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How can we take up science courses? Readability of levels of Junior High School Integrated Science textbook in Ghana

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This study investigated the readability levels of some Integrated Science Textbooks approved by the government's education ministry for use in Junior High Schools (JHS) in Ghana. The Flesch Readability Ease and Flesch-Kincaid Readability Formulas were used to assess the readability levels to ascertain their difficulty or ease. Cloze Test was used to ascertain the comprehension levels for the sample students. A sample population of 135 pupils, drawn from JHS 1 through 3 were selected for the study. The outcome of the assessments revealed that the selected textbooks had a difficult level of comprehension for many of their intended readership except those who had much assistance. The study also revealed that these approved books employed the use of long sentences and multi-syllabic words to deliver lessons and instructions, which made it difficult to be understood by their users.

Keywords: Integrated science, textbook, readability, Flesch Readability Ease, Flesch-Kincaid, Cloze test

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I. INTRODUCTION

The importance of science education for the development of every economy cannot be over-emphasized. Its relevance is captured in the words of Nehru(seeVinod & Deshpande,2013, p. 507), "It is science alone that can solve the problems of hunger and poverty, of insanitation and illiteracy, of superstition and deadening custom and tradition, of vast resources running to waste, or a rich country inhabited by starving people... Who indeed could afford to ignore science today? At every turn we have to seek its aid …the future belongs to science and those who make friends with science".

Gyasi (2013, p. 1) also emphasizes that science "…plays a crucial and pivotal role in the alchemy of scientific research and technological innovations" and these have become the catalysts for the development of every nation. It must be stated that these scientific and technological innovations cannot be achieved without providing the appropriate textbooks at the various levels of education in science. This can be comparable to "democracy without the appropriate constitution or farming without functional farm implements" (Gyasi, 2013, p.9). Textbooks are very important tools for education (Izgi&Seker, 2012; Devetak, &Vogrinc, 2013). These educational materials should be equipped with the cognitive and perceptive capabilities appropriate for the age and knowledge level of users (Izgi&Seker, 2012) if they are to become effective and useful for users' independent study.

Central to the appropriateness of textbooks for their users, irrespective of the level in education, is readability (Scot, 2011). Thus, the text should be reader-friendly and should neither be too difficult nor too easy to read. It should be easy enough to comprehend and difficult enough to contribute to students' academic development (Scot, 2011).

Essentially, writers and publishers have been encouraged to pay attention to the language component of science textbooks, as it is a major factor in the comprehensibility of any written material (Willington &Orsbone, 2001; Gyasi, 2013).

Gyasi (2013, p. 9) cautions that "language use is a major barrier to most students in learning science", making it difficult for students whose mother tongue is not the language used for instruction to understand what they read or are taught. This situation is what Yong (2010) describes as making the learning of science difficult. This is because one has to master the both the language and content of science and language of instruction simultaneously (Rollnick, 1999). This is the fate of Ghanaian school pupils; they must contend with understanding English, which is their second language but used as the official communication language, the language for instruction and the language of science. The challenge is, if English natives are having difficulty in understanding science textbook language (Curtis & Millar, 1988; Bryce, 2013), then it is likely to be more difficult for Ghanaian pupils, who are only beginning or yet to begin learning English as a second language,

much less grasp the technicalities that science profess. The situation becomes even more complicated when "words are not translatable between English and their first language" (Asabere-Ameyaw&Ayelsoma, 2012). The difficulty with language in textbooks is indeed compounded due to the "the confusion between language used at home and language of instruction"(Ayodele, 2013). It is therefore not surprising that the report by the West Africa Examination Council (WAEC) on the performance of science subjects by Junior High School pupils indicated a below average performance; with the chief examiner stressing the poor use of English language in answering of questions (WAEC, 2015).

Textbooks cover about 75 to 90 percent of classroom instructions (Stein, Stuen, Carnine& Long, 2001) and so they need to be accurate and appropriately target the levels of their audience (Hubisz, 2003). They must provide access to informational text that the targeted audience can read and understand (Bryce, 2013) since they are the foundational tools for acquiring formal knowledge and skills for human and national development (Essuman& Osei-Poku, 2015).

The progressive decline in the performance of Junior High School students in the Basic Education Certificate Examinations in recent times has been a source of worry for educationists, teachers and parents in Ghana. The lower levels of performance are particularly serious in the science subjects (Ghana News Agency, 2010; Kweitsu, 2014). Successive governments since Ghana's independence, have made efforts to improve on infrastructure and to increase the availability of textbooks and other resources for teaching and learning in schools. Despite these efforts, studies show that, myriad of challenges — lack of conducive learning environment, non-availability of textbooks, lack of teacher motivation, and so on, still hamper the effective delivery of basic education in Ghana (Wienstein, 2011). Majority of the studies targeted at providing solution to these poor performances of students have always been around the provision of infrastructure, textbook and issues of teacher motivation (Glewwe& Kremer, 2006; Opoku-Amankwa, 2010), with little or no attention given to the content of the materials used by pupils in terms of their appropriateness for their level of readership.

It is upon this premise that the Government of Ghana's Ministry of Education (MoE) through the National Council for Curriculum and Assessment (NaCAA) has taken upon itself the sole responsibility to ensure that textbooks are developed and evaluated properly under the right stipulated standards established by policy makers. Therefore, this study sought to find out whether the content of Government Approved Integrated Science textbooks for Junior High Schools is written to suit pupils' grade levels as means of enhancing science education in Ghana.

The study is guided by the following research questions;

1. How do readability formulas rate the level of difficulty for the approved integrated science textbooks used for the study?
2. What is the level of performance of pupils on the comprehension of the textbooks selected?

Readability and Textbooks

Textbooks approved for use in schools especially in developing countries such as Ghana have been criticized for not going through rigorous evaluation process where critical considerations are given to issues such as language difficulty, line length, layout and presentation (Essuman& Osei-Poku, 2015). The issue of language difficulty presents a challenge to the two primary users of textbooks: the teacher and the pupil. The teacher would find it difficult explaining concepts especially in the Science subjects as presented in the textbooks to the pupils, and the pupils will have difficulty reading and understanding these materials when instructed to do so or while studying on their own (Asabere-Ameyaw&Ayelsoma, 2012).

One's ability to comprehend a given passage depends greatly on its readability, the straightforwardness of the language used in writing the text, the reader's knowledge of the vocabulary used and the reader's ability to make meaning of the text (Wissing, Blignaut& Van den Berg, 2016). Understanding the written words in the textbook presents an arduous challenge for most basic school pupils (Uchennah, 2002). Most of these core subject textbooks such as Science have been written in the English language which happens to be the second language of most pupils (Ayodele, 2013 and Gyasi, 2013). Science textbooks have thus been reported as being difficult to read (Bryce, 2013).

There are two contributors to easy reading; the reader and the text (DuBay, 2007). Readability is an attribute of text while comprehensibility is an attribute of the reader (Jones, 1997; Wissing*et al*., 2016). The reader is mostly influenced by some factors that enhances their reading ease — the reader's reading skill, interest and motivation (DuBay, 2004), the text readability hinging on content, style, design and organisation (DuBay, 2007). These factors are important in enhancing reading comprehension — extracting and constructing meaning from the written language (Snow, 2002).

To select the most appropriate textbooks especially in the developed world, teachers and authorities rely on a variety of instruments such as the Readability test formulas. Readability according to Edgar Dale and Jeanne Chall (1949) (seeDubay, 2004, p.76) is "the sum total (including all the interactions) of all those elements within a given piece of printed material that affect the success a group of readers have with it. The

success is the extent to which they understand it, read it at an optimal speed, and find it interesting." Readability formulas are tools for measuring certain features of a text based on mathematical calculations.

These formulas are objective and are based on measurable features of writing (Venable, 2003) and "have be well researched as being indicative of whether a text will be understood by its intended readership" (Wissing*et al*., 2016, p. 159). There are over 200 of such instruments in use (Mesmer, 2008) but the most used include Simple Measure of Gobbledygook (SMOG) index, Cloze test, Flesch Reading Ease, Fry's Readability Graph, Flesch-Kincaid Grade Level test (DuBay, 2004). These formulas usually measure the complexity of sentences and the complexity of words. The complexity of sentences is measured by the average words per sentence, whiles the complexity of words is measured in slightly different ways (Karmakar& Zhu, 2010).

According to Karmakar& Zhu (2010, p. 292) "Flesch Kincaid Reading Ease test and Flesch-Kincaid Grade Level test use the average number of syllables per word, while the Coleman-Liau Index and the Automated Readability Index uses the average number of characters per word. Gunning Fog Score and SMOG index use the percentage of polysyllables (complex words, or words with more than three syllables), while the Dale-Chall Readability Formula uses the percentage of difficult words that are not on a 3,000-familiar word list."

These readability formulas have advanced through numerous changes and improvements since their inception in the 1920s (DuBay, 2007), and with the development of new formulas (Guven, 2014) all aimed at getting an appropriate balance between supports and challenges (Tabatabaei& Bagheri, 2013).

Some studies (Ajideh&Mozaffarzadeh, 2012; Janan& Wray, 2012) have cautioned the use of readability formulas as being too simplistic in their calculations since they do not take into account certain factors such as reader motivation, interest, competitiveness, value and reading purpose as summed up by Bryce's caution (2013, p. 105);

Readability formulas do not consider many factors that affect the difficulty of a given text for particular readers. Characteristics such as reader background and familiarity with the topic, text structure and organisation, coherence, or audience appropriateness can influence how challenged readers are by a given text.

In spite of these criticisms,Stajner, Evans, Oransan and Mitkov (2012, p. 4) argues, the most "important issue is the degree of consistency that each formula offers in its predictions of the difficulty of a range of texts and the closeness with which the formulae are correlated with reading comprehension test results" as well as providing a single, summary average score without requiring having to know the characteristics of the eventual reader of the text (Wissing*et al*., 2016)

More so, these formulas are considered to be the most useful tools for the important task of measuring the difficulty of reading materials (Chall 1981) by providing means of differentiating between easier and harder text (Janan& Wray, 2012). Chall (1981)opines these tools offer unbiased grades that educators and teachers can have confidence in in predicting the level of reading difficulty in matching reader to text. "No matter the choice of the formula or graph, if the readability level of the textbook exceeds the selected grade level, such a book is often not considered an appropriate choice for the students" (Ayodele 2013, p. 110) because "children who have successful and interesting experiences with books are more likely to be motivated to read again"whiles the reverse will "experience increased exasperation, destroy motivation, and depleted self-esteem" (Mesmer, 2008, p. 2).

The Flesch Reading Ease formula (FRE), the Flesch-Kincaid Grade level Formulas and the Cloze Test were adopted and used in this study because they are the most widely used in this area of study (Bormuth, 1969; Tabatabaei& Bagheri, 2013) and the most reliable and tested formulas of readability (Bargate, 2012).

The Flesch-Kincaid Grade level and Flesch Reading Ease formulas are variation of the original Flesch Readability formula published in 1943 (Mesmer, 2008). The Flesch Reading Ease (FRE) is used to determine the reading difficulty of a given text without assigning any grade level. This formula scores the readability of a given sample with the range 0–100. A score of 0 means the text is very difficult to read whiles a 100 score indicates easily readable content. According to Wissing*et al*. (2016, p. 159) "text with a readability score of 90–100 indicates that a reader, who has completed Grade 4, should be able to correctly answer 75% of comprehension questions set over the text." The inability of FRE to give a definite grade level led to its modification by Kincaid and his team.

In 1976, J.P. Kincaid and his team modified the Flesch Reading Ease to produce a grade level score. This became the Flesch-Kincaid Grade Level formula. A score attained from the use formula indicates the grade-school level. For instance, 8.3 means an 8^{th} grader would be able to read that content.

The Flesch Reading Ease and Flesch-Kincaid Grade Level formulas have been incorporated in the Microsoft Word application for easier calculation of readability levels for users of such computer application due to their acceptability in the area of readability studies (Wissing*et al*., 2016).

Taylor in 1953 introduced "Cloze Procedure" and was revised by Bormuth in 1969 as a tool for measuring reading comprehension, citing several difficulties with the readability formulas of Flesch and Dale-Chall on the bases that words are not the best measure of difficulty but how they relate with one another (Fatoba, 2014). The validity of this formula lies with its consideration for reader qualities, proving to measure reading comprehension objectively, reliably and validly (Wissing*et al*. 2016)

In Close Test, a number of passages with equal length are selected. Cloze Test is a deletion test (Mesmer, 2008) based on the theory that readers are better able to fill in the missing words as their reading skill improve (Ayodele,2013;Helfeldt, Henk, &Fotos, 1986). The test is constructed by deleting random words, significant words or every *nth* word from the passage and replacing the deletion with space of equal length. One's ability to correctly fill in the missing words is an indication of the reader's ability to make sense of the material (Taylor, 1957).

It is important to noted that "writing the missing words requires learners to benefit from critical thinking as two mental competences, "syntagmatic competence" and "paradigmatic competence" are invoked in cloze procedures" (Kılıçkaya, 2018, p. 135).

Accuracy rate is based on readers identifying the exact words deleted from the passage given. The lower the score, the more difficult the text and vice versa. A Cloze test score of between 0% and 40% indicates the Frustration level. This means that the language was difficult for the readers to cope. A score between 41% and 60% indicates reading at the instructional level where readers needs some assistance in their comprehension. A score of 61% to 100% indicates an independent level of reading where the reader can cope with the language.

II. METHODOLOGY

The study focused on content analysis using the *Flesch Readability Ease*, the *Flesch-Kincaid* Readability Formulas and Cloze Test. A questionnaire was also developed to seek the opinions of pupils and teachers.

The Flesch Readability Ease and Flesch-Kincaid formulas were used to determine the suitability of the passages of the selected textbooks for the readership. It was also used to determine their grade levels. The Flesch Reading Ease formula was used to determine the vocabulary loads of the selected passages (by counting the number of syllables per word) and the sentence length (by counting the number of words per sentence) while the Flesch-Kincaid Readability formula was used to determine the grade level of the selected textbooks.

The mathematical formulas are as follows;

Flesch Reading Ease (FRE) formula: $FRE = 206.835 – (1.015 \times ASL) – (84.6 \times ASW)$ and Flesch-Kincaid Grade Level (FKGL) formula:$FKGL = (0.39 \times ASL) + (11.8 \times ASW) – 15.59$

Where ASL is the average sentence length (*the number of words divided by the number of sentences*), and ASW is the average number of syllables per word (*the number of syllables divided by the number of words*).

Table 1 shows interpretation of Flesch Reading Ease Score as used to measure the reading difficulty levels based on the notion that the readers mother tongue is English. This interpretation is based on Wyatt and Schnelbech's (2008) work.

***Table 1*:** Interpretation of Flesch Reading Ease Score

Reading Ease Score	Description	Reading Grade
0-29	Very difficult	Post graduate grade
30-49	Difficult	College grade
50-59	Fairly difficult	$10^{th} – 12^{th}$ grade high school
60-69	Standard	Standard $8^{th} – 9^{th}$ grade
70-79	Fairly easy	7^{th} grade
80-89	Easy	$5^{th} – 6^{th}$ grade
90-100	Very easy	4^{th} - 5^{th} grade

Source: (Wyatt and Schnelbech, 2008)

The Cloze Test was used to measure the reading comprehension of the users. In the Cloze Tests, every fifth-word was deleted from the selected sample passages and were administered to the pupils to measure their reading comprehension levels. The test was carried out during normal class hours with permission from the various head teachers and class teachers. The selected passages were read and explained to the pupils for 30 minutes after which they were made to do self-reading for 15 minutes. The passage were collected and the Cloze Test administered to be answered within 30 minutes.

In scoring the passages, the substituted or similar words were counted as correct (disregarding spelling errors) and then divided by the total number of spaces provided.It was then multiplied by 100 to give the percentile Cloze Score of the students. The interpretation of the score is based on Wellington and Osborne's (2001) work as shown in Table 2.

Table 2: Cloze test interpretations

Cloze scores	Reading level	Description
60-100%	Independent	Material is too easy
40-59%	Instructional	Material is appropriate
0-39%	Frustration	Material is too difficult

Source: (Wellington and Osborn, 2001)

A sample of 135 Junior High School pupils in year 1 to 3 were selected from three schools, with 45 pupils drawn from each school. 15 pupils were selected from each class with an average population of about 45 (JHS 1, 2 and 3), with an age range between 12 to 17 years. These pupils were randomly selected by the use of casting lot with help of their class teachers. The study took place in the Kumasi Metropolis of the Ashanti Region of Ghana.

The *New Integrated Science for Junior High Schools (3rd edition),* textbook published in 2012 was purposefully selected since that was the most commonly used Government Approved Integrated Science textbook within the study area. A 3 x 3 Passages with a minimum of 100 words were then randomly selected from the front, middle and last sections of each of the Pupil's Books 1 to 3. The specific page numbers of the selected passages were as follows: Book 1 (pages 10, 86, 139), Book 2 (pages 13, 50, 67) and Book 3 (pages 9, 120, 150). An average score from the selected passages was used to determine the readability level and the ideal grade level each book is meant for.

Questionnaire were administered to pupils after the Cloze Test to find out their understanding of the passages read. Pupils were also asked if they received any help at home with regard to their reading and whether they were given extra tuition in school or home using their integrated science textbook and other materials. The questionnairewere administered according to their levels of study (i.e. form 1, 2 or 3).The analysis was grouped according to their respective levels. Tutors who handled integrated science in the study area were given questionnaire soliciting their view on the textbooks used for the study.

III. FINDINGS

This section of the study deals with answering the two research questions posed in the study. These questions are repeated here as follows;

1. How do readability formulas rate the level of difficulty for the approved integrated science textbooks used for the study?
2. What is the level of performance of pupils on the comprehension of the textbooks?

Q1. How do readability formulas rate the level of difficulty for the approved integrated science textbooks used for the study?

Recorded scores for the readability of the *Integrated Science for Junior High Schools books* 1-3 passages showing the grade levels and reading ease is shown in Table 3 with its interpretation based on Table 1.

Table 3: Results for Flesch Reading Ease and Flesch-Kincaid grade level of JHS Integrated Science text books 1-3

	Total words	Total sentences	Total syllables	Average sentence length	Average Syllables per word	Reading Ease Score	Grade level
JHS 1							
Passage 1	100	6	174	16.66667	1.7	42.71433	11
Passage 2	106	7	174	15.14286	1.6	52.5933	10
Passage 3	101	7	199	14.42857	2.0	25.50287	13
Average score of 3 passages	*102*	*6.7*	*182.3*	*15.4*	*1.8*	*40.3*	*11.5*
JHS 2							
Passage 1	102	7	177	14.57143	1.7	45.23912	11
Passage 2	104	8	162	13	1.6	61.85923	8
Passage 3	103	10	203	10.3	2.0	29.64458	12

Average score of 3 passages	*103.0*	*8.3*	*180.7*	*12.6*	*1.8*	*45.6*	*10.0*
JHS 3							
Passage 1	111	6	193	18.5	1.7	40.9602	12
Passage 2	104	5	173	20.8	1.7	44.99415	12
Passage 3	103	5	186	20.6	1.8	33.15318	14
Average score of 3 passages	*106*	*5.3*	*184.0*	*20.0*	*1.7*	*39.7*	*12.7*

Q2: What is the level of performance of pupils on the comprehension of the textbooks?
Computational results of respondents according to their performance in the Cloze test with interpretation based on Table 2 is shown in Table 4.

Table 4. Cloze test for the three schools

Textbook/ Class	*Cloze score*	*Total number of respondents*	*Percentages (%)*	*Cloze reading score*
Book 1 / JHS 1	0-39%	14	31	Frustration
	40-59%	21	47	Instructional
	60-100%	10	22	Independent
	Total	**45**		Total
Book 2 /JHS 2	0-39%	11	24	Frustration
	40-59%	21	47	Instructional
	60-100%	13	29	Independent
	Total	**45**		
Book 3 / JHS 3	0-39%	3	7	Frustration
	40-59%	12	27	Instructional
	60-100%	30	67	Independent
	Total	**45**		

It was also observed that environmental conditions in some of the schools were not conducive for effective teaching and learning as well as some of the pupils seem to be far ahead (Intelligent quotient) of their peers during interactions before taking the cloze test.

IV. DISCUSSION

Using the Flesch Reading Ease formula, the study showed that the readability levels of these integrated science textbooks are difficult for their respective levels. The average readability scores recorded for the textbooks were high as shown in Table 3. Based on *Wyatt and Schnelbech (2008)* interpretation, the appropriate grade levels for the selected books should be for students above the tenth grade i.e. Senior High School level in Ghana based on the assumption that pupils in Ghanaian schools are native speaker of the language of instruction upon enrolment. Contrary to this, pupils use of English language (L2) starts at class four base on accepted educational policy of the Ghana (Owu-Ewie, 2013). This show that technically speaking, the books are written way above the grade level of such pupils coupled with the language of science itself.

Again, the Cloze Test scores indicated that Pupil's Books 1 and 2 were written above the comprehension levels of the pupils (Table 4). Only a minority of pupils can use the books on their own, with majority of the pupils (60%) reading at the instructional or frustration levels. This means that pupils would need assistance before they can use these materials. Although Pupil's Book 3 recorded a high readability ease score, withmajority of pupils having a comprehension rate of 60-100% which seems to suggest the material was written to match the comprehension level of its intended grade. Analysis of the questionnaire shows that majority of the pupils in JHS 1 and JHS 2 did not attend any extra classes or did not have any additional tutorial support at home or after school. On the other hand, since the third-year pupils were preparing for their final examination (Basic Education Certificate Examination) for progression to Senior High School during the period of the study, many of these pupils were given extra tuition in school and some at home. This could account for the better performance of the JHS 3 pupils even though the text at that level was graded high. It must also be

noted that the study was conducted in an urban area where many pupils come from homes where guardians could afford extra tuition to augment what wards are taught in school but where there is no such help, then pupils could be facing challenges that would no motivate them to take up science or even pass their basic examination in science to have the chance to read science related courses in the senior high school.

Further analysis of questionnaire administered to pupils shows that pupils will like to see some changes made in the content of the Government approved textbooks to make the book more comprehensible and useable. Some of these suggestive revisions included; words in the textbooks should be made simpler for reading and understanding; complex and technical words used in the passages should be explained by teachers when teaching and simple explanation be given in the glossary; passages should be well illustrated for better understanding of the written text; the content of the textbooks should be simplified and pupils be allowed to take the textbooks home on weekends.

On a different and equally important plane, tutors in the respective schools who handled Integrated Science indicated that the writing style of the textbooks is difficult for the pupils, and that the textbook is very useful to them but need to be upgraded and reviewed to meet the reading needs of pupils. They also said that government textbooks do not treat the topics in detail as required by syllabus,hence, they often consult from other Science textbooks as well when teaching.

During the study, latent factors were also identified as hindering the reading comprehension levels of the pupils. The environment within which teaching and learning took place was one key factor. The intelligent quotients (IQs) of some of the pupils were comparatively higher, making comprehension unbalanced as some pupils obviously understood the passages better than others base on the result of the Cloze test.

Additionally, the complexities with vocabulary length and structure inherent in the science textbooks contributed to their reading difficulty resulting in their lower and sometimes no comprehensibility. However, this might not always be the situation as in some cases, the length of the sentence and number of syllables per word do not necessarily contribute to the complexity, but rather the topic under study and/or its familiarity to the students. A word's unfamiliarity can also contribute to its difficulty. Sentence length and syllabic count can only support the readability process but cannot on their own, be used to draw conclusions on the readability of a text.

A similar study by Gyasi (2013), regarding integrated science textbook used in senior high school showed similar trend where the text was written above the reading levels of the students. It is, therefore, not surprising that 7% of about 500,000 students studying in Ghana's Universities at the undergraduate level are pursuing science related courses (Ibrahim, 2018). If majority of students are having challenges passing the basic requirement of science at the junior levels then the situations needs critical consideration as their lack of motivation to take up science in the higher levels would in the long-term hamper Ghana's scientific innovations for national development.

V. CONCLUSION AND RECOMMENDATION

From the findings and data analysis, it was concluded that the JHS 1 to JHS 3 Government Approved Integrated Science textbooks studied are written at a level that is too difficult for the intended pupils to read and comprehend independently, and even sometimes with help. With over 73% of the students selected from three different Junior High Schools at study levels of form 1-3 reading at the Frustration Level, it is an obvious and clear indication that the *New Integrated Science for Junior High Schools, Pupil's Books 1-3* are too difficult for the students to read and understand. This is a material approved by the authoritative voice of the Government on education purported to have undergone rigorous evaluation and selection. What then would be the case with materials that were not approved by the National Council for Curriculum and Assessment (NaCCA) but are still in use in the classrooms? This discussion is beyond the scope of this study and would need a further probing to come out with the relevant research indications that would help correct the system.

It is recommended among other things that text materials for these pupils should match their reading levels for easy comprehension. Long sentences and multi-syllabic words should be broken down into smaller components for easy understanding, and that all stakeholders including policy makers, the Department of Publishing Studies of the Kwame Nkrumah University of Science and Technology, publishers, teachers, parents should be involved in the evaluation and development of the government approved textbooks.

This study looked at the semantic and sentence difficulties of the textbooks but not the relationship between text and images used which could be a catalyst for understanding, and need studying, to assess whether the illustrations and graphics used in these materials could help with the comprehension levels because.

REFERENCES

[1]. Ajideh, P., &Mozaffarzadeh, S. (2012). A comparative study on C-test vs. cloze test as tests of reading comprehension. Journal of Basic and Applied Scientific Research, 2(11), 1159-11163. URL: http://dx.doi.org/10.5539/elt.v5n11p143

[2]. Asabere-Ameyaw, A., &Ayelsoma, S. (2012). Language proficiency and science learning. In A. A.-A. al, Contemporary Issues in African Sciences and Science Education (pp. 55-61). Sense Publishers.

[3]. Ayodele, M. O. (2013). A Comparative Study of Textbook Readability and Students' Comprehension Levels in Senior Secondary School Biology. Journal of Educational and Social Research, 3(1).

[4]. Bargate, K. (2012). The readability of managerial accounting and financial management textbooks. Meditari Accountancy Research.

[5]. Bormuth, J. R. (1969). Development of readability analyses (Final Report, Project No. 7-0052, Contract No. OEC-3-7-070052-0326). Retrieved from ERIC database. (ED029166).

[6]. Bryce, N. (2013). Textual features and language demands of primary grade science textbooks: The call for more informational texts in primary grades. In Critical analysis of science textbooks (pp. 101-120). Springer, Dordrecht.

[7]. Chall, J. S. (1981). Readability: Conceptions and Misconceptions. Retrieved from ERIC database. (ED263620)

[8]. Curtis, S., & Millar, R. (1988). Language and conceptual understanding in science: A comparison of English and Asian language speaking children. Research in Science & Technological Education, 6(1), 61-77.

[9]. Devetak, I., &Vogrinc, J. (2013). The criteria for evaluating the quality of the science textbooks. In Critical analysis of science textbooks (pp. 3-15). Springer, Dordrecht.

[10]. DuBay, W. H. (2004). The Principles of Readability. Costa Mesa, California: Impact Information. Retrieved from http://www.impact-information.com/impactinfo/readability02.pdf

[11]. DuBay, W. H. (2007). Smart Language: Readers, Readability, and the Grading of Text.

[12]. Essuman, M. A., & Osei-Poku, P. (2015). Evaluation of Selected Textbooks from Ghanaian Primary Schools. International Journal of Innovative Research & Development, 4(6), 310–319.

[13]. Fatoba, J. (2014) Readability level of recommended chemistry textbooks and students' academic performance in senior secondary schools in Ekiti State, Nigeria. International Journal of Education and Research, 2(9), 41-50.

[14]. Ghana News Agency, (GNA) (2010). Poor Performance in BECE2009:Online Press Release Retrieved November 20, 2014 from http://www.modernghana.com/news/235641/3 /anomabu- township-gets-ict-centre for-students.html

[15]. Glewwe, P., & Kremer, M. (2006). Chapter 16 Schools, Teachers, and Education Outcomes in Developing Countries. Handbook of the Economics of Education, 2(06), 945–1017. https://doi.org/10.1016/S1574-0692(06)02016-2

[16]. Guven, A. (2014). Readability of texts in textbooks in teaching Turkish to foreigners. Anthropologis, 18(2), 513-522.

[17]. Gyasi, W. K. (2013). The Role of Readability in Science Education in Ghana: A Readability Index Analysis of Ghana Association of Science Teachers Textbooks for Senior High School. IOSR Journal of Research & Method in Education (IOSRJRME), 2(1), 09-19. https://doi.org/10.9790/7388-0210919

[18]. Helfeldt, J. P., Henk, W. A., &Fotos, A. (1986). A test of alternative cloze test formats at the sixth-grade level. The Journal of Educational Research, 79(4), 216-221.

[19]. Hubisz, J. (2003). Middle-school text don't make the grade. Physics Today, 56(5), 50–54. https://doi.org/10.1063/1.1583534

[20]. Ibrahim Y. (2018). Encourage the study of science for rapid progress - Prof. Agyemang, Ghana New Agency http://www.ghananewsagency.org/education/encourage-the-study-of-science-for-rapid-progress-prof-agyemang-143274 accessed date: 25th December

[21]. Izgi, U., &Seker, B.S. (2012). Comparing Different Readability Formulas on the Examples of Science-Technology and Social Science Textbooks. Procedia - Social and Behavioral Sciences, 46, 178–182. https://doi.org/10.1016/j.sbspro.2012.05.089

[22]. Janan, D., & Wray, D. (2012, September). Readability: The limitations of an approach through formulae. In Br. Educ. Res. Assoc. Annu. Conf. Univ. Manchester (pp. 1-16).

[23]. Jones, K.H. (1997). Analysis of Readability, Interest Level, and Writing Style of Home Economics Textbooks: Implications for Special Need Learners. Journal of Vocational Home Economics Education, 12 (2), 13-24. Retrieved from http://www.natefacs.org/Pages/v12no2/12-2-13%20Jones.pdf

[24]. Karmakar, S., & Zhu, Y. (2010). Visualizing text readability. 2010 6th International Conference on Advanced Information Management and Service (IMS), 291–296.

[25]. Kılıçkaya, F. (2018). Recycling English vocabulary through rational/selected deletion cloze, c-test and cloze elide. In M. Krawiec, & R. Pritchard (Eds.), Sezie the day: New perspectives on foreign language learning and teaching (pp. 133-154). Hamburg: Verlag Dr. Kovac.
[26]. Kweitsu, R. (2014, November 7). Modern Ghana. Retrieved April 2018, from www.modernghana.com: https://www.modernghana.com/news/579629/ghanas-education-sector-key-challenges-hindering-the-effec.html
[27]. Mesmer, H.A E. (2008). Tools for matching readers to texts: Research-based practices. Guilford Press.
[28]. Opoku-Amankwa, K. (2010). What happens to textbooks in the classroom? Pupils' access to literacy in an urban primary school in Ghana. Pedagogy, Culture and Society, 18(2), 159–172. https://doi.org/10.1080/14681366.2010.488042
[29]. Rollnick, M. (1999). The influence of language on second language teaching and learning science. In Clements, M.A. (Ken) & Leong, Y.P. (Eds.), Cultural and language aspects of science, mathematics and technical education,(pp. 123-132)Gadong: Universiti Brunei Darussalam.
[30]. Scot B. (2011). Readability Formulas. Retrieved April 18, 2018, from http://www.readabilityformulas.com/articles/why-the-education-industry-needs-readability-formulas.php
[31]. Snow, C. (2002). Reading for understanding: Toward an R&D program in reading comprehension. Rand Corporation.
[32]. Stein, M., Stuen, C., Carnine, D., & Long, R. M. (2001). Textbook evaluation and adoption. Reading & Writing Quarterly, 17(1), 5-23
[33]. Tabatabaei, E., & Bagheri, M. (2013). Readability of reading comprehension texts in Iranian senior high schools regarding students' background knowledge and Interest. Journal of Language Teaching and Research, 4(5), 1028-1035.
[34]. Uchennah, E. (2002). A comparative analysis of the readability level of three African School Certificate Examinations. University of Port Harcoutrt.
[35]. Venable, G. P. (2003). Readability case study and scenarios. Topics in Language Disorders, 23(3), 248–251.
[36]. Vinod, M. J., & Deshpande, M. (2013). Contemporary political theory. PHI Learning Pvt. Ltd..
[37]. WAEC (2015). http://test.waecgh.org/uploads/examinersReport/2015/Integrated%20Science15.pdf
[38]. Wellington, J & Osborne, J. (2001). Language and Literacy and Science Education. McGraw-Hill Education (UK).
[39]. Wienstein, J. (2011, May 17). Develop Economies. Retrieved April 2018, from http://developeconomies.com/: http://developeconomies.com/development-economics/the-challenges-for-public-education-in-ghana/
[40]. Wissing, G. J., Blignaut, A. S., & Van den Berg, K. (2016). Using readability, comprehensibility and lexical coverage to evaluate the suitability of an introductory accountancy textbook to its readership. Stellenbosch Papers in Linguistics, 46, 155-179.
[41]. Wyatt, E. S., &Schnelbach, S. D. (2008). Calculating Reading and Writing Levels. Tameri Guide for Writers.
[42]. Yong, B. C. S. (2010). Can Students Read Secondary Science Textbooks Comfortably? Brunei International Journal of Science and Mathematics Education, 2(1), 59-67.

Nunoo, K.N. Francis. "How can we take up science courses? Readability of levels of Junior High School Integrated Science textbook in Ghana." *IOSR Journal of Humanities and Social Science (IOSR-JHSS)*, 25(8), 2020, pp. 16-24.