Comparative Review of Mathematics Textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria

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Abstract

This study carried out a comparative review of the Mathematics Textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria. The study adopted a descriptive survey design. Four research questions and three hypothesis were raised to guide the study. The population of the study consist of the mathematics textbooks used in JSS3 in government approved secondary schools in Makurdi Local Government Area, Benue State, Nigeria. The sample size of this study consist of 3

Mathematics Textbooks used across 22 Government approved schools selected via stratified sampling in Makurdi Local Government Area of Benue State, Nigeria. The researcher-made checklist titled Mathematics Textbooks Review Checklist (MTRC) was used as the main instrument for data collection. The instrument was validated by two experts in Mathematics Education, two experts in Test and Measurement and two Mathematics teachers. Data collected were analyzed using descriptive statistics of frequency, means and standard deviation to answer the research questions, while Analysis of variance was used to test the hypotheses at 0.05 level of significance The result revealed that *MAN Mathematics*, *New General Mathematics* and *New Concept Mathematics* are the major Mathematics textbooks used in Junior Secondary Schools in Makurdi LGA of Benue State, Nigeria. The Mathematics textbooks align with the mathematics curriculum, and measured up in terms of content and appearance. It was recommended that the textbooks' authors and publishers should be trained to follow a given standard. The government should set up the standard and the pattern that every textbook authors and publishers should follow. Workbooks and teachers' guide should also be written to accompany all recommended Mathematics textbook.

Introduction

Mathematics is one of the core subjects offered at the secondary school level in Nigeria. The need for mathematics can be said to be as old as mankind. This arose out of man's desire to count and keep records of things around him. Mathematics has helped to transform man's rural society to modern society. This stems from the fact that mathematics is the foundation of science which is the bed rock of modern development. It is well known that the level of social and economic development of any country is intimately connected with the level of development of that country in science and technology. Since mathematics is known to be the foundation of science and technology, it means that the level of social and economic development is closely connected with the level of development in the mathematical sciences (Kuku, 2012).

It has also been asserted that no society can develop without effective teaching and learning of mathematics in schools (Ukeje, 2002). The International Association for the Evaluation of Educational Achievement (IEA) (2004) has also associated the learning of mathematics with the basic preparation for the adult life.

Mathematics is supposed to provide appropriate mathematical knowledge, understanding and skills to diverse students and other users of the subject. Mathematical skills are relevant to a wide range of analytical, technological, scientific, security, political and economic applications and the solid foundation in mathematics prepares one for other educational and professional challenges (Ambali, 2014).

The production of technicians and technologists in any society depends on the level of the study of mathematics in the society (Azuka, 2015). Hence, it has been asserted that the gap in the level of development between the advanced countries and the developing countries is as a result of the gap in the level of the teaching and learning of mathematics (Ukeje, 2002).

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The effective teaching and learning of mathematics in secondary schools is surrounded with many problems such as lack of classroom management, ethnicity, lack of trained teachers, inequity, lack of teaching and learning materials, lack of clear objectives, gender issues and use of content and pedagogy (Oduolowu, 2007) Out of the issues, the teacher factor in terms of quality appear most prominent (Azuka, 2015). Obviously, no secondary school can achieve effective teaching and learning of mathematics without quality teachers and quality mathematics textbooks.

According to Afolabi (2014) textbook as a teaching and learning resources is unique among all the mathematics instructional resources due to its possession of certain characteristics. It is durable, permanent (not transient), portable and independent of electricity or electronic device when in use. It appears to be the oldest teaching and learning resources. Due to its age-long existence and availability, it is common among teachers and learners more than any other resources.

Aggarwal (2001) alluded to the comment of UNESCO (1970) publication in Preparing Textbook Manuscripts: A Guide for Authors in Developing Countries by reporting that activities depend heavily on the textbook especially in the institutions where the teachers are not well qualified. Textbooks play an important role in Mathematics education because of their close relationship to classroom instruction (Johansson, 2003). Moreover, textbooks have a prominent position in curriculum reform and are considered the most important tool for the implementation of a new curriculum in many countries (Valverde, Bianchi, Wolfe, Schmidt & Houang, 2002). Moreover, textbooks have a great position in curriculum reform and are considered the most important tool for the implementation of new curriculum (Afiolabi, 2014).

Mathematics textbook is one of the source materials for both the teachers and learners (Omiko, 2011). Akani and Abonyi (2011) argued that mathematics textbooks available to the students are those that contain uncommon examples or cite experience that only small percentage of students may gained from. Hence, Okafor (2009) outline four main characteristics that are relevance to be considered in selecting a textbook. This include the content, the complexity of the text, how the text is built, and the degree of involvement and participation the invites. Aggarwal (2001) suggested guidelines upon which the relevance and adequacy of textbook features could be evaluated. These include the following features, author, content, organization and representation of content, language, exercise and illustrations, and general features.

Content of a textbook may be described as a total knowledge, skills, attitude and values to be learnt by the learner. According to Spicuzza (2009) content of a textbook refers to the accurate and appropriate depth coverage of all the topics, provision of reference to the students, clear presentation and addressing of specific vocabulary and appropriate illustrations in a book. Nworgu (1988) view it as a topic coverage, learning activities, study questions, illustrations and chapter summary. Contents of a textbook can also include its practiced orientation, worked examples of quantitative problems, accuracy of content, clarity of language but these were beyond the scope of the present work.

In the teaching and learning of any subject both teachers and students rely on text materials and as such it is not doubtful then that the quality of textbooks in use will determine, to a large extent the quality of learning and transfer of such learning which will occur (Nworgu, 1991). Hence the quality of educational materials such as textbooks is most fundamental where information presented is reliable, valid and authoritative. Taylor (2003) asserts that quality books could withstand the test of time; their content and physical appearance will still be impressive, intact, and beautiful even after many years of usage. Aggawal (2001) said that well writing and beautifully compiled textbooks can win and retain the attention of the user.

On the aspect of concept presentation, Badru (2008) cited Fajemidagba (2000) as saying that the majority of available textbooks present Mathematics concepts, principles, theorems, proofs and models in a highly verbal and illogical manner without regard to the interface between the discipline of Mathematics and other subjects. Similarly the results of most researchers shows that there are more English words to be learnt in Mathematics textbooks than in English textbooks (Kalejaiye, 2015). Badru (2008) noted that Mathematics terms, notations and symbols are also some new things to be learnt which are introduced in Mathematics textbooks.

According to Uzoechi (2007) the existing textbooks are deficient for the new Science, Technology and Mathematics (STM) curriculum and that the existing STM textbooks will also be unable to meet the demand of the proposed restructuring at the post basic education level. This call for the review/assessment of the relevance and adequacy of the existing textbooks in compliance with the new curriculum specification of mathematics.

It is against this background that the present work seek to carry out a comparative review of mathematics textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria. Specific emphasis is placed on the alignment of the available mathematics textbooks with curricular guidelines and quality of the mathematics textbooks in terms of content and appearance.

Statement of the Problem

The use of textbooks for effective teaching and learning of mathematics in secondary schools is very important and necessary. Given the sequential nature of mathematics, the mathematics textbooks becomes a vital resources for mathematics achievement.

In Nigeria, it has been observed that the majority of the mathematics textbooks used in secondary schools in most part of the country fall short of recommended standards. Studies have also shown that most of the existing textbooks does not meet the demand of the new mathematics curriculum. This is contributing greatly to the mass failure of students in mathematics in the secondary schools. Hence, there is a research need for a comparative review of mathematics textbooks used in Makurdi Local Government Area of Benue State, Nigeria, with the commensurate focus on curriculum, content and aesthetic appearance.

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Literature Review

Theoretical Frame Work

Activity Theory

One theoretical perspective that is helpful in understanding the role of textbooks in mathematics classroom comes from an interpretation of activity theory (Rezat, 2006). According to this theory, humans conduct activities in a culturally mediated context by using an embedded artifact to reach an object. Activity theory attempts to explain the role of textbooks in teaching and learning of mathematics from a socio-cultural perspective by using subject-mediating artifact-object triad. Textbook use is one such activity. Humans use artifacts called mathematics textbooks to reach an object in a culturally formed system. In other words, textbook use is influenced by the educational system in which it is used (Li, 2007). Textbooks are both a pedagogical tool as well as a marketed product, textbooks are an instrument for learning as well as an object of learning, and textbooks address both students and teachers.
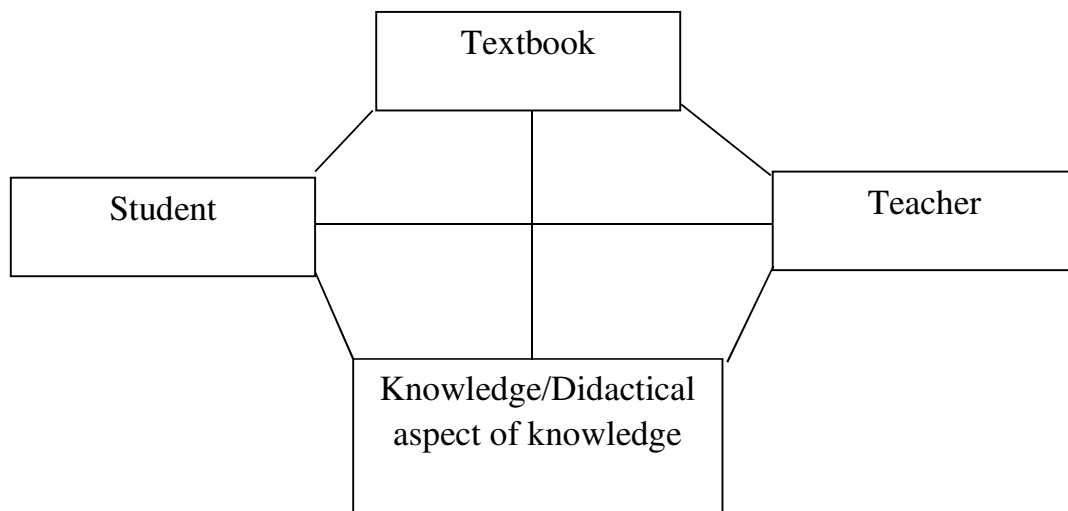

Figure 1: Tetrahedron model of textbook use based on activity theory

With regard to the two major subjects that are using textbooks, the teacher and the pupil, Figure 1 represents a more comprehensive model of textbook use. The tetrahedron represents the use of textbooks in class. Each of the triangular faces of the tetrahedron reveals another aspect of textbook use.

i. Student's and teacher's knowledge of the subject (mathematics)

Students reaches mathematical knowledge by using a textbook without the mediation of a teacher. This happens when for example, a student reads a textbook for an explanation of a mathematical concept, follows a worked-out example or attempts to solve a problem by his or her own initiative. The object of his activity is knowledge of the

subjects in general. The textbook is regarded as the instrument to access the knowledge of the subjects. It mediates between the knowledge of the subjects and the student.

ii. Students – teacher – textbook

Students use the textbook through mediation of his or her teacher. They access the information in the textbook when the teacher borrows concept explanations, metaphors, definitions, theorems or other pedagogical tools from textbook, or when she assigns problems to students from the textbook. The student is the acting subject in this triangle and the textbook is the object of his activity. The teacher mediates the use of the textbook.

iii. Teacher – textbook – knowledge (didactical aspect)

This triangular phase refers to teacher's use of textbook for his own professional development in a context more general than the need to prepare a particular lesson, and more as a source of reference to supplement his mathematical knowledge. While the teacher acts as a mediator of textbook use in the whole activity system, he/she is the subject of the activity in this subsystem. The object of his/her activity is the didactical aspects of the knowledge represented in the textbook.

iv. Student – teacher – knowledge

In this phase, students can learn mathematical knowledge directly from their teachers. The teacher implements the knowledge that is represented in the textbook without using the textbook overtly in the lesson. He/she acts as a mediator of the knowledge.

From all indications, this theory acknowledges the fact that textbook play a major role in teaching and learning of mathematics. Textbooks serve as the major source of information to both the teacher and the learner at the secondary school level.

Conceptual Framework

The Relevance of Mathematics in the Modern Age
The increasing importance and contribution of mathematics to the modern culture of science and technology has been very well established. Indeed, Ukeje (2010) outlined that without mathematics, there is no science, without science there is no modern technology, and without modern technology there is no modern society. In other words mathematics is the precursor and the queen of science and technology and the indispensable single element in modern societal development.

Jahun (1991) noted that in this period of Hi-technology and Internet superhighways, no nation can make any meaningful achievement, particularly in economic development, without technology whose function are science and mathematics. In fact, the achievement of any meaningful economic goals in this present age of Science and Technology must of necessity be largely dependent on the state of Science and technology that is ultimately on mathematics because the state of science and technology at any age is a function of the development and application of mathematics (Agah, 2020).

We are now in the midst of an overall revolutionary advance in the use of mathematics in the 21st century. The social studies, the schools of business administration, natural sciences are all increasing their demands of mathematics. The engineers and

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scientist are also broadening their interest in mathematics. The new users and uses of mathematics relate to its role as a language in terms of which theories and hypothesis can be precisely formulated and tested. For a long-time, mathematics was taught because of the training it was supposed to give to its learner. But now, there has grown a different attitude towards the subject mathematics. This is the attitude of Utility. Utility in a sense that, what mathematics is to other subject (Agah, 2020).

Mathematics has played a very important role in building up modern civilization by perfecting all sciences and arts. It is an efficient and necessary tool, which is employed by all the sciences. To this effect, it has been very properly said by Lassa (1998), "mathematics is science of all sciences and art of all arts. Odilli (2006) sees mathematics as a subject that help students to form the habit of clarity, brevity, accuracy, precision and certainty in expression and this will go a long way in giving us the much needed unity in the country. In preparing students for life, we may consider the power of mathematics in character building.

Mathematics Textbooks

A textbook is a book containing a comprehensive compilation of content in a branch of study. Mahmood (2010) defines the term "textbook" as an authentic material to be presented in classroom. Textbook is the most important device in teaching-learning process (Aziz & Zain, 2010).Textbook is primary tool and the basic source to implement the curriculum suggested and written by the Government. According to Wen-Cheng, Chien-Hung, and Chung-Chieh (2011) textbooks offer guidance about course and activity design to novice teachers; it assures a measure of structure, consistency, and logical progression in a class. For the proper implementation of any curriculum, text book is an integral part of the education system and cannot be neglected (Mahmood, 2010). Ornstein (1994) concluded that the accomplishment of educational objectives is intensely dependent on the degree of alignment between the textbooks and the curriculum.

Mathematics is often considered as a difficult subject to teach and learn. Students usually took mathematics as a boring and complex subject, on the other hand teachers also took this subject challenging and complicated and need to acquire greater skills to teach (Gafoor & Kurukkan, 2015). Properly written and high quality books can play a vital role to improve mathematical skills of students. Aggarwal (2001) stated that classroom activity depends heavily on the textbook especially in the school where the teachers are not well qualified.

Importance of Mathematics in Teaching and Learning

The use of mathematics textbook in teaching and learning of mathematics is of paramount importance as it plays a key role in effective teaching and learning. The textbook provides a framework for what is taught and how it is taught. It also imparts a sequence that is followed in a particular subject. Given the sequential nature of mathematics, the mathematics textbook becomes a vital component for mathematics achievement (Ajayi, Oyeniga & Olutayo, 2019). According to Afolabi (2014), textbook serves as a basic source of knowledge and formal learning, as well as the learning aid closet to the students and the teaching aid closet to the teachers. He therefore concluded that textbook is one of the factors responsible for low or dwindling achievement of students in Mathematics.

Omiko (2011) also said mathematics textbook is one of the source materials for both the teachers and the learners. To him, the good understanding that students need will be acquired in Mathematics textbooks and this informs the need for Mathematics textbooks to be readable. Nwafor (2015), opined that the readability level of book implies the extent to which the students use, read and understand the textbook at optimum speed and find it interesting. Adams, Pegg and Mellissa (2015), stated that Mathematics textbooks are generally helpful to both teachers and students because readers can gain new knowledge and understanding from reading varieties of mathematics-focused texts. In Nigeria, the monitoring of learning successes in Mathematics involves the procedures of testing, measuring, assessing and evaluating which is derived from textbooks (Adu, Mathwasa & Adu, 2020).

Teachers use textbooks in lesson planning as they provide philosophies and practices which frame classroom activities to achieve goals that they probably would not be accomplished on their own (Brown 2009). Studies show that teachers spend much time preparing lessons, interacting with textbooks and various teaching and learning materials to determine grade-specific texts and effective ways to present their lesson (Nicol & Crespo 2006). Good textbooks stipulate in detail, the materials to be taught, the design of every lesson and provides the teacher with a balanced, sequential presentation of a lesson (Fredricks, 2005). Textbooks serve as a guide to the teacher in the pedagogical enactment of the content for the entire year. The use of textbooks by teachers in lesson planning has inherent advantages that make lesson delivery easy. Textbooks provide teachers with stimulating and compelling platforms for transmission of information subsequently motivating learners to better understand the concept (Agiro 2012). Textbooks are essential aspects of teaching and learning situations, and they do not simply supplement learning but complement its process.

Junior Secondary Schools Mathematics Curriculum

Curriculum is the foundation of the entire teaching-learning process, whether it is a formal school or an informal training setup. Since it is the plan for ordering and directing the instructional experiences that students encounter in an educational institution, there can be no educational training without curriculum (Anyor & Abah, 2014). Curriculum has been described as a dynamic, intellectual and social enterprise (Onyeleke & Akinyeye, 2013). The implication is that it is highly responsive to the needs and challenges of the people it is meant to serve.

The Universal Basic Education (UBE) was launched in 1999 by the Federal Government in response to the Declaration on Education for All (EFA) as recommended by the Jomtien Conference of 1990. The implementation of the new basic education mathematics curriculum, which is for 9 years continuous schooling, commenced in September 2008 in all Primary and Junior Secondary Schools in Nigeria (Awofala, Ola Oluwa, & Fatade, 2012). Basically, the new curriculum was necessitated by the need to encourage innovative teaching approaches and learning approaches that promotes creativity and critical thinking of learners (NERDC, 2012). There is also the need to touch on issues of national interest such as gender sensitivity, globalization, environmental preservation, HIV/AIDS and family life.

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A distinguishing feature of the 9- year Basic Education Mathematics Curriculum is he emphasis placed on affective domain and quantitative reasoning in order to boost learners' cognitive and psychomotor capabilities (NERDC, 2012). It also provided maximal aid for teaching by prescribing topics, expected learning outcomes, students and teachers activities and evaluation guides. Broad themes represented include Number and Numeration, Basic Operations, Measurement, Practical and Descriptive Geometry, Everyday Statistics, and Elements of Computer Operations.

Mathematics Textbooks Content

Content of a textbook maybe describe as a total knowledge, skills, attitudes, and values to be learnt in a subject. Contents of mathematics imply the various topics that the students are expected to exposed to in the classroom by the teachers (Aduwa, 2020).Various topics in mathematics textbooks at different levels are documented in a book called curriculum. Nworgu (1988) view it as topics coverage, learning activities, study questions, illustrations and chapter summary. According to Igbeyi (2001) the content of a textbook is the totality of the topics presented in a discipline. Such contents must be appropriate, adequate, and logically well presented in such a way that the learner could benefit from reading the content.

The importance of textbook evaluation cannot be overemphasized especially in the areas of content, chapter summary and readability (Omebe, 2014). Textbooks especially mathematics texts, not only govern what is to be taught, but also provide a procedure for teaching the topic. Many of the curriculums in today's schools are to be found in the text books. Therefore, no meaningful teaching and learning can be easily achieved in the absence of a good textbook. According to Omebe, (2014), a good teaching materials include a review of the main theme of the completed chapter. The review is usually in the form of a summary of the main points of a particular chapter and may include chapter review or summary. Thus, the end of chapter review or summary is also an aspect of the content evaluation of textbook. Akanyi and Abonyi (2001) argue that mathematics textbooks available for students are those that contains uncommon examples or cited experiences that only small percentage of students may gain from. On that note Aggarwal (2001) suggested guidelines upon which the relevance and adequacy of textbook features could be evaluated. Some of the features include -physical features, content, organization and presentations, language, exercise and illustration, and general.

Content

i.   It should be child centered.
ii.   The subject matter should be arranged from simple to complex and concrete to abstracts.
iii. It should be objective oriented.
iv.   It should be written according to prescribed syllabus.
v.   It should satisfy the demands of examination.
vi.   The answers given at the end of each section should be correct.
vii. It should include the recent developments in Mathematics relating to the content dealt with.
viii. Oral mathematics should fine its due place in the textbook.

Organization and presentation

    i.   It should provide for individual differences.

    ii.   There should be sufficient provision for revision, practice and review.

    iii.   It should offer suggestion to improve study habits.

    iv.   Content should be organize with a psychological consideration.

    v.   Content should be organize in a logical way.

    vi.   It should suggest project work, fieldwork and laboratory work165

Exercise and Illustrations

    i.   The illustrations should be accurate.

    ii.   The illustrations should be clear and appropriate.

    iii.   It should contain some difficult problems.

    iv.   It should contain exercises to challenge the mathematically gifted students.

    v.   There should be well-graded exercises given at the end of every topic.

    vi.   The exercise should develop thinking and reasoning power of the pupils.

General

    i.   At the end of book, there should be tables and appendices.

    ii.   The textbook should be of latest edition with necessary modifications.

    iii.   The book should be of moderate price and readily available in the market.

Aggarwal (2001) therefore concluded that a good Mathematics textbook must have a table of contents, illustrations, charts or other references that can facilitate both students and teachers to do wonders in the subject.

As a result of the importance of textbook to school teaching-learning process, the paucity of research on Mathematics textual materials and rare analysis of these textbooks themselves, this research work has considered the comparative review of the major mathematics textbooks used in junior secondary schools in Makurdi Local Government Area of Benue State, Nigeria. The textual material factors such as statement of objectives, content of the subject matter, learners, activities, evaluation exercises, presentation, hierarchy of exercise, worked examples, solution and key to exercises, chapter summary, tables, glossary, and index will be considered in the review covered by this present study.

Appearance of the Mathematics Textbooks

Quality textbooks play unarguably a long lasting and ever life changing role in the academic prowess and transformation of students at whatever level of education in Nigeria and anywhere in the world (Mefun, 2019). Taylor (2003) assert that quality books could withstand the test of time; their content and physical appearance will still be impressive, intact and beautiful even after many years. One of the way of achieving good reading habit in children is by making textbooks more fascinating to them through good cover design and attractive inside the illustrations. Aggarwal (2001) also suggested physical features upon which the relevance and adequacy of a textbook could be evaluated, which include the following:

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i.   Paper: the paper used in the textbook should be of superior quality.
ii. Binding: it should have quality strong and durable binding.
iii. Printing: it should have quality printing, bold font and easily readable font..
iv. Size: bulky and thick. It should be handy.
v.   Cover: it should have an appealing and attractive cover page.

Well written and beautifully compiled textbooks attract and retain the attention of the students Aggarwal (2001). Making sure that the authors' message reaches the intended readers clearly and effectively involves more than words (Banjo, 1999). There must be the assurance that: the words are supported when necessary by illustrations; the appearance of the publication supports the message (design), the typesetting and printing should be clear, clean and the message reaches the potential readers . Quality of a textbook could be gleaned from the result of testing the design of a particular textbook against questions such as: Is the type a suitable face? Are the size of type, length of the line, and spacing suitable for easy reading? Is the page an appropriate size for the intended user? Is the binding appropriate for the intended user? Are illustrations well- planned so that details can be reproduced, does the design fit within the budget? Will it attract the intended readers? (Montagness, 1999). Ubong (2001) asserts that quite a number of textbooks used in schools are of poor quality. Many textbooks in Nigeria, according to Olajide (1995), have the following inadequacies: awkwardness of the format and layout, inadequate representations and illustrations, and insufficient boldness of the print. Also, most of these books are not durable, in view of the length of time they are expected to be used, which call for this review of the case of mathematics texts in junior secondary schools in Makurdi Local Government Area of Benue State, Nigeria.

Empirical Studies

Ajayi, Oyenuga, and Olutayo (2019) conducted a research on Content Analysis and Readability of Prescribed Secondary School Mathematics Textbook in Ogun State, Nigeria. The descriptive research design of survey type was used while the Multi-stage sampling technique was used in selecting the sample. Four research questions and two hypotheses were raised and tested using mean scores and Pearson Product Moment Correlation respectively. Data collection was carried out using two research instruments Teachers' Perception on the Content of Prescribed Mathematics Textbook Questionnaire (TPCPMTQ) and Assessment of Students' Readability of Content of Prescribed Mathematics Textbook Questionnaire (ASRCPMTQ, r = 0.82). The results showed that teachers perceived that the prescribed mathematics textbook lacked some content quality while the organization and presentation features qualities were also lacking. The findings also revealed that majority of the students found the textbook content sometimes confusing. It was therefore, recommended that policy makers and educational planners in the state should seek to know how the prescribed mathematics textbook could be improved to make it more student-friendly. The research study is similar to the present study as both looks into the content of the Mathematics Textbooks. The study differs with the present study as it further assess students readability of content of the Mathematics Textbooks while the present study further research for alignment of the Mathematics Textbooks with the Mathematics curriculum and the extent the Mathematics Textbooks

measure up in terms of content and appearance in Junior Secondary Schools in Makurdi local Government Area of Benue State, Nigeria.

Mefun (2019) conducted a research on quality comparison of old and new senior secondary school Mathematics textbooks. Three prescribed Mathematics textbooks were used for the comparison. The comparison was made on the old and new editions of these textbooks in terms of clarity of contents, adequacy of worked examples and appropriateness of end of chapter exercises. The study made use of descriptive survey research. The population consisted of only senior secondary school (SSS) 1 Mathematics teachers in Ondo State. A total of one hundred and forty four (144) SSS 1 Mathematics teachers were randomly selected from forty two (42) schools across the three senatorial districts of the State. One research instrument tagged "Rating of Quality of Mathematics Textbooks (RQMT) was used to collect data. Frequency counts and simple percentage calculations were used to analyze the data. The result reveals that, the quality of the new editions of Mathematics textbooks are better in terms of clarity of contents, adequacy of worked examples and appropriateness of end of chapter exercises than the old editions. The study therefore recommended among others that, textbook authors and publishers be encouraged to always revise textbooks to ensure that the content are clear, examples adequate and end of chapter exercises appropriate. The present study deals the comparative review of the Mathematics Textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria in terms of alignment with the Mathematics curriculum, content and Appearance.

Afolabi (2014) carried out a study on recommended mathematics textbooks used in Senior Secondary Schools in Southwestern States of Nigeria. The study also provided empirical evidence on the relevance, suitability and adequacy of some recommended Mathematics textbooks in Southwestern Nigeria. Eleven features in the textbooks were analyzed directly by the users (teachers). Mathematics teachers were purposively selected from two randomly selected public Senior Secondary Schools in each of the senatorial districts of all the six states in Southwestern geopolitical zone. The study comprised of 117 Mathematics teachers as the total respondents from the 36 public Secondary Schools that were selected for the study. Three major textbooks found in the survey were New General Mathematics (NGM) for West Africa; Mathematical Association of Nigeria (MAN) Mathematics; Science Teachers' Association of Nigeria (STAN) Mathematics and very few others which were perhaps numerically negligible. NGM was the most commonly used by many teachers and schools. The comparison of the features was in line with the expectations of the Senior Secondary School National Mathematics Curriculum. The features were well provided for in the textbooks. The books were relevant, suitable and adequate in their provisions and capable of bringing forth desirable learning outcomes. The textbooks however, need further provision of Students' Workbook, Teachers' Guide, progressive hierarchy of tasks, multiple and attractive colours. The establishment of Textbook Standard Content Review Panel (TSCRP) was recommended to approve textbooks for school use after proper screening by this body. Years for reprint, re-editing were to be recommended by the committee or panel. Like Afolabi (2014), the present study also considered the major mathematics textbooks used in Secondary Schools as well

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as their alignment with curriculum and the extent to which they measure up in terms of content and appearance. However, the present study is being carried out in Junior Secondary School whereas the reviewed study was carried out in Senior Secondary Schools. Additionally, the present study is being carried out in Makurdi LGA of Benue State, North-Central Nigeria whereas the reviewed study was carried out in Southwestern States of Nigeria.

Purpose of the Study

The purpose of the study is to carry out a comparative review of mathematics textbooks used in Junior Secondary Schools in Makurdi local Government Area of Benue State, Nigeria. In order to achieve this the following specific objectives are considered.

i. To ascertain the major mathematics textbooks used in Junior secondary Schools in Makurdi Local Government Area of Benue State, Nigeria.

ii. To ascertain the extent that the mathematics textbooks used in Junior Secondary Schools in Makurdi local Government Area of Benue State, Nigeria align with the mathematics curriculum.

iii. To investigate the extent that the mathematics textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria measure up in terms of content.

iv. To investigate the extent that the mathematics textbooks used in Makurdi Local Government Area of Benue State, Nigeria measure up in terms of appearance.

Research Questions

The following research questions guided the study.

i. What are the major mathematics textbooks used in Junior Secondary Schools in Makurdi local Government Area of Benue State, Nigeria?

ii. To what extent do mathematics textbooks used in Junior Secondary Schools in Makurdi local Government Area of Benue State, Nigeria align with the mathematics curriculum?

iii. To what extent do mathematics textbooks used in Junior Secondary Schools in Makurdi local Government Area of Benue State, Nigeria measure up in terms of content?

iv. To what extent do mathematics textbooks used in Junior Secondary Schools in Makurdi local Government Area of Benue State, Nigeria measure up in terms of appearance?

Research Hypotheses

The following hypothesis were tested at 0.05 level of significance

i. There is no significant difference among the mathematics textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria in terms of alignment with the mathematics curriculum.

ii. There is no significant difference among the mathematics textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria in terms of content.

iii. There is no significant difference among the mathematics textbooks used in Junior Secondary schools in Makurdi Local Government Area of Benue State, Nigeria in terms of appearance.

Methodology

Design of the Study

The study employed a descriptive survey research design. The design is very appropriate for this study because it helps to study the whole population by collecting data from the sample that is true representation of the whole population.

Area of the Study

The area of the study is Makurdi Local Government Area of Benue State, Nigeria. Makurdi is the capital of the Benue State. The local government is located in the North central Nigeria along the Benue River. The local Government Area shares boundaries with Guma local government area to the West, Gwer to the South and West and Doma local Government Area of Nasarawa state to the north-west.

Makurdi Local Government was created in 1976. The local government is inhabited predominantly by the Tiv, Idoma, Jukun, Hausa and other minor tribes. From the 2006 census record, the local Government is estimated having the population of about 300 377(NPC, 2006) with a landmark of 16km radius. Makurdi Local Government Area has a rich agricultural heritage and is known for the cultivation of yam, Cassava, groundnut, soybeans, and other variety of fruits.

Population of the Study

The population of the study consist of the unique mathematics textbooks used in JSS3 in the 110 government approved secondary schools in Makurdi Local Government Area, Benue State, Nigeria.

Sample and Sampling Technique

The sample size of this study consist 3 Mathematics Textbooks. The sampling techniques used for this study is stratified random sampling. 2 schools were selected from each of the 11 council wards in Makurdi Local Government, Benue State, Nigeria. The mathematics textbooks used for Junior Secondary Schools in each school was then selected into the sample. This results in 3 unique mathematics textbooks used across the 22 selected schools.

Furthermore, a random sample of 9 in-service Mathematics teachers were drawn to constitute the Mathematics Textbooks Review Panel. Each panel member was provided with a copy of the NERDC Mathematics Curriculum for Basic Education and the complete sets of the selected JSS3 Mathematics Textbooks .The panelist were briefed on the Mathematics Textbooks Review Checklist (MTRC) and were allowed to independently score each Mathematics Textbooks.

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Instruments for Data Collection

The researcher-made checklist titled Mathematics Textbooks Review Checklist (MTRC) was used as the main instrument for the study. The instrument has four (4) sections, A, B, C, and D. Section A collected data on the Mathematics Textbooks' particulars, section B collected data on the alignment of the textbooks to the Mathematics curriculum, section C collected data on the extent the mathematics Textbooks measure up in terms of content while section D collect data on the extent the Mathematics Textbooks measure up in terms of appearance. A checklist was used because it offer a systematic way of collecting data by the researcher from the subject. Sections B, C, and D are structured on 3-points, namely, High = 3; Medium = 2; and Low = 1.

Validation of the Instrument

Validation was carried out on the MTRC by two experts in Mathematics Education, two experts Test and Measurement and two Mathematics teachers for the review of the designed items. This is to ensure that the content were clear, relevant, and unambiguous. After validation by the experts, suggestions and corrections made by the experts were reflected in the final draft.

Method of Data Collection

The researcher visited Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria to sample mathematics textbooks used. The panelist were briefed on the MTRC and were allowed to independently score each mathematics textbooks.

Method of Data Analysis

The data were analyzed descriptively using frequencies, means and standard deviation to answer the research questions. A mean of 2.00 was used as a cut-off mark for decision making in the study. Hence, an overall mean of 2.00 and above was considered high, while below 2.00 was considered low. The hypotheses were tested at 0.05 level of significance using inferential statistics of Analysis of Variance (ANOVA). Scores were aggregated across clusters and the entire MTRC for each panelists rating for each unique mathematics textbook.

Results

The results of this study are presented according to the research questions and research hypotheses.

Research Question One

What are the major mathematics textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria?

Table 1: Major mathematics textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria

S/No.	Mathematics Textbook	Author(s)	Publisher
1	MAN Mathematics	Mathematical Association of Nigeria	University Press Plc
2	New General Mathematics	M. F. Macrae, A. O. Kaljaiye, Z. I. Chima, G. U. Garba, & M. O. Ademosu	Longman
3	New Concept Mathematics	A. A. Arrigbabu, M. O. Salau, A. A. Salaudeen, M. O. Salaam, T. D. Bot, H. N. Odogwu, A. I. Usman, R. A. Jimoh, & A. E. Adebisi	Learn Africa

Based on the result presented in Table 1, MAN Mathematics, New General Mathematics and New Concept Mathematics textbooks are the major Mathematics textbooks used in the selected Junior Secondary Schools in Makurdi LGA of Benue State. However, the most used textbook is MAN Mathematics while the least used textbooks is New Concept Mathematics.

Research Question Two
To what extent do mathematics textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria align with the mathematics curriculum?

Table 2: The Extent to which Mathematics Textbooks Used in JSS in Makurdi LGA Align with the Mathematics Curriculum

S/No.	Statement	Mean	SD	Remark
1	The topics in the textbook align with the curriculum	2.63	0.56	High
2	The chapter objectives align with the curricular objectives	2.04	0.71	High
3	The suggested teaching and learning materials align with the curriculum	1.85	0.60	Low
4	The serial organization of the topics align with the curriculum	1.93	0.68	Low
Cluster Mean		**2.11**		**High**

It can be seen from Table 2 that cluster mean for all the 4 items was 2.11., which is greater than the benchmark of 2.00. This implies that to a high extent, the mathematics textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria align with the mathematics curriculum. However, the individual item means

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for items 3 and 4 are below the decision benchmark of 2.00, indicating that suggested teaching and learning materials do not align with the curriculum; and that serial organization of the topics do not align with the curriculum.

Research Question Three

To what extent do mathematics textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria measure up in terms of content?

Table 3: The Extent to which Mathematics Textbooks Used in JSS in Makurdi LGA Measure Up in Terms of Content

S/No.	Statement	Mean	SD	Remark
1	Usability of the acceptable terms and symbols	2.30	0.47	High
2	Accurate, clear and appropriate illustrations	2.37	0.56	High
3	Provision of suitable exercises to each chapter	2.52	0.58	High
4	The number of worked examples for each chapter	2.52	0.58	High
5	Provision of answers to the exercises	2.70	0.47	High
6	Revision exercise and general test	2.52	0.58	High
7	Use of table of contents and other tables	2.56	0.51	High
8	Use of glossary	1.37	0.56	Low
9	Use of index	2.30	0.78	High
10	Explanation of keywords for each chapter	1.93	0.62	Low
11	Organization of the content (simple-complex)	2.37	0.56	High
Cluster Mean		**2.31**		**High**

Results presented in Table 3 revealed that the cluster mean for all the 11 items was 2.31 which is above the benchmark of 2.00. This implies that to a high extent, the mathematics textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria measure up in terms of content.

Research Question Four

To what extent do mathematics textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria measure up in terms of appearance?

Table 4: The Extent to which Mathematics Textbooks Used in JSS in Makurdi LGA Measure Up in Terms of Appearance

S/No.	Statement	Mean	SD	Remark
1	Quality paper	2.41	0.64	High
2	Durable binding	2.11	0.64	High
3	Quality printing and bold font	2.44	0.71	High
4	Appealing and attractive cover page	2.52	0.64	High
5	Portable size of the textbook	2.56	0.70	High
6	Colourful diagrams/illustrations	1.74	0.71	Low
Cluster Mean		**2.30**		**High**

Result presented in Table 4 revealed that cluster mean for all the 6 items was 2.30, which is greater than the benchmark of 2.00. This implies that to a high extent, the mathematics textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria measure up in terms of appearance.

Hypotheses one
There is no significant difference among the mathematics textbooks used in Junior Secondary Schools in Makurdi local Government Area of Benue State, Nigeria in terms of alignment with the mathematics curriculum.

Table 5: Summary of ANOVA for Alignment of Mathematics Textbooks with the Curriculum

Source of Variation	Sum of Squares	df	Mean Squares	F	F-crit	p-value	Decision
Between Groups	4.962963	2	2.481481				
				0.746518	3.402826	0.484703	Not Significant
Within Groups	79.77778	24	3.324074				
Total	**84.74074**	**26**					

$\alpha = 0.05$

Result presented in Table 5 shows that the p-value of 0.484703 is greater than the level of significance of 0.05, therefore the null hypothesis cannot be rejected. This implies that there is no significant difference among the mathematics textbooks used in Junior

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Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria in terms of alignment with the mathematics curriculum. This shows that the three Mathematics textbooks provide the same quality in terms of alignment with the Mathematics curriculum.

Hypothesis Two

There is no significant difference among the mathematics textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria in terms of content.

Table 6: Summary of ANOVA for Content of Mathematics Textbooks

Source of Variation	Sum of Squares	df	Mean Squares	F	F-crit	p-value	Decision
Between Groups	22.22222	2	11.11111				
				1.93548	3.40282	0.16623	Not Significant
Within Groups	137.7778	24	5.740741				
Total	**160**	**26**					

$\alpha = 0.05$

Result presented in Table 6 shows that p-value of 0.16623 is greater than the level of significance of 0.05, therefor the null hypothesis cannot be rejected. This implies that there is no significance difference among the mathematics textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria in terms of content. This also implies that all the three Mathematics textbooks provide the same quality in terms of content.

Hypothesis Three

There is no significant difference among the mathematics textbooks used in Junior Secondary schools in Makurdi local Government Area of Benue State, Nigeria in terms of appearance.

Table 7: Summary of ANOVA for Appearance of Mathematics Textbooks Appearance

Source of Variation	Sum of Squares	df	Mean Squares	F	F-crit	p-value	Decision
Between Groups	24.96296	2	12.48148				
				2.597303	3.402826	0.095258	Not Significant
Within Groups	115.3333	24	4.805556				
Total	**140.2973**	**26**					

$\alpha = 0.05$

The result presented in Table 7 shows that p-value of 0.095258 is greater than the level of significance of 0.05, therefore the null hypothesis cannot be rejected. This implies that there is no significant difference among the mathematics textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria in terms of appearance. The result shows that the three mathematics textbooks provide the same quality in terms of appearance.

Discussion of Findings

Results from Table 1 revealed that the major Mathematics textbooks used in Junior Secondary Schools in Makurdi LGA of Benue State are *MAN Mathematics*, *New General Mathematics* and *New Concept Mathematics*. The finding is in line with that of Afolabi (2014) which revealed that the major textbooks used in Secondary Schools were New General Mathematics (NGM) for West Africa, Mathematical Association of Nigeria (MAN) Mathematics and very few others which were perhaps numerically negligible. The finding however contradicts with that of Afolabi (2014) which revealed that New General Mathematics was the most commonly used by many teachers and schools. This study has shown that the majority of the schools in Makurdi Local Government Area uses Man Mathematics Textbooks. The difference in the two findings may be as a result of review of Secondary School curriculum and the preference of Junior Secondary Schools in the study areas.

The outcomes from Table 2 revealed that the mathematics textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria align with the mathematics curriculum to a high extent. The objectives stated in the three (3) Mathematics textbooks are in line with the Mathematics Curriculum objectives which are to help the learner(s) to: acquire mathematical literacy to function in an information age, cultivate the understanding and application of skill and concepts, develop the essential element of problem solving, communication, reasoning and connection with the study of mathematics become prepared for further studies in mathematics and other related field. The testing of hypothesis one also revealed that there is a no significant difference among

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the mathematics textbooks used in Junior Secondary Schools in Makurdi local Government Area of Benue State, Nigeria in terms of alignment with the mathematics curriculum. The finding supports that of Afolabi (2014) which revealed that the comparison of the features was in line with the expectations of the Secondary School National Mathematics Curriculum.

Result from Table 3 revealed that the mathematics textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria measure up in terms of content to a high extent. The major Theme and the topics considered in the three (3) mathematics textbooks which include number and numeration, basic operations, algebraic process, mensuration and geometric, everyday statistics are in line with the curriculum content. The testing of hypothesis two also revealed that there is no significant difference among the mathematics textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria in terms of content. The finding is in line with that of Mefun (2019) which revealed that the quality of the new editions of Mathematics textbooks are better in terms of clarity of contents, adequacy of worked examples and appropriateness of end of chapter exercises than the old editions. The finding also supports that of Afolabi (2014) which revealed that the Mathematics textbooks were relevant, suitable and adequate in their provisions and capable of bringing forth desirable learning outcomes. The finding however, contradicts with that of Ajayi, Oyenuga and Olutayo (2019) which revealed that the prescribed mathematics textbooks lacked some content quality.

Result from Table 4 revealed that the mathematics textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria measure up in terms of appearance to a high extent. The testing of hypothesis three also revealed that there is no significant difference among the mathematics textbooks used in Junior Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria in terms of appearance. The finding contradicts with that of Ajayi, Oyenuga, and Olutayo (2019) which revealed that the presentation features qualities of Mathematics textbooks were lacking. The finding also supports that of Afolabi (2014) which revealed that the Mathematics textbooks need further provision of multiple and attractive colours.

Conclusion

Based on the findings of this study, it is concluded that MAN Mathematics (University press PLC), New General Mathematics (Longman) and New Concept Mathematics (Learn Africa) textbooks are the major Mathematics textbooks used in Junior Secondary Schools in Makurdi LGA of Benue State, Nigeria. It is also concluded that to a high extent, the Mathematics textbooks used in Junior Secondary Schools in Makurdi LGA of Benue State, Nigeria align with the Mathematics curriculum and as well measure up in terms of content and appearance.

Recommendations

Based on the findings, the following recommendations are made;

i. The textbooks' authors and publishers should be trained to follow a given standard. The government should set up the standard and the pattern that every textbook authors and publishers should follow.

ii. Workbooks and teachers' guide should be written to accompany all recommended Mathematics textbook. Where work books are available, teachers and students should be encourage to make good use of them.

iii. The presentation format, font, colours and diagrams in Mathematics textbooks should be made more attractive.

iv. Mathematics textbook should have practical oriented tasks as much as possible. This could be written in interactive form to appeal to the emotion of the learners (affective learning).

v. Practical activities should be suggested/recommended in the textbooks to enhance psychomotor learning. Other areas where practical and activities could be used, such as in 3-D objects and other areas should be recommended and not left to the discretion of the teachers.

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