TOWARDS A REFORMED UNIFORM SYLLABUS FOR
MATHEMATICS AT THE SECONDARY SCHOOL LEVEL FOR
EFFECTIVE TEACHING AND LEARNING OF MATHEMATICS AT
THE TERTIARY EDUCATION LEVEL IN NIGERIA

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Abstract
This paper seeks uniformity in Mathematics syllabus at the secondary education level for effective learning and teaching of mathematics at the tertiary education level. It examines the disparity in O level General Mathematics and Further Mathematics syllabuses, consequences of the disparity, reasons for secondary Mathematics syllabus amendment, the usefulness of a reformed syllabus in mathematics and gives recommendations. The recommendations include appreciation of the real differences between the two syllabuses a thorough study of both syllabuses in view of a hitch-free reform, improved motivation of mathematics teachers and students, and improved mathematics teaching aids and techniques/methods. It concludes on the need for the interest of effective mathematics and science education in Nigeria.

Introduction
Mathematics education at the secondary school level in Nigeria has two syllabuses, a syllabus for Mathematics and another syllabus for Further Mathematics which is specially designed for student who would later read mathematics as a discipline at the tertiary level. This disparity has not argued well for effective teaching and learning of mathematics at the tertiary level. This is so as many students who read simply Mathematics at the secondary education level would later want to read mathematics as a discipline at the tertiary level with students who initially read Further Mathematics at the secondary education level. The result is that those who initially read mathematics’ instead of Further mathematics find their selves in a disadvantaged position as they did not study many topics which were initially taught in Further Mathematics. This situation calls for a reformed uniform syllabus for Mathematics at the secondary school level for effective teaching and learning of the subject at the tertiary education level in Nigeria.

Mathematics reforms are creation and introduction of specific changes in Mathematics curriculum content, new practices or methods and new teaching and learning of Mathematics. Materials or aids
to solve identified and specified Mathematical problems. The secondary level of Mathematics education is very important as it determines to a large extent, what a person can become in the higher level of Mathematics education.

A reform is much more than a casual change. It is a drastic and extensive replacement of the former situation with a newer one, whose effects could be difficult or even painful to accept. For all intents and purposes reforms are meant for changes with positive results.

The aims of secondary education in Nigeria according to NPE (2004), and the secondary school curriculum is the preparation of student for useful living with the society and preparation for higher education.

Educational reform are cluster of innovations, usually meant to affect the whole educational system or an important aspect of it with clear implications for teaching and learning practices and with purposes related to the general nature of society and the role of education within (Schaeffer 1990).

Educational innovation is generally conceptualized as a process and as a specific measure or event.

As a process, it is concerned with the conception and direction of ideas to achieve curriculum aims and objectives, policies structures and organisation of the school system (Agnu 1976).

As a specific measure, it is the creation in curriculum content, new practices or methods and new teaching and learning materials or aids to solve identified and specific education.

The knowledge of the global curriculum leads to the importance of the objectives of teaching Mathematics in Nigerian secondary schools.

At the Onitsha conference of March 1978 the following objectives for teaching Mathematics at the secondary school level were formulated and adopted.

(a) To generate interest in Mathematics and to provide a solid foundations for every day living.
(b) To develop computational skills.
(c) To foster the desire and ability to be accurate to a degree relevant to the problem at hand.
(d) To develop and practice logical and abstract thinking.
(e) To develop the ability to recognize problem and to solve them with related Mathematical knowledge.
(f) To provide necessary Mathematical background for further education.
(g) To stimulate and encourage creativity.

To achieve the sixth objectives. There is the need to add necessary topics to boost the senior secondary Mathematics syllabus so that students can be motivated to learn Mathematics at the higher level. Mathematics teachers at the secondary levels must be prepared to implement the reformed National curriculum for senior secondary schools in terms of the objectives to achieve, content area to cover activities and materials expected of teachers and students, evaluation procedures to follow and some other additional information required for effective teaching and learning of the new curriculum.
The Ministry of Education should be able to send the reformed syllabus to West African Examination Council (WAEC) and NECO in order to enhance a uniform syllabus for their examinations.

**Disparity in Ordinary O level General Mathematics and Further Mathematics Syllabuses:**

Below is the list of topics covered on General Mathematics syllabus:

i) Positive and Negative integers, Rational numbers

ii) Fraction, decimals and approximations

iii) Ratio, proportions and rates.

iv) Percentages

v) Number Bases

vi) Indices

vii) Logarithms

viii) Sets

ix) Sequences

x) Algebraic expressions

xi) Simple operations on algebraic expressions.

xii) Variations

xiii) Change of the subject of a formula

xiv) Algebraic fractions

xv) Solutions of linear equations

xvi) Quadratic equations

xvii) Graphs of linear and quadratic functions.

xviii) Linear inequalities

xix) Lengths and Perimeters

xx) Areas

xxi) Volumes

xxii) Types of Angles

xxiii) Angles and intercepts on parallel line

xxiv) Triangles and Polygons

xxv) Circles

xxvi) Constructions

xxvii) Loci

xxviii) Sine, Cosine and Tangent ratios of acute angle

xxix) Sine, Cosine and Tangent ratios of any angles.

xxx) Graphs of sine and cosine of angles

xxx) Angles of elevation and depression

xxxii) Bearings

xxxiii) Measure of central tendency

xxxiv) Graphical representation of data

xxxv) Cumulative frequency

xxxvi) Measures of Dispersion

xxxvii) Experimental and Theoretical probabilities

xxxviii) Addition and multiplication of probabilities.

The Further Mathematics syllabuses contains these topics:

i) Operations

ii) Identification and menstruation in 2 and 3 dimensions

iii) Rectangular Cartesian coordinates

iv) Trigonometry

v) Indices, logarithms

vi) Surds

vii) Sequence

viii) Algebraic equations

ix) Polynomials

x) Partial Fractions

xi) Linear inequalities

xii) Logic

xiii) Geometry

xiv) Plane geometry

xv) Differentiation and integration

xvi) Sets

xvii) Mapping
The Aims and Objectives of both Syllabuses are Stated Below:

For General Mathematics they are:
1) to recognize Habit of effective and reflective thinking
2) Communication of thought symbolic expressions and graphs
3) The ability to distinguish between relevant and irrelevant data
4) Computational skills
5) The ability word problems and translate them into Mathematical expression before solving them with related Mathematical knowledge.
6) The ability to be accurate to a degree relevant to the problem at hand.
7) Precise, logical and abstract thinking.

While that of Further Mathematics are:
1) Further conceptual, manipulative and computational skills.
2) Precise, logical and abstract thinking.
3) Aspects of Mathematics which prepare the child for advanced level Mathematics in higher institutions.

The Further Mathematics syllabus is an intermediate course of study which bridges the gap between elementary Mathematics and advanced level Mathematics. It is developed to meet the needs of potential mathematicians, Engineers, Scientist and other related Professionals. It is the aspects of this syllabus that will prepare students for these discipline.

Reasons For Secondary Mathematics Syllabus Amendment

According to Adebosu (2005) the reason for innovation in the curriculum is to update the curriculum to enable it meet the demands of the changing societal needs and aspirations. A student who had not the opportunity to study or enroll further Mathematics at the secondary school level may be handicapped in the course of further studies of Mathematics courses like Matrices Calculus, surd, polynomials etc. that are not in the ordinary level of Mathematics syllabus look strange a year 1 Mathematics student may need to consult further Mathematics ordinary level for proper grounding before he/she can fit into the system. This if not well handled can lead to backwardness or withdrawal of such students from the departments.

The concern of the researcher is on how the level Mathematics syllabus in order for the tertiary syllabus to be a continuation of what was learnt in the secondary school Mathematics.

If for instance differentiation and integration of simple explicit algebraic and trigonometric functions are introduced into the ordinary level Mathematics syllabus, students will study calculus in their first year with ease.
There is the need of concept innovation in the secondary Mathematics to encourage students for further study of the subject.

The Mathematics curriculum will be successful when appropriate experiences from the secondary level are transferred to learner to enhance continuation in the higher level. The Mathematics curriculum in the secondary level must be adjusted in order to further study of mathematics in level.

The Mathematics curriculum in the secondary level must be adjusted in order to further the study of Mathematics in education.

The secondary level of education according to Ofoefuna is very important as it determines what a person can become in life. Its objectives are clearly defined in the National Policy on Education (2004), the goals of secondary education shall be to prepare the individual for:

a) Higher education
b) Useful living within the society

The broad goals are brought to specific terms to include:

a) Provide all primary school leavers with the opportunity for education of a higher level, irrespective of sex, social status religious or ethnic background.
b) Offer diversified curriculum to cater for the differences in talents, opportunities and future roles.
c) Provide trained manpower in the applied science, technology and commerce at sub-professional grades.
d) Provide technical knowledge and vocation skills necessary for agricultural, industrial, commercial and economic development (NPE, 2004 PP 18-19).

A look at most of the products of our secondary schools points to the fact that mush stills needs to be alone. As Ofoefuna (1997), points out, the 6-3-3-4 system has not departed much from the old system.

The Mathematics syllabus for the senior secondary school requires introduction of some topics in Further Mathematics to enhance a hitch-free flow of knowledge and the teaching of the subject in the tertiary level of education.

Topics like Binomial series, differentiation and integration, Hyperbolic functions, Matrices, rectors amongst others should taught at their introductory level in the senior secondary Mathematics to facilitate mathematics education at the tertiary level.

The above mentioned topics will facilitate the smooth learning of courses like algebraic, trigonometry, calculus amongst others.

The broad goal of secondary education in Nigeria as mentioned above according to NPE 2004 is to prepare students for higher learning, if most of these topics expected to be learnt at the higher level are not introduced in the senior secondary general mathematics, the subject mathematics which most student termed a no go area may continue to appear difficult and uninteresting for student to further it's learning at the higher level, because these topics serve as pre-
requisite for the course at the higher schools.

Obanya (2003) points out that students leaving school without the acquisition of the pre-requisites of these higher school Mathematics courses may create a feeling of helplessness in young people and choice of wrong discipline.

According to Fasanya (1969), the educational system must equip a Nigerian child for career in life, for if the secondary school curriculum is properly reformed and implemented will tackle youth unemployment.

The idea behind the secondary school mathematics is to give them the basic tools to enable them integrate into the higher level mathematics to have good career aspiration. The curriculum should prepare the students for specified activities in the world of work that is always changing due to technological development.

This is why Abe (1999) lamented that as robust and well intended as the secondary school curriculum is, its aims, objectives and aspirations are not being achieved. If the secondary school mathematics syllabus reformed to contain other topics of mathematics, the percentage of the secondary school learner’s actually passing Joint Admission and Matriculation Examination (JME) will improve.

Consequence of The Disparity in Mathematics Syllabus in the Secondary and Tertiary Level of Education.

Poor academic performance in Mathematics at the tertiary level of education is a common feature on recent time. There is a consequent poor enrolment in tertiary level of mathematics and withdrawal of many students from the mathematics department to other fields that may not be related.

According to Oyanna (1979) evidence abound as regards the low level of performance in Mathematics. High failure rate has been quite common.

Inspite of the efforts of policy makers so far, some gaps remain between the mathematics curriculum in the secondary schools, and in the production of the mush needed high quality and number of mathematics in Nigeria. More often than not the contents of the mathematics curriculum especially at the secondary school level, do not appeal to the interest and curiosity or ability of students.

Eyibe (1989), points out there is no virtue in dividing pupils into academic and non-academic let alone creating a curriculum.

Recommendation

According to Adodo (1993) curriculum reforms must be planned and developed progressively along the major components of initiation, implementation research and evaluation and institutionalization.

The paper presents the following recommendations.

1) The government, educational managers, teachers, students and the society at large should appreciate the real differences between O level General Mathematics and Further
Mathematics. They should also appreciate the effects of the disparity especially in the light of the prime position of mathematics in education generally.

2) The government and its educational agencies which are makers and implementers of the curriculum and educational policies, should again embark on a thorough study of both syllabuses in view of a hitch-free reform.

3) Mathematics teachers should be highly motivated by government sponsored regular and improved workshops, improved salaries like Mathematics allowance, improved teaching aids etc.

4) Student should also be motivated to study Mathematics. They need to be encouraged not to see mathematics as a no go area. Student’s interest in Mathematics should be stirred up and maintained.

5) More and improved Mathematics teaching aids should be made available for the teaching and learning of Mathematics at the ordinary educational level and at the tertiary level.

Conclusion
Disparity exists in the mathematics education at the secondary school level in Nigeria, and this is considered to be un-productive.

To over-come this, the above recommendations have been given. If the recommendations are given due considerations and an educational policy on secondary mathematics that is uniform and board-based is formulated and implemented, it will improve mathematics and science education in particular, and our society in general. The processes to implement the reform may not always be easy or comfortable, but there is the assurance that if well handled, educational standards in Nigeria could be improved, and consequently Nigeria could take its right of place in economy and power among nations. This situation demands the co-operation of all.

Reference


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