

# READABILITY OF APPROVED BASIC SCIENCE TEXTBOOKS IN USE IN EBONYI STATE JUNIOR SECONDARY SCHOOLS

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**Abstract** - This study was an evaluation study aimed at evaluating the readability of basic science textbook in use in Ebonyi state junior secondary school. The study two research questions guided the study. The sample comprised twelve basic science textbooks, eighteen secondary schools and fifty four teachers. One instrument was used basic science textbooks readability test (BSTRT). This is a close technique for determining the readability of basic science textbooks. It was validated by three experts in educational measurement and evaluation from Ebonyi State University, Abakaliki. The BSTRT was assessed for readability using test re-test procedure. The mean readability scores of the students of each class level together with the standard deviation were calculated and interpreted based on guide line provided by Bormuth (1998) and Harrison (1980) as shown below. Below 40% is not readable, 40-45% is readable and above 45% is very readable. mean and standard deviation were used to answer the research questions. The finding revealed that nine out of (12) twelve basic science textbooks were readable and there is a slight variation in their reading ability across class levels. The study finally concluded that nine textbooks out of twelve (12) are readable and there is a little variation in their reading ability across class levels. It was recommended among others that basic science textbooks used for teaching students need to be periodically revised with the view to make them readable and enrich them in terms of readability.

**Key words**- Evaluation, Readability, Basic Science text books, Readability scores.

## Introduction

Hardly could any effective learning take place without an effective communication. Communication is very crucial in everyday life. Reading according to Okafor (2004) is one of the major avenues of communication. A breakdown in communication is associated with problems capable of bringing retrogression. Travers (1997), observed that reading is more than being able to say the words represented by the texts because deriving meaning from the words requires that the individual understands the structure of the sentence and is able to assign function to words within that structure. Dioch (2005) affirmed that teachers everywhere in the world are much interested in determining the readability or reading difficulty of materials presented to them by publishers.

It is sometimes desirable in education to measure the difficulty level of a particular text in relation to the class for which it is assigned. One of such measures is readability. Reading is usually thinking skill utilizing the eyes at higher process. According to Perere (2002) reading is the method by which the perception of printed symbols cause some form of reactions in mind. According to him, being able to read, perception and retention take place. The view was supported by Oyetunde (1997) who observed that children and their parents learning to read are seen as one of the earliest signs of intellectual achievement. Reading can be seen as a means of acquiring experience through the knowledge of what other people had been through and had written down. It is only those who can have successfully learnt to read can read and learn. This contributes to the comprehensiveness of the sentence being read.

The ability to read effectively can be regarded as a scale for measuring the learner's level of literacy. Therefore, reading is a way of acquiring experience through understanding of other

documented experiences of live. Macndip (1995), defined readability as the linguistic and conceptual difficult levels of a textbook. The ease with which a text can be read and understand by the students depends on author's choice of semantic and syntactic structure. Basic science involves abstract contents like energy, molecules, atoms, iron etc one has to arrange the topics in ascending order of difficulty considering the cognitive level of the students who use the textbook. Ideally, the concepts in each chapter are gradually introduced, develop and ultimately there application are presented so that the students can make meaning from them. Sampson, Valmont and Allen (2002) summarized readability as the ability of a receiver to read and understand information from a message source. Readability of a text is the extent to which students or whoever is concerned can read and understand or comprehend the message of the text. Ali (1998) said that in all good quality textbook, information are presented on the bases of moving from known to unknown and from the least difficult to the most difficult and often using examples drawn from the environment of the students.

Indeed, the development of physical concepts in basic science should be on ascending or progressive order of difficulty in which the reader must use previous knowledge. This should be stickly adhered to because of the difficulties students encounter in reading basic science textbooks as a result of physical terms, increasing complex and abstract language of science.

One of the effects of reading disabilities is lack of interest. A poor message from science textbooks many change the meaning of a particular science concept. This situation is very serious and in order to alleviate this problem, good basic science text has to be provided.

Since readability is an important criteria under which a text can be evaluated, a number of techniques have been developed for

determining the readability of any science textbooks being evaluated. One of the techniques is cloze testing. Cloze testing is based on the psychological principle of “closure”, the human tendency to fill in or complete pictures, sentences or other stimuli, which are incomplete. This human tendency to bring closure has led to the use of the cloze procedure in identifying, measuring and improving comprehension, and in assessing language competence (Harrison and Smith, 1999) cloze procedure essentially entails removing words from the text and then asking students to work out what the removed words might be (David, 1999) cloze procedure according to Kelly and Ewolt (1998) was judged to have potential as an evaluation tool because it seemed to require the integrated use of semantic and syntactic clues. In cloze procedure, the reader is not merely gassings on the contrary, he is being asked to use the cognitive powers to the fullest. Readability measures are primarily based on factors such as the number of words in the sentences and the number of letters or syllabus per word. There are many types of readability measures. They include (a) gunning “Fox” (b) fry readability graph (c) Flesch Kincaid Formular (d) powers – Summer Kearn Forumlar (e) Flesch reading ease (f) forecast formula. In addition, more than 40 readability formulas have been developed over the years. Readability measures guide the construction of textbooks such that the readability conforms to the intended grade level.

**Objectives of the Study**

The objectives of the study is to evaluate basic science textbooks in Ebonyi State junior secondary schools. Specifically, this study seeks to:

- (i) Find out the readability scores of each of the basic science textbooks in Ebonyi state junior secondary schools.
- (ii) Find out how the reading ability of the students in the approved basic science textbooks vary across class levels.

**Research Questions**

The following research questions guided the study.

- (i) What are the readability scores of each of the basic science textbooks in Ebonyi state junior secondary schools?
- (ii) How does the reading ability of the students in the approved basic science textbooks vary across class level?

**Method**

The study employed evaluation research design. Evaluation study according to Ali (2006) is the type of design that makes use of value judgment on programmes or project based on certain pre-determined criteria. The researcher found the study very useful because it involves making value judgment about basic science textbooks in Ebonyi state junior secondary schools.

The study was carried out in Ebonyi of Nigeria. The study covered the three education zones of Ebonyi State, Abakaliki, Onueke and Afikpo.

The population comprised all approved basic science textbooks in Ebonyi state junior secondary schools, all basic science teachers in Ebonyi State junior secondary school and all the students. Simple random sampling technique was used to draw (12) twelve basic science textbook out of fifty one (51) basic science textbooks that was approved for Ebonyi state junior secondary schools. Eighteen secondary schools were drawn from the three education zone through simple random sampling. A total of fifty four (54) teacher were drawn from 18 sampled schools through

stratified random sampling in Ebonyi state junior secondary schools.

One instrument was used. Basic science textbook readability test (BSTRT) this is a cloze technique for determining the readability of basic science textbook. It was developed by the researcher. The basic science textbook readability test (BSTRT) is a cloze deletion passages. it was developed separately from each textbooks being evaluated. it was systematically drawn from the themes to ensure fair representation of the sections of the textbooks.

The BSTRT was face validated by three experts in educational measurement and evaluation from Ebonyi State University. The basic science textbook readability test (BSTRT) was assessed for readability using test re-test procedure. An interval of one week was given for the re-test. Scores obtained from the two administration of the test were correlated using Pearson product moment correlation approach.

The mean readability scores of the students of each class levels together with the standard deviation were calculated and interpreted based on guideline provided by Bormuth (1998) and Harrison (1980) as shown in the table below. The interpretation of cloze readability scores summarized by Harrison is presented thus.

Percentage	Interpretation
Below 40	Not readable
40 – 45	Readable
Above 45	Very readable
Mean and standard deviation were used to answer the research questions	

**Results**

Based on the data collected, the analysis are displayed in the table below.

**Research Question 1**

What are the readability scores of each of the basic science textbooks in Ebonyi state junior secondary schools?

Data for answering the above research question was obtained from eighteen (18) sampled schools in Ebonyi state junior secondary schools through the man of the readability scores of twelve (12) basic science textbooks as follows

**Table 1: Readability Scores**

Textbooks	Class level	Scores
STAN Nigerian basic science project	1	42.72
	2	40.84
	3	43.56

Basic science for Nigerian schools	1	No score
	2	
	3	
Spectrum basic science for junior secondary schools	1	42.27
	2	43.04
	3	41.60
Upper basic science for junior secondary	1	44.09
	2	45.23
	3	44.45

Data in table 1 revealed that the readability scores for STAN Nigerian basic science project for JSI was 42.72, JSII was 40.84, JSIII was 43.56. For basic science for Nigerian schools has no readability scores because the basic science textbook readability test was systematically drawn from the themes to ensure fair representation of the sections of the textbooks but basic science for Nigerian junior secondary schools did not take note of the themes from the basic science core-curriculum.

The readability scores for spectrum basic science for junior secondary schools were as follows, 42.27, 43.04 and 41.60 for JSI, JSII and JSIII respectively.

For basic science for junior secondary schools, upper basic, the readability score for JSI, JSII and JSII were as follows 44.09, 45.22 and 44.45 respectively.

### Research Question 2

How does the reading ability of the students in the approved basic science textbooks vary across class levels?

**Table 2: Mean and Standard Deviation of Cloze Text Scores of the Students on each Textbooks and Class Level**

Textbooks		Class level			Total
		JSI	JSII	JSIII	
STAN Nigerian basic	$\bar{x}$	42.72	40.84	43.56	42.37
	SD	4.18	5.99	6.24	5.47
	n	47	45	41	133
Basic science for Nigerian schools	$\bar{x}$	No readability score			
	SD				
	n				
Spectrum basic science for JSS	$\bar{x}$	42.28	43.05	41.60	42.31
	SD	3.59	3.75	2.45	3.26
	n	43	42	40	125
Basic science for JSS upper basic	$\bar{x}$	44.1	45.23	44.45	44.59
	SD	5.74	6.33	6.35	6.14
	n	41	40	40	121

Total	$\bar{x}$	43.03	43.04	43.20
	SD	4.50	5.36	5.01
	N	131	127	121

Table 2 above showed the overall mean score and standard deviation as follows; JSI 43.03 with standard deviation 4.50, JSII 43.04 with standard deviation 5.36, JSIII 43.20 with standard deviation 5.01. Their scores fall within the readability range according to Harrison (1980) guideline. For basic science for Nigerian junior secondary schools has no readability score as shown in the above table two. The reason being that the textbook. In line with the basic science core-curriculum. The textbook did not take note of the four themes that covered knowledge, skills and attitudinal requirements like. you and environment, living non-living things, science and development and you and energy.

Their deviation across class levels are close except JSI that has slight difference that implies that there is variation in their reading ability across class level.

Generally out of twelve textbook under study nine textbooks are readable. This is in line with Ghagwedera (1990). The findings show that there was slight difference in their readabilities of the text.

### Conclusions

Based on the findings of this study, the following conclusions were made.

- i. Nine textbooks out of twelve textbooks are readable.
- ii. There is a little variation in their reading ability across class levels.

### Recommendations

Based on the findings and conclusions of this study, the following recommendations were made:

- i. Basic science textbooks used for teaching students need to be periodically revised with the view to make them readable and enrich them in terms of readability. Basic science whose readability are empirically known to be high should be recommended for teaching and learning in school.
- ii. Selection and recommendation of basic science textbooks should be down by experts in the area.
- iii. Authors and publishers of basic science textbooks should consult basic science core-curriculum. That will ensure a good textbook coverage of the curriculum topics, good learning activities index and a readable text.
- iv. Basic science textbooks should be properly evaluated before recommending them to any class level. particular

attention should be paid to the readability to the readability and the content of the textbooks for the intended class level.  
v. STAN should liaise with the state government to periodically mount conference, seminars, and workshops for basic science teachers, authors and publishers on how to write high quality and standard textbooks.

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