INTEGRATING ENTREPRENEURIAL EDUCATION INTO SCIENCE AND TECHNOLOGY CURRICULUM: A STRATEGY FOR POVERTY AND UNEMPLOYMENT REDUCTION IN NIGERIA

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Abstract
This paper focused on integrating entrepreneurial education into science and technology education programmes at the secondary school level for poverty and unemployment reduction. The paper examined critical issues involved in entrepreneurial education such as skill acquisition, youth empowerment, self-reliance and wealth creation. Other issues examined in this paper include challenges facing integration of entrepreneurial education into science and technology education and the remedies. Lastly, a typical model for science and technology entrepreneurial education curriculum was presented.

Entrepreneurship and skill acquisition and other means of employment are key issues that have been receiving attention globally. Training the youths to acquire useful skills helps them to live a fulfilled life. Education is an instrument par excellence for effecting national development. Nigeria’s philosophy of Education stipulates that “education is an instrument for national development and to this end; the formulation of ideas, their integration for national development and the interaction of persons and ideas are all aspects of education (FRN, 2004). Akuma and Igu (2012) observed that for us to achieve this aspect of the philosophy of Nigerian education there is the need for functional education, for the promotion of a progressive and united Nigeria and African sub-region. Therefore, the school curriculum needs to be relevant, practical oriented and comprehensive. It is this relevance and productivity that entrepreneurial education emphasizes.
Meaning of Entrepreneurship/Entrepreneurial Education

Entrepreneurship according to Drucker in Akuma and Igu (2012) is all about taking risk. Stanley (2006) was of the view that it is all about seeing opportunities and bring about change. Wikipedia (2001) and Omiko (2012) in their view defined entrepreneurship as a practice of starting new organizations (business) or revitalizing mature organizations, particularly new businesses generally in response to identified opportunities.

Entrepreneurship means the ability to overcome that structural obstacle that hinders some from excelling. Ogbackirigwe (2010) defined entrepreneurship as the power, authority and consent given to someone to carry out certain activities on his/her own without someone intervening.

The present day education does not give the youths the skill to engage in self employment. It is disheartening to see many Nigerians (school leavers/graduates) roaming the streets in both the urban and villages looking for white collar jobs. The white collar job opportunities are limited and highly competitive. It cannot go round to all job seekers in Nigeria because of the number of graduates being produced every year. The only solution to this problem is to integrate entrepreneurship into our school curriculum and introduce the learners (youths) into entrepreneurial education which would enable them acquire saleable entrepreneurial skills.

The National Universities Commission (NUC) recently advised universities to introduce entrepreneurial education into the curriculum. Some universities have started adding entrepreneurial education into their academic programmes in form of general studies (GST) courses. But this is yet to be achieved or fully implemented by many universities. To achieve this laudable objective, the NUC was among the first institutions to organize a national workshop on entrepreneurial education. This action set the pace on thinking and contributing ideas on this all important aspect of education for self-actualization .Ekong (2006) noted that the federal government of Nigeria (FGN) urged training institutions to re-orient their programmes towards vocational and entrepreneurial education for training of staff and for onward production of graduates that would be equipped to possess the relevant skills for self-employment and self-reliance.

The Need for Entrepreneurial Education in Nigeria and Africa in General

Entrepreneurial education is a form of education that seeks to prepare people specially to be responsible and enterprising individuals who become entrepreneurs and entrepreneurial thinkers to contribute to economic and sustainable communities (Consortium for entrepreneurship education, 2005). Cherwitz (2006) viewed
entrepreneurial education as the ability to educate people who will utilize their
intellectual prowess to add to disciplinary knowledge as a lever for social and economic
good. In a conference of education for All (EFA), coordinated by the United Nations
Education Scientific and Cultural Organization (UNESCO) under Education Forum
held in Dakar in April 2000, a lot of emphasis was on life skill education which is
translated as entrepreneurial skills. Goal number (4) of the forum was “ensuring that the
learning needs of all young people are met through equitable access to appropriate
learning and life skill programmes. The best way of introducing and planting these
skills in our youths is to integrate the skills into the secondary school and universities
curricular.

As our nation moves to become the twenty-first largest global economy by
2020, the need to integrate our education and entrepreneurship becomes an important
issue for wealth creation and employment generation. UNESCO and international
labour organization, Ilo (2002) jointly recognized the importance of the development of
attitudes among young people through entrepreneurship education, training and
entrepreneurship development. Many countries in Africa have recognized the need and
urgency of responding to the challenge of youth education and employment and lasting
peace.

Entrepreneurial education offers quick solution to problems of unemployment
and poverty among others. Etonyeaku and Ajala (2010) strongly felt that “it seeks to
prepare people particularly youths to become entrepreneurs or interpersonal thinkers by
immersing them in real life learning experiences where they can take risks, manage the
results and learn from the outcomes”. They went further to emphasize that it will enable
young people to learn organizational skills, time management skills, sought by
employers. Wikipedia (2001) outlines the following as other positive outcomes from
entrepreneurial education for the youths.

1. Improved academic performance
2. Improved problem solving and decision making abilities
3. Improved interpersonal relationship and team-work
4. Money/capital management and public speaking skills
5. Job readiness and
6. Enhanced social, psychological development (self esteem, ego development,
   self efficacy and perceived improved health status.
Entrepreneurial Education and Skill Acquisition in Science and Technology

According to the National Policy on Science and Technology (NPST, 1998), the following are the general objectives of science education in Nigeria.

1. To enhance active involvement of students in the teaching and learning process.
2. The development of motivation and ability to work and think independently.
3. To develop the ability to apply previous knowledge to new situation.
4. To develop ability to devise skills for problem solving and science information.
5. To develop ability to communicate effectively and selectively the scientific knowledge acquired.
6. To develop ability to relate experience in each subject area to life in general.

Though the National Policy on Education (FRN, 2004) has not set out specific goals for science education but some statements of goals for science education are mentioned; they are:

At the Primary School Level
1. To lay sound foundation for scientific and reflective thinking
2. To develop in the child the ability to cope with his changing environment.
3. To give the child the opportunity to develop meaningful skills that will enable him/her to function effectively in the society within the limit of his ability. Entrepreneurial education at this level in science and technology would enhance their skill acquisition at the secondary school level.

At the Secondary School Level
1. To prepare the child for useful living in the society.
2. To prepare the child for higher education in science. If the above goals of science education are to be achieved through the development of science curriculum programmes, students should be provided with the opportunity to:
   3. Develop mental skills and process in science
   4. Develop intellectual ability (critical and problem solving abilities).
   5. Develop an awareness of the interaction of science, technology and society and
   6. Development of the consciousness of science to its social relevance.

At the Tertiary Institutions
1. Acquire, develop and inculcate value orientation and
2. Develop intellectual capacities
At the Vocational and Technical Education

According to the national policy on education (2004), the goals of vocational education shall be to:
1. Provide trained manpower in the applied sciences, technology and business particularly craft, advanced craft and at technical levels.
2. Provide the technical knowledge and vocational skills necessary for agriculture, commercial and economic development.
3. Giving training and imparting the necessary skills to individuals who shall be self-reliant economically.

How can Education in Science, Technology and Mathematics help in Entrepreneurship Education in Nigeria

When we promote the study of science, technology and mathematics in our youths, we are improving their educational opportunities and this in turn will make them able to create job and create “wealth” among other advantages. Questia Media America (2008) writes “By improving educational opportunities for the youths and girls, World education helps them develop skills that allow them to make decisions that influence community change in key areas. Olagunju and Akanbi (2009) observed that these programmes in turn have positive impact on some of the most profound issues of our time, such as in population growth, diseases, peace and security, and the widening gap between the rich and the poor. Science helps in finding out, technology helps in creativity and innovations while mathematics is the tool for calculations. All these are needed in entrepreneurship. Science, technology and mathematics cannot be left out of entrepreneurship education. Scientific process also develops an attitude of value in learners studying science. This attitude is useful for entrepreneurship education.

Salleh (2002) “observed that entrepreneurship has two characteristic dimensions; the formulation of a new venture organization and value creation performance”. The study of both the cognitive and process dimensions of science starting at primary level and going up to tertiary level has the potential to develop in individual these two characteristics.

Practically some areas in science and technology naturally give entrepreneurship skills and opportunities. Areas such as soap making in chemistry, electricity generation in physics, fishery and waste management in biology, internet and computer business in technology, among others. All these provide entrepreneurship opportunities. A team of researchers, Ewing, Marion and Kauffman Foundation (2008)
that tracked the educational backgrounds of United States immigrant entrepreneurs who were key founders of technology and engineering companies from 1995 to 2005 shows a strong correlation between educational attainment (particularly in science, technology and mathematics) and entrepreneurship. The leader of the research team Wadhwa (2008) said: “our research findings confirm that advanced education in science, technology, engineering and mathematics is correlated with high rates of entrepreneurship and innovation”.

Model for Science and Technology Entrepreneur Education Curriculum

A typical model for science and technology entrepreneurship education, adopted from Olagunju and Akanbi (2009). The module can be incorporated into science curriculum in the Senior Secondary Schools (S.S.S. classes); for effective entrepreneurship education thus:

(1) Unit A and B – Biology Curriculum
(2) Unit C, D, E, F and G. Chemistry Curriculum
(3) Unit H, Physics Curriculum

The module can be used wholly as Science Entrepreneurship Education Module (S.E.E.M.) as done in countries like the United States, Japan and South Africa.

A Typical Model for Science Entrepreneurial Education Curriculum

The model below can be incorporated into the science curriculum in the senior secondary school thus:

Unit A and B - Biology curriculum
Unit C, E, F, and G - Chemistry curriculum
Unit H - Physical curriculum

Otherwise, the module can be used wholly as science entrepreneurship education module (S.E.E.M) as done in countries like the United States, Japan and South Africa.
Other entrepreneurship/trade subjects which need to be incorporated into the school curriculum include the following:

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<tbody>
<tr>
<td>1</td>
<td>Auto body repair and spraying /plant</td>
<td>19</td>
<td>Dyeing and blending</td>
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<td>2</td>
<td>Auto electrical work</td>
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<td>Garment making</td>
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<td>3</td>
<td>Marketing</td>
<td>21</td>
<td>Leather goods manufacturing and repairs</td>
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<td>4</td>
<td>Salesmanship</td>
<td>22</td>
<td>Catering practice</td>
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<td>Fisheries</td>
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<td>Upholstery</td>
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<td>6</td>
<td>Animal husbandry</td>
<td>24</td>
<td>Furniture making</td>
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<td>7</td>
<td>Mining</td>
<td>25</td>
<td>Carpentry and joinery</td>
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<td>8</td>
<td>Tourism</td>
<td>26</td>
<td>Machine wood working</td>
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<td>9</td>
<td>Photography</td>
<td>27</td>
<td>Plumbing and pipe fitting</td>
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<td>10</td>
<td>GSM maintenance</td>
<td>28</td>
<td>Painting and decorating</td>
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<td>11</td>
<td>Book keeping</td>
<td>29</td>
<td>Auto mechanical work</td>
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<tr>
<td>12</td>
<td>Store keeping</td>
<td>30</td>
<td>Auto part merchandising</td>
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<td>13</td>
<td>Data processing</td>
<td>31</td>
<td>Air conditioning refrigerator</td>
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<td>14</td>
<td>Shorthand</td>
<td>32</td>
<td>Welding and fabrication engineering craft practice</td>
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<td>15</td>
<td>Key boarding</td>
<td>33</td>
<td>Electrical installation and maintenance work</td>
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<td>16</td>
<td>Cosmetology</td>
<td>34</td>
<td>Radio, TV, and electrical work</td>
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<td>17</td>
<td>Printing craft practice</td>
<td>35</td>
<td>Block laying, brick laying and concrete work</td>
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<td>18</td>
<td>Textile trade</td>
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(Source NERDC, 2008)

The integration of these trade/entrepreneurial subjects into the school curriculum, and the realization of the laudable objectives of the curriculum would help to produce youths that can make use of their brain and hands as a result of their acquired creative knowledge and self employment skills. Lukman and Oviawe (2010) observed that such productive individuals equipped with necessary professional competence, entrepreneurial abilities and managerial skills would sustain quality production of goods and rendering of services to ensure human survival and economic prosperity.

Benefits of Entrepreneurial Education

Integrating entrepreneurship education into the science and technology programmes would help the students in different ways. Mueller (2004) and Okoli
(2009) identified the benefits of entrepreneurship to include the following. It will help the students to:

1. Become entrepreneurial thinkers who also have the skills and tools to start their own business.
2. Write a business plan, assess feasibility of ideas and management risk.
3. Apply basic marketing skills, business accounting principles and principle of human relations management
4. Engage in ethical business practices
5. Demonstrate financial management
6. Identify legitimate source of capital
7. Translate problems into opportunities
8. Demonstrate skills in maintaining business longevity.
9. Access other resources and services
11. Change personal and career attitudes including: ability to control one’s own life, personality, creativity and interpersonal communications.

Entrepreneurial education can positively impact a learner at various levels in a wide variety of contexts and the benefits accruing from entrepreneurship education is enormous. “Entrepreneurship education seeks to encourage an innovative and sustainable range of student centred activities in entrepreneur training directed at helping students to cope with the changes of the global knowledge-based economy.

Challenges of Integration of Entrepreneurship Education in Science and Technology Education Programmes

1. Unqualified resource persons/instructors/teachers: majority of the teachers or resource persons who teach or handle entrepreneurial education qualified, but they are not experts in the fields or areas they teach. Therefore they cannot teach what they do not know. This means that they cannot teach the content to aid the students understanding of entrepreneurship and skill acquisition.

2. Inadequate fund: The fund being channeled to the activities of entrepreneurship education is inadequate and so some of the materials needed for effective entrepreneurship education by the school authority cannot be bought with empty hand.

3. Poorly equipped science laboratories: Some schools lack laboratories, where laboratories exist, they are poorly equipped with outdated instruments and expired chemicals.
Youth unwillingness/impatient attitudes towards learning and skill acquisition. Many students or youths nowadays are unwilling and impatient to learn. They are impatient to learn trade and acquire useful skill that would help them be self-reliant. They exhibit such attitudes that will show that they don’t want rigorous exercise/learning. They want everything just like they want to pick money quick, when a teacher involves them in a kind of activity method of learning or demonstration method regularly, they tend to hate the teacher. This also posses a great challenge to entrepreneurship skills acquisition in science and technology.

Lack of participation in seminars and workshops: Most teachers and students do not take part in seminars and workshops. During workshops and seminars experts in various fields of work give talks on important issues that relate to entrepreneurship. Seminars and workshops on entrepreneurship provide the learners/youth with skills and attributes which are needed by an entrepreneur to succeed in business.

Strategies for Promoting Entrepreneurship Education in Science and Technology

1. Employment of qualified and competent resource persons/teachers: The teachers or resource persons employed to teach entrepreneurship education should be competent and qualified in terms of professional qualification, practical skills and knowledge of business opportunities available after graduation. The teacher is expected to know both the methodology and content of the subject to foster effective teaching and learning (Adetayo, 2009).

2. Organizing school seminars/workshops: Seminars/workshops on entrepreneurship skills and attributes which are needed by entrepreneurs to succeed in business should be organized for students. Successful entrepreneurs and experts in trade areas could be invited to deliver lectures on entrepreneurship to broaden students’ minds, knowledge, horizon and help them (students) to know more about entrepreneurship practices. Such business skills like: business planning skills, opportunity recognition and selection, business ideas generation, resources management skills, time management, people management, customers relation and marketing of goods and services-can be taught in the workshop/seminar.

3. Practical entrepreneurship counselling: The entrepreneurial teacher needs to counsel the students on the benefits, importance, significance and contribution of entrepreneurship education to national development.
4. Regular visitation to entrepreneurs in the community entrepreneurship educators should regularly organize visits to local entrepreneurs for their students. These visits will afford students the opportunities to become familiar with entrepreneurial and management tasks. Omoifo (2009) noted that to successfully implement entrepreneurial curriculum, the teachers should use project work, case studies, field trips and link with entrepreneurs in the community.

5. Internship: The internship provides students with opportunity to practice with a small business organization; with a view to exhibiting the skills they have learned in the school. Through these programmes, entrepreneurial awareness among the youth is promoted, and a stronger bridge between the school system and the business world is further strengthened and enhanced.

6. Efforts should be made by government at the state and national levels for adequate funding of education in line with the UNICEF recommendation.

Conclusion
Entrepreneurship is a science of the mind that requires the willingness and capacity to go into business enterprise. It is not gender sensitive; (Okoli, 2009), hence everybody is allowed to participate in entrepreneurship education.

Entrepreneur is the bedrock of any country’s Industrialization and economic growth. To reduce the ever increasing number of unemployed graduates from the various levels of the education system, there is urgent need to integrate entrepreneurship education into the various education programmes at the secondary and tertiary levels of education. Such a programme will arm the young school leaver or graduate with relevant entrepreneurial skills that will enable him/her set-up a business of his/her own, become self-employed, and so become his or her own boss someday, and in the end become employer of labour as well as create wealth.

Recommendations
Considering the role of entrepreneurship education in fostering economic development and the attainment of vision 20-20:20, the following recommendations are made:
1. Entrepreneurship education unit should be established/created at the federal and state miniseries of education and local governments, Education authorities (LGEA) with a mandate to monitor and provide support to schools for effective implementation and teaching of 35 entrepreneurship/trade areas.
2. Training and retraining programmes should be planned by the government to enhance teacher’s capacity with the skills and professional competence for coping with the task of teaching entrepreneurial trade curriculum.

3. Government should provide facilities and adequate training equipment for the effective delivery and implementation of the entrepreneurship education curriculum.

4. Government should provide loans to the entrepreneurial education trainees to enable them start-up their own businesses.

References


