CONTENT EVALUATION OF APPROVED BASIC SCIENCE TEXTBOOKS IN JUNIOR SECONDARY SCHOOLS IN ENUGU STATE

Mercy Ifunanya Ani
Department of Science Education, Alex Ekwueme Federal University Ndufu Alike Ikwo Ebonyi State, Nigeria ani.mercy@funai.edu.ng

Abstract
The research focused on evaluating approved Basic Science textbooks for Junior Secondary Schools in Enugu State. The study used an evaluation research design, addressing five specific research questions. The population consisted of eleven approved textbooks, with a sample of five selected through purposive random sampling. Data was collected using the Quantitative Approach to Content Evaluation of Science Textbooks (QACEST), analyzing five criteria to answer the research questions. The findings indicated that all five textbooks covered the curriculum content, though one excelled in covering all specified topics and sub-topics. Additionally, one textbook had the highest learning activity, balancing active learning with passive reception of information. Two textbooks posed the most challenging study questions, promoting deeper thinking among learners. Regarding chapter summaries, one textbook stood out for its comprehensive linkage of chapter materials, while two lacked chapter summaries entirely. Overall, one textbook emerged as the most recommended due to its extensive topical coverage, robust learning activities, numerous study questions, and effective chapter summaries. The result of this study will be beneficial to the authors and publishers because the study will provide information on the topical coverage, learning activities, study question, illustration and chapter summaries in the text that will guide them and as well enable the authors to revisit the content of their textbooks where necessary for further improvement. Based on these results, the study recommended that the Ministry of Education should approve textbooks that undergo rigorous content evaluation to ensure high quality and relevance for educational use. This approach would encourage authors to produce textbooks with comprehensive coverage, engaging learning activities, thoughtful study questions, effective illustrations, and well-structured chapter summaries.

Keywords: Basic Science, Content, Evaluation, QACEST, Textbooks

Introduction

Science is a systematic exploration of nature through observation and experimentation, aimed at building a body of knowledge that enables problem-solving. It involves discovering connections among facts to form a coherent understanding of the natural world. The knowledge produced by science is robust and practical, empowering the development of new technologies, medical treatments, and solutions to various challenges. Science forms the foundation for modern technological advancements. According to Adeboye (2011), science is defined as the acquisition of knowledge through systematic experimentation and observation. Adeboye emphasizes the immense potential of science in alleviating human burdens and fostering both individual and national progress. Science plays a crucial role in enhancing quality of life, bolstering economic stability, improving health outcomes, and ensuring national security. It also serves as a catalyst for industrial growth and overall national development (Okolo, 2011). Among the fundamental disciplines in the field of science - Basic Science, Biology, Chemistry, Physics, and Mathematics, Basic Science stands out as particularly crucial. It forms the primary foundation for learning in junior schools, owing to its relevance and significance.

The introduction of Basic Science into Nigeria's education system stemmed from the re-alignment and restructuring of curricula for primary science and junior secondary school integrated science. According to NERDC (2007), the primary objectives of this restructuring were to enable learners to:

- ✓ Cultivate interest in science and technology.
- ✓ Acquire fundamental knowledge and skills in science and technology.
- ✓ Apply their scientific and technological knowledge and skills to address societal needs.
- ✓ Explore various career opportunities available in science and technology.
- ✓ Prepare adequately for further studies in science and technology.

Femi (2011) argued that these objectives are not fully achieved since students' performance in Basic Science external examinations. To address the persistently poor performance of students in Basic Science examinations, such as those conducted by the National Examination Council (NECO), it's crucial to understand the factors contributing to these outcomes. According to the Chief Examiners' reports from 2019-2022, many candidates have failed these examinations, indicating a lack of understanding and mastery of the subject matter. Several factors contribute to poor performance in Basic Science examinations, including textbooks, teaching quality, planning, monitoring, supervision, and evaluation. Therefore, achieving educational objectives requires that the Basic Science curriculum reflects relevant and meaningful content and instructional methods. Additionally, it's essential for authors to develop effective teaching and learning materials to support teachers in their delivery of the subject, including the use of various Basic Science textbooks. Basic Science textbooks play a critical role as instructional materials, providing comprehensive coverage of science and technology content to learners. They facilitate activities such as scientific inquiry, question identification, planning, assignments, and experiments. According to Okolo (2011), both teachers and students heavily rely on textbooks for information.

Textbooks are a fundamental component of curriculum implementation at all educational levels. They are systematically organized materials designed to provide structured instruction in specific subjects. According to Goslin (2013), textbooks differ from other books as they adhere to a standardized curriculum within a school system. A Basic Science textbook, therefore, serves as an instructional tool that presents the curriculum content of Basic Science in a structured manner. Ezeano & Neboh (2010) opined that the content of a textbook encompasses the knowledge, skills, attitudes, and values learners are expected to acquire. As described by Nworgu (1988), textbook content is evaluated based on several criteria: Topical coverage, learning activity, chapter summaries, illustrations, and study questions. Each of these criteria provides an index that can be used to assess the quality and effectiveness of a textbook. Topical coverage, as defined by Nworgu in Ani (2023), refers to how comprehensively a textbook covers the prescribed curriculum or syllabus. This includes both surface coverage, which measures the proportion of topics covered, and depth coverage, which assesses the thoroughness with which those topics are treated. In the context of this study, topical coverage measures the extent to which main topics and sub-topics from the curriculum or syllabus are addressed within a textbook.

The study focuses on evaluating the content of approved Basic Science textbooks used in junior secondary schools in Enugu State. This evaluation is crucial due to persistent challenges in student performance on Basic Science examinations, such as those conducted by the National Examination Council (NECO). Factors contributing to poor performance include textbook quality, teaching standards, planning, supervision, and evaluation. To effectively evaluate these textbooks, the study adopts the Quantitative Approach to Content Evaluation of Science

Textbook (QACEST), which assesses five key criteria: Topical coverage, learning activities, study questions, illustrations, and chapter summaries. This approach ensures a comprehensive assessment of the textbooks' factual content, ideas, and scientific models, thereby determining their suitability for educational use (Ani, 2016; Ifeobu, 2014; Omiko, 2010 and Omebe, 2010).

The content of textbooks plays a pivotal role in addressing the objectives of the Basic Science curriculum across cognitive, affective, and psychomotor domains of learning. It is imperative that only textbooks evaluated and deemed adequate in content by educational authorities are approved for use in schools. Publishers should prioritize updating and improving textbooks in alignment with new curriculum standards to enhance educational outcomes. Issues with textbook evaluation and selection are not unique to Nigeria but are global challenges. Omiko, & Abonyi, (2011) raised concerns about the criteria used in textbook approval processes, highlighting the potential influence of non-academic factors in textbook selection. Such shortcomings can negatively impact students' achievement in external examinations. Given these considerations, it is essential to investigate and evaluate the content of Basic Science textbooks systematically used in junior secondary schools in Enugu State. This evaluation aims to ensure that textbooks meet educational standards, effectively support teaching and learning, and contribute to improved student performance in examinations (Omebe, 2010; Akani & Abonyi, 2011). Therefore, it is crucial to thoroughly evaluate approved Basic Science textbooks used in Junior Secondary Schools in Enugu State, Nigeria to assess their adequacy. This evaluation is necessary because some approved textbooks may lack essential qualities required for effective Basic Science education.

By conducting this evaluation, the study seeks to ensure that these Basic Science textbooks meet the necessary standards in terms of content coverage, instructional activities, study aids, visual aids, and summarization techniques. This evaluation is crucial for supporting quality education and enhancing students' understanding and performance in Basic Science at the senior secondary school level in Enugu State. The study aims to evaluate the content of approved Basic Science textbooks intended for senior secondary schools in Enugu State. Specifically, the researcher intends to assess:

1. The extent of topical coverage of the syllabus, measured quantitatively.
2. The adequacy of the learning activities provided in each Basic Science textbook for effective use in senior secondary education.
3. The adequacy of the study questions presented in each Basic Science textbook to facilitate comprehensive learning.
4. The adequacy of illustrations included in the Basic Science textbooks to support visual understanding and engagement.
5. The adequacy of chapter summaries in each Basic Science textbook to reinforce key concepts and facilitate review.

Research Questions

The following research questions guided this study:

1. To what extent does the content of the approved Basic Science textbooks cover the content (in terms of index topical coverage) specified in the syllabus?
2. What is the adequacy of learning activities index of the approved Basic Science textbooks for senior secondary schools in Enugu State?
3. What is the adequacy of study questions in each of the approved Basic Science textbooks?
4. What is the adequacy of illustrations in each of the approved Basic Science textbook?
5. What is the adequacy of chapter summaries in each of the approved Basic Science textbooks?

Methods

The research utilized an evaluation research design, as defined by Nworgu (2015), which involves systematically gathering evidence to assess the effectiveness of educational programs, products, or methods against predefined criteria. This approach was chosen to empirically evaluate Basic Science textbooks, enabling informed decisions about their educational impact. The study was conducted in Enugu State, situated in Nigeria's South East Geopolitical Zone. Enugu State was established in 1991 from the former Anambra State and consists of 17 local government areas. Geographically, it borders Abia and Imo States to the south, Ebonyi State to the east, Benue State to the northeast, Kogi State to the northwest, and Anambra State to the west. Enugu, Nsukka, and Enugu serve as key cities within the state, with Enugu being the capital. Known as the "Coal City State," Enugu State is organized into six educational zones: Agbani, Agwu, Enugu, Nsukka, Udi, and Uzo-Uwani. These zones play a critical role in coordinating educational policies and activities aimed at enhancing educational standards and outcomes. Historically, Enugu State has been acknowledged for its progressive approach to education, particularly in Science and Technology Education, as highlighted by Ifejika (2009).

Enugu State was chosen for the study due to a concerning trend of decreasing performance among students in Basic Science exams, as highlighted in the NECO Chief Examiners' Reports spanning 2019 to 2022. This decline emphasizes the necessity for a thorough assessment of Basic Science textbooks to pinpoint areas needing improvement and to enhance educational outcomes across the state. The study encompasses all students in Upper Basic Education III attending the 295 public secondary schools in Enugu State, as well as 11 officially endorsed Basic Science textbooks designated by the Enugu State Ministry of Education. These textbooks, authored by different individuals, align with the Junior Secondary School (JSS III) curriculum content. Each textbook comprehensively covers the curriculum topics for this grade level, ensuring all necessary subjects are addressed by the approved Basic Science materials used in Enugu State's junior secondary schools.

The data collection instrument employed in this study was the Quantitative Approach to Content Evaluation of Science Textbooks (QACEST), developed by Nworgu (1988). Widely recognized and utilized in numerous master's and doctoral level studies, this instrument was used to assess the content of five approved Biology textbooks across five quantitative indices:

i. Topical Coverage Indices: This index evaluates the comprehensive coverage of topics and sub-topics specified in the Biology syllabus by each textbook.
ii. Learning Activities Indices: This index assesses the presence and effectiveness of activities within the textbooks that promote active learning and engagement among students.
iii. Illustration Indices: This index measures the quality and relevance of illustrations, diagrams, and visuals used in the textbooks to aid in the understanding of concepts.
iv. Chapter Summaries Indices: This index examines the clarity and coherence of chapter summaries provided in the textbooks, which are intended to enhance retention and comprehension of the material.
v. Study Questions Indices: This index evaluates the adequacy and quality of study questions included in the textbooks to stimulate critical thinking and reinforce learning.

These indices were applied specifically to the evaluation of Basic Science textbooks selected for this study, using the QACEST framework to provide structured and objective insights into their educational effectiveness. Each of these indices provides a quantitative measure of specific aspects of the textbook's content, aiming to gauge its effectiveness as an educational resource for Basic Science students. This structured approach ensures a systematic evaluation that helps identify strengths and areas for improvement in the selected Basic Science textbooks.

To answer each of the five research questions regarding the evaluation of Basic Science textbooks for Upper Basic III using the QACEST model, specific formulas and criteria were applied. Below is how each research question was answered:

1) Research Question 1: (Topical Coverage Index - TCI): The Topical Coverage Index (TCI) formula was used to assess how well each textbook covered the topics and sub-topics in the syllabus. The formula is:

$$TCI = \left[\frac{T_t}{T_s} + \frac{S_t}{S_s} \right]$$

Where:
(Tt): Number of topics covered by the textbook
(Ts): Total number of topics in the syllabus/curriculum
(St): Number of sub-topics covered by the textbook
(Ss): Total number of sub-topics in the syllabus/curriculum

The TCI value ranges from 1.00 (complete coverage) to 0.00 (no coverage). A cut-off point was determined to decide if Basic Science textbook adequately covered the syllabus topics based on guidelines and previous studies.

2) Research Question 2: (Learning Activities Index - LAI): The Learning Activities Index (LAI) formula assessed the presence of engaging learning activities in each textbook. The formula used is:

$$LAI = \frac{A-P}{A+P}$$

Where:
(A): Number of sentences requiring active engagement (activities)
(P): Number of sentences requiring passive reception (passivity)

The LAI ranges from -1.00 to +1.00, where positive values indicate adequacy in learning activities. A positive LAI score indicates sufficient activities to engage students actively.

3) Research Question 3: (Study Question Index - SQI): The Study Question Index (SQI) formula evaluated the effectiveness of study questions in promoting understanding and application of knowledge.

$$SQI = \frac{T-R}{T+R}$$

Where:
T = Higher order questions i.e. total number of questions requiring students to engage in real thinking.
R = Lower order questions i.e. total number of questions requiring students to merely regurgitate what had been learned from the text.

SQI also ranges from -1.00 to +1.00, with positive values indicating effective study questions that enhance learning.

4) Research Question 4 (Illustration Index - ILI): The Illustration Index (ILI) formula evaluated the quality and adequacy of illustrations in each textbook.

$$ILI = \frac{La-Lb}{La+Lb}$$

Where:
La = Number of illustrations that require a learner to perform some activities and not just viewing
Lb = Number of illustrations that demand mere viewing seeing or watching.

Similar to LAI, ILI ranges from -1.00 to +1.00. Positive values indicate sufficient and effective use of illustrations to aid understanding.

5) Research Question 5: (Chapter Summary Index - CSI): The Chapter Summary Index (CSI) formula assessed how well chapter summaries provided an overview of the textbook content. It is expressed as:

$$CSI = \frac{N-R}{N+R}$$

Where:

N = the number of statements in the chapter summary which link the materials in the chapter with the new materials in the next chapters to facilitate more permanent learning and transfer of learning.

R = the number of statements in the chapter summary that are mere repetitions of the materials previously treated in the chapter.

Like LAI and ILI, CSI ranges from -1.00 to +1.00. Positive values indicate comprehensive chapter summaries that aid in reinforcing learning.

Cut-off Points: - For TCI, LAI, ILI, CSI, and SQI, the decision on adequacy was based on whether the score exceeded zero. A positive score indicates adequacy, while zero or negative scores indicate inadequacy in that particular aspect of the textbook. In conclusion, each research question was systematically addressed using the respective QACEST formulas to provide a comprehensive evaluation of the Basic Science textbooks. The findings helped determine the strengths and weaknesses of each textbook based on their content, learning activities, illustrations, chapter summaries, and study questions, enabling informed decisions on their suitability for Upper Basic III education in Enugu State.

Presentations of Results

Research Question 1: To what extent does the content of the approved Basic Science textbooks cover the content (in terms of index topical coverage) specified in the syllabus?

Table 1: Indices of the Topical Coverage Index (TCI) of the Five Recommended Basic Science Textbooks for Upper Basic III Students in Enugu State

S/N	Text	T_t	T_s	S_t	S_s	Index
1	NERDC Basic Science for Junior Secondary School Book Three UBE Edition	21	26	57	112	0.66
2	STAN Nigerian Basic Science Project. Pupils Textbook Three New Edition	25	26	102	112	0.94
3	Basic Science for Junior Secondary Schools U B E Edition, Book 3 by Bajah, et.al.	21	26	156	112	1.10
4	New Edition Junior Secondary Basic Science 3 by Ashiakpa Adaeze	26	26	108	112	0.98
5	Comprehensive Basic Science For Secondary Schools 3 by Beloved C. E. C. Onoh & N. N. Onoh,	26	26	136	112	1.10

Acceptance range =0.00 to +1.00

Tt = Number of topics in the curriculum or syllabus treated in (covered by) the textbook

Ts = Number of topics in the curriculum/syllabus

St = Number of sub-topics in the curriculum/syllabus treated in (covered by) the textbook.

Ss = Number of sub topics in the curriculum/syllabus

The result of data analysis in Table 1 reveals the topical coverage indices of the Basic Science textbooks. NERDC Basic Science for Junior Secondary School Book Three UBE Edition for Senior Secondary had topical index of 0.66, STAN Nigerian Basic Science Project, Pupils Textbook Three New Edition had 0.94, Basic Science for Junior Secondary Schools UBE Edition, Book 3 had 1.10 while New Edition Junior Secondary Basic Science 3 had 0.98 while Comprehensive Basic Science For Secondary Schools 3 had the highest topical coverage index of 1.10. This implies that almost all the Basic Science textbooks evaluated content coverage were adequate and as the texts covered completely all the topics and sub-topics in the curriculum.

Research Question 2: What is the adequacy of learning activities index of the approved Basic Science textbooks for senior secondary schools in Enugu State?

Table 2: Learning activity Index (LAI) scores of the Five Recommended Basic Science Textbooks for Upper Basic Education III in Enugu State

S/N	Texts	A	P	Index
1	NERDC Basic Science for Junior Secondary School Book Three UBE Edition	37	203	-0.69
2	STAN Nigerian Basic Science Project. Pupils Textbook Three New Edition	66	254	-0.59
3	Basic Science for Junior Secondary Schools U B E Edition, Book 3 by Bajah, et.al	151	189	-0.11
4	New Edition Junior Secondary Basic Science 3 by Ashiakpa Adaeze	153	267	-0.27
5	Comprehensive Basic Science For Secondary Schools 3 by Beloved C. E. C. Onoh & N. N. Onoh,	65	405	-0.72

Acceptance range = -1.00 to +1.00

A= No of sentences requiring the learner to perform some kind of activity

P= No of sentences requiring the learner to only receive information with no other activity

Table 2 revealed that NERDC Basic Science for Junior Secondary School Book Three UBE Edition had a learning activity index (LAI) score of -0.69, STAN Nigerian Basic Science Project, Pupils Textbook Three New Edition had -0.59, Basic Science for Junior Secondary Schools UBE Edition Book 3 by Bajah, et.al, had -0.11, New Edition Junior Secondary Basic Science 3 by Ashiakpa had -0.27 while Comprehensive Basic Science For Secondary Schools 3 by Beloved C. E.C. Onoh had a learning activity index (LAI) score of -0.72. This showed that the book had the least learning activity indices. It means that there is few provision in the textbook for the learner to perform some kind of activity, but all the provisions made require absolute passivity on the part of the learner. Other textbooks in an increasing order of learning activity index (LAI) scores indicated a corresponding increase across the books in the provisions of activities which promote maximum participation of the learners on the curriculum content treated in a book.

Research Question 3: What is the adequacy of study questions in each of the approved Basic Science textbooks?

Table 3: Topical Study Questions Index (SQI) scores of the Five Recommended Basic Science Textbooks for Upper Basic Education III in Enugu State

S/N	Texts	T	R	Indices
1	NERDC Basic Science for Junior Secondary School Book Three UBE Edition	24	91	-0.58
2	STAN Nigerian Basic Science Project. Pupils Textbook Three New Edition	51	38	+0.15
3	Basic Science for Junior Secondary Schools U B E Edition, Book 3 by Bajah, et.al	59	68	-0.07
4	New Edition Junior Secondary Basic Science 3 by Ashiakpa Adaeze	43	98	-0.39
5	Comprehensive Basic Science For Secondary Schools 3 by Beloved C. E. C. Onoh & N. N. Onoh	NSQ	NSQ	NSQ

Acceptance range = -1.00 to +1.00

T = Higher order questions i.e. total number of questions requiring students to engage in real thinking.
R = Lower order questions i.e. total number of questions requiring students to merely regurgitate what had been learned from the text
NB: N.S.Q = No Study Question

Table 3 revealed that Comprehensive Basic Science For Secondary Schools 3 by Beloved C.E.C, et.al, have no study questions (N.S.Q). The textbook study question index (SQI) is therefore represented by N.S.Q not 0 (zero). SQI of 0 (zero) means that there is a balance between the study questions that require learners to do some real thinking and those that demand mere regurgitation of the acquired knowledge from the textbook. STAN Nigerian Basic Science Project, Pupils Textbook Three New Edition had a chapter summary index of +0.15. This means that most of the study questions in the textbook are the type that do not demand mere regurgitation of the knowledge acquired from the textbook. Other books in their increasing order of study question index (SQI) values are: New Edition Junior Secondary Basic Science 3 with SQI value of -0.07, Basic Science for Junior Secondary Schools UBE Edition Book 3 with SQI value of -0.39 and NERDC Basic Science for Junior Secondary School Book Three with SQI value of -0.58. The negative SQI values of all the three textbooks however indicate that most of the study questions in the books demand mere regurgitation of the knowledge acquired from the textbooks as against the study questions that require learners to do some real thinking.

Research Question 4: What is the adequacy of illustrations in each of the approved Basic Science textbook?

Table 4: Illustration Index (ILI)scores of the Five Recommended Basic Science Textbooks for Upper Basic Education III in Enugu State

S/N	Texts	La	Lb	Indices
1	NERDC Basic Science for Junior Secondary School Book Three UBE Edition	4	14	-0.56
2	STAN Nigerian Basic Science Project. Pupils Textbook Three New Edition	13	23	-0.28
3	Basic Science for Junior Secondary Schools U B E Edition, Book 3 by Bajah, et.al	3	26	-0.79

4	New Edition Junior Secondary Basic Science 3 by Ashiakpa Adaeze	2	12	-0.71
5	Comprehensive Basic Science For Secondary Schools 3 by Beloved C. E. C. Onoh & N. N. Onoh,	4	16	-0.60

Acceptance range = -1.00 to +1.00

La = Number of illustrations that require a learner to perform some activities and not just viewing
Lb = Number of illustrations that demand mere viewing seeing or watching.

Table 4 revealed that NERDC Basic Science for Junior Secondary School Book Three UBE Edition had an illustration index (ILI) score of -0.56, STAN Nigerian Basic Science Project, Pupils Textbook Three New Edition had -0.28, Basic Science for Junior Secondary Schools UBE Edition Book 3 by Bajah, et.al, had -0.79, New Edition Junior Secondary Basic Science 3 by Ashiakpa had -0.71 while Comprehensive Basic Science For Secondary Schools 3 by Beloved C. E.C. Onoh had an illustration index (ILI) score of -0.60. This analysis indicated that the basic Science textbook by STAN had the highest number of illustrations that required the learners to perform some activities and not just viewing the illustrations. This is followed by Basic Science textbook written by NERDC, Beloved CEC Onoh, Ashiakpa and Bajah, et al, respectively. Each Basic Science textbook ILI had values between -1.00 and + 1.00 indicating that most of the illustrations provided in each book are the type that requires only viewing, seeing or watching by the learners with few illustrations that require learners to perform operations or activities aimed at better understanding of the ideas being referred to.

Research Question 5: What is the adequacy of chapter summaries in each of the approved Basic Science textbooks?

Table 5: Chapter Summary Index (CSI) scores of the Five Recommended Basic Science Textbooks for Upper Basic Education III in Enugu State

S/N	Texts	N	R	Indices
1	NERDC Basic Science for Junior Secondary School Book Three UBE Edition	10	92	-0.80
2	STAN Nigerian Basic Science Project. Pupils Textbook Three New Edition	33	109	-0.54
3	Basic Science for Junior Secondary Schools U B E Edition, Book 3 by Bajah, et.al	47	77	-0.24
4	New Edition Junior Secondary Basic Science 3 by Ashiakpa Adaeze	74	172	-0.40
5	Comprehensive Basic Science For Secondary Schools 3 by Beloved C. E. C. Onoh & N. N. Onoh,	NCS	NCS	NCS

Acceptance range = -1.00 to +1.00

N = The number of statements in the chapter summary which link the materials in the chapter with the new materials in the next chapters to facilitate more permanent learning and transfer of learning.
R = The number of statements in the chapter summary that are mere repetitions of the materials previously treated in the chapter.
NB: N.C.S = No Chapter Summary.

Table 5 revealed that one out of the five recommended Basic Science textbooks. This implies that Comprehensive Basic Science For Secondary Schools 3 by Beloved C. E.C. Onoh et.al, have no chapter summary (N.C.S). The chapter summary index (CSI) of the textbook is therefore represented by N.C.S not 0 (zero). CSI of Zero means a balance between sentences of chapter summaries which promote permanent understanding of the content of the textbook

and those that do not, but are mere repetitions of the materials in the content. The analysis in Table 4 indicated that the Basic Science textbook written by Bajah, et.at, had the highest chapter summary index, followed by the texts written by Ashiakpa, STAN and NERDC with a chapter summary index (CSI) score of -0.24, -0.40, -0.54 and -0.80 respectively. Each Basic Science textbook scored the minimum value for CSI (CSI value ranges from -1.0 0 to +1.00), this indicated that almost the whole summaries in each textbook are mere repetitions of the materials in the chapters which do not promote permanent understanding of the content of the textbooks. This implies that the textbook contains few sentences in its chapter summaries which promote permanent understanding of the content of the textbook, while most of the sentences in the chapter summaries are mere repetitions of the materials presented in the chapters which do not promote permanent understanding of the content of the textbooks. This book by Bajah et al with CSI of -0.24 is therefore the best out of the five recommended textbooks in terms of chapter summary as the text highlights what the learners have learnt as summary. However, the reason may be due to the fact that the text was written by team of experts in science education.

Summary and Discussion of Findings

The study findings underscore significant areas for improvement in Basic Science textbooks used in Enugu State, particularly in enhancing learning activities, study questions, illustrations, and chapter summaries to better support educational outcomes and student engagement. Here are the findings of the study based on the analyzed and interpreted data:

1. All five recommended Basic Science textbooks adequately cover their topics, consistent with findings from Ani (2016), who found nine out of eleven textbooks to be adequate. In contrast, Akani and Abonyi (2011) discovered severe deficiencies in coverage and instructional quality among five evaluated chemistry textbooks, possibly due to lack of alignment with the curriculum during their development.
2. The study found that all five evaluated Basic Science textbooks lack sufficient learning activities, indicated by negative Learning Activities Index (LAI) values ranging from -1.00 to 0.59. This suggests a lack of activities that engage learners actively with the curriculum content. This finding parallels Akani and Abonyi's (2011) study on chemistry textbooks in Nigerian secondary schools, where similar deficiencies across various criteria were noted, indicating a trend among textbook authors prioritizing knowledge over learner-centred activities.
3. One of the Basic Science textbooks lacked any study questions, while the remaining four had inadequate study questions in their chapter summaries, with Study Questions Index (SQI) values ranging from -1.00 to -0.48. This signifies a shortage of higher-order thinking questions. This finding aligns with the studies of Ani, Obodo, Ekeh and Osakuade (2021) on Basic Science textbooks in Nigeria, highlighting consistent issues of inadequate chapter summaries.
4. The study found that all five evaluated Basic Science textbooks have inadequate illustrations, with Illustration Index (ILI) values ranging from -1.00 to -0.80. This indicates a lack of illustrations that effectively engage learners in activities to enhance content understanding. This trend is consistent with previous research on Chemistry textbooks in Ebonyi State, indicating a preference for static illustrations over activity-oriented ones (Omiko, & Abonyi, (2011).
5. One of the five approved Basic Science textbooks for Upper Basic Education III in Enugu State lacked any chapter summary, while the remaining four had inadequate summaries. Their Chapter Summaries Index (CSI) values ranged from -1.00 to -0.96, suggesting deficiencies in sentences that promote deeper understanding compared to those merely repeating material from the chapters. This finding is consistent with the study of Omebe

(2010) on Basic Science textbooks in Enugu State, highlighting a focus on knowledge recall rather than application or higher-order questions.

Conclusion

The conclusion underscores significant areas for improvement in the development and content of Basic Science textbooks, particularly in terms of inclusivity, depth of explanations, and the integration of effective learning activities. Based on the study's findings, several conclusions can be drawn regarding the evaluated Basic Science textbooks:

i. Illustrations and Examples: None of the textbooks sufficiently include human pictures or common examples to support their explanations. Additionally, there is noticeable gender bias favoring males in the human pictures provided.
ii. Depth of Explanation: Most of the textbooks, despite being authored by different individuals, lack detailed explanations of key concepts. Instead, explanations are often too brief to effectively enhance understanding and comprehension among students.
iii. Learning Activities: The five Basic Science textbooks generally lack adequate learning activities. This deficiency hinders the development of science process skills among students, as these activities are essential for active engagement and application of learned concepts.

Recommendation

Based on the findings of this study, the following recommendations are proposed:

1. Improvement of Textbooks: The Enugu State Ministry of Education should oversee improvements in subsequent editions of Basic Science textbooks to address identified deficits.
2. Inclusion of Gender-Neutral Illustrations**: Authors of Basic Science textbooks should ensure the inclusion of diverse human pictures representing both males and females to mitigate gender bias among students.
3. Enhancement of Illustrations: Illustrations in Basic Science textbooks should be both illustrative and explanatory to facilitate easier understanding of concepts.
4. Detailed Content: Whether segmented by junior secondary levels or not, Basic Science textbooks should provide detailed explanations and include explanatory notes at the end of each topic to enhance comprehension.
5. Clarity for Age Appropriateness: Authors should consider the age and educational level of students when crafting sentences to ensure clarity and comprehension.
6. Criteria for Textbook Selection: When recommending textbooks, prioritize those that meet criteria for readability, including appropriate size of print, clear diagrams and pictures, and concise sentences, all of which contribute to better understanding of scientific concepts and development of science process skills.
7. Textbook Approval Process: The Ministry of Education should approve textbooks only after rigorous evaluation to ensure they meet adequate content standards for use in schools.
8. Publishing Standards: Publishers should require evidence of comprehensive evaluation and adequacy across multiple criteria before publishing textbooks for school use.
9. Continuous Improvement: Authors of Basic Science textbooks should promptly update their materials in accordance with any revisions to the Basic Science curriculum or other relevant educational standards.

These recommendations aim to enhance the quality and relevance of textbooks used in educational settings, ensuring they effectively support learning outcomes and educational goals.

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