

**SPECIAL EDITION
AFRICAN JOURNAL OF STUDIES IN
EDUCATION**

**VOLUME 11
NO. 3 SEPTEMBER, 2015**

ISSN: 0189-241-X

**AN OFFICIAL PUBLICATION OF
FACULTY OF EDUCATION
UNIVERSITY OF BENIN
BENIN CITY, NIGERIA**

CLIMATE CHANGE CURRICULUM: IMPLICATION FOR TEACHING SCIENCE TO CHILDREN AT EARLY YEARS.

Nwabuwe, Sunday Nathaniel,
Physical and Health Education,
nwabuwe_edu@yahoo.com
08034669739

Nwabuwe, Henrietta Ifeanyichukwu,
Early Childhood Care Education,
nwabuwehenrietta@gmail.com

Dr. Mrs. Moemeke, Clara. D.
Curriculum Studies and Educational Technology,
College of Education, Agbor, Delta State.
08063475851

Abstract

Curriculum development processes usually involve identifying an underlying philosophy or belief about what, why and how teachers do what they do. A curriculum acts as a dynamic force in the development of young children and must be reviewed periodically to remain relevant and effective in preparing children for life in a rapidly changing world. Current early childhood curriculum practices throughout the world are increasingly influenced by new knowledge emerging from the growing body of research on brain development and early learning, and the type of learning environments that best promote children's development and learning in ways that are age-appropriate. Climate change is one of the major challenges of our time and adds considerable stress to our societies and to the environment. From shifting weather patterns that threaten food production to rising sea levels that increase the risk of catastrophic flooding, the impacts of climate change are global in scope and unprecedented in scale. Without drastic action today, adapting to these impacts in the future will be more difficult and costly. Based on this, the paper reviewed teachers' education, curriculum, climate change and science in early years teaching and some suggestions were made.

Introduction

The Early Years School Curriculum celebrates the uniqueness of the child, as it is expressed in each child's personality, intelligence and potential for development. It is designed to nurture the child in all dimensions of his or her life – spiritual, moral, emotional, imaginative, aesthetic, social and physical. The curriculum recognizes the integrity of the child's life as a child and aims at catering for his or her needs and potential as they evolve day by day. By meeting

these needs, the curriculum enriches the child's life and the foundations are laid for happiness and fulfillment in later education and in adult life.

The curriculum acknowledges that children live in and are part of society and that their personal development is deeply affected by their relationships in the home and with other people in the society. The curriculum takes full account of these aspects of the child's life in seeking to balance individual and social development, in developing an appreciation of how the different dimensions of life complement each other, and in helping the child to work co-operatively with others (Nwabuwe, and Nwabuwe, 2013).

It is a popular claim that climate change will result in increase in problem of flooding, loss of biodiversity, and changes in agricultural production among others. The above in simple language implies that climate change would result to increase in the level of poverty (Houghton, 2001). Education is seen as the key that unlocks the door to development and thus breaks the jinx of poverty. The teacher is indispensable in the education system as the extent of his management determines the degree of learning that can take place. The needs of children are most at-risk and marginalized by climate change. Quality education aims at making all children more resilient to the impacts of climate change (Naomi, Bob, & Sarah, 2013). Quality education is a key component of adaptive capacity which is the knowledge and skills needed to adapt lives and livelihoods to the ecological, social and economic realities of a changing environment. The child-friendly schools approach is most effective when it starts before school, continues throughout the child's life cycle and leads to lifelong learning in adulthood. For education to be transformative, however, it must be based on:

- a. Active, inclusive and participatory learning and teaching processes;
- b. Supportive and qualified teachers;
- c. Safe, supportive learning environments;
- d. Inherent links to local communities and local issues.

While children are among the most vulnerable to climate change, they need not be considered passive or helpless victims. Through education, projects, and action, children can contribute to every aspect of climate change policy-making, mitigation, and adaptation. Children are powerful agents of change. When empowered and educated on climate change by child-friendly schools, children can reduce their vulnerability of themselves and their communities and contribute to sustainable development.

There is no doubt that the role of science in modern society is changing. It is very different from that of a generation ago. Increasingly the challenges we face as a community - be it at the global level such as dealing with climate change or at the local level such as the problems of an aging population, environmental degradation, or enhancing our economic productivity through science and innovation - all depend on science. There is no challenge affecting our society

that does not fall under the preview of science and technology and its search for solutions.

The relationship between education and society is dynamic and interactive. Education not only reflects society but is an influence in shaping its development. It helps to equip children to share in the benefits of the society in which they live and to contribute effectively to that society's sustenance and evolution. The curriculum reflects the educational, cultural, social, and economic aspirations and concerns of Nigerian society. It also takes cognizance of the changing nature of knowledge and society and caters to the needs of individual children in adjusting to such change.

In order to realize this view of the child and education, the curriculum outlines a detailed and structured framework of content that is comprehensive and flexible. It promotes the active involvement of children in a learning process that is imaginative and stimulating. Its overall vision is to enable children to meet, with self-confidence and assurance, the demands of life, both now and in the future.

Barr, (2002), opined that every child has the right to the best possible childhood in order to achieve their social, intellectual, economic, physical and emotional potential. Early development takes place in the context of families and communities and is shaped by the day-to-day experiences and environments of early life. The steady drip of daily life establishes pathways for lifelong learning, behaviour and health that are inextricably linked to the development of the whole child

Teacher Education

Teachers are the key players in improving the learning of all our children in school. The large majority of the world's population has experience being in school and the job of the teacher may seem obvious. However, detailed studies show the complexity of the role of the teacher, especially where the teacher is responsible for the majority of the entire curriculum. Effective teacher preparation in the curriculum requires pre-service teacher training at a minimum. Pre-service training alone, however, is insufficient for quality life skills-based education. Ideally, teachers should access continuing education and professional development through in-service training and teacher resource centres on climate change, the environment and life skill-based education.

Teachers' lack of knowledge and understanding remains the primary barrier to the effective implementation of child-centered sustainable development curricula in schools. Stronger interdisciplinary links to key stakeholders such as researchers, teachers, NGOs and public officers can eliminate this obstacle. Teacher education on climate change and environmental and social issues must go beyond tools and messages. It should also include worldviews on the environment. Action-based research approaches for environmental education have also been proven effective.

Professional Development is defined as an integrated set of organized and sustained measures designed to enhance the teaching profession, within the context of school policy, organization and culture. Such measures include strategies to improve the theoretical competence of teachers in their ability to apply theory to solving educational problems, their research skills and expertise as well as their classroom skills and practice (Nwabuwe and Nwabuwe, 2013).

Finally, the curriculum must be locally relevant and culturally appropriate and should include due reference to equity issues. It must balance local needs with global concerns.

Curriculum

Curriculum is defined as everything staff do with children. A well-balanced curriculum supports the development of all children socially, emotionally, physically, and intellectually. The curriculum should be designed for the active involvement of children in the learning process, recognizing that young children learn through play, active manipulation of the environment, concrete experience and communicating with peers and adults. The curriculum should provide a variety of activities and materials to encourage behaviours appropriate to each child's age, background, stage of development, and individual needs, including adaptations for children with disabilities. A curriculum acts as a dynamic force in the development of young children and must be reviewed periodically to remain relevant and effective in preparing children for life in a rapidly changing world. Current early childhood curriculum practices throughout the world are increasingly influenced by new knowledge emerging from the growing body of research on brain development and early learning, and the type of learning environments that best promote children's development and learning in ways that are age-appropriate.

The primary purpose of the early childhood curriculum is to provide a 'blueprint' or 'master plan of the why? What? and how?' of a caregiving and teaching are based on a philosophy of how children develop and learn. The National Association for the Education of Young Children (NAEYC) [USA] defines curriculum as “an organized framework that delineates the content children are to learn, the processes through which children achieve the identified curricular goals, what teachers do to help children achieve these goals and the context in which teaching and learning occur” (NAEYC, 1991, cited in Catron and Allen, 2003).

The effective curriculum provides specific guidance that gives a clear direction to the user but allows for flexibility in adapting to special situations as needed. A written curriculum document generally incorporates the guiding philosophy of the programme: goals, learning objectives and desired outcomes for children's development; teaching/learning activities incorporating appropriate content knowledge; examples of supporting resources; assessment strategies; and

guidelines for planning the learning environment and relating positively with children.

Teaching Climate Change to Children in the Early Years

Climate change is one of the greatest public policy issues in our time. It has a lot of implications for humanity and the environment with its effects often linked to the collapse of various civilizations. Climate change is a change in the statistical distribution of weather elements that is sustained for up to a decade or more. According to Houghton, (2001) climate change is a change in the statistical properties of the climate system when considered over periods of decades or longer, regardless of cause.

For the United Nations Framework Convention on Climate Change (2010), climate change is a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. Nwankwo and Unachukwu (2012) opined that changes in climate can only be regarded as climate change if such changes are observed over comparable periods of up to a decade. There is also the implication that climate change is caused by a number of factors. The factors responsible for climate change are classified into two; namely:

- a) The climatic forcing and natural factors: such as
 - solar radiation mountain building and continental drift and
- b) The human factors which include:
 - activities of man that increase the emission of greenhouse gases e.g. methane emitted during the production of gas and transport of natural
 - gas, oil, coal e.t.c.; nitrous oxide emitted during the combustion of fossil fuels, persistent deforestation, land use, animal agriculture

It is true that the issue and problem of climate change have been on air and are seriously viewed by the West, Asia and Europe, but most Nigerians see climate change as the white man's problem. Serious work has to be done in the education of Nigerians in the area of climate change and its problems. The media has been used by both United Nation and the International Communities but it seems it is falling on deaf ears in Nigeria. It will be better to educate the young ones through the school system for more impact and understanding to be made. Nwankwo and Unachukwu (2012) stated that the major problems are the extent the teachers are aware of climate change and its possible causes and effects, and the strategies they could apply in the classrooms to be able to educate the students effectively on that. In various parts of the world including Nigeria effects of climate change have been seen, for example, the flooding in Lagos, Sokoto, and some towns in Niger, Delta, Bayelsa, Rivers, Anambra, Imo, Cross River, Akwa Ibom and Kogi States in Nigeria in 2012 and wildfire in Russia, Greece, Australia and California. There was also serious flooding in Pakistan, India, Bangladesh,

Philippines, and many countries in North and South America and Asia. In all, serious human and material losses were incurred.

There is then an urgent need for Nigerians to be educated on the issues and problems of climate change with particular emphasis on how to prevent it or mitigate its adverse effects.

Riverine communities are disproportionately affected by climate change because they often rely heavily on local resources such as water and food, which are vulnerable to climate change. They tend to have less access to resources from elsewhere and fewer options for dealing with climate change. Climate change can intensify existing stresses on low-income populations, such as population growth, poverty, improper land use, and pollution. Even though the effects of climate change are greater on developing countries, these countries contribute the least to climate change on a per-person basis. Low-income populations usually have smaller carbon footprints than wealthier populations. They buy fewer manufactured items and use less energy for home and travel (Randy Poplock,2007).

Especially in low-income countries like Nigeria. Certain people in these countries, such as children and elderly people are most at risk from climate change impacts (Confalonieri,2007).

On any given day, more than a billion children are in pre-primary, primary and secondary school. However, many fail to complete their education, deterred by poor school quality and persistent challenges caused by deepening poverty, gender inequities, location, emergency and conflict situations, HIV and AIDS, disabilities, chronic environmental degradation and climate-related hazards. Such conditions can impact diminishing water resources, causing increased malnutrition, waterborne diseases such as diarrhea, and vector-borne diseases such as malaria. Floods and rising sea levels can cause drowning, injuries, and severe mental and physical trauma, particularly for communities living in Small Island developing states, settlements alongside major river deltas and low-lying coastal areas.

Malnutrition

This is a major health risk to all, especially children. The primary cause of malnutrition is a lack of access to essential foods. Campbell-Lendrum, Corvalan, Pruss Ustun, (2003) are of the view that climate change like drought may affect food production by reducing water availability, increasing salt content in soils, increasing the number and/or intensity of storms and floods, and increasing the numbers of pests and plant diseases. They stated that climate change may make difficult crop-growing conditions in dry regions of Africa and other environmentally sensitive areas even worse. Diarrhea diseases, which can cause dehydration and death, are especially common in developing countries like ours. Diarrhea is often caused by organisms that thrive in warmer temperatures. Campbell-Lendrum, et al (2003) held the view that there are many other ways that climate change may impact human health. For example, an increase in diseases, including malaria, has already been observed. Injury and death due to heat waves and droughts have also been observed in many places.

Human Migration

In addition to health effects, some people are becoming environmental refugees. Many gradual environmental changes have been linked to climate change. Desertification reduced freshwater availability, and rising sea levels, can all force people to leave their homes (Stefan, 2005). Some rural areas have experienced internal migrations (movements of people) due to environmental factors. People in Delta State, the Ukwuanis, Isokos, Iteskris and the Ijaws have moved from the coastal areas to neighbouring villages or cities that are farther above sea level. As sea level rises, further migration to higher lands may occur. Nwankwo & Unachukwu (2012) argue that "Climate refugees," as they are sometimes called, are not always people from developing or small island nations. During the last 15 years, the cases and intensity of floods have increased, possibly due to warmer global temperatures. It is estimated that 550,000 people in Nigeria became climate refugees in 2012 after a flood forced them from their homes.

Implication for Teaching Science to Children at Early Years

In our opinion this education should commence from the early years. Therefore, there can be no justification for omitting climate change National Curriculum, and the education of pupils would be deficient if they did not receive teaching about it. Within the current National Curriculum, climate change is taught in Basic Science, Social Studies and Civic education. We note that the new Framework includes a less in-depth introduction to climate change, and is restricted to science only the effects of climate change like flood, erosion, deforestation, etc at this level should have been mentioned. In particular, the subject content for science specifies only that children should be taught "the production of carbon dioxide by human activity and the impact on climate". But this does not explicitly include an introduction to key knowledge about the

potential impacts of unmanaged climate change, as well as the options for mitigation (for instance through reducing greenhouse gas emissions), even though the “efficacy of recycling” is included in science.

These omissions would undermine the core knowledge base of children who will experience first-hand those impacts of climate change that are now unavoidable and who will be faced in their lifetimes with important decisions and choices about how to manage and respond to climate change risks. However, these are essential issues and cannot be allocated to, for instance, in social studies only, which would not be compulsory, and would result in the majority of pupils being deprived of the necessary learning opportunities.

If the teaching of climate change is spread between more than one subject, for instance, science inclusive, it is important that the programmes of study are properly integrated. Pupils are likely to gain a complete understanding of issues such as climate change are taught within the context of the processes that operate within the Earth system, rather than as an isolated topic.

In teaching science to young children, topics like You and Your Environment, Production of Carbon (Iv) Oxide, Deforestation and Afforestation, Disasters and Conflicts, Environmental Governance, Harmful Substances and Hazardous Waste, Ecosystem Management, Climate Change and their implication should be explained. For example, teaching scientific support packages for Global and National Climate Change Information should include enhancing communication of science-based information, scientific capacity to address key knowledge gaps (particularly in data-scarce regions of the developing world), and improving the general understanding of and access to climate science. In teaching deforestation and afforestation the pupils should know that forests play a central role in the global carbon balance, and also provide a multitude of other services alongside carbon storage. Forests contain over two-thirds of the world's terrestrial biodiversity and are a source of vital ecosystem services which provide people with food, water, fuel, wood and regulatory services such as climate and food regulation.

Conclusion

The teacher's based knowledge of climate change and inclusion of same in the curriculum for early childhood education will help in the teaching for better understanding and awareness of the effect of this climate change on the early years, primary, secondary and tertiary education and the society at large.

Recommendations

To have an effective implementation of climate change curriculum in early years' education in Nigeria, the following recommendations should be adhered to:

- The curriculum for early years science education should be amended to include climate change, its causes, effects and eradication.
- Government should, without delay, start organizing workshops and conferences for teachers and parents on issues of climate change.
- As a member of the United Nations, the Nigerian government should start carrying out media campaigns on the causes and effects of climate change.
- Government should start working on the schools by providing infrastructural facilities that could enable the pupils to meet the demand of this era of climate change.
- Promoting sustainable forestry-harvesting trees in such a way that forests continue to thrive.
- Promoting sustainable agriculture-reducing soil tillage and water use.

References

- Catron, C., and Allen, J. (2003). *Early Childhood Curriculum: A Creative Play Model*. 3rd Ed UpperSaddle River, New Jersey: Merrill Prentice Hall.
- Confalonieri, U.,(2007), "Human Health," in *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, ed.
- Confalonieri, U., (2007), "Human Health," in *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, ed.
- M. L. Parry, O. F. Canziani, J. P. Palutikof, P. J. van der Linden and C. E. Hanson (Cambridge, UK: Cambridge University Press, 2007), 391-431.<http://www.ipcc-wg2.org/>.
- Houghton, J. T:(ed.) (2001). *Appendix I-Glossary. Climate Change 2001: The Scientific Basis: Contribution of Working Group to the Third Assessment Report of the Intergovernmental Panel on Climate Change* Cambridge: United Kingdom: Cambridge University Press.
- Naomi Hicks, Bob Ward and Sarah Lester (2013). "Climate change in the National Curriculum in England": Submission to a consultation by the Department for Education Policy paper
- Nwabuwe, H. I. & Nwabuwe, S.N. (2013), *Curriculum and Teaching of Elementary Science in Early Childhood Classroom in Nigeria: Issues for the Future*. *African Journal of Studies in Education*. 9. 1., 109-115
- Nwankwo C.A. and Unachukwu, Glad O. (2012) *Teachers Awareness of the Causes and Effects of Climate Change and their Classroom Management Strategies in Climate Change Era*. "Research Journal in Organizational Psychology and Educational Studies 1(3) 161-167.
- Randy Poplock, (2007),"The poor are hit hardest by climate change, but contribute the least to it," *Seattle Post-Intelligencer*, August 19, 2007.
- Stefan Lovgren, (2005)."Climate Change Creating Millions of 'Eco Refugees,' UN Warns," *National Geographic News*, November 18,2005.http://news.nationalgeographic.com/news/2005/11/1118_051118_disaster_refugee.html.
- The United Nations Framework Convention on Climate Change <http://unfccc.int/essential/background/convention/background/items>. Retrieved 28th September 2010