IMPROVING TEACHING BASIC ELECTRICITY THROUGH IMPROVISATION OF INSTRUCTIONAL MATERIALS

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Abstract
This paper looks critically at the meaning of improvisation in teaching science vocational subjects. The paper highlights the needs of improvisation in teaching of Basic Electricity since there is lack of standard instructional materials. Some of the skills that can help Basic Electricity teachers to improvise the instructional materials and also the problems associated with improvised materials are also highlighted. The paper concluded by recommending that Basic Electricity teachers should be encouraged in developing positive attitudes as well as being committed towards improvisation

Introduction
Over the years, it has become increasingly apparent that a new approach to science teaching was needed to improve rapid changing conditions in the society and schools. The needs for improvisation of instructional materials in schools are appreciated by most technical educators but the fact remains that more efforts should be put in the areas of production and utilization of instructional materials. The need for improvisation of science equipment and materials are needed in Nigeria Secondary schools today than in the past when the economy was much better than it is today (Aliche 2014). Basic Electricity as a science subject in Nigeria Secondary Schools is activity-oriented and the suggested method for teaching it, which is guided discovery method is resource based (Federal Republic of Nigeria (FRN 2013). This suggests that the mastery of some Basic Electricity concepts cannot be fully achieved without the use of instructional materials. Basic Electricity, like other sciences, is both empirical as well as conceptual and its study entails the learning of concepts, established principles and a lot of laboratory/workshop activities. These laboratory works are conceived to demonstrate practically some of the principles taught in theory, tests, the validity of certain methods used and illustrate properties of units taught theoretically in the classroom.

The teaching of Basic Electricity without adequate and appropriate instructional materials will certainly result in poor achievement in Basic Electricity in schools and external examinations. For students to perform well, Basic Electricity teaching should be done using appropriate instructional materials, like other subjects, must have to be properly taught. It is now generally believed that students remember things they

participated in doing or they saw done than stories or things taught them. More so, a teacher can help students to participate fully as well as making his teaching more interesting and attractive by making use of instructional materials either standard ones or improvised. The teaching of Basic Electricity can only become more meaningful if done with science equipment and instructional materials.

Ideally, no effective vocational education programme can emerge without the use of instructional materials. These instructional materials are indispensable to good science teaching as well as practical works. Without good instructional materials, practical Basic Electricity teaching in schools and colleges may continue to be defective. Hence, to enrich the teaching of Basic Electricity in schools and colleges, the Basic Electricity teachers should endeavor to improvise where the equipment and materials are not available.

Meaning of Improvisation in Vocational Technical Education

Improvisation had been a concept that had attracted the attention of many science educators in recent years. Improvisation had been defined as the provision of a substitute made from locally or readily available raw materials for producing real or original equipment or materials. The substitute or alternative materials are expected to take the place of the real or original materials with high precision as time, money and other facilities. Gaka (2012) defined improvisation as a process whereby some sophisticated and expensive science materials are replaced by those made by the teacher or which he caused to be made by some other individuals in order to achieve the objectives of his science teaching comprehensively. Wasa (2000) defined improvisation in science teaching as the act of using alternative materials and resources to facilitate instruction whenever there is a lack or shortage of some specific first hand teaching aids and Bomi (2014) defined improvisation as the act of using materials or equipment obtainable from the local environment or design by either the science teacher or with the help of local personnel to enhance instruction. Bom (2015), and Eze (2000) pointed out that there are two forms of improvisations in science teaching, which they identified as; Role substitution and Role stimulation.

In role substitution, the original materials are modified in order to perform novel function in an experimental setting. Example, using spirit burner or stove as a Bunsen burner and transparent tumbler as a beaker. In the role stimulation, the actual constructions of the instruction materials are undertaken by the use of carpenter and welder because the apparatus are too expensive. They stated that to enrich the teaching of science/vocational subjects in Nigerian secondary schools, these forms of improvisation must be gainfully explored.

It is however, necessary to note that from the various definitions of improvisations enumerated above, improvised materials must serve the purpose for which it is intended. However, the role of the teacher is to identify materials that can be improvised, design and construct the materials personally or with the help of the learners. More so, where it involves mere substitution, the teacher should identify the substitute from the local environment and employ the learners in the collection of such materials from the environment. For example, in a Basic Electricity class, a good Basic Electricity teacher may ask the students to bring

stone and rope as substitutes for spirit level during practical classes to confirm vertical objects.

Needs/Importance of Improvisation in Basic Electricity Teaching.

The needs to improvise instructional materials for effective teaching of Basic Electricity cannot be under-estimated based on the fact that there is lack or shortage of science equipment in schools. The need also is coupled with the activity oriented and child-centered Basic Electricity curriculum developed and being used in Nigeria secondary schools which imposed heavy demand on laboratory facilities (FRN, 2013). Hence, the teaching of Basic Electricity must be directed towards the use of local materials gotten from the learner's environment because of the following.

Improvisation is a way of widening inquiry, curiosity, creativity and productive application of intellect. It serves as means of local application of the University of Science. It is needed as teaching aids for attracting and retaining students. They understand things more when they participate in doing rather than stories.

Improvisation in Basic Electricity affords the teacher opportunities of using alternative materials and resources to facilitate instruction whenever there is lack of resources in a teaching-learning processes. Improvisation in Basic Electricity teaching reduces the bad attitude and non- commitment of some Basic Electricity teachers dodging topics due to the absence of standard equipment.

Skills Needed for Improvisation in Basic Electricity Teaching

The quality of the students' products and their achievement in external examinations depend to a large extent on the qualities and commitment of the teachers. Accordingly, "what to teach, when to teach, how to teach and materials to use are always influenced by the teacher. Hence, the Basic Electricity teacher is expected to be resourceful and exhibit commitment towards the improvisation of instructional materials that will enhance teaching of Basic Electricity in schools. The relevant skills necessary for improvisation for Basic Electricity teachers include the followings.

The Basic Electricity teachers should be creative. A resourceful Basic Electricity teacher should endeavour to improvise by making use of materials found in his immediate environment in order to improve and facilitate learning on the part of the students.

The Basic Electricity teacher should have a comprehensive knowledge of the subject matter to be taught. This is because adequate knowledge of the content of the lesson will enhance the type of quality of instructional materials to be improvised.

The Basic Electricity teacher should study and understand the underlying principles on which the operation of the equipment is based. This would enable him to construct the equipment in such a way as to make Basic Electricity teaching and learning meaningfully and interestingly. A good and resourceful Basic Electricity teachers should posses the skills of identifying materials that could be improvised in his environment and allows the students to participate in the collection of materials from their immediate environment.

Ife (2000), gave some lists of materials that can be improvised in Basic Electricity to improve the teaching of Basic Electricity in schools as:

Items Substitutes

Plumb- rope and weight
Transformer laminations- cut locally from light metals
Transformer wires- equivalent bought from local shops
Winding papers - equivalent bought from local shops
Winding machines- nails on boards

All these items and more when successfully employed will improve the effective teaching of Basic Electricity in Nigeria secondary schools

Problems of improvisation in Basic Electricity

Despite the numerous efforts made by teachers in general and Basic Electricity teachers in particular to improve teaching through improvisation, there are some problems associated with the effective improvisation of instructional materials in schools. Balo (2012) mentioned that in addition to financial, there are two basic types of problems of improvisation of Basic Electricity equipment in Nigeria schools, namely

i Technical Factors
ii Human Factors

According to him, the technical factors challenge the degree of accuracy and precision that can be achieved with the improvised equipment vise a visa, the factory produced one. Other technical problem factor is the problem of usage. The teacher may employ the services of local personnel in the construction in order to ensure that they confirm to specification. The problems of technical factors were more crucial at the secondary and tertiary levels where more sensitive equipment and observations are carried out.

Human factors are problems associated with the teachers' professional commitments, creativities, abilities, technical skills, ingenuity and imaginative abilities. Hence, all these skills were indispensable towards effective improvisations of Basic Electricity teaching equipment.

Conclusion

The paper attempted to encourage Basic Electricity teachers to use local materials to facilitate teaching and learning of Basic Electricity. Seminars and conferences should be organized for Basic Electricity teachers where ideas are shared amongst equals. This will ensure standardization of the items being improvised.

In conclusion, the Basic Electricity teachers should be committed to their teaching profession and develop positive attitudes towards the use of improvisation in order to improve their teaching-learning processes.

Recommendations

The paper recommends that both the federal and state governments should approve research grants to Basic Electricity teachers to explore the use of local materials in constructing teaching aids/instructional materials for use in teaching Basic Electricity. The Federal Government should improve the science equipment production centre at Enugu to accelerate the actual production of locally produced science equipment. The factory should produce to satisfy national needs.

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