

## Text Difficulty of English Textbooks for Senior High School and the College Scholastic Ability Test in South Korea

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### Abstract

*The present study investigated the text difficulty of English textbooks for senior high school and the College Scholastic Ability Test (CSAT). By comparing the degree of their text difficulty, this study aimed to predict how effectively public education can prepare for the CSAT. To build a corpus, five types of high school English reading and writing textbooks reflecting the revised 2015 curriculum and 2019-2020 CSAT were selected. With Coh-Metrix, the web-based automated language analysis tool, the text difficulty level was measured in linguistic features: descriptive indices, word information, lexical diversity, syntactic complexity, standard readability, and cohesion. To compare the measurements and find out if there are any statistically significant differences, an independent t-test is used. In conclusion, most features, except for syntactic complexity and semantic cohesion, showed statistically significant differences between textbooks and the CSAT. This finding suggests that the students who follow the curriculum focusing on the textbooks would find it challenging to accomplish what they expect from the CSAT. To meet the purpose of the CSAT, normalizing public education and easing the burden of excessive learning, a balance between the difficulty of textbooks and the CSAT should be achieved.*

**Keywords:** English textbooks, CSAT, Text difficulty, Coh-Metrix

### 1. Introduction

In a rapidly globalizing and information-oriented society, the importance of English education has been increasingly emphasized in Korea. According to Statistics Korea (2020), the average monthly private education expenditures for high school seniors were the highest in 2019, and English was the highest for spending on private education [1]. To normalize high school education and ease the burden of excessive private education, the ministry of education converted the English exam of the CSAT into absolute evaluation from 2017. The ministry guided the direction that the absolute evaluation of English in the CSAT focuses on measuring students' standard achievement written in the high school English curriculum and the ability to use English when taking classes at university. Students do not have to study English beyond the level of the curriculum because examiners would not try to raise the level of difficulty of the CSAT for the changed evaluation system [2]. For students who faithfully follow the school curriculum, focusing on the textbooks to get the scores they expect from the CSAT, the close connection between the CSAT and the curriculum must precede. It means that the CSAT must have a high degree of correlation with the actual textbooks.

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The purpose of this study is to identify how closely English textbooks written for high school seniors facing college admission are linked to the CSAT. By analyzing the level of association in the text difficulty, we will see if the CSAT meets the test's purpose as normalization of public education [3].

## **2. Literature review**

Since the CSAT was first conducted in 1994, research on the difficulty of the CSAT has been actively carried out. Recently, there have been several studies on the difficulty of the English section using Coh-Metrix. Kim et al. [4] compared the difficulty of high school English I and II textbooks with the 2015-2016 CSAT via Coh-Metrix. As a result, the difficulty of the CSAT was greater than that of textbooks in descriptive indices, cohesion, lexical diversity, and syntactic complexity except for the frequency of the content word. Kim et al. [5] used Coh-Metrix to compare the difficulty of EBS CSAT-prep books, the CSAT, and high school textbooks. The difficulty of EBS CSAT-prep books and the CSAT was greater than textbooks. They showed more complex syntactic structure than textbooks. Moreover, the readability index was similar to the New York Times and Time magazine. Moon et al. [7] constructed a corpus of the CSAT taken from 1994 to 2016 and analyzed it through Coh-Metrix. Their finding reported that the difficulty in terms of readability steadily increased every year, and the mean number of words in the sentence, the age of acquisition of content words, and syntactic complexity affected the difficulty most. No analysis has been carried out to compare the difficulty of the CSAT and English textbooks written for senior high school, reflecting the 2015 revised curriculum. Therefore, it has not been addressed whether the recent high school senior students could prepare enough for the CSAT by learning their textbooks.

## **3. Method**

### **3.1. The data collection procedure**

All five newly published high school English reading and writing textbooks, reflecting the 2015 revised curriculum, were selected for analysis. Most of the high schools in the region chose 'English Reading and Writing' to organize their senior students' curriculum. Therefore, English reading and writing textbooks are considered most appropriate to compare the difficulty with the CSAT. Also, the CSAT English reading materials for the last two years (2019-2020) are subjected to analysis. We modified both texts before building the corpus to enhance the reliability of the analysis. First, only the text corresponding to the reading area was selected, except for the listening and speaking areas. Second, diagrams and illustrations were excluded since it is difficult to call and text them. Third, appropriate vocabulary was filled in the blank, and the grammatically wrong sentences were corrected for accurate comparison.

### **3.2. The data analysis method**

Coh-Metrix provides quantitative figures for the superficial and in-depth aspects of language use. Among the 106 indices obtained, this study selected proper measurements to analyze and compare the difficulty of target texts, referring to representative measurements usually chosen when using the Coh-Metrix at the University of Memphis [7]. 13 indices that are considered to help identify the text difficulty are selected based on the prior study:

number of syllables in words, the mean number of words in sentences, age of acquisition for content words, words frequency for content words, concreteness, imaginability, type-token ratio, words before the main verb, modifiers per noun phrase, Flesch Reading Ease, Flesch-Kincaid Grade Level, co-referential cohesion, and semantic cohesion. To compare their text difficulty and find out if there are any statistically significant differences, an independent t-test is used.

## 4. Result

### 4.1. A comparison of descriptive indices between textbooks and the CSAT

Descriptive indices provide basic information for the simple comparison of the texts, which can quickly determine the difficulty of the text. Generally, the difficulty level increases when the text contains longer words and sentences, requiring a longer time to read [8]. [Table 1] shows that the quantitative correlation between textbooks and the CSAT is not well established in terms of the number of syllables in words and the mean number of words in sentences. It suggests that future CSAT should consider the quantitative correlation with textbooks when constructing the reading materials.

Table 1. T-test for descriptive indices

| Variable                             | Text      | N | Mean  | SD  | t     | p   |
|--------------------------------------|-----------|---|-------|-----|-------|-----|
| number of syllables<br>in words      | textbooks | 5 | 1.48  | .04 | -9.89 | .00 |
|                                      | CSAT      | 2 | 1.66  | .00 |       |     |
| mean number of words<br>in sentences | textbooks | 5 | 13.57 | .89 | -4.05 | .01 |
|                                      | CSAT      | 2 | 16.33 | .37 |       |     |

$p < .05^*$

### 4.2. A comparison of word information between textbooks and the CSAT

Words constitute a substantial portion of studying English. Thus, the difficulty of learning largely depends on which words are used in the text. The age of acquisition indicates when native speakers acquire a particular vocabulary on average. Word frequency represents the relative frequency of appearance for each vocabulary in public documents containing millions of words. Concreteness and imaginability deliver information that reveals how specific and distinct the concept of the word is. As presented in [Table 2], the average age of acquisition for content words of the CSAT is higher than textbooks, indicating that the difficulty of the CSAT words is more serious than textbooks. The average word frequency for content words in textbooks is higher than the CSAT, meaning that textbooks contain high-frequency words more than low-frequency words. In general, the text containing more low-frequency words tends to be more challenging to understand [9]. [Table 2] presents that textbooks have more concrete and imaginable words than the CSAT. In other words, textbooks include words that are more familiar to learners and convey specific information than the CSAT.

Table 2. T-test for word information

| Variable                                | Text      | N | Mean   | SD   | <i>t</i> | <i>p</i> |
|---|-----------|---|--------|------|----------|----------|
| age of acquisition<br>for content words | textbooks | 5 | 13.59  | .89  | -4.50    | .01      |
|   | CSAT      | 2 | 16.33  | .37  |          |          |
| words frequency<br>for content words    | textbooks | 5 | 2.26   | .03  | 5.41     | .00      |
|   | CSAT      | 2 | 2.14   | .01  |          |          |
| concreteness                            | textbooks | 5 | 385.27 | 7.82 | 2.93     | .03      |
|   | CSAT      | 2 | 367.71 | 3.44 |          |          |
| imaginability                           | textbooks | 5 | 417.76 | 7.36 | 3.07     | .03      |
|   | CSAT      | 2 | 400.80 | 1.35 |          |          |

$p < .05^*$

### 4.3. A comparison of lexical diversity between textbooks and the CSAT

A representative index of lexical diversity is a type-token ratio. Type refers to the individual word contained in the text, and token refers to the frequency at which the individual word repeatedly appears within the text [8]. The larger the ratio becomes, the more likely the text is to contain a variety of words, thus increasing the text's difficulty [9]. [Table 3] shows that the types of words appearing on the CSAT are relatively more diverse than in textbooks. The appearance of various words is supposed to reduce text comprehension, which means the CSAT difficulty is greater than in textbooks.

Table 3. T-test for lexical diversity

| Variable         | Text      | N | Mean | SD  | <i>t</i> | <i>p</i> |
|------------------|-----------|---|------|-----|----------|----------|
| type-token ratio | textbooks | 5 | .50  | .03 | -6.22    | .00      |
|                  | CSAT      | 2 | .63  | .00 |          |          |

$p < .05^*$

### 4.4. A comparison of syntactic complexity between textbooks and the CSAT

In general, text with complex syntactic structures in sentences is more challenging to understand [10]. Words before the main verb and modifiers per noun phrase are considered to affect syntactic complexity. The measurement of words before the main verb is the average number of words before the main verb. The measurement of modifiers per noun phrase presents the number of adjectives, adverbs, and qualifiers that modify the noun. According to Table 4, both do not show any statistically significant difference between the CSAT and textbooks, although the CSAT shows higher measurements on average in both words before the main verb and modifiers per noun phrase. It suggests that students who prepare for the test by mainly studying textbooks would not have trouble reading and grasping the syntactic structures of the CSAT.

Table 4. T-test for syntactic complexity

| Variable                      | Text      | N | Mean | SD  | <i>t</i> | <i>p</i> |
|-------------------------------|-----------|---|------|-----|----------|----------|
| words<br>before the main verb | textbooks | 5 | 3.28 | .48 | -2.16    | .08      |
|                               | CSAT      | 2 | 4.08 | .24 |          |          |
| modifiers<br>per noun phrase  | textbooks | 5 | .81  | .05 | -1.44    | .10      |
|                               | CSAT      | 2 | .87  | .02 |          |          |

$p < .05^*$

#### 4.5. A comparison of standard readability between textbooks and the CSAT

The measurement of standard readability indicates how much difficult the text is to read. The Flesch Reading Ease and the Flesch Kincaid Grade Level are measured based on word and sentence length within the text [8]. FRE score ranges from 0 to 100. The higher the score is, the easier the text is. According to [Table 5], textbooks' FRE score shows a statistically significant difference from the CSAT, meaning that the learners experience more difficulty reading the CSAT than textbooks. The FKGL score representing the grade level of learners who speak English as their native language ranges from 0 to 12. On average, textbooks show the 7th-grade level, but the CSAT represents the 10th-grade level. Since the FKGL score of textbooks and the CSAT differ by more than three years on average, it reveals that there is a considerable difficulty gap in terms of standard readability.

Table 5. T-test for standard readability

| Variable | Text      | N | Mean  | SD   | <i>t</i> | <i>p</i> |
|----------|-----------|---|-------|------|----------|----------|
| FRE      | textbooks | 5 | 68.07 | 4.13 | 9.70     | .00      |
|          | CSAT      | 2 | 50.16 | .02  |          |          |
| FKGL     | textbooks | 5 | 7.14  | .78  | -9.00    | .00      |
|          | CSAT      | 2 | 10.32 | .10  |          |          |

$p < .05^*$

#### 4.6. A comparison of cohesion between textbooks and the CSAT

The higher the cohesion of the text, the easier it tends to be to understand it [11]. Co-referential cohesion indicates the bond between sentences, and it increases with more linguistic devices such as nouns, pronouns, and noun phrases that refer to other text components. Semantic cohesion is measured by Latent Semantic Analysis (LSA), a method of computational linguistics. It increases when the meaning of adjacent sentences is closely connected. In general, the higher the co-referential and semantic cohesion measurements, the lower the difficulty of the text. As presented in Table 6, there is a significant difference in co-referential cohesion between textbooks and the CSAT, meaning that sentences in the CSAT are relatively loosely connected due to the lack of connecting devices. Therefore, it would take a longer time for learners to read the CSAT than to read the textbooks. On the other hand, the semantic cohesion shows no statistically significant difference between textbooks and the CSAT, even though the CSAT shows higher measurements than textbooks.

Table 6. T-test for cohesion

| Variable                | Text      | N | Mean | SD  | <i>t</i> | <i>p</i> |
|-------------------------|-----------|---|------|-----|----------|----------|
| co-referential cohesion | textbooks | 5 | .29  | .03 | 3.80     | .01      |
|                         | CSAT      | 2 | .21  | .02 |          |          |
| semantic cohesion       | textbooks | 5 | .15  | .02 | -.88     | .42      |
|                         | CSAT      | 2 | .17  | .03 |          |          |

$p < .05^*$

### 5. Conclusions

This study aimed to compare the text difficulty of the CSAT and English reading and writing textbooks for senior high school, using Coh-Metrix, an automated language analysis tool. Five English reading and writing textbooks for high school seniors and English texts for

the 2019 and 2020 CSAT were constructed as the corpus, and the text difficulty was measured in 13 indices via Coh-Metrix. The key conclusions derived from this study are as follows.

First, the CSAT's quantitative difficulty level is statistically significantly higher than textbooks, indicating that learners would take a longer time to read the CSAT. Second, the measurements of the age of acquisition, words frequency for content words, concreteness, and imaginability show that the CSAT contains a higher level of words than textbooks. It suggests that learners would find it difficult to understand the CSAT if they learn words in textbooks only. Third, in terms of the type-token ratio, the CSAT contains more diverse words than textbooks. Therefore, learners who have studied textbooks would feel a high level of difficulty due to the new words on the CSAT. Fourth, there is a statistically significant difference in standard readability. Considering the level of learners who study English as a foreign language, the fact that the CSAT shows three or more grade levels in FKGL than textbooks could indicate there is an excessive difficulty gap. Finally, comparing the cohesion reveals a statistically significant difference in the co-referential cohesion. Therefore, for learners who have learned English, focusing on textbooks, the CSAT needs linguistic devices to strengthen sentence cohesion. Overall, textbooks and the CSAT shows statistically significant differences in 10 of the 13 Coh-Metrix measurements. The study's findings could answer whether the high school senior students could prepare enough for the CSAT by learning textbooks, which were not examined from the prior study, and provide practical implications for how high school English textbooks and the CSAT should develop in terms of text difficulty. First of all, to prepare enough for the CSAT with public education, the difficulty of the CSAT should be similar to the textbooks. If the CSAT fails to balance the difficulty of textbooks used in high school, learners will be likely to receive private education and get burdened with excessive learning. Therefore, Korea Institute for Curriculum and Evaluation, which plans and oversees the CSAT, should make a great deal of effort to establish a strong connection in text difficulty between the CSAT and the textbooks for high school students. Thereby, the CSAT could contribute to the normalization of public education.

The CSAT contains listening questions more than 30%. Since this study dealt with the reading areas only, future researchers interested in this topic should consider including listening areas that compose a large part of the CSAT.

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