READABILITY OF ‘A-LEVEL CHEMISTRY FOR SENIOR HIGH SCHOOL VOLUME 1B’ TEXTBOOK

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ABSTRACT: This study was intended to investigate and describe the readability of ‘A-Level Chemistry for Senior High School Volume 1B’, an endorsed Chemistry textbook for SBI/RSBI in Malang that uses English as the medium of instruction. The readability tests employed are cloze test, Fry Readability Graph, Flesch-Kincaid Readability Formula, and Dale-Chall Readability Formula. The cloze test, deleted every ninth word with 50 blank items, was conducted in SMAN 3 Malang, SMAN 5 Malang, and SMAN 8 Malang. A class of ± 30 students from each school was elected on the basis of proportional random sampling. In applying the readability formula, 18 passages from the front, middle, and back part of the textbook were selected to be calculated using four readability tools. The study revealed that the readability level of the textbook according to the result of the cloze test was in the frustration level for most of the students. According to the result of the readability formula, the textbook is difficult to read and suitable for students in Grade 10-12.

Keyword: readability, readability test, readability level

As the Education Bill No. 20 year 2003 about National System of Education released, schools in Indonesia are reinforced to establish their education unit at any grade to be improved as an international standard unit of education. In this so-called International Standard School program (further mentioned as SBI: Sekolah Bertaraf Internasional), English is taught as a subject and also used as the medium of instruction in Mathematics, Hard Science, and Information and Communication Technology (ICT) (Depdiknas, 2007a:3). Teachers from these subjects stumble upon new challenges: to make their students not only understand the language being used, but also the content of the subject presented.

Textbooks are important resources for teachers in assisting students to learn subjects at school. In some cases, they may function as supplements to the teaching and learning process. For most situations, textbooks provide the foundation and the major source of lessons being taught. They offer students opportunities to learn scientific knowledge and are being used as an indispensable source that affects seriously what students learn and what teachers teach (Baker et.al, 1998 as quoted by Küçük, 2002). Being reasonably beneficial, textbooks used in instructional procedure should not covered weak content and complex terms, and not written in vague language since both the teachers and the students will find it pretty problematic (Colleta, A. T. et.al, 1989 as quoted by Küçük, 2002). In other words, textbooks are seen as an interactive tool to facilitate effective learning.

In order to achieve the teaching and learning objective, teachers have to carefully select the most effective and relevant textbook that serve lead to student success in that particular course. There are several criteria to look at in a textbook, namely readability, content, length, relevance, interactivity, and organization (Cosmato, 2008). Readability then becomes incredibly important, especially in science teaching in foreign language. The struggle of the students to understand the language is one of the biggest roadblocks for learning. A good reading material also should be in the right level of the students’ competence. If it is too difficult then the students will be easily discourage and if it is too easy then it will make them simply bored (Arief, 1993).
The problem of matching between reader and text could be viewed by readability. The definition purposed by Dale and Chall (1949, as quoted by Dubay, 2004) of readability 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.” Teachers can employ readability tests to measure the reading passages of the textbook, whether it is appropriate or not, before they decide to use it in a classroom.

‘A-Level Chemistry for Senior High School’, the commonly used textbook for science among the SBI/RSBIs in Malang, gives an introductory course for the tenth graders which topics are all based on 2004 Indonesian’s Curriculum and A-Level 2007 Cambridge Curriculum. It is selected as the object of the study for several reasons. First, grade X is the initial year in Senior High School and where Chemistry is formally introduced as a subject. The understanding of the early materials will surely helpful for further conception of the content of Chemistry itself. Secondly, the study conducted in the second semester and the students were assumed to already have the primary knowledge of Chemistry. There also has not been any study regarding the readability level of this book. According to some personal interviews, a number of students find difficulties in understanding the materials from the textbook. It is either because of the complexity of the content itself or the way it is presented in narrative explanation.

With a view to the importance of providing suitable materials in terms of its readability that determine the success of teaching and learning Chemistry as one subject taught in English as a foreign language in SBI, the present study on the readability of ‘A-Level Chemistry for Senior High School Volume 1B’ is conducted.

METHOD

To administer the cloze test, the study was conducted at SBI/RSBI senior high schools in Malang that use ‘A-Level Chemistry for Senior High School Volume 1B’ as textbook in Chemistry teaching and learning process. They are SMAN 3 Malang, SMAN 5 Malang, and SMAN 8 Malang. The subjects of this study were the X grade students of the above mentioned schools; SMAN 3 Malang, SMAN 5 Malang, and SMAN 8 Malang. The population is all X grade students of SBI/RSBI that use ‘A-Level Chemistry book for Senior High School Volume 1B’ in the Chemistry teaching and learning process. One class of grade X in every school (± 30 students each class) is selected randomly as the sample; Class X-7 in SMAN 3 Malang (28 students), X-4 in SMAN 5 Malang (30 students), and X-3 in SMAN 8 Malang (35 students). The try-out of the instrument was conducted at SMAN 4 Malang.

In choosing the passage to be evaluated using the cloze test, the researcher considered two following issues. First, the passage should have feasible length to be deleted every ninth word for fifty items (±500 words), leaving the first and the last sentences complete. Secondly, the passage should contain fewer formulas, numerical, or other symbolic features in order to provide sufficient amount of context. The deletion every ninth word was chosen because it was assumed to provide enough contexts while also making the cloze test not too simple. Fifty blank items are chosen to ease the scoring. Therefore, a 536-word passage is chosen from Chapter 5: Chemical Bonding, Part IV: Metallic Bonding, Subpart 5.2 Model of bonding in metals to Subpart 5.3 Electrical and thermal conductivity in metals, page 105-106. The exact scoring method was applied.

To employ the readability formula, eighteen 150-200 word passages were chosen from the front, middle, and back part of the book. These passages were then analyzed using readability test tools in www.readabilityformulas.com, www.read-able.com, www.readability-score.com, and the readability measurement from Microsoft Word. The aforementioned websites were chosen because they are in the top list of free readability tool
FINDINGS

This part presents the results based on administering the cloze test. In SMAN 3 Malang, it was found that 9 students got less than 35% of correct answer while the other 19 scores were between 35-50% correct. The minimum score was 8% while the maximum was 48%. In SMAN 5 Malang, 12 students got less than 35% correct answer and 9 students got between 35-50% correct answer. The minimum score was 2% whereas the maximum was 50%. In SMAN 8 Malang, 17 students got less than 35% correct answer, 14 students got 35-50% correct answer, and 3 students got more than 50% correct answer. The minimum score was 6% and the maximum was 64%.

Based on the result of the cloze test taken in three SBI/RSBI schools, it can be suggested that 32% of the 10th graders in SMAN 3 Malang found ‘A-Level Chemistry for Senior High School Volume 1B’ is in their frustration level, while the other 68% found it in instructional/assisted level. In SMAN 5 Malang, 57% of 10th graders showed their frustration level of the book whereas 43% shows that it’s in instructional/assisted level. Different cases happened in SMAN 8 Malang where 9% of the 10th graders found the textbook suitable for the independent/assisted level, 41% thought it was in the instructional/assisted level, and in the frustration level for the remaining 50%. Based on the data, in can be inferred that typically the 10th grade students in SMAN 3 Malang found ‘A-Level Chemistry for Senior High School Volume 1B’ suitable for the instructional/assisted reading level, while in both SMAN 5 Malang and SMAN 8 Malang the textbook is in the frustration level of the students.

This part presents the results based on administering the readability formulas, namely Fry Readability Graph, Flesch-Kincaid Readability Formula, and Dale-Chall Readability Formula, by employing readability measurement tools.

The first website, www.readabilityformulas.com, generally uses seven popular readability formulas to calculate the average grade level, reading age, and text difficulty of the text, included the three formulas utilized in this study. The second website, www.readable.com, contains several readability formulas but from those three formulas employed in the study, only Flesch-Kincaid Readability Formula was present. In the third website, http://www.readability-score.com/, once again only Flesch-Kincaid Readability out of the three previously selected formulas can be found among other readability measurement. Meanwhile, the data obtained from Microsoft Word’s readability test was based on Flesch-Kincaid Reading Formula. The result of the computation was shown in Table 1.

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<td>Front</td>
<td>FRE 42.4 FKGL 11.2 DCRF 8.6 FRG 11.5</td>
<td>FRE 46 FKGL 10.7 DCRF 8.6 FRG 11.2</td>
<td>FRE 42.5 FKGL 11.2 DCRF 8.6 FRG 11.2</td>
<td>FRE 32.7 FKGL 12.9</td>
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<tr>
<td>Middle</td>
<td>FRE 55.2 FKGL 9.4 DCRF 8.6 FRG 11.2</td>
<td>FRE 60.6 FKGL 8.6 DCRF 55.1 FKGL 9.4</td>
<td>FRE 47.3 FKGL 10.9</td>
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<tr>
<td>Back</td>
<td>FRE 46.2 FKGL 11 DCRF 8.9 FRG 12.8</td>
<td>FRE 51 FKGL 10.4 DCRF 46.2 FKGL 11</td>
<td>FRE 39.3 FKGL 12.6</td>
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<td>Average</td>
<td>FRE 47.9 FKGL 10.5 DCRF 8.7 FRG 11.8</td>
<td>FRE 52.5 FKGL 9.9 DCRF 47.9 FKGL 10.5</td>
<td>FRE 39.8 FKGL 12.1</td>
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Note: FRE = Flesch Reading Ease
FKGL = Flesch-Kincaid Grade Level
DCRF = Dale-Chall Readability Formula
FRG = Fry Readability Graph
Several inferences can be made based on previous computation. First, according to Flesch Reading Ease, ‘A-Level Chemistry for Senior High School Volume 1B’ scores 47, which means it is difficult to read. Secondly, based on Flesch–Kincaid Grade Level, the textbook is appropriate for 10-11 graders. Thirdly, along with the result of the Dale-Chall Readability Formula, the score 8.7 makes the textbook suitable for Grades 11-12. Finally, the result of the Fry Readability Graph shows that the book is best-suited for 11-12 graders.

DISCUSSION

It is widely known that cloze tests assess the readability of a book for students in a far more personal way than formulas or standardized tests of reading comprehension. According to Templer (1982), the cloze procedure reflects the total language abilities in the following ways: familiarity with sentence structure, context clues and vocabulary, and the ability to draw inferences from written text. The scores from this test can give teachers better insights into the readers' understanding and ability, and into what will or will not be suitable instructional materials for them.

According to Chatel (2001), the independent reading level is the level at which a student reads the text with excellent comprehension and fluency without instructional interventions, even as a recreational activity since the students can and do read the materials single handed and successfully. The instructional reading level is the level at which the student can improve his/her reading skills with appropriate instruction; in other words it is challenging but not out of reach. The frustration reading level is the level at which a child may be unable to decode and/or comprehend the majority of the text; it is simply too demanding to be useful instructionally. Therefore, if a teacher was to check the readability of a class textbook, s/he might expect the cloze test to show that his/her students are spread between the ‘instructional’ and ‘independent’ level.

Knowing the reading levels of students, a teacher can successfully conduct the teaching and learning process to achieve the desired objectives. But it should be noted that reading levels are not static and change constantly (Chatel, 2001) so the progress ought to be supervised continuously.

Some people argue that giving the students a text with slightly higher level than it should be can be a trigger to motivate them to learn more. Readability measurements are made to predict the average reading level of students, which leave the high-achievers and low achievers. Low achievers, still struggling to be at the average reading level, will find it really tricky to read a passage with higher readability level. Some additional efforts to help enhancing students’ understanding of the projected message in the text are necessary in this case. Deciphering long sentences with complex words and giving extra explanation of the content are seemingly a must.

The readability formula is a good tool for alerting the teachers if a text is too difficult or not for instructional purpose. Now that they are computerized and easily obtained, readability formulas are even more efficient to be used to check the readability level of certain materials. But it should be remembered that readability formulas screen for difficult words and sentences, in other words only some of many factors that affect ease of reading. An appropriate grade level does not by itself ensure the match between the reading skills and the difficulty of the material. Despite the limitations of readability test, it is still a useful tool to give illustration of how difficult a passage or a book is.

CONCLUSION AND SUGGESTION

Conclusion

Based on the findings of the study, there are some conclusions that can be drawn in relation to the readability level of ‘A-Level Chemistry for Senior High School Volume 1B’.
According to the result of the cloze test, the textbook is in the frustration level of the students with the average score of 34% correct answer. It is a level at which a student may be unable to decode and/or comprehend the majority of the text and that the textbook is simply too demanding to be useful instructionally. The appropriate readability of a textbook in teaching and learning process is in the instructional level where the improvement of the reading skill can be helped with appropriate instruction; challenging but not out of reach. Based on the three readability formula employed in this study namely Fry Readability Graph, Flesch-Kincaid Readability Formula, and Dale-Chall Readability Formula, the book is difficult to read and most suitable for the reader in Grade 10-12. Inferring to those measurements, ‘A-Level Chemistry for Senior High School Volume 1B’ is difficult to read and slightly above the students’ reading level, thus resulting in the frustration level of comprehending it.

It should be noted that it is indeed a system of grading intended to USA students. It is assumed that the reading level of L2 learners should be lower than the L1, leaving the passages harder to be understood. Since the textbook contains many pages and not all of them could be examined, this study only represents 10% of all passages presented in ‘A-Level Chemistry for Senior High School Volume 1B’.

Suggestion

It should be underlined that the use of readability tests such as cloze procedures and readability formula cannot be used as the only tool to justify whether a book is suitable or readable as a whole. The measurement provides illustration of how readable or how difficult the book is. For the teacher of Chemistry, the result of this study can be used to anticipate the level of students’ understanding and thus may discover some ways to overcome the difficulty to attain the goal of the teaching and learning process. Thus, if the textbook appears to be highly above the students’ level, the teacher should give other reading materials that are suitable for the students to make certain the maximum understanding or adding more time for reassuring the students’ comprehension. Providing the students with suitable materials is exceedingly necessary in the sense of escalating their interest and motivation to learn better. And for English teacher, knowing that the students mostly have difficulty in decoding some scientific terms, can enrich students’ knowledge of the related vocabulary to assist their comprehension. As for textbook writers, specifically for the ‘A-Level Chemistry for Senior High School Volume 1B’ writer, the result of this study is expected to give an illustration of the importance of readability in writing textbook, especially for science. It is suggested for the writers to check the passages’ readability so that if it is too difficult or too easy some adjustments can be carried out, such as paraphrasing or choosing alternative dictions. For future researchers, the result of this study can give illustration and may be a useful reference in advance. There are a lot of other bilingual and English textbooks for other subjects that are potential to be studied further. The development of grade level conversion may also be helpful in the study of readability in advance.

REFERENCES


