

Enhancing Peace-Building through Chemistry Education: Option for Sustainable Peace and Development in Nigeria

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Abstract: This paper titled “Enhancing peace-building through chemistry education: Option for sustainable peace and development in Nigeria” aimed at highlighting the efficacy of chemistry education in promoting peace-building in Nigeria. The paper pointed out the critical need for measures to ensure peace in the face of violent conflicts and their wanton effects on the nation. Alternatives employed to achieve peace were explored with the paper showing preference to peace-building mechanisms. The roles of chemistry education in positioning chemistry graduates to contribute to economic advancement, communication and dialogue and environmental sustainability were x-rayed as options for achieving sustainable peace and development in Nigeria. The paper suggested that for chemistry education to contribute effectively to sustainable peace and development in Nigeria, chemistry education should, among others be relevant, made available to all and should be practical.

Keywords: Conflict, Peace-building, chemistry education, sustainable peace and sustainable development.

1. INTRODUCTION

Human society is made up of complex social relationships. Those relationships are defined by socio-economic and cultural ties which exist at interpersonal, intra-group and intergroup levels that make the world a global union. But the interplay of the same set of factors often results to differences thereby making the relationships complex. Chukwuma and Aghara in Odo (2015) noted that complexities arise from differences in needs, aspirations, hopes, goals, opinions, views and values. Anioke in Chukwuma and Aghara (2010) observed that differences in relationship could be social, economic, religious, psychological or political. Cultural and environmental differences also account for complexities in individual and group relationships in human society (Odo, 2015).

Complexities result from contradictions that offset social equilibrium due to friction which adversely disrupt harmonious co-existence. According to Mao Tse-tung cited in Rummel (2013) contradiction is universal, absolute, existing in all processes of the development of things and running through all processes from beginning to end. The contradictions and differences result to conflict situations.

According to Brad (2013) conflict is defined in many ways based on how it is used in different contexts. According to Rummel (2013) conflict refers to some form of friction, disagreement or discord arising within a group when the beliefs or actions of one or more members of the group are either resisted by or unacceptable to one or more members of another group. Conflict can however, be between individuals within one group. Accordingly conflict pertains to opposing ideas and actions or antagonistic state (Brad, 2013). Conflict behaviours are manifestations of averred determination to address displeasures over contradictions in individuals' or groups' wants capacity and will. Conflict is universal as there is no society that is perfectly harmonious. Rummel (2013) noted that aggregate conflict manifestations are random across societies in relation to their specific structures and expectations.

The causes of conflicts in the society are many and vary from one society to another and across time. People have tried to identify the causes of conflict from several years back. For instance, in the far back 70s Rummel stated that change which alter power relationships promotes conflict, change from one society to another type has involved violence and increase in education increases the probability of conflict (Rummel, 1976). Similarly, low rate of economic development raises the probability of conflict and the ratio of growth in social consciousness in the society to its development provides a measure of the rigidity of the status quo and the likelihood of conflict. It is natural for conflict to arise as a response to positive and negative factors of the development of a society. Any social activity is therefore taken into consideration while assessing the causes of conflict behaviours in the society.

Massaquoi (2009:114) identified the following causes of conflict:

1. Poverty and inequality in the distribution of wealth which create resentment of the wealthy, generates anger and hatred, diminishes the respect of the poor for social institutions. Poverty and inequality dis-empower the afflicted and reduce their access to justice, hence, perpetuate dominance of the rich over the poor.
2. Denial of human rights and collapse of the rule of law. These give room and impetus to individuals and groups resorting to illegal means to defend themselves or resist injustice.
3. Breakdown in communication, which results from lack of proper information, lack of dialogue, misunderstanding and distrust.

Keen observation of conflict situations show that conflict can result from five common beliefs: superiority, injustice, vulnerability, distrust and helplessness. These can act singularly or in any combinations to cause individual or inter-group conflicts. The actual causes of conflict vary according to people, location and within interests in any given socio-economic and cultural setting.

As part of the global community, Nigeria has not been spared of conflict behaviours at different levels, times and in different forms. Many factors have been adduced for conflict behaviours in Nigeria. Anasi (2010) blamed bad government, unemployment, poverty, inadequate educational opportunities and resources, inadequate information and communication and lack of basic infrastructures to prevent conflict and restive behaviours. According to Nwogwugwu, Alao and Egwuonwu (2012) conflict behaviours in Nigeria may result from marginalization and environmental degradation.

No doubt Nigeria has experienced various degrees of manifestation of conflict situations ranging from individual and group deviant, group antisocial behaviours and organised crimes to militancy and sect related violence/insurgency. Notably, Nigeria has been bedeviled by robbery, cyber crimes and fraud, organised robbery, thuggery, cultism, kidnapping and activities of 'Area Boys'. As noted by Chukwuemeka and Aghara (2010) the acronyms EGBESU, OPC, MASSOB, MOSOP, MEND are household ones in Nigeria, representing ethnic based militant groups. The number of groups tend to increase unabated, each new one coming up in protest over certain dissention to existing or emerging socio-economic and political order.

Religion-based sects/groups have manifested such dissatisfactions at various times. Prominent among them are the Maitatsine sect and Boko Haram insurgents. These groups and other groups like the Avengers in the Niger Delta areas, adopted terrorist approaches in asserting their displeasure with the existing order. Nigerians have unwittingly learnt to content with means of conflict behaviours like riots and strike actions as accepted means of expressing displeasure. Nzewi (2014) aptly summarized conflict manifestations in Nigeria as communal clashes, political assassination, electoral violence, youth militancy and terrorism. There is no gainsaying, the grave consequences of the myriads of conflict behaviours in Nigeria on her socio-economic growth and development.

Conflicts behaviours of the magnitude violence and war in Nigeria have taken tolls on the individual victims, infrastructure and the economy. The visible negative impacts include maiming, destruction of valuable properties, homes, lives, infrastructure and social amenities. Victims are often inflicted with hardships like hunger, general insecurity and halt in socio-economic activities. Developmental (agriculture, industrial and commercial) activities are also negatively affected. Schools have been closed down at various places and times, resulting to major setbacks on human development. The harm caused on the economy by militants and terrorists cannot be determined with any certainty.

Conflict management and resolution as well as post-conflict reconstruction and rehabilitation are both costly and diversionary from advancement of real development. As a nation, Nigeria has suffered a lot of setbacks due to loss of

huge resources and investment capitals used in reconstruction, rehabilitation and conflict management in areas and sectors of the country affected by violence. Alternative measures that would prevent conflict are therefore imperative. Consequently, conflict in Nigeria should rather be avoided than managed or suppressed by mobilizing every sector to promote culture of coexistence. This makes pursuit of peace through peace-building inalienable option for national survival, cohesion, growth and development. This will be in line with the United Nations Organisation recommendation that nations should adopt measures to build and maintain peace rather than waiting to resolve or manage conflicts (Massaquoi, 2014).

2. PEACE-BUILDING

Peace is not mere absence of war but includes social balance that ensures the absence of real or imagined causes of conflict from a human grouping. Rummel (2013) defined peace as equilibrium within social field. Peace can therefore, be seen as absence of dissension, violent conflict or war. It is the occurrence of harmony which is characterized by lack of violence and other conflict behaviours and includes freedom from fear of violence. Peace is a perquisite for real development.

The current global views and practices for minimizing internal and international conflict and wars are to address the causes to prevent them rather than stopping or redressing them. Attainment of peace would follow from certain basic requirements. Massaquoi (2009) identified four basic requirements for peace. These are Socio-economic advancement, intercultural dialogue (communication), a culture of peace and enjoyment of human rights and justice by all.

For Nigeria and indeed any nation or group to achieve peace by avoiding conflicts and war, all the factors that would run contrary to the above requirements for peace and order should be addressed. The strategies to avoid conflict and ensure peaceful society constitute peace-building mechanisms. The term Peace-building was first used in 1975 by Galtung (Galtung, 1976). He opined that peace-building structures should be created to promote sustainable peace by addressing the root causes of violent conflict and supporting indigenous capacities for peace management and conflict resolution.

Peace-building made in-road into United Nations (UN) programme concepts in 1992 as part of the report on Agenda for Peace: Preventive Diplomacy, Peacemaking and Peacekeeping (Organization for Economic Co-operation and Development, (OECD) (2005). According to OECD (2007) peace-building activities are efforts that adopt goals and objectives aimed at preventing conflict or building peace, most often focused on a particular conflict zone. A conflict zone is an area threatened by, in the midst of, or recovering from serious intergroup violence. Peace-building mechanisms include measures to address emerging, current or post-conflict situations for the explicit purpose of preventing violence and conflict in order to ensure lasting peace. Peace-building has been categorized, (OECD, 2005), into three dimensions – the security dimension, the governance and political dimension, and the socio-economic dimension. The security dimension encompasses the security of the country and personal security of the inhabitants. Some elements of the security dimension are disarmament, demobilization, reintegration, humanitarian action, control of small arms and light weapons and security system reform.

Governance and political dimension addresses the underlying causes of conflict resulting from governance and political activities. Under this dimension, measures are put in place to address conflicts resulting from real or perceived illegitimate or weak institutions, corruption, insufficient respect for human rights, lack of good governance and inaccessible government. Recommended measures for peace-building include democracy, good governance, support by media and civil society and balancing inequality in political opportunities.

Socio-economic and environmental dimension encompasses measures to address the causes of socio-economic differences, unequal distribution of benefits, marginalization of groups in socio-economic activities and competition for limited natural resources.

OECD (2005) recommended that in order to build peace through the socio-economic and environmental dimension, nations and groups should:

- (i) Build or re-build infrastructure and extend important government functions to vulnerable groups or geographical regions
- (ii) Pursue programmes for high-quality and accessible education and health services;

Stimulate the productive sector development, ensuring employment, self-sustenance, trade and investment, economic reform, institutional and technical co-operation;

(iii) Build and expand national capacity for sustainable environmental and resource management through technical and financial assistance as well as education.

The dimensions are not exclusively independent factors or elements of peace-building. Nigeria has tried various means to achieve peace. Prominent among them are arrests and prosecutions, amnesty measures, military actions and full blown civil war. Yet the country is still far from attaining sustainable peace. This calls for refocus in strategies and in particular, socio-economic and environmental dimension. This is in realisation of the fact that the economic well-being of individuals or groups disposes them towards peace and diminishes dissension to institutional imbalance or inequity (Massaquoi, 2009). This can be achieved through relevant and sustainable peace and development.

3. SUSTAINABLE PEACE AND DEVELOPMENT

The subject of sustainability has received reasonable attention in the recent time due to rapid growth in world population and concomitant need to develop today and preserve the system for posterity. According to Beattie (2015) sustainability is meeting the needs of the present without compromising the ability of future generation to meet theirs. UN in Fien. (2001) stated that sustainability requires of human needs, well-being that incorporate such non-economic variables as education and health enjoyed for their own sake, clean air and water and protection of natural beauty. To be sustainable implies that the present needs, goals and aspirations are met, leaving room for those of future to be met.

Peace is sustainable if it subsists and is consistent across time, without compromising the future peace of any social and geographical entity. Sustainable peace must meet the criteria of reducing conflict in the present and making provision for the peace of the future. Sustainable peace can be achieved if peace is built into development programmes of the society. Development is the acceleration of economic growth, the reduction of inequality and eradication of absolute poverty. Development is not growth in infrastructure or economy per se but encompasses the reorganization and reorientation of entire economic and social structures. Such changes would engender positive changes in attitudes, customs and beliefs that are stable and permanent, anchored on mutual trust, justice and equity. It should basically be sustainable.

According to the World Commission on Environment and Development (WCED) in Onwu (2009) sustainable development is development that meets the needs of the present without compromising the ability of future generation to meet their own needs. Sustainable development means improving the quality of human life while leaving the carrying capacity of supporting ecosystems (United Nations Environment Programmes (UNEP), 1995). This includes creation of vast population of literate citizens who are conscious of the factors that ensure sustainability of peace and development.

There is close link between sustainable peace and sustainable development in such a manner that they cannot be separated, with one deriving from the other. Sustainable development of a nation is dependent on sustainable peace and sustainable peace creates the needed atmosphere for sustainable development. This further underscores the need for all sectors of national life to contribute towards ensuring sustainable peace and development. This paper seeks to highlight the role of chemistry education in peace-building as a means of ensuring sustainable peace and development in Nigeria.

4. CHEMISTRY EDUCATION AND SUSTAINABLE PEACE AND DEVELOPMENT

Education has been recognized as an instrument of peace and development. Guided by this understanding, UNESCO Constitution declared that “education can help secure a safer, healthier, more prosperous and environmentally sound world while simultaneously contributing to social, economic and cultural progress, tolerance and international co-operation” (UNESCO, 1945). Sustainable economic prosperity, cultural development as well as mutual tolerance are requirements for peace and stability in a given society. The extent of this contribution depends on the particular discipline of education and focus in the goals of curriculum content and delivery. The present worldview places science at top priority position among development- enhancing disciplines.

The global popularity and inevitability of science in human activities are no longer in doubt. Science refers to the knowledge of facts or principles gained by systematic study, reflection and contemplation (Ivowi, 2011). Science is an interdisciplinary concept which includes chemistry, biology and physics and is distinguished by common methods called the science process skills. The science process skills are those skills used in doing science which include observation, experimentation, measurement and inference.

Chemistry is the branch of science that deals with the composition, structure, and properties of substances and with the transformations that they undergo (Marriam-Webster Dictionary, n.d). According to Anand (2014) chemistry is the study of composition, structure, properties and interaction of matter. Chemistry is a branch of physical science that studies the composition, structure, properties and change of matter.

Chemistry by its nature and products is capable of creating or marring the environment, improving or destroying the economy and creating harmony or disorder in the society. This assertion can better be understood when it is realized that chemicals and other instruments of warfare are made using the negative applications of products of chemistry. These range from the water bomb, teargas, gunpowder, small arms and ammunitions to the sophisticated bombs and chemicals of mass destruction. Water and air pollutions and environmental degradations are outcomes of unguided application of chemical processes and production.

On the other hand the relevance of chemistry to socio-economic development cannot be overemphasized. Chemistry as a discipline has the potentials to positively impact on the environment and socio-economic fortunes of Africa in general and Nigeria in particular. The discipline is the domain of chemical knowledge needed for improved agriculture, mining, petrochemical industries, textile industries, power generation among others. According to Chang (1996) chemistry has application in seeking solutions to environmental pollution, depletion of energy, radiation and problems relating to industrial production. The discipline can therefore be guided to promote peace-building through wealth creation, environmental sustainability, and increasing the general well-being of the people. The end results of the peace-building mechanism are sustainable peace and development. This requires among others, effective contributions of academic disciplines, including chemistry education

The desire to exploit chemistry for sustainable peace and development can be achieved if chemistry education is focused toward peace-building. This will involve incorporating peace-building mechanisms into science education. Chemistry education is the process by which the knowledge, attitudes and skills relating to chemistry are transmitted to learners. The component knowledge include the knowledge of the composition, structure, properties, applications and changes of matter and their applications to solving personal and societal problems. Chemistry education teaches skills useful to personal and national development. It makes the learner develop the ability to make informed decisions. Specifically, chemistry education should be properly aligned to effectively address relevant issues of sustainable development.

Chemistry education inculcates the knowledge (contents), skills (process skills) and positive attitudes (scientific attitudes) to the learner. These correspond to the cognitive, psychomotor and affective domains of learning outcome. The implication is that chemistry education is a holistic education.

The immense inherent positive linkage between chemistry education and peace-building mechanisms are worthy of attention and exploitation for peace-building that will ensure sustainable peace and development in Nigeria. The attributes of science (including chemistry) education dispose the practitioners towards peace and make science education useful component of peace-building mechanism. The attributes of science which are useful in peace-building, according to Massaquoi (2009:116) are:

- (i) Scientific knowledge.
- (ii) Scientific processes (experimentation and observation)
- (iii) Scientific mindset (knowledge and analytical arguments)
- (iv) Science in application (tool for change and progress)

OECD (2005) recommended that peace-building should encompass measures in the context of emerging, current or post-conflict situations for the explicit purpose of preventing violent conflict and promoting lasting and sustainable peace. The best way to achieve sustainable peace in Nigeria is to redress the potential causes of conflict in the country. The major causes of conflict in the third world countries include political marginalization, bad governance, economic inequality, inequity in distribution of resources and infrastructure, unemployment, communication gap and lack of attention to relevant and sustainable education (Chukwuezi, 2009, Massaquoi, 2009 and Anasi, 2010). The option of science education (including chemistry education) as a peace-building mechanism is imperative based on the relevance of chemistry education in promoting sustainable peace using attributes of science. Chemistry education can impact on economic advancement, communication and intercultural dialogue and environmental sustainability in Nigeria.

The background causes of most conflict behaviours are negative factors relating to the economy. They include poverty, inequitable distribution of wealth, unemployment, unequal access to the common wealth and other opportunities and unfair resources control mechanism. According to Massaquoi (2009) such negative factors create resentment of those who are well off. In addition unfair economic structure breathes anger, hatred, disempowerment and diminished self-esteem. The victims are forced to adopt the option of conflict and violence to assert their disapproval and reverse the perceived injustice. Sustainable peace and development can be built in Nigeria through chemistry education by focusing it to enable the creation of wealth, increased income, building capacity for self-reliance and entrepreneurship for chemistry graduates. In addition, pursuit of chemistry education can transform agricultural production, food preservation, research in agriculture and new farming techniques.

Communication and dialogue are acclaimed instruments of human coexistence. Conflict situations in Nigeria are often rooted on mistrust, lack of knowledge and disrespect for the values of other cultures (Anasi, 2010). Communication and dialogue among different cultures, tribes, regions and interest groups in Nigeria would improve the knowledge, understanding and respect for the divergent views and values of others as well as reduce mistrust. Effective and efficient communication and dialogue can serve as useful antidotes to conflicts relating to environmental degradation. Meaningful and independent participation in modern democracies assume an ability to judge the evidence and arguments associated with the many socio-scientific issues that appear on the political agenda (Sjøberg, 2002). Such issues, if not properly handled, result to conflicts. Chemistry graduates and others who are reasonably knowledgeable in the field can provide the needed solutions. Developments in chemistry as in other science disciplines are outcomes of dialogue, compromise and consensus derived through logic, analysis and communication. Chemistry education enables the learner develop the art of dialogue and communication and ability to judge based on evidence thereby reducing tension and preventing violent conflicts in industrial areas of Nigeria. In general, the enormous means of communication available in the teaching and learning as well as in the practice of chemistry, if effectively utilized, can bridge gaps in communication and enhance dialogue among opposing interest groups. This will facilitate peace-building and enthrone sustainable peace and development in the country.

Much of the conflict behaviours in Nigeria are linked to activities that have negative impact on the environment (Nwogwugwu, Alao and Egwuonwu 2012). Such conflicts include the frequent clashes between herdsmen and their host communities, violent conflicts in oil producing areas and civil rifts around industrial and mining areas. Chemistry education can be employed to avoid the occurrence of such conflicts. Chemistry education and practice can be utilised in ensuring environmental sustainability through water treatment and preservation of aquatic life, preservation of arable land and improvement of soil fertility, counteraction of land, water and air pollution, and identification and promotion of alternative economic activities for the local dwellers who are usual victims of industrial, manufacturing and mining activities.

5. CONCLUSION

The level of conflict situations in Nigeria has assumed alarming proportion. The situation calls for urgent actions and requires the contributions of relevant organs and institutions of human activities to reverse the trend. It is clear that the efforts in conflict resolution which yielded positive results in the country in the past have failed in recent times. This can be attributed to the failure of the socio-economic and political systems to respond positively to demands for sustainable peace and development which requires peace-building nurtured by relevant and purposeful education. Cries by religious and political leaders for peace and non-violence are now seen by most people as obsolete and insincere due to the widening gaps in the socio-economic structure which favour the leaders. The younger generations are more sophisticated, more active in the technology-driven world and hence, more evasive to the old order. They should be better managed through what appeals to them. There is therefore, the need for the education system to respond to this. Science education in general and chemistry education in particular, by its nature has the potential to transform the learner and increase his capacity to improve productivity, create wealth, improve his capacity for dialogue and communication and contribute to ensuring sustainable safe environment. In particular, chemistry education as a discipline has the potential to address the problems that lead to conflicts. Chemistry education should therefore, be strengthened to re-position it towards enhancing peace-building in Nigeria. It should therefore, be the concern of all stakeholders so that education in chemistry should become quantitatively as well as qualitatively oriented for effective contribution to building sustainable peace and development in Nigeria.

6. SUGGESTIONS

For chemistry education to be a proactive in the peace-building mechanism, some of the issues involved have to be given particular attention. The following suggestions may be useful:

1. Chemistry education should be made relevant to local concerns. Chemistry education programmes should aim at producing graduates who would address problems within the local context. Socio-economic and environmental problems in Nigeria can find solution from locally relevant science (including chemistry) education. Graduates of chemistry should be entrepreneurial, skillful and knowledgeable and self-reliant to contribute to national development. This requires curriculum reforms, training and retaining of teachers, provision of relevant local inputs as well as adoption of local technology to promote chemistry education. These measures will expand economic growth, promote innovations, instill self-confidence and reduce the citizens' dependence on government. All these will result to stability and sustainable peace and development.
2. Chemistry education should be taken beyond the confines of formal school system. There is the need to pursue a Science Education for All programme. This will expose a vast number of Nigerians to basic knowledge of chemistry as well as produce a large pull of experts in the field. The citizens should have knowledge enough to appreciate the products and workings of chemicals. In this way, there will be improvement in socio-economic development for individual and the nation. Attainment of sustainable peace and development requires the collective involvement of all. Science Education for All programme will produce citizens with rational minds needed for application of information and communication technology for logically balanced dialogue among different groups.
3. Pedagogies that promote unity and social learning should be encouraged. These include co-operative learning techniques, science, technology and society (STS) approach, excursion and discussions. The funds of knowledge of the chemistry students at all levels should be utilised in teaching chemistry. These will help to promote social cohesion, reduce mutual suspicion and dispose the graduates towards adopting dialogue when confronted with situations in the society. These are assets to sustainable peace-building.
4. Locally relevant chemistry education and practice in Nigeria can only be attained through the development, adoption and sustenance of home-bred research. Research in relevant aspects of chemistry should be financed by various governments. There should be vast research in teaching methods and teaching resources, utilisation of local facilities in chemistry education and practice, development and production of technologies and techniques to support local industries, agriculture and manufacturing. Products of research should be patronized and utilised to improve productivity, ensure availability of employment and enhanced access to communication and information. These are invaluable means of peace-building, sustainable peace and development.
5. Chemistry education at all levels should be practical oriented. This is in line with the nature of science in general and chemistry in particular. Practical chemistry ensures that learners imbibe the knowledge, skills and attitudes needed for practice and application of chemistry in their daily lives. The learner will graduate with the capacity to transfer the knowledge to other facets of national life. This will help in promoting sustainable peace and development in Nigeria.

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