

## USING CLOZE PROCEDURE IN ASSESSING THE READABILITY OF APPROVED CHEMISTRY TEXTBOOKS IN EBONYI STATE SECONDARY SCHOOLS IN NIGERIA

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### ABSTRACT

This study assessed the readability of three (3) approved chemistry textbooks in Ebonyi State senior secondary schools. The study employed descriptive evaluation research design. It was carried out in Ebonyi State of Nigeria. Simple random sampling was used to draw three (3) chemistry textbooks out of seven (7) approved for Ebonyi State. Twenty one secondary schools were drawn from the three education zone through simple random sampling. One instrument was used chemistry textbook readability test (CTRT). This is a cloze test technique for determining the readability of chemistry textbooks. The CTRT was developed by the researcher. It was systemically drawn from the themes to ensure fair representation of the sections of the textbooks. It was validated by three experts in educational measurement and evaluation from Enugu State University of science and technology ESUT, Enugu. The CTRT was assessed for readability using test re-test procedure. The mean readability score of the students of each class levels together with the standard deviation were calculated and interpreted based on guideline provided by Barmuth (1968) and Harrison (1980). The two research questions were answered using mean and standard deviation. The findings revealed that the three approved chemistry textbooks, their scores fall within the “readable” and “very readable” and their deviations across class levels are not cloze ie there is variation in their reading ability across class level. Based on the findings and conclusions of this study, recommendations were made.

**KEYWORDS:** Readability, Cloze Procedure, Chemistry Textbooks, Deviation Across Class Levels, CTRT, Readability Scores

### INTRODUCTION

It is sometime 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 measure is readability. Readability according to Sampson, Valmont and Allen (2002) is 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 (1999) 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.

The readability of a particular text depends both on its content and its typography i.e. its font size, line height and line length (Tinker, 1963). Readability is distinguished from legibility, which is a measure of how easily individual letters or characters can be distinguished from each other. Easy reading helps learning and enjoyment, so that what we write should be easy to understand. Teachers and educators had long known that readers, especially beginning readers, should have reading material that closely matched their ability, to help improve their reading skill (Fry, 2006).

The ability to read effectively can be regarded as a scale for measuring the learners' level of literacy. Reading is a way of acquiring experience through understanding of other documented experiences of lives. Reading according to Okafor (2004) is one of the major avenues of Communication. Communication is very crucial in every day life to the fact that a break down in communication is associated with problems capable of bringing retrogression. Travers (1997) observed that reading is more than being able to say that 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 the 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.

A number of researchers posited that the most scientific and technical disciplines are conveyed to students by textual materials. The ease with which a text can be read and understood by the students depends on author's choice of semantic and syntactic structure. Chemistry as a subject involves abstract contents. It involves matter and its interactions with other matter and energy (Yoloye, 1999). It deals with the composition, properties and uses of matter.

Everywhere in Nigeria, a lot of science textbooks are published for secondary schools especially chemistry textbooks. The issue is that most of these books are published and pushed into the market without proper evaluation by specialists (Slami, 1998). When one goes into chemistry classroom, one observes that the main tool for instruction is one of those books. This therefore calls for a continuous evaluation of chemistry and other science textbooks to determine their readability. This should be strictly adhered to because of the difficulties students encounter in reading chemistry textbooks as a result of physical terms, increasing complex and abstract language of science.

## **THE PROBLEM**

In Nigeria, the trend of academic performance of chemistry students in the senior secondary school examinations (SSCE) has shown to be very low (Ajagun, 2006). This assertion has over the years been confirmed by the chief examiners report in chemistry. Chemistry is one of the essential science subjects for most of the professional courses at the university level, this poor achievement in chemistry limits their opportunities to offer professional courses like Human medicine, Veterinary medicine, pharmacy, nursing, agriculture, biotechnology, engineering among others.

The poor performance had been traced to so many factors ranging from the attitude of students towards the subjects, methods of teaching the subject, lack of motivation on the part of the teachers, lack of basic science background at the primary school levels to the resources for teaching sciences.

Effort to provide solutions to the consistent mass failure in senior school certificate examination has often attracted the attention of specialists in the discipline in conferences, workshops and seminars (Jegede, Otuaka and Eniajeju, 1999). Specialists are being recruited to teach chemistry, different methods were adopted to arrest the situation, but the results obtained are still far from what is desirable (Salami, 1998).

Since chemistry textbooks and other science textbooks are recommended for schools without subjecting them to proper scrutiny, there is the likelihood that those chemistry text books in use in the schools may lack basic qualities and consequently influence performance in the subject, therefore, the researcher deemed it necessary to look into the readability of the approved chemistry textbooks in Ebonyi State Senior secondary schools.

## PURPOSE OF THE STUDY

*The purpose of the study* is to evaluate the readability of the approved chemistry textbooks in Ebonyi State secondary schools. Specifically, this study seeks to;

- Find out the readability scores of each approved chemistry textbooks in Ebonyi state senior secondary schools
- Find out how the reading ability of the students in the approved chemistry textbooks vary across class level.

## Research Questions

The following research questions guided the study.

- What are the readability scores of each of the chemistry textbooks in Ebonyi State Senior secondary schools?
- How does the reading ability of the students in the approved chemistry textbooks vary across class level?

## METHOD

The study employed descriptive evaluation research design. Evaluation study according to Ali, (2006) is the qualitative value or judgment we make about something or someone, based on certain pre-determined criteria and qualitative data derived from testing, monitoring, measurement, appraisal and or assessment. The researcher found the study very useful because it involves making value judgment about chemistry textbooks in Ebonyi state senior secondary schools.

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

The population comprised all approved chemistry textbooks in Ebonyi state senior secondary schools, all chemistry teachers in Ebonyi state senior secondary schools and all chemistry students. Simple random sampling was used to draw 3 chemistry textbooks out of seven (7) chemistry textbooks approved for Ebonyi State senior secondary schools. Twenty one secondary schools were draw from the three education zone through simple random sampling. A total of twenty one teachers were drawn from twenty one (21) sampled schools through stratified random sampling in Ebonyi state senior secondary schools.

One instrument was used. Chemistry textbook readability test (CTRT). This is a cloze test technique for determining the readability of chemistry textbooks. The chemistry textbook readability test (CTRT) was developed by the researcher. The CTRT 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 CTRT was validated by three experts in Educational Measurement and Evaluation from Enugu State University of Science and Technology, ESUT, Enugu. The chemistry textbook readability test (CTRT) 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 score of the students of each class levels together with the standard deviation were calculated and interpreted based on guideline provided by Barmuth (1998) and Harrison (1980) as shown in the table below.

**Table 1: Mean and Standard Deviation**

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 analyses are displayed in the table below.

### Research Question 1

What are the readability scores of each of the approved chemistry textbooks in Ebonyi State Senior secondary School?

Data for twenty one (21) sampled schools in Ebonyi State Senior secondary schools through the mean of the readability scores of the three (3) chemistry textbooks as follows

**Table 2: Readability Score**

S/N	Textbooks	Class Level	Scores
1.	TONAD Essential chemistry for senior secondary schools by I.A. Odesina	SS I	46.43
		SS II	46.2
		SS III	45.21
2.	Macmillan chemistry for senior secondary schools by A.A Demehim PC Onianwa, P.A. Oshinyemi Seyi Thomas	SS I	49.2
		SS II	44.63
		SS III	47.77
3.	New school chemistry for senior secondary schools by Osee Yaw Ababio	SS I	51.82
		SS II	47.2
		SS III	50.8

For TONAD Essential chemistry for senior secondary schools by I.A. Odesina, the readability scores for SSI, SSII and SSIII was 46.43, 46.2 and 45.21 respectively.

For Macmillan chemistry for senior secondary schools by A.A. Denehim, P.C. Onianwa, P.A. Oshinyemi and Seyi Thomas, the readability scores for SSI, SSII and SSIII was 49.2, 44.63 and 47.77 respectively.

For New chemistry for senior secondary schools by Osei Yam Ababio, the readability scores was 51.82, 47.2 & 50.8 for SSI, SSII & SSIII respectively

### Research Question 2

How does the reading ability of the students in the approved chemistry text books vary across class levels?

**Table 3: Mean and Standard Deviation of Cloze Test Scores of the Students on each Textbooks and Class Levels**

Textbooks	Class Levels				
		SSI	SSII	SSIII	Total
TONAD Essential chemistry for senior secondary schools by I. A. Odesina	$\bar{X}$	46.43	46.2	45.21	45.95
	SD	18.33	11.38	8.77	12.83
	n	28	26	24	78
Macmillian chemistry for senior secondary schools by A.A Demehim, PC, Onianwa, P.A. Oshinyemi	$\bar{X}$	49.2	44.63	47.77	47.2
	SD	11.72	12.63	11.99	12.11
	n	21	19	18	58
New school chemistry for senior secondary schools by Osei Yaw Ababio	$\bar{X}$	51.82	47.2	50.8	49.94
	SD	10.60	14.49	9.70	11.60
	n	30	25	25	80

The result from the above table 3, showed the overall scores for SSI, SSII and SSIII of the three approved chemistry textbooks for Ebonyi state secondary schools. The results are as follows.

The results from the above table 3, showed the overall mean and standard deviation of TONAD Essential chemistry for senior secondary schools by I.A. Odesina as follows SSI 46.43 as mean with standard deviation as 18.33; SSII 46.2 as mean with standard deviation as 11.38 and SSIII 45.21 as mean and standard deviation as 8.77. Their scores fall within the “readable” and “very readable” range according to Harrison (1980) guideline Their deviation across class levels are not close. That implies that there is variation in their reading ability across class level.

For Macmillan chemistry for senior secondary schools by A.A Demehim, P.C. Onianwa and P.A. Oshinyemi, their overall mean and standard deviation were as follows SSI 49.2 and 11.72, SSII 44.63 and 12.63 and SS III 47.77 and 11.99. Their scores fall within the “readable” and “very readable” range according to Harrison (1980) guideline. Their deviations across class levels are close except SSII that has slight different. That implies too that there is variation in their reading ability across class level.

For new school chemistry for senior secondary schools by Osei Yaw Ababio, Their overall mean and standard deviation for SSI, SSII and SSIII were as follows 51.82 & 10.60, 47.2 & 14.49 and 50.8 & 9.70 respectively. Their scores fall within “very readable” range according to Harrison (1980) guideline. Their deviations across class levels are not close. That implies that there is variation in their reading ability across class level.

However, the results showed that all the three textbooks evaluated, all are readable and every readable. This is inline with Omebe (2014). Her findings showed that the textbooks in question have no reading difficulty to the students and there was slight difference in their readabilities of the text.

## CONCLUSIONS

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

- The three chemistry textbooks are ‘readable’ and ‘very readable’.
- There is variation in their reading abilities across class levels.

## Recommendations

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

- Chemistry textbooks used for teaching students needs to be periodically revised with the view to make them readable and enrich them in terms of readability. All chemistry textbooks whose readability is empirically known to be high should be recommended for teaching and learning in schools.
- Selection and recommendation of chemistry textbooks should be down by experts in the area.
- Authors and publishers of chemistry textbooks should consult chemistry core-curriculum. That will ensure a good textbook coverage of the curriculum topics/contents good learning activities index and a readable text.
- Chemistry textbooks should be properly evaluated before recommending them to any class level. Particular attention should be paid to readability and the content of the textbooks for the intending class level.
- Government should periodically mount conferences, seminars and workshops for chemistry teachers, authors and publishers on how to write high quality and standard textbooks.
- New school chemistry by Osei Yaw Ababio revised by L.E.S. Akpanisi and Herbert Igwe should on their next edition separate the contents of their chemistry texts into varies classes. Examples SS I, SS II and SS III or Book 1, Book 2 and Book 3 as other authors of chemistry textbooks did. That will go along way in helping teachers of chemistry allot
- Finally, all chemistry authors should be guided by the chemistry core curriculum to avoid missing of some chemistry concepts. Concepts of all chemistry tests suppose to be in themes.

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