

## **Refocusing Science Education for Youth Empowerment In The 21<sup>st</sup> Century.**

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**Abstract:** *A primary focus of science education in many African countries in the eighties has been the search for relevant content and new methods of science teaching and learning which should be alternatives to the colonial teaching and learning. This embraces philosophies in which education takes place and thus meet the needs of the learner. Certain stereotypes about African attitude towards science education also account for poor performance and state of affairs in this country. Every nation like Nigeria strives towards the provision of quality education for its citizens. Achieving this quality education takes into consideration science education sector in this 21<sup>st</sup> century, it has been observed by educationist that attention from academic theories in universities and secondary schools into current pedagogy, educative innovations and interactive skills that can enable our children and youths to take charge of their lives are not practiced by today's teachers. Thus we have experienced high levels of youths and students deviance, not being equipped educationally to sustain themselves economically, neither empowered to participate meaningfully in the community and social life, all these and other corrupt practices poise serious challenge in the Nigerian education system and science education in particular in this 21<sup>st</sup> century. It is in view of this that this paper sought to look at the theme: Refocusing Science Education for Youth Empowerment in the 21<sup>st</sup> Century.*

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### **I. Introduction**

In many African nations today of which Nigeria is one, science is recognized as a means towards economic survival and as a new magic for achieving modernity in a short space of time. With this has come a heavy demand on science education which is a gateway toward scientific knowledge. The role of modern science education according to Gbamanja, (1999) is to treat science not as an accumulation of facts but as an experience in investigation and discovery. It aims at stimulating an inquiry and analytical mind in the learner so as to aid understanding of the changing nature of the environment and rational powers. Apparently, the major role of science education in Nigeria had been to stress the potential of science to promote the development of intellectual qualities and skills rather than knowledge of particular scientific facts and theories as has been the status quo. Scientific literacy, as could be advocated by good science education programmes in Nigeria, is a major factor for developing positive attitudes towards rational and meaningful change. But numerous bottle necks hampering progress in this direction exist.

Firstly in Nigeria and other West African countries, it has been observed by the chief examiner WASSCE from the year 2010 to 2018 that more and more students who take the final examinations at the end of their secondary school education fail the science subjects.

Several factors have been identified by Kitta, (2014) as causes of mass failure, poor performance or under achievement in science. They include:

- (i) That certain language usage and vocabulary are responsible for the swing away from science by secondary school students in Nigeria.
- (ii) Secondary school curriculum does not expose the students to the realities of his environment.
- (iii) Not using modern methods of teaching science education in secondary schools.
- (iv) Unqualified science educational teachers employed in junior and senior secondary schools.

### **Concept of Science Education**

Science itself is the study of phenomena and events around us through systematic observation and experimentation, science education therefore cultivates students curiosity about the world and enhances scientific thinking. It is the field concerned with sharing science content and process with individuals not traditionally considered part of the scientific community, (Tabe & Keith, 2009). Through the inquiry processes, students will recognize the nature of science and develop scientific knowledge and science process skills to help them evaluate the impacts of scientific and technological development. This will prepare students to participate in public discourse in science related issues and enable them to become life-long learners in science and technology. Science education according to Duit, 2006 is one of the most important subject in schools due to its relevance to students lives and the universally applicable problem-solving and critical thinking skills it uses and develops. These are life long skills that allow students to generate ideas, weigh decisions intelligently and even understand the evidence behind public policy-making. Teaching technological literacy, critical-thinking and problem-solving through science education gives students the skills and knowledge they need to succeed in schools and beyond. The emphasis of science education is to enhance students scientific literacy through investigative activities that involve planning, measuring, observing, analyzing data, designing and evaluating procedures and examining evidence (Gbamanja, 1999). Solomon, (1993) and Aikenhead, (1994), opined that learning science education will enable our students to leave a fulfilling and responsible life by encouraging them to learn independently, deal with new situations, reason critically, think creatively, make informed decisions and solve problems. They maintained that through science education activities, students should develop interest and thus be motivated to become active learners in science, have an understanding of the interrelationship between Science, Technology, Society and Environment (STSE), strengthen the ability to integrate, apply knowledge and skills across disciplines, that students should be able to meet the changes and challenges in the ever developing society, contribute towards the scientific and technological world.

Students with high ability or a strong interest in science need more challenging learning programmes. These programmes should stretch the students science capabilities and offer opportunities for students to develop their potential to the full.

We are surrounded by technology and the products of science everyday according to Yage, (1996), that public policy decisions that affect every aspect of our lives are based on scientific evidence, and of course, the immensely complex natural world that surrounds us illustrates infinite scientific concepts, as children grow up in an increasingly technologically and scientifically advanced world, they need to be scientifically literate to succeed. Ideally, teaching the scientific methods to students is teaching them how to think, learn and solve problems. These skills are integral to every aspect of students, education and life, from school to career. With a graduate degree in science education, teachers can use what they learn about science instruction techniques and curriculum design to advance science education and students learning as a whole. Governmental guidelines and tests often focus on middle and high school level, yet many educators believe science education should begin much earlier. Not only does science education teach young learners problem-solving skills that will help them throughout their schooling, it also engage them in science from the start.

### **Problems and Challenges Facing Science Education**

In this 21<sup>st</sup> century Ezeudu, (2013) revealed some of the challenges to include:

- i. **Unstable staff:** The problem is no longer unavailability of teachers but the instability. Due to the poor earnings of teachers, many people use teaching professions as a stepping stone to more attractive jobs. This has made teaching profession of fresh graduates of universities and colleges of education who are ready to quit the job as soon as they get better offer. As a result of meager payment, most Nigeria teachers do have other jobs which they give more concentration to, and thus, no doubt affects their effectiveness in teaching. Imagine a secondary school teacher also working as a taxi driver during or after school hours.
- ii. **Inadequate classrooms:** classes are always crowded with up to ninety students in the class designed for about thirty students in most cases, especially in public secondary schools, chairs are not enough. Students will be sharing seats and some would start to receive lectures, whereby students are learning science subjects, they will lack concentration as they would be easily distracted.
- iii. **Inadequate learning equipment:** Nigerian schools at all levels are lacking the essential material for learning, especially for science practical classes. This no doubt, affects the learning process. Most secondary schools lack science materials and those that have lack the manpower to use it.

Some other problems that should be overcome for a sustainable and proper science education according to Kubilay, and Ozden (2012) are:

- ❖ The insufficient in service training of science teachers in the transition state of a new programme.
- ❖ Compartmentalized subjects taught by teachers isolated within and across departments.
- ❖ Students generally lack motivation and have low self confidence in learning.
- ❖ The informational education orienting students towards only exam achievement.

- ❖ The intensive curriculum but sufficient time allocation for science education.
- ❖ The instruction of lesson in an information level and students in passive positions (i.e only listening and writing), teachers in active position (i.e writing on the board and teaching in a classical way).

The review undertaken by Sir Gareth Roberts in (2002), summarized the scale of this problem. In particular it noted the lack of women choosing to study science-related subjects, reports students poor experience of science education, also the shortage of well qualified and enthusiastic science teachers, and young people's poor image of science-related careers.

### **Concept of Youth and Youth Empowerment**

Youth can be defined as the appearance, freshness, vigor, spirit etc. Characteristic of one who is young according to Random House Learner's Dictionary of American English 2020. Youth is generally, the time of life between childhood and adulthood (maturity) the early period of existence, growth or development. The youths in school have been recognized as agents of change, Ugbomeh, (1993) in Enefu & Okaforcha, (2014) and to effect change in the society. The agent of change must itself change first Egun, (1994). Societal changes have been very swift in recent years, the exposure of parents to various agents and media of educating the youths have influenced the age at which children attend and are retained in school. However, it is obvious that the youths instead of been positive change agent, they are usually involved in vices that are anti-development. Hence there has been an increase in the occurrence of acts of violence and lawlessness, including things like hostage-taking of prominent citizens and expatriate oil workers, as well as oil bunkering, aims insurgence, cultism, youth restiveness etc. especially in the Niger Delta region and the North east geo-political zone. Youth restiveness in Nigeria has been a prominent issues in recent times even till date. Elegbeleye, (2005) in Enefu and Okaforcha, (2014), defined youth restiveness as "a sustained protestation embarked upon to enforce desired outcome from a constituted authority by an organized body of youths". It is usually marked by violence and disruption of lawful activities due to other hoodlums that will take advantage of it. Various forms of youth restiveness that are economically, politically, or religiously motivated have existed for a long time even till date. It is in the light of this that, Elegbeleye 2005 in Enefu and Okaforcha, 2014 vividly captures the land mark cases of youth restiveness in Nigeria. Youth people all over the world are a vital and important segment of the society in which they live. A disciplined, focused, and law abiding youth can create a bright future for any nation and a lawless, indulgent and violent youth is a great threat to a nation's peace, development and security.

Youth empowerment is a process where children and young people are encouraged to take charge of their lives. They do this by addressing their situation and then take action in order to improve their access to resources and transform their consciousness through their beliefs, values and attitudes (Ledford, M. Lucas & Bronwyn, 2013).

Empowerment is "the process of becoming stronger and more confident, especially in controlling one's life and claiming one's rights (Oxford Dictionary). Empowerment skills can said to be of five kinds namely: Life coping skills, manipulative skills, intellectual skills, communicative skills and artistic skills Zimmerman, (2000).

**Life coping skills:** These are natural skills which every organiser including man, acquires from birth to adapt fittingly in his or its environment. They are survival instincts or skills. They are natural things we do to survive. Today, many youth have acquired life coping skills in politics, religion, business, agriculture etc. Religious institutions, today, engage many youths in the leadership and fellowship programmes reducing unemployment among youths. In business, economic activities, distribution, exchange and consumption of goods and services, are more in the hands of youth, who acquired the right type of education.

**Manipulative skills:** These are seen in skills acquisition centres as it involves economic activities that inculcate skills such as technical education, computer, field events, mining, manufacturing, technological works, scientific experiment etc. Virtually 90% of all occupations are manipulative.

**Intellectual skills:** In the primary sense, it is called brainwork, without the intellectual skills, no other skills can function as they are the master minds, innovators and coordinators. It is the engine of all activities generating the initiative and innovations in all their designs. Nigerian youths are playing active roles in the intellectual and professional acquisition of skills. Among a great number of youth that made marks in the 'who is who' records of academic or intellectual achievements are Olu Oghuibe, who at 32 years, became a Professor of Literary Arts in one of the universities, Philip Emeagwali, computer whiz-kid with his operational base in the United States of America and Alloy, Chief Director of Info-services at Euro Energy Centre, Houston, Texas.

**Communicative skills:** Communicative skills assist the intellectual skills to be expressed adequately and specifically. To transfer skills to people, one needs a good communicative skill. A group project or a public programme can only be properly executed and achieved with efficient communicative skills.

**Artistic skills:** These are close to communicative skills and are more complex. It includes the art of good writing, fine and applied arts, music and drama. These skills make effective use of all the other four skills were necessary.

Four essential components of empowerment include: Authority, resources, information and accountability.

### **Refocusing Science Education for Youth Empowerment**

Today many science graduates have been rated employable by various organizations. **Science Education needs to be refocused** to infuse knowledge as well as skills and capabilities in many young people to produce goods and service for national development from their early stages of life. Below are some of the issues in science education in schools as well as **suggestions on how to refocus** it in this 21<sup>st</sup> century for youth empowerment: Over the years there has been high rate of unemployment in Nigeria, which was put at 23.9% (Federal Bureau of statistics, (2011) and National Bureau of Statistics, (2013).

Science education in Nigeria is focused on producing individuals knowledgeable in the principles and processes of science but not students that can foresee business opportunities and utilize or apply their knowledge and skill in producing goods and services.

Science education which is meant to only prepare students for further studies in science and science related areas can best be described as inadequate. It is only science education that can provide knowledge, technical and entrepreneurship skills that can be regarded as adequate. Though the National Policy on education emphasized the importance of science education in national development, it is however silent on entrepreneuring development, Agada, (2013) which is very important in national development and youth empowerment.

- The federal government Intervened in 1972 in the area of science education by introducing the Nigerian secondary school science project which yielded a dramatic results by producing many professionals in Nigeria workforce today, this project provided practical approaches to easy teaching and learning of science subjects and also boost the implementation of the project. If such projects are reintroduced, it will redesign science education curriculum to improve the qualities of science education graduates, Enem, (2013). Science education that requires proper equipping of laboratories / workshops and training of science teachers is neglected, the use of laboratory facilities by students to acquire skills which will subsequently empower them in future is not in place. There is dearth of qualified science teachers in secondary schools in Nigeria, most of the teachers that currently teach science subjects in secondary schools as shown by research findings only possess the knowledge and not the skills and techniques of science, this is why practicals are rarely conducted in science teaching except few days to SSCE or NECO exams when teachers adopt fire brigade approach in demonstrating perceived practical questions from WASSCE/NECO list of apparatus to be supplied for the exams. Curriculum of science education lacks infusion of contemporary science issues and discoveries that entice the youths. Contents of science syllabus have remained the same over decades in our secondary schools. The zeal to learn science is gradually dying among the youths. This is manifesting in the low enrolment of students into science related courses and professions. This science curriculum should be redesigned and implemented to encourage creativity and skill development. This implies that students should acquire knowledge and apply it in real life situations to produce goods and services early in life. For example, the knowledge of chemical energy can be applied by students to manufacture homemade batteries for touch lighting and radio operations or the knowledge of distillation process can be used to produce ethanol for human consumption and industrial use, even the knowledge of eating the citrus group of fruits helps to heal wounds and infections rapidly. This will attract more students to science than the present method of introducing science as myth. In line with this, Opara (2004) stressed that there is need to adapt science curricular to equip learners with strategies, attitudes and skills to live effectively in the society and enable then respond to experiences that may arise from time to time.

- The National policy on science education should be revised; this should be done to change the present emphasis on the acquisition of science process and principles to the detriment of techniques of transferring knowledge into producing goods and services for national development. When students learn to acquire these techniques they will be engaged in self employment and not wait for white collar-jobs.

- Science education in this 21<sup>st</sup> century should be well- funded so that more facilities such as books, laboratory equipment will be provided for students to have practical knowledge of what they learn in the classroom and subsequently help them to transfer knowledge and empowerment very effectively. Science education teachers should be made to retrained in the area of modern teaching methods such as computer aided instructions which will make teaching more meaningful ad relevant to the students (youths) and the society at large. There should be teachers resource centers in all local government areas where seminars for science teachers can be organized at regular intervals to expose them to modern methods and techniques of teaching science. The government of the day should gather all roadside artisans to establish training centers and make the centers of industrial hub of the nation. For example, the artisans at coal camp, motor spare parts market can form an industry for motor spare parts manufacture in Nigeria towards massive industrializations. Government should offer free education for all students who offer science up to university level.

Refocusing science education in the schools both secondary and tertiary institutions in Nigeria, this 21<sup>st</sup> century

calls for rethink in the mode of assessment of science outcomes. The continued dependence on cognitive instruments for the assessment of skill-oriented, creativity- laden and reasoning related science outcomes do nothing but kill innovativeness in teaching, creativity and skill inculcation. The need for alternative process-oriented and divergent assessment techniques in evaluating science outcomes aid a radical departure from the age-long examination and elitist states of assessment, (Jegade, 2002).

**Conclusively;** the Nigerian educational system has prioritized science and formulated policies that are favourably disposed to science but unfortunately, enrolment into science subjects has not improved in our secondary schools. The opinion left is for science educators and administrators to review and refocus the science education curriculum in our secondary schools.

New methods of teaching to attract more youths to embrace science education culture should be adopted as it is prevalent in most civilized countries where science education is a way of life empowerment. This will reduce the problem of unemployment in Nigeria to the barest minimum and hence boost our national development and youth empowerment.

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