Text Complexity in Reading Texts of Indonesian Senior High School English Textbooks using Coh- Metrix 3.0

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Abstract

This study examined text complexity, mainly related to lexical/sematic and syntactical complexity. Two English textbooks of grade 10 and 12 of Indonesian senior high schools are assessed. Four reading texts in each book respectively selected based on text genre and word length. Coh-Metrix 3.0 was utilised. Descriptive statistics were presented, and Independent T-test was conducted to perceive differences on texts in the two textbooks. Finally, it was found that between grade 10 and grade 12, the complexity on both lexical and syntactical aspects showed no difference, but texts in grade 10 tend to produce significantly more consistent of the syntactic constructions than grade 12. It is suggested that texts in grade 12 should be revised to meet reading texts based on their levels relating to character of sophistication of language complexity.
Keywords: Lexical Complexity, Reading, Syntactical Complexity

Abstrak

Penelitian ini mengkaji kompleksitas pada teks, terutama yang berhubungan pada kompleksitas leksikal/semantik dan sintaktik. Dua buku Bahasa Inggris Sekolah Menengah Keatas kelas 10 dan 12 yang dinilai. 4 teks bacaan masing-masing pada setiap buku dipilih berdasarkan genre teks dan panjang teks. Coh-Metrix 3.0 yang dipakai. Deskriptif statistik dipersembahkan dan Independent T-test dilakukan untuk melihat perbedaan pada teks di dua buku tersebut. Akhirnya, ditemukan bahwasanya diantara kedua buku (kelas 10 dan 12), kompleksitas pada aspek leksikal maupun sintaksis menunjukkan tidak ada perbedaan, tetapi teks di kelas 10 secara signifikan cenderung lebih konsisten pada konstruksi sintaksisnya daripada di kelas 12. Hal ini disarankan bahwa teks pada kelas 12 sebaiknya direvisi agar sesuai dengan level terkait dengan karakter kekompleksitasan kebahasaanya.
Keywords: Bacaan, Kompleksitas Leksikal, Kompleksitas Sintaktik

I. INTRODUCTION

Reading skill is one of useful abilities since it aids as an access to all information (PISA, 2009). In addition, in school environment, Strevens (1977, p.64) claims that the ability of reading is vital instrument between teacher and learners, since reading provides an access to a huge number of language involvements and information. At this point, the need of the readers to comprehend or simply make a unity between the readers' focus and the text delivered in writing context is important. It is also highlighted by Yukselir (2014) that reading is

psycholinguistic process. In a sense that; when readers read a text, they make tentative decisions to verify, discard or filter as reading progresses (Goodman, 1970, p.260). As such description, reading is seen to be an active process in purpose of comprehension of a text. Such comprehension is influenced by a text that whether or not it is in accordance with their levels relating to character of sophistication of language complexity (Anstrom, et al., 2010).

Theoretically, reading comprehension or outcome is the result of interaction between the reader knowledge and text features (Anderson, 2000, p.33). In other words, readers' outcome emerges from the reader's interaction with text. In this case, reader's knowledge (including vocabulary, grammatical, discourse knowledge, and world knowledge) will interact with textual features (involving lexical, syntactic properties, and other textual properties). This dyadic interaction during comprehension processes will be of interest in this study. However, this study does not look at both reader and text and how they both interact each other simultaneously. Rather, this study only looks at the textual aspects that are argued to play essential role in L2 reading outcomes. This study assumes that the textual complexity levels that the text carries for reader will affect reading comprehension. Thus, it is essential for reading teachers or educators to prepare texts which are not too challenging or less demanding. The reading materials or texts should be matched with readers' knowledge, in this sense.

Moreover, text complexity assessment of texts should be conducted to determine appropriate texts for appropriate grade since undesirable result of reading comprehension may possibly occur due to reader-text mismatch. Moreover, learners might ignore and fail in understanding certain text because it is not readable for their grades. In other words, there should be an evaluation or assessment of text readability.

Several studies have worked out on text assessment based on its text complexity using readability quantitative methods (Kintsch, 1998; Sahiruddin, 2019; Nation and Snowling, 2010; Arya et al., 2011, Rohmatillah, 2015; Indrawan, 2018). A study by Kintsch (1998) argued that lexical complexity has a direct relationship to readers' knowledge about the topic, which has a great impact on comprehension. Ortega (2015) similarly adds that a syntactic complexity relates to the extent of grammatical sophistication in producing language. In this case, a syntactic complexity, as one of variable of text complexity plays a role for readability in form of reading text. Nation and Snowling (2010) found similar pattern that syntactic complexity and semantic ambiguity influence reading performance and differentiate between normal readers and poor readers. However, Arya et al. (2011) found that syntactic complexity did not play a role in L1 third graders' reading performance, but lexical complexity had higher significant contribution to reading comprehension. Sahiruddin (2019) argues that syntactic complexity level could predict reading comprehension in L2 setting. Moreover, he added that syntactic complexity

issue leads L2 reading performance distinguishing between good and poor readers. Albeit there have been divergent findings, many scholars recognize the role of lexical and syntactic complexity in the texts in determining the level of complexity of texts.

Meanwhile, some studies in Indonesian context which examine purely on text complexity levels without involving students in performing reading comprehension task are also evident, particularly in using readability formulas to assess reading texts in school's textbook in Indonesia (Rohmatillah, 2015; Indrawan, 2018). Rohmatillah (2015) analysed reading texts in grade 10 English textbook in Indonesia Entitled *English Alive for Senior High School Grade X* Published by Yudhistira through assessing the combination of lexical and syntactical complexity by using Flesch readability formula. She concludes that only 5 texts are relevant out of 16 texts to grade 10 students of Senior High School. Meanwhile, Indrawan (2018) measured the combination of semantic/lexical and syntactical by using two formulas which are Flesch-Kincaid Grade Level and Syntactic Complexity Analyser. He concludes that most reading texts of grade 10 is more difficult than grade 11.

In conclusion, based on text complexity factors affecting reader's comprehension in reading texts in school's textbook, this study is motivated to respond to previous studies conducted by Rohmatillah (2015) and Indrawan (2018). The two studies assessed text complexity based on lexical/sematic and syntactic complexity. This study focuses on similar complexity factors (lexical/sematic and syntactic complexity) with different analyser. Therefore, at this point, this study attempts to fill in the gap by analysing as well as comparing the text complexity factors which are lexical/semantic and syntactic complexity on reading texts of Indonesian secondary level English textbooks. This study will quantitatively utilise Coh-Metrix 3.0. This study is limited to seek: what do the lexical and syntactic features of reading texts in grade 10 English textbook differ from reading texts in grade 12 English textbook?

II. RESEARCH METHOD

This study scrutinizes the complexity level of texts from several texts in Indonesian secondary school textbooks. The source of the data was taken from two English textbook (of grade 10 and 12) Indonesian secondary level provided by Education and Culture Ministry. The sampled reading texts, data, are taken from those two textbooks based on the selection of texts on text genre (expository texts) and word length (> 200-word length). However, of the 15 texts in total found in the textbook of grade 12, only 3 are expository texts, meanwhile the rest (excluded the non 200-word length) are procedure with 5 texts in total. Therefore, the simple random sampling is conducted.

Overall, on the reading texts found in English textbooks of grade 10 and 12 senior high school in Indonesia, it is found four reading texts, respectively, in total in each textbook based on those criteria. Since they are processed and analysed using quantitative tool while as well emerging numeric values, quantitative approach will be applied. This is related to what Dornyei (2007) stated that quantitative research involves a procedure of data collection with primary result involves numerical data which is then analysed by using statistical method. The data analysis in this study uses statistical data to measure the numerical data which is then interpreted to understand the difference of complexity in two different textbooks in terms of lexical and syntactical aspects.

Furthermore, descriptive statistics will be presented for each aspect (lexical and syntactical aspects) and Independent T-test is computed to see the differences between those two aspects across texts in two different textbooks (grade 10 and 12).

Table 1 List of Reading texts in grade 10 English textbook

Reading texts in Grade 10 English textbook			
No.	**Title of reading text**	**Word Length**	**Text Genre**
1	Tanjung Puting National Park	413 words	Expository text
2	Taj Mahal	264 words	Expository text
3	Visiting Niagara Falls	477 words	Expository text
4	The Beauty of Batu City	291 words	Expository text

Table 2 List of Reading texts in grade 12 English textbook

Reading texts in Grade 12 English textbook			
No.	**Title of reading text**	**Word Length**	**Text Genre**
1	Why Don't You Visit Seattle?	457 words	Procedure text
2	Tenants advised to obey regulations on apartment	207 words	Expository text
3	Parents upset, disappointed with online school	520 words	Expository text
4	Indonesia Opens Regional Recycling Conference	225 words	Expository text

Research Instrument

This study utilizes Coh-Metrix 3.0 web tool found in http://cohmetrix.com/. This study selected the indices to those that provide textual similarities and differences across reading texts in English textbook used by grade 10 and 12 of Indonesian secondary level. The following figure presents in detail:

Figure 3 List of Indices

Selected Category	Index	Description
Lexical aspects	WRDFRQc	CELEX word frequency for content words
	LDTTRc	Type-token ratio for content words
Syntactic complexity	SYNLE	words before main verb
	SYNNP	Number of modifiers per noun phrase
	SYNSTRUTa	Sentence syntax similarity for adjacent sentences

III. RESULT AND DISCUSSION

As for quantitative analysis, assessment in terms of normality was conducted. Since it is important to see that all the data sets were normally distributed and emerging credible results from independent T-tests. To do so, the Shapiro-Wilk test was conducted to all the collected data sets, since the Shapiro-Wilk test has the best consistency level comparing to Lilliefors test and Kolmogorov-Smirnov test (Oktaviani & Notobroto, 2014). Afterwards, the following table presented the statistical data to perceive the differences in terms of lexical and syntactical aspects of reading texts in grade 10 and 12.

a. Difference in terms of lexical aspects

Assessment on lexical feature was conducted. It was based on lexical familiarity (WRDFRQc) and diversity (LDTTRc). The following table (Table 4.1) presents overall calculation of statistical results. To be noted is that, in descriptive statistics, the higher value of mean (M), the higher occurrence of complexity. Meanwhile, in Independent T-test, the hypothesis is set:

- H0 : No mean difference occurs on lexical complexity towards school's graders.
- H1 : Mean difference occurs on lexical complexity towards school's graders.

* If Sig. is lesser than .05 (Sig < .05) = H0 is rejected and H1 is accepted, vice versa.

Table 4.1 Statistical result for Lexical Aspects

Descriptive Statistics					Independent T-test	
Index	Grade	N	M	SD	Mean differences	Sig.
WRDFRQc	Grade 10	4	2.02	.12	-.21	.33
	Grade 12	4	2.24	.11		
LDTTRc	Grade 10	4	.73	.01	-.003	.95
	Grade 12	4	.73	.11		

As demonstrated in Table 4.1, it is seen that the lexical familiarity (WRDFRQc) on grade 12 (M = 2.24, SD = .11) is a bit higher than grade 10 (M = 2.02, SD = .12). But, the occurrence of lexical familiarity of two different grades is very small or close to having no significant difference. Additionally, it is supported by the Independent T-test with the mean difference (-.21, Sig .33) confirming the significance is greater than .05 (Sig .33 > .05). It means that the H0 is accepted and H1 is rejected which approves that no mean difference on lexical familiarity (WRDFRQc) occurs towards school's graders. In this sense, the lexical familiarity (WRDFRQc) employs the same level on different grades (10 and 12).

In addition, the lexical diversity (LDTTRc) was found on grade 10 (M = .73, SD = .01) and grade 12 (M = .73, SD = .11) representing that the occurrence of lexical diversity of two different grades have no significant difference. Moreover, it is supported by the Independent T-test with the mean difference (-.003, Sig .95) approving the significance is greater than .05 (Sig .95 > .05). It means that the H0 is accepted and H1 is rejected which approves that no mean difference on lexical diversity (LDTTRc) occurs towards school's graders. In essence, the lexical diversity (LDTTRc) does not seem to be distinguishable between different grades (10 and 12).

b. Differences in terms of syntactical aspects

Different from lexical feature in which is based on lexical level, the assessment on syntactical feature will be based on sentential level. It was based on the mean number of words before the main verb, or the subject (SYNLE), the average number of modifiers per noun phrase in the subject (SYNNP) and uniformity of the syntactic constructions in the text (SYNSTRUTa). The following table (Table 4.2) presents overall calculation of statistical results. To be noted is that, in descriptive statistics, the higher value of mean (M), the higher occurrence of complexity. Meanwhile, in Independent T-test, the hypothesis is set:

- H0 : No mean difference occurs on syntactical complexity towards school's graders.
- H1 : Mean difference occurs on syntactical complexity towards school's graders.

* If Sig. is lesser than .05 (Sig < .05) = H0 is rejected and H1 is accepted, vice versa.

Table 4.2 Statistical result for Syntactical Aspects

Descriptive Statistics					Independent T-test	
Index	Grade	N	M	SD	Mean differences	Sig.
SYNLE	Grade 10	4	4.77	1.12	1.59	.11
	Grade 12	4	3.19	1.27		
SYNNP	Grade 10	4	1.19	.18	.22	.56
	Grade 12	4	.97	.04		
SYNSTRUTa	Grade 10	4	.13	.03	.05	.031
	Grade 12	4	.08	.19		

As presented in Table 4.2, the index of SYNLE (refers to mean number of words before the main verb) indicates that grade 10 (M = 4.77, SD = 1.12) occurs quite higher than grade 12 (M = 3.19, SD = 1.27). However, as supported by the Independent T-test, the mean difference (1.59, Sig .11) signifying that the significance is greater than .05 (Sig .11 > .05) which means that the H0 is accepted and H1 is rejected. It accepts that no mean difference on the index of SYNLE occurs towards school's graders. In this sense, the mean number of words before the main verb (SYNLE) occurs no distinction between different grades (10 and 12).

Similarly, the index of SYNNP (refers to the average number of modifiers per noun phrase in the subject) shows that grade 10 (M = 1.19, SD = .18) appears small difference (quite higher) comparing to grade 12 (M = .97, SD = .04). Though, as supported by the Independent T-test, the mean difference (.22, Sig .56) representing that the significance is greater than .05 (Sig .56 > .05) which means that the H0 is accepted and H1 is rejected. Therefore, it indicates that no mean difference on the index of SYNNP occurs towards school's graders. In this sense, the average number of modifiers per noun phrase (SYNNP) between two different grades (10 and 12) do not seem to be divergent.

Conversely, the index of SYNSTRUTa (refers to uniformity of the syntactic constructions in the text) demonstrates that grade 10 (M = .13, SD = .03) shows significantly different comparing to grade 12 (M = .08, SD = .19). As also supported by the Independent T-test, the mean difference (.055, Sig .031) representing that the significance is lesser than .05 (Sig .031 < .05) which means that the H0 is rejected and H1 is accepted. Therefore, it indicates that mean difference on the index of SYNSTRUTa occurs towards school's graders. In this case, grade 10

tend to produce significantly more consistent in terms of syntactic constructions in the text than grade 12.

c. Discussion

Several studies have addressed lexical/semantic and syntactic complexity to determine text difficulty (Kintsch, 1998; Sahiruddin, 2019; Nation and Snowling, 2010; Arya et al., 2011, Rohmatillah, 2015; Indrawan, 2018). As this study followed those, it reported that texts in grade 10, regarding with differences based on lexical features (that refer to familiarity and diversity), are considered to employ the same level with grades 12. Therefore, this fact rejected the prediction that texts in grade 10 were likely simpler by means of selecting words or dictions that were frequently familiar and non-diverse for readers comparing to texts in grade 12. The index of WRDFRQc related to the frequency or familiarity of words, and the index of LDTTRc related to the diversity of words and were dealing with the number of words that a writer knows (Crossley et al., 2011).

Similarly, on the syntactical features that refer to mean number of words before the main verb and average number of modifiers per noun phrase in the subject show that between texts in grade 10 and 12 are considered to employ the same level as well. Accordingly, this fact rejected the prediction that texts in grade 10 were likely simpler by means of providing sentences with shorter noun phrases, with small number of modifiers in the subject. But then, this accepted the prediction that texts in grade 10 are more consistent on syntactic constructions in the whole texts comparing to texts in grade 12. It is since texts in grade 10 (M = .13, SD = .03) tend to produce significantly more consistent in terms of syntactic constructions in the text than grade 12 (M = .08, SD = .19).

IV. Conclusion

Finally, based on the findings of the difference of reading texts in grade 10 and grade 12, the lexical aspects showed non-significant difference on both grades and did not seem to be distinguishable based on the lexical frequency and diversity. Similarly, relating to the syntactical aspects that dealt with mean number of words before main verbs and the mean number of modifiers per noun phrases, texts in grade 10 and 12 do not seem divergent as well. But then, texts in grade 10 tend to produce more consistent in terms of syntactic constructions comparing to grade 12.

Based on that, it is seen that the level of complexity based on the lexical frequency and diversity and the noun phrases construction in texts in grade 12 employ the same level as grade 10 in which texts in grade 12 should have high demand on working memory while reading, or

harder. In other words, texts in grade 12 should be revised to meet reading texts based on their levels relating to character of sophistication of language complexity (Anstrom, et al., 2010).

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