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MATHEMATICS CURRICULUM: AN OVERVIEW OF EDUCATIONAL CURRICULUM IN SIERRA LEONE

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Abstract:
In Sierra Leone, Mathematics is core subject in all stages of schooling. This paper highlights the significant of Mathematics in education. Besides, it gives an overview of education, with a flash on the historical background of mathematics under consideration. The paper went on to show Mathematics Teaching Curriculum, the aim and objectives of teaching mathematics nationally. Moreover, there is flash on the scope of mathematics syllabus for secondary school, approaches to teaching and learning of mathematics in Sierra Leone. In a clearer picture, the paper measures Mathematics Teachers Training Colleges, the problems of mathematics education, and the remedy to mathematics education in Sierra Leone. In conclusion, recommendations for the improvement and developments of mathematics education in Sierra Leone were made.

Keywords: mathematic, education, curriculum

1. Introduction

Mathematics is viewed by humanity as the base of scientific and Technological knowledge that is vigorous in social economic development of the nation. As a result, mathematics is a required subject at both primary and secondary levels in Sierra Leone. Besides, Mathematics is used as an elementary entry prerequisite into any of the significant courses such as medicine, architecture and engineering among other degree courses. Sierra Leone gives premium to Mathematics as core subject taught in all level and stages in its Educational system. The curriculum of Mathematics works in consonant with other curricula of the sub region countries under the assessment of West African Examination Council as the main body. The curriculum of mathematics

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education like other subjects was inherited from colonial powers – England-and been modified to some degree, but still operating at range and equity. Sierra Leone experienced war that lowered the education system to some level, but with the attainment of peace, it has speedily raised up again to a much higher level. Mathematics teachers are given special incentives to be motivated, and the subject is given high consideration in both man power and materials alike.

As soon as children begin talking, parents begin to rehearse the ABCs and start counting from 1 to 10, Even at an initial age, parents understand the importance of schooling their children the starting basic of reading and mathematics beforehand they enter school (Sheldon & Epstein, 2009). Sheldon and Epstein stated, "*In every school across the country, students are taught and expected to learn mathematics, beginning with number recognition in kindergarten*" (p. 196)

Teaching Syllabus for Mathematics in schools is very vital in education, particularly in Sierra Leone, where Mathematics is a core subject in all stages of schooling. The logic of mathematics is a rational, reliable and mounting body of concepts, which makes use of precise language and skills to perfect, analyze and interpret the world. It offers a means of communiqué that is commanding, concise and precise. Viewed as a human activity, mathematics involves creativity in the detection of patterns of shape and numbers, the acknowledgment of relations, the exhibiting of situations, the interpretation of data and the communication of developing ideas and concepts.

Mathematics is one of the indispensable areas of learning. Everybody needs to advance mathematical concepts and skills to aid them comprehend and play a accountable part in society. Mathematics education aims to pay to the growth of wide-ranging range of numeracy skills. In a progressively technological age the ownership of problem solving and decision making skills is an essential necessary. Mathematical education offers the chance for students to improve these skills and inspires them to become flexible problem solver.

Accomplishing this necessitates a sound mathematics curriculum, capable and acknowledgeable teachers who can assimilate instruction with assessment, classrooms with ready admittance to technology, and an assurance to both equity and excellence.

With much expectation that the knowledge and skills learnt in mathematics, learners will determine, adapt, modify and be advanced in fronting changes and future tasks. The knowledge of mathematics at all levels encompasses more than just the basic gaining of concepts and skill. It includes, more importantly, a thoughtful of the fundamental mathematics thinking, general strategies of problem solving. The tough mathematical competencies established at the schools are essential necessities for effective study in mathematics, science, commerce, industry and a diversity of other professions and vocations for pupils ending their education at the schools as well as for the those ongoing into tertiary education and beyond.

2. General Education Background in Sierra Leone

Sierra Leone is located on the West Coast of Africa, it has a population of about 7 million people and owns fertile land with plenty of natural resources. It is bounded on North, North- East by the Republic of Guinea; and the South, South-East by the Republic of Liberia. Sierra Leone has one of the longest histories of western education in Sub-Saharan Africa (SSA), thanks to the exertions of Christian missionaries. Although designed mainly to produce teachers, catechists and middle-level human power to service the European colonial establishment), missionary education succeeded in producing some of Africa's greatest intellectuals.

2.1 Education during the First Development Decade (1961-70): Expansion and Consolidation

Sierra Leone inherited a British-type education system at independence in 1961 that was very selective and was intended largely at the urban middle class. The system was partial toward academically-gifted students and most Sierra Leoneans were unable to access formal education. Thus, literacy levels remained low and fewer than 15 percent of children aged 5-11 years attended school, and only 5 percent of children 12-16 years were in secondary school.

The United Nations declared the 1960s the First Development Decade and this was not coincidental. It was during the 1960s that many African countries especially gained their political independence and considering the underdeveloped nature of these countries, development, whatever the term meant in international circles, was to be given some priority.

Sierra Leone's indigenous government placed a lot of emphasis on (western) education because this sector was seen as the rock upon which the nation could build a free, democratic and economically-viable society. In other words, education was regarded as the key to development. Accordingly, educational facilities expanded considerably during the 1960s.

In the area of tertiary education, the existing nine teachers colleges were consolidated into six colleges for reasons of economy and more effective use of their training staff. The Institute of Education was created in 1968 to coordinate the activities of these colleges and to organize in-service courses for teachers. Njala College was upgraded to university status in 1964.

The Education Act, No. 63 of 1964 made provision for the administration and control of secondary schools by Boards of Governors. The aims of secondary education then (and now) were to provide every child with an education which took into account:

- character and personality development;
- the cultivation of desirable attitudes;
- interests, ability and aptitudes;
- the manpower needs of the country;
- the economic resources of the State, so that education can be of use to the country and at the same time provide opportunities for a satisfying life.

2.2 The structure of education in Sierra Leone

Sierra Leone inherited a bookish type of education from the colonial power (Britain) in 1961 called the 7-5-2-4 system of education. It was later modified in the 80s to 6-5-2-4. In 1993, the system was changes to the 6-3-3-4 in order to withstand the manpower strength of the country.

2.3 Background History of Mathematics Education in Sierra Leone

In tracing the history of mathematics in Sierra Leone, Howson (1978:133) briefly recounted that:

> *"In medieval periods the instruction of mathematics in England rest on very much on written works of the Roman Boethius and Greek Euclid. Later England and France exported text, such as Dilworth's Arithemetics and Geometry to the developing United States' of America. In the initial part of the past century, the school children of the Empire (now Commonwealth) learned their mathematics from Hall and Knight, Godfey and Siddon and later, Durell."*

Sierra Leone after independent in 1961 has conserved numerous of its educational traditions and for a long time continue to use, in mathematics curricula which is very comparable to those developed in Europe and America.

It was viewed out at an international mathematics seminar in Kuwait in 1986:

> "*The "Western" curriculum, which was planned in a particular historical and cultural context for a few, has not only been enforced upon all in recent years but also transferred to other countries across the world."* (Howson and Wilson, 1986:8)

International mathematics researches in twenty developing and developed countries exhibited that, topics taught at the lower secondary level or to students between the ages 12 and 15 years are comparable to those taught at the same level in England (Travers and Westbury, 1989). In a similar analysis, Mereku (1990) established that the mathematics topics taught in the lower secondary level in three West African countries- Ghana, Nigeria and Sierra Leone- were similar to those taught at the same level in England. This shows that the curricula designed in a specific historical and cultural context were imported and not properly modified. (Dr. Kofi Mereka, 1999)

3. Curriculum Innovation

Curriculum innovation started in Sierra Leone in 1968 when a Science Curriculum Development Centre was established at Njala University College, one of the constituent colleges in the University of Sierra Leone by then. Discussions for the establishment of the science Education Programme for Africa (SEPA) originated here at this center, and it also became the secretariat for SEPA was moved to Accra, Ghana. SEPA concentrates its effort on the improvement of science teaching and learning at the primary school level,

and it has been producing materials for that segment of education. Because of financial constraints, however, SEPA did not seem to do much in the 1980s. But back in Sierra Leone, the Curriculum Revision Unit (CPU) was established in 1970 to implement the requirements of the agreement between the Sierra Leone Government and the International Development Association (IDA). This Curriculum Unit is located in the Institute of Education in the University of Sierra Leone. The Institute is under the University, but it is completely autonomous in all its functions. It is located outside the University campuses and has its own staff. It is much more the affairs of the Government through its Ministry of Education than that of the University. The primary task of the curriculum Revision Unit of the Institute is to examine and develop in English, Mathematics, Science and Social studies for the primary and secondary school system in the country. Much effort in these directions has been realized in recent years. (Sahr P.T. Gbamanja, 2002:37)

3.1 Mathematics Teaching Curriculum

The mathematics curriculum has been calculated to provide knowledge and mathematical skills to learners from many circumstances and levels of ability. Day-today's world pressures that fresh individuals should be able to use numbers proficiently, read and interpret numeral data, reason logically, solve problems comprises calculations and mathematical intellectual, as well as interconnect effectively with other people using correct mathematical data and interpretations. Attainment of this talent will aid them in their professions later in life and in the procedure benefit the society and the nation. That is, the curriculum stresses mathematical knowledge and skills that should aid the young person to advance basic proficiency competence to be able to function successfully in society.

Numerous features have been taken into contribution when designing the curriculum and these are: mathematical concepts and skills, vocabularies and terminology applied, and the level of expertise of English among teachers and learners.

3.2 General Aims

Mathematics education is aiming at:

- the worth of mathematics and its practicality can be appreciated by children;
- the skills, concept, understandings and attitudes can develop to enable them to handle positively with the mathematics of daily life,
- stand-in an intelligence of individual accomplishment and to inspire a continuing and generate awareness in the mathematics;
- aid learners develop a diversity of problem solving approaches relating to mathematics and progress the capacity to think and reason logically;
- assist children develop mathematically knowledgeable in a world which is technologically and information oriented;
- lay groundwork for those learners who may determine for further studies in mathematics or other topics relating to mathematical concepts are essential.

3.3 General Objectives

The learners will be able to:

- develop interest and co-operation with other learners in mathematics;
- literacy in numbers;
- an application of strategies to achieve number operations;
- identify and usage of patterns, relationships and sequences and make simplifications;
- identify and use functions, formulae, equations and inequalities;
- recognize and use random and standard units of measure;
- formulate and usage of graphical representation of equations and inequalities;
- the appropriate use of unit to estimate and measure several amounts;
- plan shapes and relate solids that are appreciated in the environment;
- gather, analyze and interpret data and find chances of events;
- the calculator usage to improve thoughtfulness of numerical calculation and solve real-life problems;
- operate learning materials to improve understanding of concepts and skills.

4. Scope of Mathematics Syllabus for Secondary School

The mathematics syllabus is constructed on the concept that an appropriate mathematics curriculum outcome from a sequence of serious decisions about three inseparable connected components: content, instruction and assessment. Therefore, the syllabus is planned to put countless deal of stresses on the development and use of basic mathematical knowledge and skills. The key areas of content concealed in all the junior High classes are as follows:

1. numbers and numerals;
2. operations of numbers & algebra;
3. measures, shape and space;
4. collection and handing data (statistics & probability);
5. problem solving & applications.

Besides, the major areas of content covered in all Senior High classes are as follows:

1. Number and numeration. This covers: number bases, modular arithmetic, fraction, decimals and approximations, indices, logarithms, sequence and series , sets, logical reasoning, positive and negative integers, rational numbers, surds, matrices, determinants, ratio, proportions, rates, percentages, financial arithmetic, variation.
2. Algebraic process. This covers: algebraic expressions, simple operations on algebraic expressions, solution of linear equations, change of subject of a formula/relation, quadratic equations, graphs of linear and quadratic functions, linear inequalities, algebraic fractions, functions and relations.
3. Mensuration. This covers: lengths and perimeters, areas, volumes.

4. Plane geometry. This covers: angles, angles and intercepts on parallel lines, triangles and polygons, circles, construction, loci.
5. Coordinate geometry of straight lines
6. Trigonometry. This covers: sine, cosine and tangent of an angle, angles of elevation and depression, bearings.
7. Introductory calculus.
8. Statistics and probability.
9. Vectors and Transformation. This covers vectors in plane and transformation in the Cartesian plane.

4.1 Approaches to Teaching and Learning Mathematics in Sierra Leone

A. Problem-Solving Methodology

A balance mathematics programme integrates conception learning and the development, conservation and application of skills. These should be taught in such that learners progress their capability to think mathematically.

B. The Standard of Instruction

Educators should certify that they use language that will enable the development and achievement of mathematical concepts. After this objective is attained; however, it is important that kids be exposed to the mathematical thoughts in English and listen to adults using the words appropriately

C. Developing the Understanding of Mathematical Vocabulary

It is necessary to for the children to have a clear understanding of mathematical vocabularies in order for them to know the subject. Kids' failure to comprehend mathematical vocabulary reveals itself when they fail to answer queries during lessons, when they fail to carry out a normal task and when they do poorly in test and examinations. Subsequently children need to obtain the suitable mathematical vocabulary so that they can fully partake in set tasks and tests.

C. Mental Exercise

Mental work must be dedicated to the first five to ten minutes of each period. This will be aiming at developing speed and accuracy in applying the four rules, to guarantee a mastery of the vital tables and to make the class for the day's main lesson in mathematics. At least one half of the mental drills given must communicate to work that is to follow in the main lesson.

D. Catering for Individual Needs (Differentiation)

With reference to the national constitution of Sierra Leone, all kids should be given the chance to accomplish the full of their abilities. Children of low talent need to ensure the opportunity to familiarity a range of mathematics, which is appropriate to their level of development, interest and capabilities. Similarly, children with outstanding ability in mathematics must be protracted (i.e. challenged) and not simply be estimated to carry out different recurrences of work they have already understood.

E. Use of Teaching and Learning Materials (TLMS)

- Concrete Materials of Mathematics: The use of TLMs to support children form mathematical concepts is well known be very important. The Use of TLMs offers

groundwork of practical experience on which youngsters can develop abstract ideas. It inspires children to be inventive, assists to develop their self-confidence and embolden independence.

- Textbooks: Textbooks comprise materials that offer learners with practice and enrichment. They cover ideas for problem solving condition, which develop mathematical skills and understanding. There is need for regular, planned opportunities for children to read mathematics textbooks both in class and at home. Nevertheless, teachers must comprehend that a textbook is just one tool to help with the application of the syllabus.

F. Mathematics across the Curriculum

There is need for Teachers to help children increase in value the significance of mathematics in their lives. This can be achieved by the using of the Thematic Method or by requesting colleagues' teachers of the other subjects to exhibit example and contexts that may be used in mathematics instructions. It is important to setting students projects that cut across subjects is one way of teaching mathematics across the curriculum. Connecting of subjects like English, Science, Creative Arts, Social Studies, Physical Health Education, Music, Drama etc. to mathematics.

G. Assessment in Mathematics

Assessment of learners' accomplishment is an important part of mathematics education. This is essential for various purposes

- to provide teachers response on the success of their methods and approaches and to support planning for new learning (formative),
- to evaluate the children's willingness for new learning and to find out what they have learnt (summative).

The key structure of assessment is the West African Examination Council as follows: for the primary is the National Primary Selective Examination (NPSE), junior secondary school is Basic Education Certificate Examination (BECE), Senior Secondary school is West African Senior School Examination (WASSCE).

4.2 Mathematics Teachers' Training Colleges

In Sierra Leone, teachers of mathematics are trained in all Teachers' training colleges such as: Milton Margai College of Education and Technology, Freetown Teachers college, Bo Teachers College, Bunubu Teachers College. There are four Universities: University of Sierra Leone, Njala University, Ernest Bai Koroma University and University of Makeni. All these universities have special Departments for Teacher education. The training of teachers covers all the stages of schooling from kindergarten, primary, and secondary education. Teachers are trained for different levels of certificates ranging from; Teacher certificate (preschool or primary), Higher Teachers Certificate (secondary teaching). Teachers are trained with the special methodology of teaching within the level of the classes taught.

4.3 Problems of Mathematics Education in Sierra Leone

Sierra Leone has recently emerged from a brutal war that lasted a decade (1991-2002) and destroyed most of the country's social, economic, and physical infrastructure. It left a multitude of scars in the education sector: devastated school setup, severe shortages of teaching materials, congestion in many classrooms in harmless areas, dislocation of teachers and delay in their salaries, frequent disruption of schooling, disorientation and psychological disturbance amongst children, deprived learning outcomes, debilitated institutional capacity to accomplish the system, and a serious lack of information and data to plan service provision.

Performance in mathematics has persistently been poor to students these years in Sierra Leone. Reasons leading to poor performance include under staffing, insufficient teaching/learning materials, lack of motivation and poor approaches by teachers and student, deteriorating practices.

These factors came as a result of causes such as: the Ten years rebel war which resulted in killing so many teachers across the country, and schools were vandalized. Some few survivors fled to neighboring country to save their lives. Teacher training colleges were all looted of teaching materials. The country had to start all over again to put structures in place from 2002 when peace was then installed all the country.

4.4 Remedy to Mathematics Education Problems in Sierra Leone

The country has made a remarkable recovery since the end to the war was officially declared in January 2002; increase security; sustained economic growth; and aggressive and effective restoration of public services, including education. Steps have been taken to improve mathematics education. The schools are provided with a lot of school materials. Mathematics teachers were given special incentives in schools since it is a core subject for all students. Besides, workshops were conducted to improve the quality of teaching mathematics particular to untrained and unqualified teachers teaching the subject in school. Students are encouraged by providing them with scholarships to study in Universities and colleges. There is also an Association of Mathematics Teachers that do promote the teaching methodology of mathematics across the country. Students are also encouraged to form mathematics clubs in schools that invites the attention of other students to develop more interest for the subject.

4.5 Recommendations for Mathematics Education in Sierra Leone

1. Mathematics Teachers should be trained to use the new technology in teaching. Teachers should be able to use computer efficiently to interpret and analyze mathematical problems. Students should be taught the use of technology in solving mathematical problems, not always chalk and chalk method all the time. Students' self-discovery is very important in improving their education.
2. Untrained and Unqualified teachers should be given scholarships to study in college or universities. This will strengthened the teaching capacity of mathematics teachers; and will fill the cap of understaffing in schools.

3. The percentage of female mathematics teachers in too low. In order to close the gap of gender participation, more females should be encouraged to be mathematics teachers.
4. Mathematics Curriculum is overloaded and tutors do not plan well or learners are relaxed in learning mathematics. In most times, teachers are unable to complete their syllabus. (Gbamaja Education Enquiry).
5. The Government to give more premiums on mathematics since it lays the foundation of science and technology.

5. Conclusion

Sierra Leone educational system takes mathematics to be a core subject from kindergarten to university. The secondary schools follow a set syllabus of the West African Examination Council, which is the regional Assessment body. Over the years, students do not perform very well in Mathematics in the public WASSCE examination due to the effect of the war. But the Government has put modalities to combat the problem by given scholarships to students, incentives to teachers, increase supply of teaching materials to schools. Mathematics is promoted all over the country by the Association of Mathematics Teachers, and students Mathematics clubs in schools and colleges.

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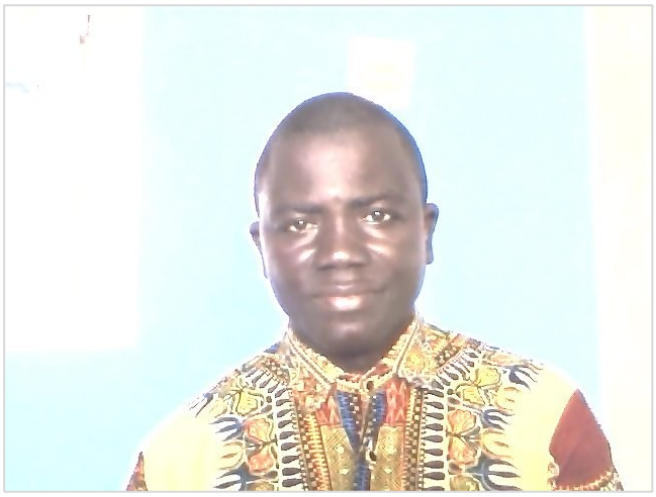

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