

Content Coverage and Readability of Science Textbooks in Use in Nigerian Secondary Schools

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Abstract

This study evaluated the content coverage and readability of science textbooks in use in Nigerian secondary schools. The study utilized an evaluation design. The study was limited to the core sciences studied at both the junior and senior secondary schools. They are Physics, Chemistry, Biology and Basic Science. A total of one thousand eight hundred and forty-eight research subjects comprising one thousand eight hundred students and forty-eight science teachers were used for the study. Two research questions and one null hypothesis guided the study. The research questions were answered using the quantitative model for textbook evaluation developed by Emerole (2008) while the hypothesis was tested at 0.05 level of significance using Chi-square test of goodness of fit. The finding revealed that all the science textbooks evaluated covered the contents of the core curriculum. The result of data analysis revealed that three out of four evaluated textbooks in biology are readable. Modern Biology for Senior Secondary Schools had readability mean score of 38.41%, Essential Biology for Senior Secondary Schools had 72.4%, College Biology for Senior Secondary Schools had 66.29% while Comprehensive Biology for Senior Secondary Schools had readability index of 60.1%. The data on readability for physics, chemistry and basic science indicate that they are readable. Based on the findings the researchers made specific recommendations with respect to the textbooks recommended for use in the four subject areas in Nigerian secondary schools. This will provide a template and guide for ministry of education in recommendation of science textbooks for secondary schools. In addition, it will serve as a basis and guide for review of science textbooks in use in both junior and senior secondary schools.

Keywords: content coverage, readability, science textbooks, secondary schools

DOI: 10.7176/JEP/13-7-06

Publication date: March 31st 2022

1. Introduction

1.1 Background

Science education is crucial to the achievement of socio-economic development of any society and also a critical element in the attainment of social, scientific, economic and environmental development goals. Two very distinct demands shape science education program in different countries. The first is the demand for specialist manpower so that societies and economies can keep pace in a world where scientific knowledge is being exploited in a rapidly increasing way. Second is the demand for a more scientifically literate citizenry. Education should, therefore, produce more members of the society who will be able to benefit from personal and social applications of knowledge and will be prepared to support the changes towards sustainable development. Udeani (2013) noted that science has undoubtedly improved the wellbeing of man. The benefits are seen in the areas of telecommunication, computers, space program (satellites space crafts), medicine and health care (including pharmaceutical advances), the study of genetics and breeding (cloning, hybridization, invitro fertilization, embryonic cell research), prevention of diseases, weaponry and military equipment, agriculture, marketing and sales through internet services, environmental sustainability and improved communication.

Education is the best investment and books are the basic tools of education. This is in line with Deshmukh's (2007) opinion that textbooks are perhaps the most vital learning material available and used in most schools. Textbooks present a treasure of knowledge to students and also boost students' interest in the subjects. If this instructional material contains any defective knowledge or information, the consequences will be serious on the students and the society in general. A number of science textbooks are not adequate and unsatisfactory as pointed out by Ekpenyong (1990).

Science encompasses the physical and natural studies and their interrelationships with the environment. The cardinal objectives of science education in senior secondary school as stated by Federal Ministry of Education (2009) are to acquire:

- a. adequate laboratory and field skills in science
- b. meaningful and relevant knowledge in science

- c. ability to apply scientific knowledge to everyday life in matters of personal and community health and agriculture, technology, environment and;
- d. reasonable and functional scientific attitude

It is therefore imperative that the contents of science textbooks should satisfy the requirement of curriculum and national policy if the objective of creating a scientifically literate society is to be achieved. According to Tugba (2012) and Onyema et al (2022), the study of science helps students learn to make more informed decisions about their own world, to recognize the importance of technology and develop skills of environmental management and sustainability. Science education opens up career opportunities. Few numbers of students enroll in science when compared to other subjects because Science. Incidentally, the performances of students in Science at School Certificate Examination as attested by Chief Examiners Report (2012) have not been satisfactory.

Textbooks play important role in the teaching and learning of science. Science textbooks are most frequently used instructional material for students and teachers at all level. This is because of their availability and ease of use. Science textbooks help students to repeat lesson at home or study before the lesson. These text materials therefore should be written with the vocabulary appropriate for the age and level of students using them. Textbooks must be understandable to students, appropriate for self-study and include accurate information. Science as a subject contains many scientific terms and much abstract knowledge. In order to encourage students, understand concepts, prevent memorization and increase their knowledge, Science textbook must contain relevant illustrations that are attractive to students and activities that stimulate critical-thinking skills and scientific inquiry. It is important that textbooks include accurate content aligned with the curriculum requirement because many teachers use them as the curriculum guide. Ozongwu (2011) stated that in today's classroom, textbooks serve as a guide and gauge and greatly influence how content is delivered. With the current high level of global technological awareness and emphasis on science education, there is a renewed call for functional science education (Emereole & Ramniki 2004). To achieve this objective, every effort should be made to establish and apply a wide variety of relevant and contextual appropriateness for the evaluation of the textbooks used in teaching science in classrooms. If Science textbooks exert influence on science teaching and learning, it becomes necessary that the content and what they convey to the students are factual, accurate and up-to-date. Therefore, it is important for the authorities in the ministry of education to evaluate the available textbooks critically before approving their use in schools (Baiyelo, 2000; edeh et al, 2021). Authorities should ensure that careful selection of textbooks to be used in senior secondary schools are made and that materials approved closely reflect the needs of the learners, the aims and values of the teaching program. The National Council on Education has directed that the State Ministries of Education should periodically review and evaluate textbooks used in teaching both junior and senior secondary school students to ensure that the books meet the expected standard. When such regular evaluation is not done, it becomes difficult to claim that the approved textbooks have acceptable quality. Evaluation of Science textbooks for use in senior secondary schools should focus principally on topical coverage and readability. The topical coverage index provides estimate of how far the content of the textbooks covers the prescribed syllabus.

Because these indices have not been established for the textbooks in use in Nigerian secondary schools, it becomes critical and very imperatives that the ministry of education be adequately guided in their recommendation of such vital curriculum materials for use in schools. In addition to justifying the usage of the textbooks it is necessary to guide the authors on areas of emphasis during further revisions of the textbooks. This study is a response to these critical needs and is therefore focused on providing a thorough evaluation and unbiased indices of major Science textbooks in use in Nigerian Secondary Schools

1.2 Overview of Textbooks

A textbook according to Eusebio (2000) is a compilation of facts, ideas, concepts, principles, practices and knowledge within a given subject matter area. Such compilation is in printed form. Savery (2001) defines a textbook as a teaching learning material covering clearly defined subject matter for the learner for a given grade level and reading ability. According to Columbia Encyclopedia (2003) the word 'book' is any collection of sheets of papers, words and other materials sewn together. Hams (2003), stated that a textbook is both designed for classroom use carefully prepared by experts in the field and equipped with the usual teaching devices.

Uche (2009) sees textbooks as books that are designed for presentation of subject matter in an orderly sequence for utilization in specific classes. Okafor (2010) defines textbook as a book specially prepared for use by pupil and teachers in a school or class, presenting a course of studies in a single subject or closely related subjects. The Robert dictionary defines textbook as a didactic work that contains in a continent format, the essential elements of science techniques and especially the knowledge which is required by the scholar programmes.

Gerard (2003) defines the textbook as a printed volume, structured in order to enroll in a learning process, with the purpose of improving the efficiency. Textbook as defined by Emenogu (1991) is a book which apart

from processing information contains exercises which guide subject matter.

From these definitions, textbook can be defined as any printed material written for classroom use during education that assists teaching and learning. From researcher's definition, an accepted science textbook should represent science in such a way that it supports learner in mastering the particular subject and performing excellently in examination. Since textbooks play important role in teaching and learning, the content and readability level need to be frequently evaluated. A textbook therefore is a repository or printed material dealing with a known subject matter for use in teaching and learning a course of instruction whose use will enable the learner learn the facts, news, skills, knowledge and attitudes of the subject matter covered in the particular textbook.

There are some characteristics which a material must poses or meet up with before it can be categorized as a textbook. Pamphlets, booklets etc. are not textbooks since they may not have met the criteria of coverage, depth and accuracy. According to Fillman (2007), Klum, Roseman (1999) textbooks play decisive roles in teaching and learning activities, serve as primary teaching instrument and often regarded as the primary organizer of the teacher and provide detailed explanations of topics to be taught.

Udechukuwu (2004) in agreement stated that textbooks are the most important resources used for teaching and learning science in schools as a result have to be improved and updated according to changes in education programs, curricula and recent scientific knowledge. There is need for frequent evaluation of the content of the textbooks recommended for use in senior secondary schools.

A number of researchers such as Singer and Tuomi (1997) investigated the issue of quality of good textbooks. Such studies identified some characteristics which make up a good quality textbook as broad, accurate, sound and well sequenced, cognitive content coverage, in line with the curriculum and the extent the contents are relevant to the aims and objectives of the course. Tuomi (1997) suggested some helpful questions that must be considered for a textbook to be categorized as good and qualitative.

- Does the textbook support the scope and sequence of the curriculum?
- Does the textbook consider the history of the scientific discipline?
- Are supplementary reading provide at multiple reading levels so that both advanced and learning-disabled students confined appropriate reading
- Is the textbook clearly written?
- How challenging is the materials?
- Are the exercises included in the text itself?

In conclusion, a textbook is a collection of the knowledge and principles of selected topic or course. It is usually written by one or more teachers, college professors, or education experts who are authorities a specific field. Most textbooks are accompanied by teacher guides that provide supplemental teaching materials, ideals, and activities to use throughout the academic year.

1.3 Readability of Textbooks

'Reading' is a complex cognitive process of decoding symbols for the intention of deriving meaning. (Online: the free cyclopedia 2011). Reading according to Urerick (2014) is a process of active construction of meaning. Academic performances are seriously affected by poor text readability. The term 'readability' refers to all the factors that affect success in reading and understanding a text. These factors include: the interest and motivation of the reader, the legibility of the print (and of any illustrations) and the complexity of the words and sentences in relation to the reading ability of the teacher. Readability has been defined in several ways. William DuBay (2006) and Fry, Edward (2006) defined it as easy reading that helps learning and enjoyment. So, what we write should be easy to understand. According to Tinker (1963) readability is the ease in which text can be read and understood. When writing a textbook, an author is intent on transmitting information to the reader. How well the author succeeds will depend on the readability of the text. Readability is concerned with the problem of matching between reader and text. An accomplished reader is likely to be bored by simple repetitive texts and while a poor reader may quickly become discouraged by texts which he finds too difficult to read fluently. This is likely to happen when the text is poorly printed, contains complex sentence structures, long word or too much material containing entirely new ideas.

Reading a text in any language is cognitively challenging whatever the subject matter for both native and second language readers because, it involves the coordination of attention, memory, perceptual processes and comprehension processes (Kerb, 1989; Edeh et al, 2020). If a student's percentage material is probably at his or her frustration level and therefore too difficult. Thus, the teacher should offer alternate ways of learning the material. If the students had 44 to 57 percent of the answers correct, the material is probably at the student's instructional level, and he or she will be able to learn from the text if the teacher provides careful guidance in reading by developing readiness, helping with new concepts and unfamiliar vocabulary and providing reading purposes and comprehension. If, however, the student has more than 57 percent of the answer correct, the material is probably at that student's independent level, and he or she should be able to benefit from the material

when reading it independently.

A teacher using the percentage given must count only exact words as correct, since the percentage were derived using only exact words. Synonyms must be counted as incorrect, along with obviously wrong answers and unfilled blanks. Because all the materials in a given textbook is unlikely to be written on the same level, teachers should choose several samples for cloze test from several places in the book in order to determine the book's suitability for a particular child.

It is only when a student can actually read and understand the texts as they glance through the pages that learning can take place and performance in senior secondary examination be assured. It is also at that time that useful knowledge can be obtained from the textbook. Clark (2003) defined reading as passive, text-driven meaning-taking process. He regarded science textbook reading as an interactive-constructive process. Reading is defined by Abodomin (1984) as a medium for exciting activity and its readability the investigation into unknown areas of information. It is a method by which the insight of printed symbols causes some form of reactions in mind. As a result of reading, perception and retention take place.

Reading experts have stated three types of reading levels for students. These reading levels according to Dolgin, (1975) and Naylor & Diem, (1987) are:

Independent Reading Level: The material that could be read by students at this level indicates material students can handle without seeking help from outside sources. Students can easily learn almost everything provided by the author; they are familiar with the words, possess the necessary skills to derive the ideas implied by the text and can comprehend the concepts stated without any difficulty.

Educational Reading Level: The material for the educational level indicates a material which students can comprehend when assisted by the instructor. At this level, the instructor should probably provide an overview as to what the students will be reading, ask them guiding questions and start a class discussion immediately after the reading process finishes improving comprehension of the text.

Insufficient Reading Level: At this level, the students are not able to work adequately with the materials on hand. Materials are so difficult for students such that a reasonable amount of educational help is insufficient for students to form a bridge between their skills and the expectations of the author. Word recognition and comprehension is very difficult and students can demonstrate observable signs of anxiety.

Students who are presented with textbook too difficult to understand may lose interest in reading as well as in the subject. Readability is concerned with the problem of matching between reader and text. An accomplished reader is likely to be bored by simple repetitive texts and while a poor reader may quickly become discouraged by texts which he finds too difficult to read fluently. This is likely to happen when the text is poorly printed, contains complex sentence structures, long words or too much material containing entirely new ideas. Readability is the assessment of difficulty that a reader of a certain level of skill may have in reading a piece of connected written discourse or text. Cheryl (2000) defines readability as the ease with which a document can be read. Webster's Defines "readable" as fit to read, interesting, agreeable, attractive and enjoyable. Pikulski (2002) defines readability as the level of ease or difficulty with which a text material can be understood by a particular reader who is reading the text for a specific purpose. The purpose of readability is to produce the best match between intended readers and texts. The difficulty level of a textbook in relation to the class for which it is meant to serve is sometimes measured. One of such measurement is readability.

Readability according to Ziriki (2009) is said to be the reading difficulty level of a textbook in relation to the class for which it is meant. Readability level of a textbook, therefore, is one of the factors that determine the understanding of a subject by the students. Readability, according to Frank (2006) can be used as a rough estimate for placing written material in appropriate grade levels. Similarly, Uchenna (2002) in a report on readability of secondary school English language textbooks, reiterated the effect of readability on such factors as vocabulary, sentence length, and sentence complexity. He advised textbook writers and publishers to use various formulas that have been developed and standardized to ensure that what is produced for learners matches the learners.

Efforts to communicate science in a way that would benefit the individual and society seem to yield little or no results. This could be as a result of the reading disability and the ideas that are not effectively communicated. If resource materials use to communicate biology is ineffective, learning cannot take place. Communication is a very important tool in transmitting ideas and information. It is a medium of transfer of information. Equally, language is a medium for communication and tool for all creative thought. Therefore, the language of every biology textbooks should not be above the expected user. A good biology textbook writer should arrange the topics in such a way that it has to be in rising order of difficulty and should consider the cognitive level of the students who are to use the textbook. Concepts in each of the biology text should be step by step introduced and presented in a way that the students can easily comprehend them.

The concepts in biology should be from less difficult topics to difficult ones in order to allow the reader use previous knowledge on the subject, this is because, students encounter difficulties in reading biology textbooks as a result of terminology and abstract language.

1.4 Research Questions

The following research questions guided the study:

1. How does the content of each of the approved Science textbooks cover the prescribed curriculum in senior secondary schools?
2. What is the readability index of each of the recommended Science textbooks?

1.5 Hypothesis

HO₁: The content of each of the recommended Science textbooks in use in the secondary schools in Nigeria does not significantly deviate from the specification of the core curriculum in science.

2. Research Method

2.1 Design of the Study

The study was carried out using evaluation design. Ali (2006) stated that Evaluation design is the type of design that makes value judgment on programmes and projects based on certain predetermined. According to Wolf (1991), is the act of gathering information and juxtaposing it with some set of criteria to make judgment regarding the strength and weakness, merits or worth of an education innovation, materials, programmes or products.

2.2 Sample of the Study

All the textbooks in four Science subjects recommended for use in Nigerian Secondary Schools were used for this study. The researcher selected one senior secondary school from each of the six geopolitical zone of Nigeria through a non-proportionate stratified random sampling technique. From each school fifty (50) students offering Science were drawn from each of the streams of JSS1, JSS2, JSS3, SS1, SS2, and SS3. In all three hundred (300) students were selected from each zone so that for the six zones a total of one thousand eight hundred (1800) students were drawn for the study. The selection of the students from the classes was achieved through simple stratified random sampling technique. Eight (8) Science teachers (two from each subject area) were drawn from each school making a total of forty-eight (48) Science teachers from the six schools. In all therefore a total of one thousand eight hundred and forty-eight research subjects (1800 students and 48 teachers) were used for the study.

2.3 Method of data Collection

Data were collected with the Quantitative Approach for Evaluation of Science textbooks (QACEST) which was developed by Emerole (2008). The criteria that was used for this particular study is index of topical coverage and readability index. The cloze tests that were drawn from the science textbooks were subjected to face validation using specialists in science and measurement & Evaluation. Four specialists in science from unity secondary schools were used for the face validation in addition to three specialists in measurement and evaluation from the University of Nigeria. They screened the cloze passages in terms of relevance, appropriateness of terms and suitability of closures.

The cloze passages were also subjected to a measure of internal consistency using the split-half approach. In this case the passages were extended to permit splitting each cloze passage into two. The scores obtained from each half of the test were assessed using the Pearson's approach. Reliability indices of 0.93, 0.74, 0.71 and 0.80 were obtained for the close passages drawn from textbooks in the four subject areas (Physics, Chemistry, Biology, and Basic Science).

Data for the main fieldwork were collected using the Quantitative Approach for Content Evaluation of Science Textbooks and the cloze test.

3. Method of Data Analysis

The research questions were answered using the quantitative model formula while the hypothesis was tested at 0.05 level of significance using Chi-square test of goodness of fit.

4. Results

4.1 Research Questions 1

How do the contents of science textbooks in use in Nigerian Secondary Schools correspond with the content specified in the core-curriculum?

The data collected on the (ITC) Index of topical coverage were analyzed for all the subjects. The scores of the textbooks per subject were calculated as shown in Tables 1a – 1d

Table 1a: *Indices of topical coverage (ITC) of the Biology Textbooks in use in Nigerian Secondary schools*

S/N	Text book	T _t	T _s	S _t	S _s	Index
1	Modern biology for senior secondary schools	38	41	84	89	0.94
2	College biology for senior secondary schools	40	41	86	89	0.98
3	Essential biology for senior secondary schools	36	41	80	89	0.89
4	Comprehensive Biology for senior secondary school	34	41	78	89	0.86

Acceptance range = 0.75 to 1.00

The result of data analysis in Table 1a reveals the topical coverage indices of the texts. Modern Biology for Senior Secondary had topical index of 0.94, College Biology for Senior Secondary had 0.98, Essential Biology for Senior Secondary had 0.89 while Comprehensive Biology for Senior Secondary had 0.86, College Biology for Senior Secondary schools had the highest topical coverage index while Comprehensive Biology for senior Secondary Schools had the lowest topical coverage index.

Table 1b: *Indices of topical coverage (ITC) of the Physics Textbooks in use in Nigerian Secondary schools*

S/N	Text book	T _t	T _s	S _t	S _s	Index
1	New School Physics	27	28	40	43	0.95
2	Essential Physics	26	28	38	43	0.91
3	Comprehensive Physics	28	28	42	43	0.99
4	Secondary school Physics	27	28	42	43	0.97

Acceptance range = 0.75 to 1.00

Summary of result in Table 1b indicates all the physics textbooks evaluated had very high topical coverage with the comprehensive physics showing higher topical coverage than other physics textbooks evaluated.

Table 1c: *Indices of topical coverage (ITC) of the Chemistry Textbooks in use in Nigerian Secondary schools*

S/N	Textbook	T _t	T _s	S _t	S _s	Index
1	New school chemistry for senior secondary schools' students	18	18	110	125	0.94
2	Chemistry for senior secondary school	18	18	120	125	0.98
3	A New Certificate Chemistry	18	18	120	125	0.98

Acceptance range ⇒ 0.75 to 1.00

The results presented in table 1, revealed that all the chemistry textbooks evaluated are within the acceptance range of topical coverage. The finding implies that they covered the content of the core – curriculum in chemistry.

Table 1d: *Indices of topical coverage (ITC) of the Basic Science Textbooks in use in Nigerian Secondary schools*

S/N	Text book	T _t	T _s	S _t	S _s	Index
1	New Edition Junior Secondary Basic Science 1	20	25	60	63	0.88
2	New Edition Junior Secondary Basic Science 2	25	25	61	63	0.98
3	New Edition Junior Secondary Basic Science 3	24	25	62	63	0.97

Acceptance range = 0.75 to 1.00

Results summarized in Table 1d indicate that all the basic science textbooks evaluated have adequate topical coverage of the core curriculum for basic science.

4.2 Research Question 2

What is the Readability Index of the Science textbooks in use in Nigerian Secondary Schools?

The data used in answering this research question were obtained from the “Cloze Test of Readability of textbooks”. The mean readability scores of the various textbooks evaluated for each subject were computed and presented on tables 2a – 2d.

Table 2a: *Readability Index of the Biology Textbooks in use in Nigerian Secondary Schools*

S/N	Textbook	Mean Readability score	Decision
1	Modern biology for senior secondary schools	38.41%	Not Readable
2	Essential biology for senior secondary schools	72.42%	Very Readable
3	College biology for senior secondary schools	66.29%	Readable
4	Comprehensive Biology for senior secondary school	60.11%	Readable

Acceptance Range => 40% & above

The result of data analysis in Table 2 reveals that three out of four evaluated textbooks are readable. Modern Biology for Senior Secondary Schools had readability mean score of 38.41%, Essential Biology for Senior Secondary Schools had 72.4%, College Biology for Senior Secondary Schools had 66.29% while Comprehensive Biology for Senior Secondary Schools had readability index of 60.1%.

Table 2b: *Readability Index of the Physics Textbooks in use in Nigerian Secondary Schools*

S/N	Textbook	Mean Readability score	Decision
1	New School Physics	58.17%	Readable
2	Essential Physics	57.33%	Readable
3	Comprehensive Physics	62.49%	Readable
4	Secondary school Physics	58.36%	Readable

Acceptance Range => 40% & above

Summary of result in Table 2b indicates that the physics textbooks evaluated are readable.

Table 2c *Readability Index of the Chemistry Textbooks in use in Nigerian Secondary Schools*

S/N	Textbook	Mean readability score	Decision
1	New school chemistry for senior secondary schools' students	60.8%	Very Readable
2	Chemistry for senior secondary certificate	46.3%	Readable
3	A new certificate chemistry	50.7%	Readable

Acceptance Range => 40% & above

Summary of result in Table 2c indicates that the chemistry textbooks evaluated are within the acceptable range of readability.

Table 2d: *Readability Index of the Basic Science Textbooks in use in Nigerian Secondary Schools*

S/No	Textbook	Mean Readability score	Decision
1	New Edition Junior Secondary Basic Science 1	65.14%	Readable
2	New Edition Junior Secondary Basic Science 2	67.10%	Readable
3	New Edition Junior Secondary Basic Science 3	66.21%	Readable

Acceptance Range => 40% & above

As shown in Table 2d the three basic science textbooks evaluated are within the acceptable range of readability.

4.3 Hypotheses

H_{01} : *The content of the Science textbooks in use in Secondary Schools in Nigerian of Nigeria do not significantly deviate from the specifications of the core-curriculum in biology.*

The contents of the textbooks for each of the Science subjects evaluated in this study were matched with the contents specified in the curriculum. The frequencies of T_t = Number of topics sufficiently covered by the textbook, T_s = Number of topics in the syllabus, S_t = Number of sub-topics sufficiently covered by the textbook and S_s = Number of sub-topics in the syllabus were subjected to a chi-square test of goodness of fit. The result is presented in the tables 3a – 3d.

Table 3a: *Chi-square Table on the Significance of Deviation of the four Biology Textbooks Contents from the Specification of biology Core-Curriculum.*

S/N	Textbook	Main Topic	Sub topic	X^2 cal	Alpha	X^2 Crit	Decision
1	Modern biology for senior secondary schools	38 (41)	84 (89)	4.70	0.05	7.82	Accept Null Hypothesis
2	College biology for senior secondary schools	40 (41)	86 (89)				
3	Essential biology for senior secondary schools	36 (41)	80 (89)				
4	Comprehensive Biology for senior secondary school	34 (41)	78 (89)				

The result in table 3 reveals a chi-square calculated value of 4.70 and critical value of 7.82 at alpha level of 0.05. Based on the decision rule, researcher accepts the null hypothesis and concludes that the content of four biology textbooks evaluated do not significantly deviate from the specification of the core-curriculum in biology.

Table 3b: Chi-square Table on the Significance of Deviation of the Physics Textbooks Contents from the Specification of Physics Core-Curriculum.

S/N	Textbook	Main Topic	Sub topic	X ² cal	Alpha	X ² Crit	Decision
1	New School Physics	27 (28)	40 (43)	4.71	0.05	7.82	Accept Null Hypothesis
2	Essential Physics	26 (28)	38 (43)				
3	Comprehensive Physics	28 (28)	42 (43)				
4	Secondary school Physics	27 (28)	42 (43)				

The result in table 3b reveals a chi-square calculated value of 4.71 and critical value of 7.82 at alpha level of 0.05. Based on the decision rule, researcher also accepts the null hypothesis and concludes that the content of four physics textbooks evaluated do not significantly deviate from the specification of the core-curriculum in physics.

Table3c: Chi-square Table on the Significance of Deviation of the Chemistry Textbooks Contents from the Specification of Chemistry Core-Curriculum.

S/N	Textbook	Main Topic	Sub topic	X ² cal	Alpha	X ² Crit	Decision
1	New school chemistry for senior secondary schools' students	18 (18)	110 (125)	2.20	0.05	7.82	Accept Null Hypothesis
2	Chemistry for senior secondary school	18 (18)	120 (125)				
3	A New Certificate Chemistry	18 (18)	120 (125)				

The result in table 3c reveals a chi-square calculated value of 2.20 and critical value of 7.82 at alpha level of 0.05. Based on the decision rule, researcher also accepts the null hypothesis and concludes that the content of three chemistry textbooks evaluated do not significantly deviate from the specification of the core-curriculum in chemistry.

Table3d: Chi-square Table on the Significance of Deviation of the Basic Science Textbooks Contents from the Specification of Basic Science Core-Curriculum.

S/N	Textbook	Main Topic	Sub topic	X ² cal	Alpha	X ² Crit	Decision
1	New Edition Junior Secondary Basic Science1	20 (25)	60 (63)	1.255	0.05	7.82	Accept Null Hypothesis
2	New Edition Junior Secondary Basic Science 2	25 (25)	61 (63)				
3	New Edition Junior Secondary Basic Science 3	24 (25)	62 (63)				

The result in table 3d reveals a chi-square calculated value of 1.255 and critical value of 7.82 at alpha level of 0.05. Based on the decision rule, researcher accepts the null hypothesis and concludes that the content of three basic science textbooks evaluated do not significantly deviate from the specification of the core-curriculum in basic science.

4.4 Summary of the Result

From the evaluation, it was revealed generally that:

- i. Three out of the four evaluated biology textbooks covered the content as stipulated by the curriculum. They are College Biology for Senior Secondary Schools with index of 0.98 followed by Modern Biology for Senior Secondary Schools with index of 0.94 and Essential Biology for Senior Secondary Schools that had 0.89. The Comprehensive Biology for Senior Secondary Schools had 0.86.
- ii. Three out of four evaluated biology textbooks are readable for Senior Secondary School students. Essential Biology for Senior Secondary Schools had the highest mean readability score of 72.41%; Modern Biology for Senior Secondary Schools had the lowest mean readability score of 38.4%. It is therefore not readable to the students.
- iii. All the recommended textbooks for physics covered the physics core curriculum and are also readable.
- iv. The Chemistry textbooks are within the acceptable range of topical coverage. The three chemistry textbooks evaluated are also readable.
- v. All the Basic Science textbooks are within the acceptable range of topical coverage. They are also readable.

5. Conclusion

Quality textbooks should have adequate topical coverage and should be written in a language that is readable to

the learners. This study exposes the fact that some of the biology textbooks approved for teaching and learning of biology in Senior Secondary schools in Nigerian are not adequate. Modern biology, College biology, Essential Biology for senior secondary schools and Comprehensive biology for secondary school are good in terms of topical coverage and should be recommended for teachers and students of biology. However, authors of Modern Biology should review the language structure and terminologies to enhance the readability of the textbook. Comprehensive Biology should be revised to ensure that the users get maximum knowledge and skills from the text.

All the chemistry, physics and Basic Science textbooks reviewed covered the core curriculum both in their main and sub-topics and are also readable.

Recommendations

Based on the findings of the study, the researchers recommends that:

- i. authors of science textbooks should periodically evaluate their textbooks in line with textbook Evaluation Criteria to ensure that the texts attain minimum standards recommended by the Federal Ministry of Education.
- ii. Ministry of Education should establish a body that should take the responsibility of evaluating biology textbooks before recommendation to the students.
- iii. textbooks recommendation should not be based on the reputation of the publishers and their lobbying abilities but should be based on some more objective criteria that relate to textbook quality with the learners as the principal focus.

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