

***Promoting Value Re-Orientation and Sustainable Socio-Economic Development
through Science Education in Nigeria***

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Abstract

Science education is essential as it is of immense value in the student's individual life and society. In the present era of science, people are in pursuit of scientific knowledge necessitated by the space age and the explosion in knowledge of information technology. Science has taken an important place because it has influential values in intellectual, vocational, aesthetic, practical, psychological, moral, cultural and adjustment arena of an individual. The problem of fraud and fraudulent practices have eaten deep into every fabric of the society to an unimaginable height that it has become frightening and worrisome to every well-meaning Nigerian and educators across the nation. From the perspective of educational system, the Nigerian problem is easily described as the tragic failure of the education system to produce right values and right priorities for Nigerian intellectuals and political leaders alike. This paper examines how science education as a powerful instrument of social change could be effective in value re-orientation and how science teachers can utilize scientific attitude and method of science to inspire value re-orientation for socio-economic development in Nigeria.

Keywords: value, re-orientation, science, education, scientific, attitude

Introduction

Nigeria is a nation with complexities. The composition of her citizens is complex and the life style of the citizens is so complex and contradictory that one finds it difficult to have a proper word to define them. The complexities that have developed with each passing year and the consequent problems arising therefrom, seem insoluble. These complexities that bred insoluble problems emanated from value misplacement which has generated value crisis crushing the citizens. The greatest worry is that some of the

value systems pursued by many Nigerians, especially the leaders, do not promote national unity and development; hence the need for a new value order or better value re-orientation education at all levels of the system. Today, Nigeria is riddled with numerous values in all spheres of life which are inimical to national development. Changes over time have eroded the earlier cherished values in Nigerian society in all ramifications such as cultural, social, economic, political, religious, educational and family values. Values refer to what represents the quality of “worth” which people place on what they have in mind (Okoh, 2012).

Through the centuries, one of the most important problems confronting philosophers and educators is the problem of values, generally known as axiology. What then is value? According to Bolarin (2007), value is the worth, merit or esteem given to a person or an object or an idea. Values influence peoples’ behavior and serve as a yardstick for evaluating the actions of other people in the society.

The Nigerian society is characterized by high level of distrust and suspicion and everybody has become a suspect of misplaced value. Immorality and lack of sanctity of life have increased as murder and kidnapping have become daily occurrence that pervades the society with infanticide, fratricide, patricide, matricide and suicide, all in pursuit of materialism.

The malady of corruption has polluted the character and personality of every Nigerian. Seemingly responsible Nigerians within the corridors of power gather around themselves sycophants and praise singers; those who dare to criticize the ugly trends are faced with open harassment. Regrettably, these vices have taken the place of virtue, while merit is scarified. These and other similar negative values have taken the place of positive values needed for development of the society. The factors that enhance the emergence of negative values in Nigeria need to be properly explained to the youths as basis of negativity in value system in Nigeria (Njoku, 2015).

In the domain of education, values are paramount as they are tightly bound to the general idea of education and the operation of schools. Education must be something worthwhile, and being worthwhile has value implication. Cultural values are those collective conceptions of things that are considered good, desirable and proper in a people’s culture (Schaefer, 2003 in Okolo, 2011). The negative values include bribery and corruption, human trafficking, kidnapping, economic sabotage, tribal and religious division, ritual killing, rape, robbery, terrorism, cultism, wanton destruction of government and individual properties in the society.

Denga (2008) perceived values as representing reasons, beliefs, convictions or virtues that guide people’s action. The acquisition of good values will enable the individual to

determine how reasonable, right or wrong, true or appropriate his actions, attitude as well as relationship with others are. Therefore, if all learning and training cannot make one of good value, then education is a failure. Education is expected to be a transmitter of worthwhile values. Olatunju (1990) posited that values are the indices of what a society expects of its members. Values are conceived of in terms of what is accepted in any social system. They are more or less a consistent body of standards which gives meaning or direction to an attitude. Huit (2003) identified important values for successful living to include autonomy, benevolence, compassion, curtesy, honesty, integrity, responsibility, trustworthiness and truthfulness. The value system of each society emanates from the environment and how the individual in such environment use that environment. It is also transferred to upcoming generations as they act on the environment.

What is science education?

Obori and Badams (2017) opined that Education should be geared towards preparing people to undertake specific tasks and employment functions essential for the transformation of society. In order to achieve this, science teachers should include programmes that must be geared towards engaging learners in such a way that excites their interest in science, helping them to discover the value of evidence-based reasoning and higher order cognitive skills. This will enable the citizens to utilize learning experiences to induce and manage positive change that could improve the standard of living in the society (Ibraheem, 2016). Based on this, education is popularly known as a powerful instrument of social change and national development; a belief which is held by all societies, either developed or less developed nations to the extent that promoting and sustaining quality education is never left to chances.

Importantly, for quite some decades, a good number of graduates from this education system failed to secure jobs and they are in dilemma, due largely to the fact that they are not equipped with the pre-requisite skills for self or paid employment (Igwe, 2007). So, an individual needs prerequisite background of science, since science education is an instrument of change and the antidote to irrationalism (Chills, 2007).

Obori (2016) claimed that for the Nigerian youths to be empowered economically, they should be given the necessary skill and for this to be done, the curriculum should be effectively implemented. According to Davidson (2012), a modern and vibrant educational system entails wide-ranging activities that would ensure functional and quantitative education of the highest possible standard at basic, post basic and tertiary education levels, improving learning, teaching, infrastructure, technology, technical, vocational and training. This study has however tried to ascertain the challenges and expose some strategies through which various forms of dilemma that constitute

inhibition to the effective functional education in the country could be eliminated and thereby promote values, knowledge, skills and national development to progress.

The main target of science education programmes aims at producing citizens who can apply their knowledge, skills and experiences to solve real life problems by harnessing the resources from the environment for the betterment of society. Kattari (2012) cited in Obori (2016) opined that science education should be geared towards preparing people to undertake specific tasks and employment functions essential for the transformation of the society. One of the major aims of science education based on National Policy on Education (FRN, 2004), stated that teaching science and technology must include science practical activities which will easily endow the learners with innovation in research work and training of appropriate skilled manpower by individuals to be self-reliant and contribute meaningfully to the development of the nation. These aims can only be achieved in a conducive environment where training facilities are adequately available. According to Ibraheem (2016), science teachers are the nerve centre for technology advancement in any society, hence it is mandatory for any nation to rise above poverty and backwardness; and this rests heavily on the shoulders of science teachers.

This has a lot of implications for science education which is the centre for value re-orientation. Science teachers possess the quality that leads the learners to think in a highly imaginative way that apply the knowledge acquired by relating it to an existing knowledge to foster creative thinking in the learners. This could lead them to inventive reasoning that promotes the society technologically. Teachers are capable of this, being that they are motivators, facilitators, role models, and friends to the learners and as one who is actively involved in achieving the laid down educational objectives (Omadivi, 2011). They also impart knowledge through multiple ways of encouragement. They teach with concepts that are known to the learners to explain things that are abstract.

Uzoечи (2014) established in his work that a creative science teacher should be able to know when it will be most important or appropriate to use direct teaching, inquiry, discovery, project or group work. Teachers' field of adequate content knowledge and ability to create an appropriate learning environment also add to the creative way of imparting knowledge to the learners.

Concept of value and value re-orientation

The crisis of value system in Nigeria suggests that the growth and progress of the society is being retarded in many aspects through outburst of materialistic tendencies of the youth. It is beyond doubt that materialism has taken over government, political institutions and has invaded traditional and cultural institutions. The malady of value

crisis has predicated Nigeria as open society in which anything goes. Nigeria seems to be grabbing the worst and getting very little of the best from the rest of the world. This misplacement of value has led to misunderstanding of the purpose of human life.

Values are fundamental to all human societies, in human activities and actions all over the world. Nigeria, in spite of the massive erosion of her values by the western colonialists, still has identifiable values. In his treatment of Idoma values, Ella (1993) identified respect for elders, chastity among women folk, dignity of labour, patriotism to one's community, hospitality, courage and self-reliance as the major values of Idoma people. Similar values were identified as dominant Nigerian values in "Dialogue 26" published by Obasanjo (1993). These dominant values include love and promotion for the family and the family name, filial piety, honour and respect not only to parents but also to all elders as well as men and women of honour. Attachment to and appreciation for the native dialect, language, folk lore, music, art, drama, song and dance were among the identified values. Respect for hard work and productivity, at least, the ability to feed oneself and one's family, identifying as farmer, trader, fisherman, hunter, blacksmith, craftsman or artist or apprentice in any of these areas of human endeavours, as well as being reasonably happy with one's situation in life came under the Nigerian values. Added to the values identified in "Dialogue 26" are truthfulness and honesty, overwhelming respect for the sanctity of human life, hospitality, strong respect for leadership and authority and belief in God, Allah or Supreme Being.

Nigerians, among other things, attach great importance to the family name. Every Nigerian works very assiduously to promote his family and the family name. He will do everything possible to avoid soiling the family's name and image. Respect for hard work, productivity and self-sufficiency in terms of providing basic needs for self and dependents are vital values. Truthfulness and honesty were prized very highly. Stealing, dishonesty and moral laxity were abhorrent to Nigerians of old. In each community, strict laws guided the people against infringing on any of these highly held values. Dishonest people, adulterers and people of dubious character were not admitted to take titles in the community. Hardwork, honesty, generosity and heroism were well rewarded while individuals who violated these values were held in disdain and disrespect among the people. Nigerians have great respect for the sanctity of life, and human life was held in a very great esteem. A violation of human life in any way was considered the greatest crime anyone could commit. Life, for the traditional Nigerian was the greatest gift from God and therefore, should not be interfered with by anyone.

God and belief in God form the hub and pivot of all values for Nigerians. God has a central place in the life of any Nigerian of traditional orientation. His life is one hinged

on the belief and worship of God. Reference is made to God in all occasions by Nigerians in those days and these values were and are still mediated to the children through the family.

In thinking about how to re-educate the Nigerian or the sort of education that is relevant to her, it is perhaps more important to understand her current state and how eroded her values has become in recent years leading up to disintegration from the values the country held in high esteem. Among Nigerians, the dominant values which characterize the society as a whole are easily discernible. The most glaring one is excessive love for money. Naturally, money is highly valued for what it does and can do. According to Okolo (1993), in the Nigerian context, this is usually everything. The average Nigerian strongly believes that money is almighty and can achieve anything and everything. It is a key to paradise on earth, to prosperity, power, social importance, even national honours and so on. Its accumulation becomes a value, the more and even the fouler the means of accumulating it, the better and indeed, the more powerful and important one with money is.

Another supreme value characteristic of a Nigerian is cheap fame or base honours. Naturally in a society like Nigeria where money and wealth are acquired with little moral scruples and means most foul, other mini-values are bound to surface such as unproductive spending, wealth exhibitionism, brandishing of wealth, power and so on. Okolo (1993) further pointed out that “the greatest enemy is the love of Ostentation”. To him, “no section of the society is free from the disease”. In this question of values which dominate the Nigerian landscape, mention must also be made of what can be called ‘love for material labour’ which can be defined simply as one geared for immediate material gain and which in turn, leads to consumerism and mere accumulation of material goods and property. Naturally, those jobs which fetch fast money and promise immediate material reward are highly valued, whereas those which promise nothing but sweat and tears without immediate gain are usually shunned. The jobs “famous with Nigerians include business deals, contracts, distributorships, executive posts (white collar jobs where the real labour is often delegated to others) etc.

For many Nigerians, gaining with little or no labour at all is ideal. He usually shuns creative labour which promises values other than material. His sole ambition is largely centred on being rich overnight. Consequently, it is no surprise to anyone to realize that drug-peddling, armed or pen robbery, kidnapping and the like evils are rife among Nigerians and by some twist of fate, have become values in themselves as sure means to instantaneous wealth.

Education has been defined differently by different people. One of the greatest educational historians, Cremin (1978), defined education as “a deliberate, systematic and sustained effort to transmit, evoke, or acquire knowledge, values, attitudes, skills and sensibilities.” Fafunwa (1987) saw education as the human act of informing, forming and strengthening of the powers of the body and mind; a process for transmitting culture for the knowledge to ensure social control and guarantee national direction of society. He also holds that the purpose of education is to develop attitudes, abilities and behaviours considered desirable by the society.

With reference to the Nigerian society, ignorance is heavily at work. Encrusted prejudices, wrong values, wrong priorities, erroneous assumptions, disordered and disoriented ambitions and goals are manifestations of ignorance, the results of false opinions in life and false philosophy of life. The new relevant education and its philosophy ought to make Nigerians appreciate some higher goals and values. Any nation that would indeed be great must be established upon enduring national values that bind every individual in the corporate entity. National culture must be revisited as it influences national character and image.

Corruption is referred as the bane of development in Nigeria, but people often forget that corruption does not exist by itself. What the nation lacks is a system of values and nothing else. Many do not realize that skills and interests are not enough to make a man great and indeed any nation; what determines how successful one would turn out in life is largely dependent on the values subscribed to.

Thomas Edison was perhaps not the brightest scientist in his days, but he stood out and invented the light bulb. After several thousands of failed attempts, Thomas reported that he became the more persistent where his colleagues may have relaxed. What saw him through was not his skills nor his interests but persistence - his value made him succeed. This is a reflection of the Nigerian experience, a nation so much talented and skilled yet, unfortunately unsuccessful. What the nation lacks is a value system, and what must be done to restore Nigeria is the redefining of her national values. Nigeria needs to take positive values more seriously and push the acceptance of same with the seriousness it deserves.

Nigerian youths must be told that there are things greater than money and that money is not the ultimate thing in life; Nigerians must learn to value hardwork, integrity, honesty and accountability over financial gains. The social evils which include wealth without work, pleasure without conscience, science without humanity, knowledge without character, politics without principle, commerce without morality, and worship without sacrifice, which characterize the nation must be dealt with to ensure social sanity in the country.

Why the need for value re-orientation through scientific attitude and scientific method

The major contributions of science education are imbedded in the inculcation of scientific attitude among its learners through its study. The credit of development of scientific attitudes however, goes to the scientific methods adopted by sciences both in its development and application. A subject can be named as science provided it encompasses the two essential features as scientific attitude and scientific method. Both aspects are given important place in the curriculum of the teaching of sciences at any stage of teacher preparation.

The developing countries today are struggling against three major problems of population explosion, poverty and corruption. The developmental efforts of these nations, Nigeria inclusive, are hindered by value misplacement which has generated value crisis crushing the citizens. The greatest worry is that some of the value systems pursued by many Nigerians, especially the leaders, do not promote national unity and development, hence the need for a new value order or a better value re-orientation education at all levels of the system. If properly utilized and geared towards the socio-economic development processes, education can be one of the potent instruments.

Science education thus can play a vital role in checking and solving these problems through development of knowledge, understanding, skills, abilities and attitudes of the citizens of a country. The study of science has its special importance both in the personal and social life of an individual. The value of science education in the development of scientific attitudes which are transferable strives to remove the superstitions, false beliefs, wrong notions spread in the society and cultivate the habits of proper reasoning, observation and experimentation, leading to a firm belief in testing and verification of facts. It creates a spirit of curiosity for knowing about new things, discovering their environment and penetrating deeply into the nature of things and events surrounding them.

One of the major and essential aims of science education is the development of scientific attitude among its learners. Thus, it is imperative for science teachers and educators to understand the meaning, significance and process of the development of such attitude. It can be defined as open mindedness, a desire for accurate knowledge, confidence in procedure for seeking knowledge and the expectation that the solution of the problem will come through the use of verified knowledge.

Through science education, the student can develop scientific attitudes characterized by open-mindedness, curiosity, tolerance, honest doubt, respect for another's point of view, critical observation and thought, freedom from superstitions, judgement made

on scientific facts, faith in cause and effect relationship and a planned procedure in solving problems (Joshi, 2005).

The method or the procedure which the scientist uses in the pursuit of science may be termed as scientific method. It is a method of solving a problem scientifically. Training in scientific method is important to students than mere acquisition of knowledge. By this method, students are taught and trained in the method of attacking a problem. Students of science get training in the use of scientific methods by performing experiments themselves in the laboratory and by observing experimental demonstrations arranged by the teacher for them. Once the students are trained in the method, they will approach all problems in the same way, even if they are put in a situation which they are ignorant and unaware of.

The scientific method is endowed with the following features: objectivity, definiteness, verifiability, generality, predictability, modification and dynamicity. The scientific method involves the appreciation of the existence of a problem and a desire to solve it, the accumulation of facts and data which are pertinent to the problem, the formation of hypotheses as partial explanations, their testing and their acceptance or rejection as well as logical interpretation of data supported by adequate valid evidence.

As a result of science education, students can habitually and skillfully employ sound thinking habits in meeting problem situations in their daily lives and by extension, the society. They should be able to adopt the following steps in solving a problem in any sphere of life: sensing a problem, defining a problem, collecting relevant evidence, organizing and interpreting the data, formulating the hypothesis, testing its validity and accuracy and drawing rational conclusions.

Benefit of science education for socio-economic development

The sole responsibility of developing scientific attitudes among students lies in the teacher who can manipulate all the situations to instill in students the characteristic features of scientific attitude. At the same time, the teacher presents himself to the students as an example for his intellectual honesty, respect for others' points of view, unbiased and impartial behaviour in his dealings, open mindedness and the like. The students in turn emulate the teacher for his qualities and values which leave a favourable and permanent impression in the students to adopt the same attitude and values.

An enthusiastic teacher can help in developing the scientific attitude through the curriculum by providing opportunities in problem solving. Students who engage in wide reading in general science are believed to develop scientific attitude more than those who read only one text book (Joshi, 2005). Democratic atmosphere in the

classroom infuses a spirit of healthy criticism and this minimizes wishful or biased thinking on the part of the students. They undertake free discussion which helps them to remove difficulties and prejudices as well as develop open mindedness and critical thinking and learn not to take things for granted unless evidence by proofs. The students are taught to perform the experiments themselves and investigate the truth and facts of their theory learning and to suspend judgement till sufficient evidence is found, observing critically and accurately, and to report actual observation while being discouraged from the habit of concocting and copying.

A person can be described as a man of scientific attitude if he possesses the following:

1. Has spirit of curiosity.
2. Believes in cause and effect relationship.
3. Believes in the theory of evidence.
4. Is open-minded.
5. Has love for truth.
6. Adopts scientific method in his thinking and working.
7. Is unbiased and impartial.
8. Is free from superstitions and prejudice.
9. Is clear and precise in doing and saying.

A person possessing scientific attitude is found to be very curious by nature and is always curious to know more and more about things, persons and events surrounding him. He continues to explore till he gets proper explanation and satisfactory response to the queries. A man of scientific attitude holds firm a belief that nothing happens without a valid cause and does not believe in misfortune and superstitions but thinks that behind every event there is some definite physical force, and the events occur in a definite pattern following the scientific laws and principles and in no case are they governed by the supernatural.

A man of scientific attitude is in the habit of accepting only those things that prove true on the basis of collected evidences and he accepts the facts in their true colour and form. He rejects all biased and prejudiced statements which are not grounded on sufficient evidence and consequently he reports what he actually experiences in exactly the same degree and amount without exaggeration. The person having scientific attitude is not narrow minded, he does not consider his own opinion as final but always ready to modify them on the basis of correct reasoning and valid proofs. He has the patience to listen to others' point of view and considers them meticulously.

A person having scientific attitude does not accept wrong and false statements or views; he is always honest in the application of his real pursuit for truth and honest in the application of his knowledge and does not allow it to be diverted in the wrong and

undesirable direction. A person of scientific attitude does not react irrationally and instinctively and is quite scientific in his reasoning and thinking. He ponders well before deriving conclusions and behaving in a particular way. He always uses scientific procedure and method for solving a problem.

Scientific attitude is thus a particular set of mind characterized to involve the personality traits like open mindedness, freedom from biases, prejudices and superstitions, honesty, truthfulness, clarity and critical mindedness in one's approach, clarity and precision in saying and doing, desire for reaching the truth on the basis of sufficient evidence following scientific method. Based on this, most science teachers adopt innovative teaching approaches that enable students participate in the lessons, acquire skills, generate ideas and develop critical thinking to enhance creativity that brings about innovations.

In order to embark on total eradication of poverty in the society, there is need for the provision of functional education that brings about human capital development to the teeming Nigerian youths in various educational institutions in the country, with a view to educating citizens in science, technical and vocational courses which will enable them become self-reliant, self-sustaining and self-employed instead of jostling for few available white collar jobs. This is a sound re-orientation that science education is centred on, for total eradication of poverty in the society.

If a nation like Nigeria boosts the science laboratories with adequate and modern equipment, it will serve as a positive role that necessarily engages the learners with series of researches that bring about innovations that promote the image of the nation. Bulus (2015) holds that any developing nation that wants to shake off its syndromes of poverty, insecurity, unemployment and other social ills must prepare to equip science laboratories and workshops in all institutions to promote science and vocational education that serve as vehicle for such realization through which individuals and communities are educated and endowed with innovative research and training of skilled manpower for self-reliance. It is for this development that the Federal Government stresses much on the importance of science with practical activities and teaching of technology and other relevant vocational education as stipulated in the National Policy on Education (FRN, 2004).

The study of science and technologies and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupation in various sectors of the country's economic life will eradicate poverty, which will surely enable the nation to compete favourably well in this era of globalization.

The role of government in reviving interests in real learning

The participation of government at all educational levels and corporate organizations in research would instill creativity and rewards and as well discourage indolence and examination malpractice among students. The research sub-sector has been the basis for socio-economic, political, scientific and technological advancement of the developed nations of the world. Therefore, conscious efforts towards qualitative and durable educational system need to be put in place for posterity in Nigeria.

The government should adequately fund education to maintain and rehabilitate physical facilities, improve instructional and living conditions in schools as well as libraries, classrooms and laboratories. Adequate funding of education cannot be left to government alone. Private and corporate organizations' participation would enhance procurement of technical and scientific equipment, books, journals and other instructional needs in the education sector.

Proper financing would empower restructuring and overhauling of educational system to improve the performance of higher education in scientific knowledge in the global economy (Igboke, 2001). Funds are required and necessary to maintain both human and material resources of the system. There is felt need for effective supervision and monitoring of the management of funds as accruals to education sub-sector in the country.

Conclusion

The re-orientation process in educational system in Nigeria would lead to redemption and salvaging of the national character and image as well as leading to a vibrant economy. The concept of education in human values requires direct and indirect techniques through the schooling process. If the schooling process should nurture and entrench values positively in children, their teachers should function as role models. Teachers should acquire intellectual competence, emotional stability and unquestionable moral standards as well as commitment that the Nigerian nation needs to be developed by them in their students. Making national character re-orientation an integral part of the curriculum of teacher education will be necessary to enable teachers internalize values they will develop in children. The fact remains that good teachers build enduring foundations that make good schools and a good nation.

The import of education in contemporary society is on re-orientation of pre-service and in-service science teacher education in order to develop holistic concept of science education and to empower in-service teachers to apply direct and indirect techniques in the development of values through inculcating scientific attitude.

The re-orientation programme for present and in-service teachers should be conducted by experts in the field of value education and stress laid on production of multi-media resource materials on education in human values. Then re-orientation would produce education for tomorrow that would ensure character development and transformation, skill acquisition and entrepreneurship along with job creation, all of which result in socio-economic growth and development of a nation.

Re-orientation of the value system through science education would promote national image, respect for human life and corporate values. The youth would imbibe the culture of hard work and productivity, wealth creation, employment generation, entrepreneurship, intangible wealth and competition. Educated and informed youths would gain better understanding of the subject matter while leadership, education, religion and home remain the focal point of value re-orientation for now and the future.

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