

## INSTRUCTIONAL APPROACH TO ENTREPRENEURSHIP TEACHING OF BASIC SCIENCE AND TECHNOLOGY AT THE BASIC EDUCATIONAL LEVEL

By

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### Abstract

*In the development of the 9-year Basic Science and Technology curriculum in Nigeria, the Nigerian Educational Research and Development Council (NERDC), identified three major factors that influence the development of nations. These three factors were identified as globalisation, information/communication technology and entrepreneurship education. Entrepreneurship education is learning by doing. In science, it is hands-on-activity. The purpose of this paper is to look at what can be done through the teaching and learning of Basic Science and Technology to promote productive-based science and technology to life related skills that could make students to create jobs for themselves thus being occupied. The paper looked at some Basic Science courses (BSc) at the undergraduate and NCE levels, and Primary and Junior Secondary Schools. Some life related skills/issues are identified. These include dying, soap making, mat weaving, nature and still life drawing, paint production, model of various organs, wine brewing among others. The paper delved into some methods teachers could employ to enable students develop the skills and attitudes necessary to creating job. The paper ends with a discussion of the implication for teachers in the teaching of Basic Science courses to make the students productive.*

### INTRODUCTION

Basic Science and Technology aims to provide a sound base of both the process and skills of science at unified entity to young pupils at Primary/ Junior Secondary School levels. This informed the organisation for Economic Co-operation and Development (OECD) Ministerial Council on Education, Employment, Training and Youth Affairs to adopt the definition of Entrepreneurship Education to be “Learning directed towards developing in young people, those skills, competences, understanding and attributes

which equip them to be innovative and to identify, create, initiate and work opportunities including working for themselves.”

In science, it is hands-on and mind-on activities which involve active participation of the learners in the learning process. In this approach, the learners are involved throughout the learning process and the responsibility for learning shifts from the teacher to the learner. The teacher needs to relate activities to the needs, circumstances and profile of the learners.

Science and technology have long been recognized as the instruments par excellence for nation building and for wealth creation which every country today craves for their advancement (Ajewole, 2005). It is a known fact that scientific literacy is for enhancing an individual's scientific concepts, scientific attitudes and process skills towards science. It also aims at increasing international competition and creating a well-being modern life (Laugksch, 2000; Shu-Nu Chang, 2007). Creating a well-being modern life implies among others, that individuals become happy with their situations.

In Nigeria, a number of science curricula in general and specifically the Nigerian Integrated Science Project (NISP) were developed based on the conviction that all students deserve and must have the opportunity to become scientifically literate. In spite of these efforts to revamp Science Education, there was still a concern that most Nigerians are not adequately scientifically literate for full participation as productive citizens in the 21<sup>st</sup> century by preparing their future jobs in science (Shinho Jang, 2004; Ajewole, 2005; Bajulaiye, 2005). For instance, Human Development Report of UNDP (Made in June 2010) placed Nigeria within the group of medium Human Development and ranked it 89 worldwide (on a total of 162 countries). Similarly international ranking on Happy Planet Index (HPI) which is an index of human well-being and environmental impact, introduced by the new economic foundation in July 2006 showed that Nigeria was in the 146<sup>th</sup>

position out of 178 countries (Okebukola UNESCO, 2007). Most worrisome is the fact that Nigeria ranked below other 18 African nations. Each country's HPI value is a function of its average subjective life satisfaction.

This report affirmed the fact that products of primary, secondary and tertiary education are battling with becoming productive to self and society. It is observed worldwide that science and technology is sine qua non to economic transformation. Hence, in Nigeria context, there exists viable Science. Technology and Mathematics curricula in the education sector. These curricula are aimed at achieving among others "Providing technological knowledge and vocational skills necessary for agricultural, industrial and economic development. (Ajewole, G. A.; Obiku, A. M. and Awobodu, V. Y. 2008).

It is therefore not surprising that in the new package for primary schools, there are some integration of vocational and technical skills in the Basic Science Curriculum. It is against this background of looking at what can be done through the teaching of Basic Science and Technology to promote productive-based science and technology-life related skill activities that this paper is conceived. We may then see some Basic Science and Technology courses and identified corresponding Entrepreneurial skills.

**Table 1**  
**Some basic science and technology (bst) courses and identified entrepreneurial skills**

S/N	BST Course Code/Title	BST contents	Entrepreneurial skills Contents
1	Z00312-Animal physiology Bio 111 - General Biology 1	Circulatory, Excretory, Respiration, Nervous and Skeletal system. (Transport, control and development in living things)	Making of models of (a) Kidney (b) Skull (c) Human and other vertebrate, skeleton.
2	GST 221 - Entrepreneurial II SED 226 - Industrial Process and application SED 412 - Nigerian industries and industrialization SED 413 - Science, technology and society Bio 211- Genetic I	Components of the environment (characteristics of living things and its classification, cells, chromosomes and genes)	Soap/detergent making, Table water production, Extraction of colour and Making of paints, Dyeing and textile work, Poultry farming.
3	BOT 221- Seed plants Bio 221 - Biological Techniques	Plant stems cocoyam leaves, ginger root, colanuts (different types). Sample of natural objects; seed/fruits, crayfish, crabs, tortoise, flower.	Nature drawings of various items, colour identification/mixing, indicator preparation, extraction of colour, paint production.
4	Bio 213 - Introduction to Ecology Bio 224 - Introduction to development cell biology SED 226 - Industrial process/applications CHM 112 - General Chemistry I laboratory	Man and the environment, ecological concepts, influence of man on the environment, pollution and conservation	Figure (life) drawings, basketry, mat weaving, calabash carving, making of fertilizer, pesticides, paints from soil
5	Bio 224: Introduction to development cell biology BOT 423: Plant reproduction Bio 221	Reproduction and growth, cell division, drawing and labelling of specimens, food processing and preservation	Model and figure drawing of pregnant woman; Human reproductive systems, sell division
6	MTH 122: Co -ordinate Geometry MTH 111: Trigonometry	Mathematics for science	Constructing different shapes of objects (rectangular, prism, triangular) graduating

Basic Science and Technology (Integrated Science) in a nutshell means teaching science (i.e. relevant knowledge in Chemistry, Physics, Biology, Mathematics, Agricultural Science and Technology) in a unified form to enable students gain the fundamental unity of science (Ajewole, 2005). Based on the above assertion. Ajewole et al (2008) identified the following possible areas for skill acquisition in science

- ❖ Biology: Biotechnology, mat weaving, cotton spinning, fishing, life drawing and others.
- ❖ Physics: Battery charging, electrical motor coil, re-wiring, vulcanizing.
- ❖ Chemistry: Soap making, dye production, wine brewing, disinfectants, perfumes, polish, bottled water, distilled water.
- ❖ Agriculture: Animal husbandry (poultry, rabbitary, snailery, fishery, bee-keeping) horticulture, floriculture etc.
- ❖ Mathematics: Designing cones and shapes of various sizes, calibrated ruler, and others.

### **INStructional Approach To Content In Bst Towards Entrepreneurship Development**

In an entrepreneurship approach, the students are expected to do the following:

- a) Be actively involved in the learning process.
- b) Identify learning strategies based on their needs.
- c) Be in control of their own learning.
- d) Listen well and ask meaningful questions.
- e) Gain self-confidence.

The teacher, in this approach, is expected to use various strategies that will encourage learners' active participation.

The newly packaged Basic Science and Technology (BST) curricula in the Junior Secondary Schools are carriers of productivity-based hinging on resourcefulness and creativity of students. It is therefore necessary for Teachers/lecturers teaching Basic Science and technology to identify some life skills/entrepreneurial skills in the courses. The Teachers /lecturers can then adopt activity based methods in which a number of activities will be given to the students individually or in groups. Projects on the identified life skills can also be given to the students and submitted at a given time and date.

**Emphasizing Generic Skills:** While almost all entrepreneurial educators see a continuing need to train students in entrepreneurship-specific skills so that they can find employment upon graduation. There is increased interest in generic skills that are broadly transferable to almost any career (Ajewole et al, 2008).

For example, generic skills for a changing workplace like complex reasoning and information processing skills (presented as a problem solving process) involves:

- ❖ Recognizing a problem
- ❖ Analysing the problem
- ❖ Generating solution paths
- ❖ Evaluating the paths and monitoring implementation
- ❖ Repairing using alterative actions

- ❖ Reflecting about the process and the solution.

Attitude and Dispositions

- ❖ Ability to make decisions
- ❖ Willingness to take responsibility for ones decisions
- ❖ Willingness to be bold in decision making
- ❖ Learning the parameters of the workplace
- ❖ Cooperating with others

The intent is to equip all students with skills that will enable them function in a changing economy and a changing workplace. Teachers/lecturers need to train their students in Basic Science and Technology at the NCE and Degree levels since these products would more particularly teach in the primary (Lower Basic 1-3 and Middle Basic 4-6 levels) and Junior Secondary Schools (Upper Basic level- basic 7-9).

He/she should also employ guided discovery and problem-solving approaches to Basic Science and Technology learning.

Emphasizing on both the academic and the practical aspects, Ivowi (2006) makes this point about the science curriculum “generating concepts in the mind...should be related where possible to familiar experiences. Experience is the application of understanding.

The way science is taught and learnt form an index to increase the level of skills acquired. As body of knowledge, science has acceptable methods through which skills in them could be acquired. Accordingly teachers/lecturers as the main operators of educational

programmes need not only to know them but also be able to demonstrate and use them when teaching their students (Nneji 2006). There are several methods of developing skills which when fully utilised would develop in our students the required entrepreneurial skills necessary for our science and technological greatness as a nation. These include:

- ❖ Activity Based Method
- ❖ Learner or child central method
- ❖ Excursion method
- ❖ Demonstration method

If fully utilized, a combination of all or some of these can provide the necessary skills to our students. Teachers need to maximize much of, if not all of the above for as opined by Ivowi (2006), the world of works is very vast, complex and demanding and emphasize the need to expose students at the basic level of education through simple and concrete processes of science and technology rather than concentrating on their products.

**The Needs For Entrepreneurship Instructions Of BST**

This refers to the fact that emphasis should be placed on the utilization aspects of every science and technology content. Basic Science and Technology education therefore demands practical and experimental approach to teaching and learning by its nature and hence the inclusion of appropriate content which is relevant to the learner (Ajewole and Akpan, 2007). This means that the theory learnt should be applied practically, given real examples to underscore its use in life and hence facilitate understanding as well as assimilation of the knowledge and skill learnt.

### **Implications For Entrepreneurship Skill Development By Students**

Implication of this paper is that it is the responsibility of the Basic Science and Technology teachers/lecturers to identify these life-related issues in each course and adopt guided discovery and problem-solving approaches. Efforts should be placed on the utilization aspects of every BST education taught and the corresponding knowledge, values, skills and attitudes. Efforts should also be made by teachers to provide learning experiences that would enable school leavers to create jobs for themselves instead of searching for one.

### **Conclusion**

The need to develop entrepreneurial skills in our learners has remain a necessity in Nigeria considering our level of unemployment and abundant opportunities we are endowed with as a nation. Basic science and technology, a core subject in the basic education provides the foundation levels for all the sciences and is full of the relevant entrepreneurial skills adequate for any successful entrepreneurship. Teachers/lecturers of this all important subject should do everything possible to effectively develop entrepreneurial skills in their learners so that both the dropouts and continuing ones can have the needed basic skills necessary for self-reliance, job creation and overall development of Nigeria.

### **Recommendations**

From the above accessions the following recommendations can be made.

1) All the concepts in BST curriculum should be handled using activity based

method (hands-on and minds-on activities).

2) Participatory learning approach should be adopted by BST teachers in schools (learner-centred method).

3) The activities should be related to the learners' needs and aspirations.

4) Teachers should teach BST to promote productive-based science and technology-life skills activities (entrepreneurial skills).

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