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CREATIVITY IN SCIENCE, TECHNOLOGY AND MATHEMATICS (STM) EDUCATION; A GATEWAY TO EMPOWERING YOUTH FOR SELF-RELIANCE

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ABSTRACT

This is an opinion paper which looks at creativity in Science Education as a gate way to the empowerment of the youth for self-reliance. It addresses some of the creative skills to be acquired in Science Technology and Mathematics Education. Examines the need to empower youth for self-reliance in STM education. Also strategies for empowering youth in STM education were also discussed as measures for unemployment reduction in the country. The paper also suggests that, in order to move forward, the National Economics and Development Strategies (NEEDS) should be revisited for action. The paper concludes that Science Education is the bed rock of economic growth and only way out of our problems and under development is that our science education should be made functional through the impartation of proper creative skills for the Nigerian youths to be self-reliant.

INTRODUCTION

It is a well-known fact that education is the key to National and societal transformation. One of the important goals of education is for it to be functional and utilitarian, preparing the individual for life in the community and reforming the society for relevance, adequacy and competitiveness in the World (Oraifo, 2012). Education is known to be the key to the economic, political, sociological and human resources development and well-being of any society. The base line of science, technology and mathematics education is to put man on the path towards accomplishing the basic tasks that keep man healthy, productive and progressive (Chukwunke, 2009). Hence, the creativity in STM, a pathway of empowering the youth for actualization of the essence of education. Looking out the meaning of creativity in this perspective, it can be defined as a process of becoming sensitive to the problems, deficiencies, missing elements, disharmonies, identifying the

difficulty, searching for solution and making guesses or formulating hypothesis and possibly modifying and finally communicating the results (Onu, 2007). Some of the relevance of creativity to science, technology and mathematics according to Penick (2006) are as follows:

- (a) Creative minds are more flexible and can cope better with new situations.
- (b) Creativity helps one to be more adaptable and sensitive to their surroundings.
- (c) Creative students are more self-sufficient, more flexible, more secured and independent.

The ability to do creative work and creative thinking is dependent largely on the student's opportunity for creative work. Creativity as a tool offers one the opportunity to learn in creative way by exploring, manipulating, questioning, experimenting, testing, modifying ideas and inquiry. According to Onu (2008). we can encourage creative behaviour by:

- (i) Treating unusual question with respect.
- (ii) Respecting unusual imaginative ideas.
- (iii) Showing students that idea have value.

It is therefore important to note that creativity as a tool for the development of creative skills should be properly emphasized in our science classroom so as to eliminate ignorance and superstition, free our minds from quicker perception of issues, initiate inquiry, experimentation and innovation in science, technology and mathematics education. Science curriculum should be designed to promote creative attitude in the learner/ youth in order to achieve the goal of unemployment reduction and job creation skills. It is a realization of the importance of youth empowerment that the government gives credence to it in the National Policy on Education (Federal Republic of Nigeria, 2013) and stipulates that the goals of vocational education shall be to:

- a) Provide trained manpower in the applied sciences, technology and business particularly at craft, advanced craft and technical levels.
- b) Provide the technical knowledge and vocational skills necessary for agricultural, commercial and economic development and
- c) Give training and impart the necessary skills to individual who shall be self-reliant economically (p.30).

Omolewa (2010) advocates for functional education, which he described as work oriented education. He opined that education at the early stage should be made to be in speciality so that learners could be able to do a specific job for which he or she will earn a living without much reliance on white collar job.

Strategies for Empowering Youth through Functional Education

The following strategies will assist in empowering the youth at the various levels of education to be self-reliant

a) Creating a positive attitude towards creativity

Encouraging creative spirit in young people is a pre-condition to achieving progress in employment, growth competitiveness and innovation. The argument is that creativity should be seen as a general attitude that can be usefully applied in all working activities and everyday life.

b) Seminar/Workshop

Here successful experts could be invited to deliver lectures on their area of specialization to broaden students' minds and help them know more about the creative skills from their experiences.

c) Intern challenge

Through the intern challenge students are given the opportunity to be interned to a small business organisation where they can practice the skills they have learned.

d) Use of competent and qualified teachers

The teachers employed to teach creative education should be competent and qualified in terms of qualification, practical skills and knowledge of business opportunities available after graduation. The teacher is expected to know both the methodology and the content of the subject so that he can teach the students effectively.

e) Teaching strategies

Teachers should use appropriate teaching methods (such as demonstration and field trip) in teaching creative education so that students can understand the lesson that will enable the students to establish their own business instead of waiting for government employment.

f) Counselling

The teachers will guide the students properly towards establishing their own business instead of folding their hands and waiting for government job only.

Developing Creative Skills in Science, Technology and Mathematics Education:

Development of creative skills in STM should be the bedrock of Nigerian education system. The curriculum should be broad enough to accommodate the development of creative skills that will make our graduate to be self-employed. Some of the creative skills to be acquired in science, technology and mathematics are as follows:

- Electrical engineering trades such as electrical installation and maintenance work, television and electrical work and appliance repairs.
- Mechanical traders such as agricultural implements and equipment.
- Computer craft practice such as computer maintenance work and data processing.
- Building trades such as block laying, brick laying and concrete work, painting and decorating plumbing and pipe fitting.
- Wood trade such as machine, carpentry and furniture making.
- Textile trades such as garment making (ladies/men dresses), textile trades, dyeing

and bleaching.

- Printing trade such as printing craft practice, graphic arts and ceramics.
- Commercial saponification (soap manufacture) such as bar soap, toilet soap, and detergents.

Even managing a fish pond is a lucrative business of its own. All these and many more are viable opportunities of self-employment in STM education. The value of science to man individually and collectively cannot be overemphasized, most of the goods and services that beeves up the welfare of mankind are products of scientific knowledge. All these creative skills should be possible if the culture of creativity is emphasized in our education system.

Functional STM Education: A Gateway to Developing Creative Skills among Graduates

Youth: The significance of scientific and technological literacy is felt increasingly in the work place as more and more jobs demand advanced skills. These skills require that people be able to learn, reason, think creatively, make decision and solve problems. There is no doubt that understanding of STM and their process contribute significantly to the acquisition of these skills. To adequately compete and effectively keep pace with this STM knowledge driven global economy therefore, requires a heavy investment in the development of a STM literate and ICT complaint workforce (Chukwuneke,2009).

National Education Standards (NES) recommends Science, Technology and Mathematics education (STME) as an active process of learning science as something students do and not what is done to learn. It advocates that

hands on activities are essential, they are not enough. Students must therefore have minds on experiences as well through the use of creativity as a tool.

Nigeria's economy is largely petroleum and gas industry based and it is at the moment characterized by weak economy, high unemployment rate, grinding poverty, high crime rate, high child and maternal mortality and low life expectancy. The most feasible way of solving these myriad of problems is to provide access to quality education to larger percentage of the citizenry, STM education is of particular interest here.

The economy, which should of necessity be diversified will be run by citizens who are skilled and knowledgeable enough to compete globally. Our STME at all levels should therefore be geared towards the realization of a lofty goals of the NEEDS (National Economic Empowerment and Development Strategies) which will go a long way in ensuring economic, social and environmental sustainability.

Adopting market driven economic development strategies would also promote the growth of knowledge based STM driven, small and medium scale enterprises (SMES). This will not only accelerate finding solution to the problem of unemployment but also promote job creation and wealth generation (Tide online. Dec. 19, 2006). The country at the moment lack the much needed middle and high level skilled labour force to operate the oil and gas based industries as mainstay of the national economy. There is need for more emphasizes on STME and government at all levels must enhance this through scholarship and grants to students in order to improve welfare package to STM teachers.

Creativity through STM for Development of Creative Skills

Science education is the bedrock of technological breakthrough. Technologically advanced countries of the world attain that status through the stock of their science educators, scientists and technicians. Technological advancement is a must for any nation to rise above poverty and backward (Onu, 2007). It is a well-known fact that no technologically advanced country is poor and no poor country is technologically advanced. This has a lot of implications for our science education (Onu, 2007).

It is imperative therefore to employ methods of teaching that will inculcate in the learner creative skills which enable them to be enterprising even outside the school. Creativity is synonymous with productive thinking, critical thinking and problems solving that can be developed through training. It is the capacity to originate, reflect, analyse and synthesize issues (Penick, 2006).

Inquiry method of teaching is hereby advocated if our STME is to be productive. Inquiry method of teaching can cultivate and improve creativity. Creativity skill if well-developed is capable of producing individuals who can take some responsibilities for shaping positively not only their own lives but that of the society at large (Holbrook et al, 2007). Skills that can make thinking logically, ask reasonable questions and seek appropriate answer will not only solve daily problems but also useful in the development of creative skills among students.

The teaching of science mainly for the acquisition of knowledge has led to the development of passivity, docile learning and dependence on teachers and textbooks instead of active learning on which teachers and textbooks are challenged.

Way Forward to Acquire Creative Skills

1. To move forward, Nigeria should revisit the National Economic Empowerment and Development Strategy (NEEDS) reform development in (2004) for action. This is because NEEDS is said to be concerned with both integrated economic development and poverty reduction strategy. The specific sectoral reforms in education under NEEDS will address the following critical issues:

1. Implementation of the free and compulsory Universal Basic Education (UBE) faithfully.
 - Review the STEM curricula from primary through tertiary to incorporate vocational and creative skills.
 - Re-tooling and repositioning the technical schools to be able to address technical manpower needs of economy.
 - Establish more vocational centres to encourage Nigerians to embrace vocational education.
 - Review the STEM curriculum at all levels to incorporate the study of information communication and technology (ICT).
 - Sustain existing vocational on the job training programme based on the above, the aims and strategies of NEED should be pursued.
2. Proper exposure of our science teachers is very necessary if we are to develop quality creative skills among our graduates. To this

end, it is necessary for the government to sponsor some science teachers abroad to countries, like Japan and China to acquire creative skills in STEM.

3. The issue of re-branding of Nigeria should be put into practice, so that bribery, corruption, examination malpractice and other vices should be done away with and fear of God be instituted. This is necessary so that our leaders will no longer embezzle or even dump the money meant for implementation of the NEEDS and other programmes in foreign banks where they have no impact on the lives of the citizenry.

Conclusion

As the bedrock of economic growth, one can say without fear of contradiction that the only way out of our problem and under-development is through STEM. It is one of the effective routes out of stagnation through the development of capabilities in science and technology by using creativity as a tool. We therefore need a functional science and technology education. To this end, the political class, who does not have the will and commitment to the study of science should however be given the political will and commitment to the study of STEM so that Nigeria will not only have functional STEM education but will consequently solve its National problems and be classified as technologically developed through the acquisition of proper creative skills.

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