools needed by the technical college. To further improve the workshop in technical college, the Federal Government has made substantial contributions to the Delta State Ministry of Education. The Government made arrangements for bulk purchase of tools and equipment, training of teachers for vocational subjects and expansion of training facilities for the production of a large number of technical teachers required for the management of workshops in the state and other parts of the federation.

[18] pointed out that technical education requires a laboratory (workshop) setting as a unique learning situation in which the learner may experiment, test, construct, disassemble, repair, design, create, imagine and study. Active laboratory experiences are essential to the study of technical education. Because technical education is a study of industrial technology, the facilities include the tools and machines which stimulate an industrial environment in education setting.

IV. WORKSHOP PLANNING AND PHYSICAL LAYOUT IN TECHNICAL COLLEGES

Proper planning of physical layout is a serious responsibility if the investment is to be sound and the educational programme productive. True planning must identify the programme philosophy; specify objectives, teacher and pupil activities enrolments to be served, financial resources, course content, and laboratory equipment before these are converted into graphic form. Technical education laboratory and workshops are designed to reflect the desired level of education. 

*Philosophy and Goal:* Industrial arts is the same thing as prevocational education which is only at primary school as basic science and technology and at Junior secondary school level as basic technology. At higher education level, industrial arts (technical education) is that subject field which provides opportunities for students to develop an understanding about the technical, consumer, occupational, recreational, organizational, managerial, social, historical and cultural aspects of industry and technology. Furthermore, it is a programme whereby students acquire industrial-technical knowledge and basic skills through creative and problem solving learning experiences involving such activities as experimenting, planning, constructing, evaluating, and using tools, machines, materials and processes.

[18] stated that the instructional and laboratory experiences help students to make wiser and more valid educational and career choices. For instance, the American culture is distinctly technological, and since the primary purpose of education in their society is to acquaint the young with the nature of the culture and their role in it, then technical education, because of its primacy becomes fundamental education in American schools. He further explained that technical education draws its contents from man's technological development. The rise of man and dominance on earth is unique as he/she thinks and creates, works with his hands, uses materials, makes tools and machines, develops techniques and processes, changes his environment and lives in a society. Dominated by technology, technical education is the study of industrial technology.

When efficient laboratories (workshops) are being planned, the initial consideration concerns the goals of a sound programme. There are four goal statements highlighted in the American Council of Industrial Arts Supervisor's Bulletin: (a) Purposes (b) Programme (c) Facilities (d) Instruction (e) Supervision.

In the bulletin, it was pointed out that industrial arts is meant to highlight the following:

a) develop in each student an insight and understanding of industry and its place in our society. Since industry is a constructive, dynamic force in the world today, it is the responsibility of the school to provide opportunities for each student to understand this force better. Industrial arts provides significant learning experiences relating to industry in which students acquire skills in performance and knowledge of principles and theory through study and application.

b) discover and develop students' talents in technical education field. Students have a diversity of talents. The school's responsibility is to assist students in discovering and developing these talents. It is the responsibility of technical education to identify special talents in industrial-technical fields.

c) develop problem-solving abilities relating to the materials, processes, and products of industry. The problem-solving approach in industrial arts involves creative thinking and gives the students opportunity to apply principles of planning and designs, construction techniques, industrial processes, scientific principles and mathematical computations to the solution of problem.

d) develop in each student skill in the proficient and safe use of tools and machines. Industrial arts provides planning, construction, and production activities which enable students to acquire industrial-technical skills. These activities offer opportunities to develop tools and machine skills commensurate with the mental and physical maturity of the students.
V. STUDENT AND TEACHER ACTIVITIES IN WORKSHOP

Facility planning must consider and provide for the anticipated activities of teachers and students in the learning environment of the laboratory and auxiliary rooms. A functional plan is based on the requirements for the interaction of students with teachers and instructional material and equipment and the needs of the teaching staff in the preparation for effective teaching.

Workshop activities involving audio-visual presentations should be planned such that an area which can be darkened for the purpose of developing pictures and other related activities. If classroom type activities in which students are required to write are included, then provision must be made for an adjacent related classroom or special provision within the laboratory or workshops. The following are examples of teacher and student activities drawn out by [19]

Teacher Activities in the Workshop
(a) Shop talks
(b) Demonstration to individual, small groups or entire class
(c) Manipulative operations: manipulation of materials and preparation prior to class time, assisting students, running through demonstration prior to class
(d) Illustrations by the use of overhead projectors, chalkboard, blackboard, charts file, projectors, models, and mock ups.
(e) Supervision activities: supervision of work group, individual projects, field trips and team teaching
(f) Contacting and being host to guest lecturers
(g) Evaluation: programme, pupil and self
(h) Reporting: reporting to administration and parents
(i) Accounting involves supplies, equipment and personnel
(j) Maintenance of equipment in the workshop
(k) Ordering equipment, tools, supplies
(l) Lesson planning
(m) Professional growth: reading, writing, attending and being host to professional group.

Students Activities in the Workshop
(a) Observation and listening skill developed while noting:
(i) Teacher performing demonstration, giving instruction
(ii) Project and activity choice information
(iii) Use of visual materials
(iv) Use of printed text and reference materials, models and muck ups.
(b) Planning and designing constructed activities in the workshop
(c) Constructing and experimenting and evaluating activities
(d) Guided discussion and recitations by individuals and groups
(e) Study of resources materials and preparation of individual activities
(f) Participation in field trips and other activities

(g) Outside work in other classrooms

VI. METHODS OF INSTRUCTION IN THE WORKSHOPS

(a) Conventional classroom activities with total class together seated
(b) Lectures in the instructional classroom area and in the laboratories or workshops
(c) Demonstrate to large and small groups and to individuals
(d) Projects and experiment construction and testing
(e) Individual study, planning and reports
(f) Individual and group research projects
(g) Audio-visual presentations
(h) Resource persons

VII. CONCLUSION

The paper was designed to look at the state of workshop and its management for effective teaching of Basic electricity in technical colleges to achieve the main objectives of national policy on education for effective teaching of Basic electricity. The paper deliberated on the following points in handling the work for effective implementation of the national policy on education: problem associated with Technical Education; Strategies for Managing Electrical Workshops; Planning of Physical Layout; Philosophy and Goals; Student and Teacher Activities in Workshops; and Methods of Instruction in the Workshops. The study dwelt on different ways and efforts towards improving the poor situations of technical college workshop and also a better recommendation and suggestions were made to ameliorate the problems and improve on the present situation of technical college workshop.

VIII. RECOMMENDATION AND SUGGESTIONS

1. Government, Non-Governmental Organisations (NGO) should provide the necessary fund for building workshops in technical colleges for effective teaching of Basic Electricity.
2. Companies and private organisations should provide equipment, tools, teachers and the enabling environment for effective teaching of Basic Electricity.
3. For effective implementation, the government should train more technical education teachers that can champion the affairs of technical colleges as administrators in our technical colleges to enable the schools solve the problems of general educators controlling the affairs of technical colleges.
4. For effective implementation of the programmes in the technical college workshops, the principal should be able to enforce the National Policy on Education of students/teacher of 20: 1 ratio to enable the teachers carry out effective practical work in the workshops.
5. Supervisors and inspectors from Ministry of Education (technical) should be assigned to the technical colleges to ascertain the degree of utilization of available workshops and equipment provided by the government.

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REFERENCES


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