

## SCIENCE AND MATHEMATICS EDUCATION: THE MISSING LINK OF ENTREPRENEURSHIP TRAINING

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### ABSTRACT

The paper highlighted the place of Science and Mathematics Education (SME) in entrepreneurship development. The history of SME in Nigeria was traced to the missionaries and colonial masters whose interests were geared toward producing only teachers who would help them achieve their goals. That is producing Science and Mathematics teachers who would think 'inside the box' and look up to them for employment. The paper submits that 56 years after independence, not much has changed both in terms of philosophy and goals of SME as we continue to not only teach with curricular devoid of entrepreneurship content but also to produce Science and Mathematics teachers who would only seek employment from government and others. The paper recommends among others that with the new reform of entrepreneurship education geared towards creating jobs for the teeming youth, science and mathematics curriculum and philosophy must be revisited so that training of new breed of science and mathematics teachers must think "outside the box" by virtue of the skills and knowledge they would be exposed to and in line with the demands of the labour market in entrepreneurship education.

**KEYWORDS:** Science and Mathematics Education, Entrepreneurship Education, Goals and philosophy of Education, Curriculum, Skills and Knowledge.

### INTRODUCTION

Science and mathematics education (SME) constitute the pivot around which all scientific and technological developments across the globe revolve. Today's world is knowledge driven. In this regard, the knowledge of Science and Mathematics (SM) is ever in demand and has become a necessary requirement for meaningful living in society (Okoronka in Bukar 2007). Being knowledgeable (SM inclusive) is the focus of education, one of the key indices among the three dimensions of measures of development namely: Life expectancy, Education and Gross National Income for measuring Human Development index (Nwadiani, 2011). Human development index is a metric developed by the United Nation to take the emphasis off economic growth (that is GDP) as basis for measuring development but to also include the human, physical and educational wellbeing as critical measures.

The trend in today's global economy is to invest massively in human capital development which provides professional skills set which empowers citizens and graduates in science and mathematics

education to become agents of development. Human capital is viewed as the collective wealth of knowledge, talents, training, skills, judgment and accumulated experiences for a population (Adewumi & Adu, 2012). In order to protect human capital, experts' advice that it is better to stay current and follow with the trend. Also, it is necessary to acquire new skills concomitant on new technology. It is against the backdrop of these emerging global trends and Nigeria's quest for urgent national development, that this paper seeks to examine the missing link between the training given to the science and mathematics teachers and their inability and reluctance to utilize such acquired knowledge and skills in more financially rewarding ways than looking for white collar jobs as is the present practice. It is the opinion of these authors that the missing link lies in the lack of entrepreneurship knowledge and skill of these teachers. Nwachukwu (2009) observed that so many graduates of the nation's education system (SM teachers inclusive) are roaming the streets as unemployed and job seekers contrary to the aims and objectives of education in Nigeria as expressed in the National Policy on Education ( Federal Republic of Nigeria, FRN, 2004). This is indicative of the gap between policy and practice in our schools.

### **Brief History of Science and Mathematics Education and Teacher Training in Nigeria.**

The earliest introduction of western formal education in Nigeria was by the missionaries. The church missionary societies, CMS in 1948 established the first primary school in Badagry , Lagos. The major interest of the missionaries in providing western education according to Okoronka and Adeoye (2006) was to train evangelists and catechist who will assist them to achieve their goals of evangelism. It was not to make the recipient self reliant. This agenda also underpinned the subsequent schools at the post- primary level which they later established in the second half of the 19th century. These schools had three major patterns summarized as follows:

- i. Grammar or classical schools.
- ii. Teacher training and pastor training schools
- iii. Vocational and Agricultural schools.

These schools by their nature focused on certain areas of knowledge and skills which they emphasized. For example, the grammar schools emphasized the liberal education while the teacher /pastor training schools emphasized the Christian religion and philosophy. The Vocational and Agricultural schools were to emphasize the inculcation of practical skills such as carpentry, horticulture, painting which would provide necessary manpower to maintain and service infrastructural facilities of the missionaries both in their schools and their churches. It could therefore be submitted that science teaching at best at this time was speculative and rudimentary as no formal and systematic attempt was made at the teaching of science and mathematics. Several reasons accounted for this which among others includes the high cost of science education, lack of uniform curriculum and lack of teachers to handle the subjects.

However, following the establishment of King's College, Lagos, in 1909 as a result of mounting pressures from the different freedom fighters at that time, a boost was not only given to education by the British colonies government but in particular to Science and Mathematics Education in the whole country. The first Physics, Chemistry and Biology Laboratories were established for preparing candidates to sit for Cambridge Senior Local Examinations. The British government like their missionary counterparts was not genuinely interested in science and technology development of Nigerians leading to their self reliance. Rather, it was observed for instance, that the first governor

General of Nigeria, Lord-Luggard believed that an ‘African versed in science and technology was a suspect’. Other colonial officials equally believed that “Africans lacked what it takes” to study Science and Mathematics. Thus, it was evident that half heartedness and reluctance marked the British government introduction of SME as they also focused on the inculcation of the three Rs (3R) namely: reading, writing and arithmetic into the then young Nigerian school children in the popular grammar schools of that time.

The obvious implication of these historical facts is that SME at all levels had been founded in Nigeria based on the wrong philosophy and ideology. These are such that could make the recipient to “think only inside the box rather than think outside the box’. The attitude of thinking inside the box for graduates of the education system (SM teachers inclusive) set the stage and is a direct consequence of the influence of the activities of both the missionaries and the colonial masters. They were only interested in producing clerks, cooks, artisans, servants, etc who would look up to them for jobs. It could therefore be inferred that this possibly determined and affected as well set the tone of the state of affairs in the entire education sector (SME inclusive) (Okoronka & Adeoye, 2006).

Thus, teachers in Science and Mathematics produced by the missionaries and colonial administrators had a mind set of looking up to and depending on their masters. Unfortunately, after 56 years of independence, not much has changed in this regard. However, with the downturn in Nigeria’s economy coupled with the reforms in the educational sector geared towards making the individual and nation self reliant, it has become expedient for trainers of SM teachers to embrace and conscientiously implement the entrepreneurship training so as to motivate the teachers to become self reliant.

### **Role of Science and Mathematics Education in Entrepreneurial Skills Development**

The knowledge of science and mathematics is a fundamental tool for daily living. The application of such knowledge and skills will help the recipients to adapt and live comfortably in their society (Obanya, 2004). It is a foundation for developing entrepreneurship skills that everybody needs. The Federal Government of Nigeria in the National Policy on Education (FGN,2004) states that science and mathematics education should be able to prepare the individual to acquire skills and techniques that can make him/her independent and productive within the society they live.

Similarly, entrepreneurship is about being independent and self reliant because it is a process of training that provides learners with experiences and motivation to identify market opportunities and exploit. Talking about entrepreneurship in Science Technology and Mathematics Education (STME), Ebhomien, Aguele, Onali and Ebhnomien (2013) observed that entrepreneurship in reality should make STM education graduates to have acquired sufficient skills that would make them self reliant and prepared to enter jobs and excel in the real world of affairs. This is predicated on the fact that STME should be practical oriented. Therefore, acquisition of science and mathematics education knowledge should be geared toward the acquisition of entrepreneurship skills. Graduates of such programmes would be expected to use the skills and knowledge acquired to develop themselves by creating business opportunities that will sustain their living without waiting for the government or others to employ them.

Graduates of science and mathematics education can involve in various entrepreneurship skills such

as production of instructional facilities for schools, publishing of basic science and mathematics textbooks for basic education programmes, win research grant on science and mathematics curriculum reforms, running of private schools among others. Adewumi and Adu (2012) noted that science and mathematics teachers can generate income by producing instructional materials for teaching and learning for schools at affordable rate and that could create innovative mind in the learners. This can be done using local materials available with the help of apprentices. However, it is on common experience that most graduates of science and mathematics join private schools for employment, instead of establishing and running private schools of their own since they have the right knowledge and skills of school administration and planning. In view of that Onyinyechi (2013) opined that mathematical knowledge gives one creative mind that can generate means of earning a living as it equips one with practical applications of mathematics to solving real life problems which includes the application of linear programming, techniques of mathematical optimization and strategies to improve productivity. Science and mathematics educators should therefore be aware of the skills and opportunities embedded in them through training to develop themselves and their societies.

The pursuit of such skills will enable the individual to secure job for himself and provide job opportunities for others that will reduce the rate of unemployment and bring about the overall development of society. Adejimore and Olufunmilayo (2009) described entrepreneurship as an avenue that brings about societal and economic benefits that may eradicate poverty, increase business opportunities, income rates and promote Gross Domestic Product (GDP). These authors however argue that beyond the problem of competent teachers and lack of necessary equipment, there is a missing link of incorporating content from entrepreneurship education into science and mathematics education curriculum. This is necessary because if the teacher education trainers had all the skills and the necessary equipment and tools to teach would be teachers, the later would still find it difficult to break away from the stereotype of depending on government to provide teaching jobs after graduation.

A well spelt out entrepreneurship programme therefore, is what is advocated. This will provide specific knowledge to would be mathematics, physics, chemistry and biology teachers on strategies that would enable them to cooperatively establish and run schools and other educational outfits as private businesses. Experience has shown that most of the private institutions are owned by non educationists who then employ the services of teachers for very ridiculous wages. The general entrepreneurial course recently introduced in the general studies units by the National Universities Commission is a right step in the right direction. However, this may not provide adequate skills and knowledge necessary to ginger the teachers- in- training” to think outside the box” rather than” inside the box “as has been the custom from the beginning of the western education in Nigeria.

When it comes to entrepreneurial skills, the technology education seems to have fared better than science and mathematics education. This is so because the graduates of technology education not only possess more skills but also seem to have a greater motivation to go into private practice unlike the science and mathematics education graduate teachers who are too scared to venture into the world of private practice. They apparently seem to lack what it takes to do so because they fail to utilize the skills that they acquired during their training for business purposes. In order to readdress this ugly order and trend, SME graduates could be trained to be conscious of the potentialities and

skills imparted in them while in training and creatively use such skills in creating job opportunities for themselves and others both within and their immediate environment. Based on the thinking of infusing a well articulated course of entrepreneurial studies into SME programme as a means of empowering graduates of Physics, Mathematics, Chemistry and Biology to become job creators (through cooperative ownership of schools and similar educational outfits) rather than job seekers, the following suggestions/recommendations are made:

1. Science and Mathematics teachers should be adequately trained, provided with adequate knowledge of content, creative skills, pedagogical and practical approaches for teaching science and mathematics as well as necessary entrepreneurial skills and knowledge which will enable them to go into private business practice.
2. Serving science and mathematics teachers should be retrained through in-service, workshops, seminars, conferences and study tours with specific emphasis on entrepreneurship.
3. Curriculum reforms on science and mathematics education programmes should be devised to domesticate and incorporate entrepreneurship contents into the various SME programmes for closer and proper monitoring and implementation. This is without bias to the general inclusion of entrepreneurship in general studies of all undergraduates' programmes.
4. Government should formulate appropriate policies that will encourage capital and financial business market operators to make loans available to graduate teachers of SM who will be interested in joining private school business ventures.
5. A complete re-organization of the curriculum for training SM teachers so that entrepreneurship content is domesticated and taught alongside other courses in the parent departments (SME) in the teacher education institutions/schools or faculties.

## **CONCLUSION**

Science and mathematics education should equip its graduates at all levels with knowledge, skills and competencies for sustainable development. Therefore, graduates of science and mathematics education programmes should be made right at the point of their training to imbibe the entrepreneurship philosophy and ideology so that they can readily apply both skill and knowledge acquired in training for private business purposes. This will make SM teachers become job providers rather than job seekers. Here lies the missing link in the training of science and mathematics teachers graduates in Nigeria.

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