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## Mathematics Education for Accountability and Sustainable Development

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### **Abstract**

*The term development is an action process for developing a particular idea or attitude. Accountability which is an attitude that a nation requires in her citizens can be developed using an instrument, mathematics education is an option. To be accountable, is an ability to give adequate explanation for some action or expenditure as the case may be. Different organizations have given different views about sustainability. The World Bank has used triangular frame work to illustrate the environmental sustainable development. Many issues have being considered as lack of progress from many sources and levels. Why should everyone be taught mathematics education up to the secondary school level in Nigeria? Mathematics education has been seen to play a significant role in the national development of every nation of the world. The aim of teaching mathematics education in Nigeria included among others to bring up student who is all round. Mathematics Language and methods are used to explain economic phenomena. The influences of mathematics education in human build up for accountability informed the 2002 world summit on sustainable development that makes to formulates national development strategies.*

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### **Introduction**

The oxford advance learners dictionary defines the word sustain as to keep something alive or inexistence. The adjective of which is sustainable which is to keep going or maintained for instance sustainable economic growth or environmentally sustainable policies. Develop is to cause something grow gradually the term development is action process of developing. The accountability is the adjective to accountable. To be accountable means to be able to give an explanation for action, or expenditure taken. The survival of any Organization or Non Governmental Organization (NGO), build on the level of accountability of the heads. The challenges of donor agencies have been standard and minimum requirement of NGOs accountabilities. These have allegedly contributed to the undermining not only NGOs stabilities but accountabilities as well.

The term sustainable development was used far back as 1972 at United Nation (UN) conference on the human environment in Stockholm, Sweden. It was not until 1987, with a UN report entitled “our common future” that the term was fully defined and translated into policy options. The Brundtland report (named after the Norwegian prime minister who chaired the UN commission authority the report) defined sustainable development as a “development that meets the needs of the presents without compromising the ability of future generation to meet their own needs”

The World Bank has also defined sustainability in terms of opportunity for future generations using a triangular framework to illustrate the idea of environmentally sustainable development. The new frame work includes economic objectives and social objective that are expended to include things like empowerment, participation, social mobility and cultural identity. Ecological objectives are shifted from resources management to ecosystem, integrity

and biodiversity. The goal sustainable development is to further each of these objectives (economic, social, and ecological) simultaneously over the long term, So that they may be enjoyed by future generation.

### **Issues in Sustainable Development**

Though the nations of the world have accepted the needs for education to achieve sustainable development, only little progress has been made at any level. This lack of progress is viewed from many sources and levels.

Lack of vision and awareness has impeded progress. Lack of appropriate policy and funding is also an implement. According to Hopkin Charles ed. (1996) a number of issues stymied the advances of education sustainable development, during the 1990's and new millennium. By addressing his critical impediments in the planning stage, government can prevent or reduce delay or development of education sustainable development efforts and ultimately the attainment of sustainability. In addition to generic issues government at all level will need to address issues that are specific to local condition such as quality of relation between the schools management and the teachers union.

#### **1 Increase awareness in sustainable development is essential.**

One step in launching of an education for sustainable development progress is to develop awareness within the education community and public that re orienting education to achieve sustainability is essential. If government officials or school administrators are aware of the critical linkages between education and sustainability, developing reorienting education to address sustainable development will occur. When people know that education can improve the likelihood of implementing national policies, regional land and resources management programs and local programme, then education is in a position to be reoriented to help achieve sustainability.

#### **2 Educational reforms and economic viability.**

The effectiveness of the world's educational system is being debated in light of the changing needs of society. The current wide spread acknowledgement of the need for educational reforms may help advance education for sustainable development. If it can be linked to one or more priorities of educational reforms education for sustainable development could have a good chance for success. if however promoters try to add another issue to an already overburdened system, the chances of success are slim.

#### **3 Facing complexity of sustainable development concept**

Sustainable development is a complex and evolving concept. Many scholars and practitioners have invested years in trying to define sustainable and envisioning how to achieve it on national and local levels. Because sustainable development is hard to define and implement, it is also difficult to teach. Even more challenging is the task of totally reorienting an entire education system to achieve sustainability. Must national education campaigns carry simple message as vaccinate our children, boil water before drinking, say no to drug abuse, HIV/AIDS is real and of recent the EBOLA virus. All these, education faces it for control and eradication.

**4 Structuring and placing education for sustainable development in the curriculum.**

Every country suffers problem of decision in addressing education for sustainable development strategy. We must decide on a method of implementation. For instance in sustainable development environmental education or population education or to reorient entire education programme and practice to address sustainable development Nation also need to clarify whether their educators are being asked to teach about sustainable development. The answer to this question will profoundly affect each nation's course of action.

**5 Developing an education for sustainable development programme with community participation.**

One obstacle to world educational reorienting is lack of its clarity regarding goals. In simple terms those who will be called upon to educate differently will ask, what am I to do differently? What should I do or say now that I did not say before. These simple questions leave most experts in a quad-ray and the questioners without an adequate response. For education and sustainable development to remain an enigma to many government and schools, all stake holders have indicated willingness to adopt education for sustainable development programme. however no successful working model currently exist, without these models to adapt or adopt, government and schools must create a process to define what education for sustainability is with respect to the local context. Such a process is challenging, it calls for public participation which the community must be involved.

**Role of Mathematics in a Nation**

Every teacher of mathematics must be informed and convinced about the educational importance of the subject. The educational value knowledge of the teacher enables him to convince this students, stake holder and society likewise.

There are many issues to consider here as to why, should everybody be taught mathematics. What shall be the advantages of devoting so much efforts, time and money to the teaching and learning of mathematics? How does it make any contribution in the development of an individual?

Mathematics has confined to play a significant role in the national development of any country. Development here is conceived as the capacity of a nation to apply technology for the exploitation of the resources of nature. Such exploitation will rely very heavily on mathematics for laying the foundation for political, government, military, scientific, technological advancement, economic development, socio-cultural environmental peace.

Ihejiro (1989) identified mathematics as the ingredient for the effective articulation of the abstract element of science that gives impetus to the development of technologies. Jegedel (1989) stressed that mathematics is indispensable because it has substantial use in all other human activities these Includes school subjects. Ezeilo (1975) long noted that there can be no real development technologically without a corresponding development in mathematics. Therefore it is not a surprise to discover that the most effective and unparallel accomplishment of human being is found in his effort to utilize his mathematical reasoning. Aminu (1995) further posits that mathematics is not only the language of science but it is the essential nutrient for thought, logic reasoning and therefore progress. A mathematical conscious mind is an accountable, mind towards development.

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### **Aims and Objectives of Mathematics Education**

Education is set to achieve certain ends and goals the different subjects of the school curriculum are different means to achieve these goals. The term aims of teaching mathematics stands for the goals, targets or broader purposes that may be fulfilled by the teaching of mathematics in the general scheme of education. Aims needs long term planning since their realization is not quite easy. They are divided into definite, functional help in bringing about behavioral changes in the learner for the ultimate realization of the aims of teaching mathematic. The objectives provide for definite learning experiences for bringing about desirable behavioral changes.

The aims of mathematics education are to bring up students who are sound all round. This helps the students in. Utilitarian values, disciplinary values cultural, social, moral, vocational, interdisciplinary values and a host of others. Mathematics education aimed at teaching students, as objectives, knowledge and understanding, skill, application, attitude and interest appreciation.

### **Mathematics and Sustainable Development for Accountability**

Remove mathematics in everyday life and all civilization comes to a standstill (Sidhu 2006). Mathematics is intimately involved in every moment of everyone's life. Right from human existence on this earth, mathematics has been a faithful companion. when man first wanted to answer the question, (how many? how much? how big? how long? etc) he invented arithmetical copulations for measurement and form, geometry was invented to find the position of high mountains and stars trigonometry was invented and developed and so on with other branches of mathematics. one cannot avoid considering the utilitarian aspect of mathematics in preparing notation, addition, subtraction, multiplication, division, weighing, measuring, selling, buying are some simple and fundamental processes of immerse practical value in life. Every one, upon finishing secondary school education, should have clear knowledge of numbers and a comprehension of both the very large and the very small. He/she should understand the way number is applied to measures like length, volume, weight, area, density, temperature, speed and pressure. Estimation and approximation will guide against economic waste in everyday life. The economy of modern living and the technology of modern selling requires a house wife to be able to estimate quickly which of two different price offers, sizes or measures is the better buy and to be able to see through many of the tricks of the trade. Krutetskii has made an indisputable claim that "the increased development of mathematics is necessary for the progress and effectiveness of a whole series of major fields of knowledge" (Krutetskii, 1976) mathematical models, method and style of thinking have penetrated every field of knowledge. So any student hoping to proceed to higher institutions should get the mathematical background in secondary school.

Mathematical Language and Methods are used frequently in describing economic phenomena. Use of mathematics is now considered to be so necessary in the study of economics that in most universities of the world a course in advanced mathematics is a necessary part of degree course in economics statistical methods are applied to economics forecast. Many issues of economics can be represented statistically, like trade cycles, volume trade, trend of export and export and population trends, industrial trends, thrift expenditure of public money and so on. The theory of probability is the basis of insurance. The businessman, who is the leaders in the field of economic system, depends on statistical procedures. Economists or business men must acquaint themselves with terms like average, ratio, percentage variation, variable, constant and formula, graphic and Tabular interpretations of data. Many articles in the field of economics make increasing demands on one's mathematical understanding and information (Sidhu, 2006).

The following could help educator, curriculum designer and administrator reorient education for sustainability.

### **Mathematics Education as Strategy for Sustainable Development**

2002 world summit on sustainable development reiterated a call to all countries to “make progress in formulation and elaboration of national strategies for sustainable development and also to begin their implementation by 2005. The national development strategies is a continuing and adaptive process of strategic and co-ordinate action. The challenges of embracing education for sustainable development will be to reorient current curriculum to address sustainability. If curriculum is written it is difficult to change. Tradition is a powerful force in keeping the status quo to add or drop anything in curriculum will requires deliberate action.

1. Teacher and planner take initial look at component of education for sustainable development to identify the knowledge, skill values and perspective that support teaching principle or goal of sustainability and or to issue relating to sustainability. This aspect is the objective of teaching mathematics in secondary school.
2. Teachers’ reorient current curriculum units to address sustainability. This is to incorporate the five component of education for sustainable development, of knowledge, issues, skill, perspective and values into the curriculum.
3. Unity is strength, teacher use their personal academic and disciplinary strength to develop a group plan. To develop and support a multi-disciplinary curriculum for education for sustainability mathematics on itself is a multidiscipline subject which inter-relate both horizontal and vertical. Education for sustainable development involves the formal and non-formal as well as informal sector of the education community.
4. Weeding the curriculum; this means to reduce the number of unit in the current curriculum to make room for education for sustainability. To evaluate each unit in the current curriculum for relevance of daily life and community sustainability goal. In case the community have define goal. This is seen in the different reforms of mathematics education to meet the needs and aspiration of the nation, as the case of Benin conference of 1977.
5. Fly your ideas; participant presents papers at workshop and conferences and build on one another’s ideas. To stimulate creativity in the initial steps of creating sustainability project. We are aware that mathematical association of Nigeria (MAN) and the National Mathematical Centre are doing a lot in this area.
6. Participants prioritize project based on importance and availability of resource, green-coloured stop light represent project that are ready to go. This will determine the order of implementation of sustainability projects according to project importance and resource availability. The mathematics teacher as individual can carry out the implementation of the curriculum.
7. Issues based education for sustainability; teacher takes an initial look at teaching issues. To identify knowledge, skill, value and perspective to support teaching of environment, societal and economic issue. Every teacher of mathematics needs to be informed and convinced about the educational values of his subject (mathematics). His own conviction about its soundness enables him to convince the students, parents and the society likewise. Some sustainability curricula are region or globe.
8. The formal education community solicits inputs from citizens, to learn what parents, business people and other community members think is important to include in formal education.

## Conclusion

Education for sustainable development must be locally relevant and culturally appropriate reflecting the environmental, economic and social condition of you community. It should be created through a process of public participation in which stake holders from across community can express their vision for a sustainable community and what an education reoriented to address sustainability and accountability.

Each mathematics educator (teacher) and administrator contribute to education for sustainable development according to the strength model, mathematics education curriculum is working towards achieving sustainability and accountability goal. Education is our great hope for sustainable future.

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