

Security Education and the Teaching of Basic Science and Technology for a Sustainable Future

Joy-Telu HAMILTON-EKEKE

*Department of Science Education, Niger Delta University, Wilberforce Island,
Bayelsa State*

Esther Benafegha ENAREGHA

*Department of Biology, Jasper Adaka Boro College of Education Sagbama,
Bayelsa State*

Regina Patricia ABAM

*Basic Science and Technology, Primary Education, Jasper Adaka Boro College
of Education Sagbama, Bayelsa State*

Abstract

As attacks on school children (like in the case of the kidnapping of the Chibok girls in 2014 in the terrorist torn zone of Nigeria – Borno) as well as computer security continues to increase, it is important that security awareness education, and training be used as an important defense, and increasingly schools at all levels are being looked upon to provide this instruction. The Chibok girls' incidence is a proof that school setting is seen as a soft target of terror attack. The inclusion of personal security as well as cyber security in the curriculum of Junior Secondary school and its relationship to teaching and learning of basic science and technology is what this article x-rayed. The article reviews the place of teaching and learning of security education in both the 9-Year Basic Education Curriculum (BEC) of 2008-2014 and the revised edition of September 2014 to date in Nigeria with particular emphasis on the features of Basic Science and Technology Curriculum. Due to the recognition of the critical role of curriculum in the teaching of sustainability, it will be appropriate for security education to have an interdisciplinary framework to facilitate the implementation of security education for a sustainable future.

Keywords: Basic Education, Junior Secondary School, Science Education, Security, Sustainability, Technology, Terrorism.

Introduction

The Universal Basic Education (UBE) Programme was introduced in Nigeria in September, 1988. The Federal Government of Nigeria in 2008, through the Nigerian Educational Research and Development Council (NERDC) developed and introduced the 9-Year Basic Education Curriculum (BEC) in schools by realigning all extant Primary and Junior Secondary School Curricula to meet the key targets of the UBE programme. According to Duada and Udofia, (2010) the National Council on Education (NCE) approved the curriculum in basic science in 2006 to suit the present system of Education of nine (9) years of universal basic education, three (3) years of senior secondary education and four (4) years tertiary education. In the curriculum the nine (9) years system of education (schooling), basic education was subdivided into 3 structures namely:

- Lower Basic Education Curriculum (Primary 1-3)
- Middle Basic Education Curriculum (Primary 4-6)
- Upper Basic Education Curriculum (JSS 1-3)

The curriculum was prepared in a way to ensure continuity and flow of themes, topics and learning experiences from primary to Junior Secondary Schools levels. This implies that any topic or content that is not covered at any stage will hamper the understanding of the next topic in the upper stage. In view of some contemporary and national concerns and to make the curriculum more practical, relevant, and in line with global best practices, the 9-year BEC was recently revised in 2012 and its implementation has just commenced in September, 2014.

According to Hamza (2007), the workability of any curriculum depends on its effective delivery which involves the learner, the teacher, the resources, the methods of teaching and evaluation as well as the physical and physiological environment which must be adequate and conducive for learning to take place. In a similar vein, Obioma (2011) stressed on the many features that can promote effective learning, which they categorized into two broad groups: physical and psychological environment. The physical environment includes the sitting arrangement of the class, decoration on the walls, light and even sound, also the content of what is to be delivered is of vital importance. Therefore, for the

effective delivery of any theme in the curriculum (security education inclusive), the following issues must be addressed:

Conducive learning environment and content to be taught: Conducive learning environment refers to the classroom and the entire school premises. Learning environment is where learners learn the various skills deemed necessary and proper for them to achieve success in the global society. The classroom is where they will gain an understanding of their place in the world and the gifts that they have to offer it. It is where the students develop what they want their future to look like, as well as knowledge of the skills needed to reach that goal.

With the classroom being such an important place in the growth of a child, it is important to understand the ways in which the classroom situation affects the learning of the content by the student so as to affect this environment in order to receive maximum effectiveness in delivering (Hamilton-Ekeke, 2016). Of importance also is the content, in the case of security education, teaching students to be security conscious and remain very alert cannot be over emphasized. Security emergency numbers is mandatory for children to cram, children should be taught the slogan 'if you see something, say something' as well as create the enabling environment to enforce the slogan. Society today is about technology (mainly computer) this very important tool can also have adverse effect on its user by exposing the user to some risk which border on security especially young users. The owning and use of mobile phones by young children is on the increase. The down side of this trend is that it exposes the children to strangers, most often adults, which may then take an undue advantage of the children. Very vital security information can be obtained through the mobile phone. Children should be taught not to divulge sensitive information to an unknown caller neither should they try to meet an unknown caller unaccompanied by their parents. The teaching of security education in terms of common crimes in the society and their management will help keep learners on their toes and security conscious.

The preceding section examined the inclusion of this all important theme - security in the 9-Year Basic Education curriculum which was developed in 2008 vis-à-vis the revised version in 2012 which came into use in September, 2014.

A Comparison of the Former 9-Year Basic Education Curriculum (September 2008-August 2014 with the Revised 9-Year Basic Education Curriculum (September 2014–Present)

The 9-Year Basic Education Curriculum (BEC) 2008 emphasizes value re-orientation, poverty eradication and employment generation capabilities in learners. In these curriculum reform initiatives, science, technology, mathematics, and vocational education and trainings are specifically designed to provide the contents, learning experiences and skills for the socio-economic transformation of the Nigerian nation (Hamilton-Ekeke, 2016). The 9-Year Basic Education Curriculum (September 2008 – August 2014) was particularly developed for the attainment of the Education for All (EFA) goals, the critical targets of the National Economic Empowerment and Development Strategies (NEEDS), and the Millennium Development Goals (MDGs) (Igbokwe, 2015). It was developed in response to Nigeria's need for relevant, dynamic and globally competitive education that would ensure that learners at the Basic Education level are capable to compete favourably anywhere in the world in terms of knowledge, skills, techniques, values and aptitude. Thus the 9-Year BEC addressed among other things, the issue of value re-orientation, poverty eradication, critical thinking, entrepreneurship and life skills but not security (there was no emphasis on security, see Table 1). Implementation of the 9-Year BEC commenced nationwide, in Primary 1 and JSS 1 classes in September, 2008, while the old curriculum (the 6-3-3-4 Curriculum) was systematically being phased out. The first batch of JSS students graduated in June, 2011 after writing the Basic Education Certificate Examination (BECE). By September, 2014, the cohort of pupils that benefited from the use of BEC at the primary school level entered class one of the Junior Secondary School (Igbokwe, 2015).

Table 1: The Structure of the 9-years Basic Education Curriculum

Lower Basic Education Curriculum	Middle Basic Education Curriculum	Upper Basic Education Curriculum
<p>PRIMARY 1 – 3</p> <p>Core Compulsory Subjects</p> <ol style="list-style-type: none"> 1. English Studies 2. One major Nigeria Language (Hausa, Igbo or Yoruba) 3. Mathematics 4. Basic Science and Technology 5. Social Studies 6. Civic Education 7. Cultural and Creative Arts (CCA) 8. Christian Religious Studies/Islamic Studies 9. Physical and Health Education (PHE) 10. Computer Studies/ICT <p>Elective Subjects</p> <ol style="list-style-type: none"> 1. Agriculture 2. Home Economics 3. Arabic Language <p>Note: Must offer 1 elective but not more than 2</p>	<p>PRIMARY 4 – 6</p> <p>Core Compulsory Subjects</p> <ol style="list-style-type: none"> 1. English Studies 2. One major Nigeria Language (Hausa, Igbo or Yoruba) 3. Mathematics 4. Basic Science 5. Social Studies 6. Civic Education 7. Cultural and Creative Arts 8. Christian Religious Studies 9. Physical and Health Education (PHE) 10. Computer Studies/ICT <p>Elective Subjects</p> <ol style="list-style-type: none"> 1. Agriculture 2. Home Economics 3. Arabic Language <p>Note: Must offer 1 elective but not more than 2</p>	<p>JSS 1 - 3</p> <p>Core Compulsory Subjects</p> <ol style="list-style-type: none"> 1. English Studies 2. One major Nigeria Language (Hausa, Igbo or Yoruba) 3. Mathematics 4. Basic Science 5. Social Studies 6. Civic Education 7. Cultural and Creative Arts 8. Christian Religious Studies 9. Physical and Health Education (PHE) 10. Basic Technology 11. Computer Studies/ICT <p>Elective Subjects</p> <ol style="list-style-type: none"> 1. Agriculture 2. Home Economics 3. Arabic Language 4. Business Studies <p>Note: Must offer 1 elective but not more than 2</p>

Source: NERDC (2008)

The Revised 9-Year Basic Education Curriculum (September, 2014 –Present)

Nevertheless, the school curriculum is a dynamic and open document that is constantly changing with the needs, challenges and aspirations of the society. Thus in the light of the feedback on the implementation of the 9-Year BEC received and the contemporary global and national concerns, the Nigerian government revised the 9- Year BEC in 2012 in line with global best practices of the time as in Kenya -7 subject, Tanzania- 8 subject, United States of America -6 subject, Malaysia and Indonesia - 9 subject offerings (Obioma, 2012).

The curriculum revision process involved identification and grouping of related disciplines as well as addition of some new emerging themes as a result of the times, security education being an example. Key concepts in the former curricula now form integrating threads for organizing the contents of the new subject into a coherent whole. One of the new clusters was the grouping of Christian Religious Studies/ Islamic Studies, Social Studies, Civic Education, and adding of Security Education to create a new composite or cluster of Revised BEC subject called Religion and National Values (in which security education is even a minor theme, see Table 2). This was supposedly borne from the current times of security threat and the unlashng of mayhem by the dreaded terrorist group boko haram in the North East of Nigeria which is now fast spreading to other Geo-Political Zones of the country. This unprecedented ugly incidence also coincided with the increase in cyber insecurity and the use of mobile devices (phones) to cause horror to the teeming population in which children are not excluded. This drives home the necessity to include security education not only in Religion and National Values as one theme (topic) as it is presently in the revised 9-year basic education curriculum but its inclusion in basic science and technology specially the technological aspect of security, or better still as a subject on its own.

Table 2: The Revised 9-Year Basic Education Curriculum (September, 2014 - Present)

Lower Basic Education Curriculum PRIMARY 1 – 3	Middle Basic Education Curriculum PRIMARY 4 – 6	Upper Basic Education Curriculum JSS 1- 3
Core Compulsory Subjects	Core Compulsory Subjects	Core Compulsory Subjects
<ol style="list-style-type: none"> English Studies Mathematics Nigerian Languages (One Nigerian Language) Basic Science and Technology (BST) <ul style="list-style-type: none"> Basic Science Basic Technology Physical and Health Education Information Technology (IT) Religion and National Values (RNV) <ul style="list-style-type: none"> Christian Religious Studies/Islamic Studies Social Studies Civic Education Security Education Cultural and Creative Arts (CCA) Arabic Language 	<ol style="list-style-type: none"> English Studies Mathematics Nigerian Languages (One Nigerian Language) Basic Science and Technology (BST) <ul style="list-style-type: none"> Basic Science Basic Technology Physical and Health Education Information Technology (IT) Pre-Vocational Studies <ul style="list-style-type: none"> Home Economics Agriculture Entrepreneurship Religion and National Values (RNV) <ul style="list-style-type: none"> Christian Religious Studies/Islamic Studies Social Studies Civic Education Security Education Cultural and Creative Arts (CCA) French Education Arabic Language 	<ol style="list-style-type: none"> English Studies Mathematics Nigerian Languages (One Nigerian Language) Basic Science and Technology (BST) <ul style="list-style-type: none"> Basic Science Basic Technology Physical and Health Education Information Technology (IT) Pre-Vocational Studies <ul style="list-style-type: none"> Home Economics Agriculture Entrepreneurship Religion and National Values (RNV) <ul style="list-style-type: none"> Christian Religious Studies/Islamic Studies Social Studies Civic Education Security Education Cultural and Creative Arts (CCA) Business Studies French Education Arabic Language
Note:	Note:	Note:
<ul style="list-style-type: none"> Minimum of 6 subjects, Maximum of 7 subjects Emphasis should be on basic concepts and their explanations Teaching and learning activity must be creative, innovative, and practical Avoid content repetition across themes and subjects Admit only basic contents from old curriculum 	<ul style="list-style-type: none"> Minimum of 8 subjects, Maximum of 9 subjects Emphasis should be on basic concepts and their explanations Teaching and learning activity must be creative, innovative, and practical. Avoid content repetition across themes and subjects Admit only basic contents from old curriculum 	<ul style="list-style-type: none"> Minimum of 9 subjects, Maximum of 10 subjects Emphasis should be on basic concepts and their explanations Teaching and learning activity must be creative, innovative, and practical. Avoid content repetition across themes and subjects Admit only basic contents from old curriculum

Source: NERDC 2013

As a result of the thread like nature of concepts in the revised curriculum, security education filters into basic science and technology curriculum which is not emphasized in the curriculum and as such has created a gap in wholeness of security education. This is obvious in term of computer security (cyber security), this gap (lacuna) in the curriculum contradict Okpala (2011) who praised the new UBE Basic Science and Technology curriculum to have been carefully planned, well written and documented; having all it entails to bring socio-economic development through the achievement of the Millennium Development Goals (MDGs) and the critical elements of National Economic Empowerment and Development Strategies (NEEDS). Cyber security is very important for the protection of our young learners as computer continues to serve as instrument for learning and socialization.

The Teaching of Cyber Security

Computer security continues to be a primary concern of all computer users today. The breadth and depth of attacks is such that it now impacts all economic sectors, units of government, and individuals (Ciampa & Blankenship, 2012). It is recognized that technology alone cannot prevent attacks; instead, security awareness, education, and training is a critical defense component (Williams, 2015). A growing number of entities are calling for this security training to be part of the curriculum through the pyramid of education (primary to tertiary) an overall schooling experience for all users and not limited to those students seeking a degree in information technology security (Ciampa, 2011). Countries are drafting this all important component of our daily living into educational system of their countries. For example, the US National Institute of Standards and Technology (NIST) drafted a National Initiative for Cyber security Education (NICE) plan, which came from the White House's Comprehensive National Cyber Security Initiative of 2008, has as its goal, to improve Cyber security by focusing on education, awareness and training. A strategic objective is to "deliver resources that enable educators to competently communicate cyber security awareness to students during all classroom interactions with cyberspace" (National Initiative for Cyber security Education, 2011 cited in Williams, 2015).

Educating general users on security also has additional benefits. First, it can provide future users with the critical thinking and basic skills to collaborate with vendors and IT professionals who provide security tools (Werner, 2005). A second benefit is that it may serve to deter attackers. Long (1999) stated that countermeasure strategies to reduce systems risk fall into four distinct and sequential activities: deterrence, prevention, detection, and recovery. General deterrence theory has been used in the study of criminals and other anti-social personalities and maintains that individuals with an instrumental intent to commit anti-social acts can be dissuaded by the administration of strong disincentives and sanctions relevant to these acts. General deterrence theory has also been applied successfully to IT by Straub (1990) and Straub, Carlson and Jones (1993). Educating users can be a form of deterrence by providing information about the risks of security and penal actions that can be taken against attackers. The benefit of training and instruction to deter attackers can also be seen in other studies. Skinner and Fream (1997) used social learning theory as a framework for exploring computer crime and security among college students. The relevance of social learning theory here is that social learning theory is organized around four concepts, one of which is differential association. Differential association refers to the process by which individuals within different social contexts become exposed to learn normative definitions favorable and unfavorable to legal and illegal. Analysis revealed strong support for social learning theory as a conceptual framework for understanding computer crime (Skinner & Fream, 1997). One of the major predictors of computer crime was associating with other students who engage in the activity, which indicates that learning computer crime is peer driven. Training and instruction regarding computer security may prove to be a deterrent not only to primary individuals but also secondarily by reducing the peer support for attacking systems. These deterrence and social theory can be incorporated in the curriculum as the curriculum is a spiral curriculum, the elementary (rudimentary) part of these concepts can be taught in the basic education curriculum.

Violence against children in basic education level in Nigeria

Due to the growing insecurity in basic education level in Nigeria, the Federal Ministry of Education in collaboration with United Nations International Children's Emergency Fund (UNICEF) commissioned a study on the assessment of violence against children in the basic education level in Nigeria. The assessment of violence against children at the Basic Education level in Nigeria was conceived as a follow up to the United Nation's Secretary General's Global Study on violence against children and as a response to the concern by the Federal Ministry of Education on the different forms of abuse and violence meted out to children in school. Violence in schools has a potential for discouraging girl child education as well as negates the principle of children friendly schooling. The implications of violence against children in school include school absenteeism, school dropout and poor achievement, as well as the long term implication of threat to safety and security. In an empirical study carried out by Hamilton-Ekeke and Ubi (2016) on children's understanding of personal safety in an emergency, reveals only a slight margin in the divide between children who appears to protect their personal safety against those who must consider improving their safety related behaviours. This implies that children (ages 8 – 17 who participated in the study) do not adequately demonstrate awareness of personal safety which is essential in security education.

Since the last decade, there have been reported cases of violence against children such as torture, kidnapping, shootings, sexual harassment, rape, corporal punishment and so on. However there is no proper documentation of most of these violent acts. In response, a global in-depth study of violence against children was commissioned by the UN Secretary General as directed by the General Assembly Resolution 57/90 of 2002 to provide a global picture. The report provided information that various types of violence exist against children within the family, schools, alternative care institutions, detention facilities, places where children work and communities. In the Year 2002, World Health Organization (WHO) reported that 53,000 children were murdered worldwide. A survey from many countries showed that between 20 to 65 percent of school aged children reported to have been bullied verbally

or physically. Furthermore WHO (2002) estimated that 150 million girls and 73 million boys under 18 years were sexually abused. About 100 to 140 million girls and women in the world underwent some form of Female Genital Mutilation (FGM) or the other.

In 2001, the International Labour Organization (ILO) report indicated that globally 218 million children were involved in various forms of child labour, 126 million of these children were involved in dangerous work. Also, 1.8 million children worked in prostitution and pornography and that 1.2 million children were victims of child trafficking.

In West and Central Africa, thousands of children are trafficked every year. Sexual violence and rape of children appears to be spiraling, inexcusably fuelled by armed conflicts, extreme poverty and HIV/AIDS. In Nigeria, sexual abuse of children often takes place behind closed doors and is unreported and undetected (Ogundipe & Obinna 2007). Initiatives to address violence against children include establishment of the National Agency for the Prohibition of Trafficking in Persons (NAPTIP) that coordinate mechanisms for rescuing, rehabilitating and reintegrating child victims of trafficking and prosecuting perpetrators.

Sustainable Future

Sustainability refers to the conservation, protection, and regeneration of resources over an indefinite period of time (Rowe, 2007). Central to sustainability is the idea that today's decisions affect the future of human health and well-being, the environment, and the economy (Paden, 2013). Sustainability requires knowledge and understanding of past events as well as the ability to make informed predictions of future events. The aim of sustainability is to make equitable decisions and to conduct activities so that human health and well-being, the environment, and the economy can be improved and maintained for future generations (Wheeler 2013). Sustainability is a complex idea. It requires understanding, not just of social, environmental, and economic issues, but of their ongoing interrelationship and interdependence. The challenge of sustainability is that it must be a collaborative process citizens need to agree upon a vision as well as an action plan for the future. This requires collective and conscious decision making, and is the heart of Education for a Sustainable Future (Byrne, 2013).

Education for a Sustainable Future can effect change and provide students with hope. It can instill within students a desire to work for the collective good, and inspire needed changes in behaviours that will help ensure survival (UNESCO, 2011). Students require a strong knowledge base in order to understand the complex issues and linkages of sustainability. According to Rowe, (2007) decision making from a sustainability perspective is a complex process and the following numbers of steps are outlined by Rowe (2007) to be considered when making decisions (security issues inclusive) from a sustainability perspective: 1. Identify/recognize a sustainability issue or concern. 2. Identify and consult with stakeholders affected by the issue. 3. Research the positive and negative impacts to the health and well-being of people, the environment, and the economy. 4. Propose creative options to solve the problem, address the issue, or to improve or rectify the identified situation. 5. Assess the options as to their positive and negative impacts on the health and well-being of people, the environment, and the economy. 6. Through a process of consensus, decide upon the best course of action. 7. Develop an action plan. 8. Implement the action plan. 9. Evaluate the action plan. 10. Communicate to the stakeholders the results of the actions. 11. Reassess the issue/situation based on evaluation and feedback from stakeholders. These various sustainability steps can be applied when designing, implementing and evaluating security education programmes for a sustainable future.

Conclusion

Security education taught as a theme in basic science and technology has the potential to make for a sustainable future in terms of cyber security and personal safety. In order for students to make informed decisions and embrace life practices that demonstrate an understanding of and belief in sustainability, they require particular knowledge, skills, values, and life practices. This will enable them to commit to a lifestyle consistent with the principles of sustainability, take personal responsibility for a sustainable future and work towards an equitable quality of life for all. Every learner who has gone through the 9 years of basic education should have acquired appropriate levels of literacy, numeracy, manipulative, communicative and life skills; as well as the ethical, moral

and civic values needed for laying a solid foundation for a life-long learning; as a basis for scientific and reflective thinking.

Recommendation

The students of today are the decision-makers of tomorrow. Although specific issues relating to sustainability are likely to change over time, a model for sustainable decision making has longevity and should be able to be applied to new situations. Students, therefore, should be encouraged to think critically, and to form and defend their opinions. They need to learn how to find creative solutions for complex problems related to security and personal safety, and to be aware of the future consequences of their decisions. In doing so, they will develop skills needed to engage in informed and sustainable decision making.

Furthermore, the integration of sustainability concepts within new and existing curricula will help students to develop the ability to: use integrative approaches to learning; work cooperatively to identify and address common concerns; develop and apply critical thinking skills to complex local, regional, and even global issues; think creatively, question established ways of doing things, and be self-directed; research, access, acquire, and apply knowledge; respect diverse positions; propose creative solutions to sustainability problems, and contribute to a sustainable future.

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