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# Student's Responses on the Suitability of Text Complexity Level Determination Using Web-Based Readability Analysis Application: Systemic Functional Perspective

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A B S T R A C T

The present study attempts to investigate the students' responses on the suitability of web-based readability analysis application results using the Systemic Functional Linguistics Framework through lexical density analysis with their level of language proficiency. This study employed a mixed-methods design, combining qualitative content analysis of selected reading texts with quantitative analysis of students' perceptions through a closed-ended questionnaire. Six texts were randomly selected from the reading texts written in five of Cambridge's Books, and nine participants at different levels were purposively selected. The qualitative findings revealed that the lexical density percentages of six selected Cambridge texts, categorized based on CEFR levels and analyzed automatically by the application, aligned with the complexity standards set by the textbook author. Quantitative results showed that students across different proficiency levels responded positively to the suitability of the categorized texts, as indicated by their questionnaire responses and their comprehension performance. Additionally, the study found that intermediate-level texts are the most appropriate for Indonesia EFL undergraduate students. This study provides implications for educators, highlighting the potential of using web-based readability analysis applications to assist in selecting and analyzing texts automatically, accurately, and efficiently.

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## 1. Introduction

Reading comprehension remains a significant challenge for Indonesian EFL learners. Some studies have investigated several contributing factors, including insufficient background knowledge, lack of vocabulary mastery, problems in comprehending complex structures, and inappropriate level of texts given by the teachers (Amendum et al., 2018; Azmy, 2020; Ramadhianti & Somba, 2023). These challenges are often exacerbated by a lack of students' motivation and inadequate reading strategies, leading to poor comprehension outcomes. However, this problem is prominently influenced by a text complexity level. When the complexity level of a text is inappropriate with students' proficiency level, they often experience frustration, anxiety, and a sense of failure, which negatively impact their motivation to engage with reading tasks (Anggia & Habók, 2023). Given these challenges, ensuring that the reading materials match students' proficiency levels is crucial.

Research has shown that if students with a lower level of proficiency read more complex text, the accuracy, comprehension, and fluency rate in decoding the text decreases (Amendum et al., 2018). In addition, an adequate level of the text for readers is needed regarding its syntactic, conceptual, and lexical complexity to engage and interest them actively in what they read (Stajner et al., 2020). Moreover, since reading becomes essential to students' intellectual process, the comprehension stage should be achieved (Ramadhani et al., 2023). However, comprehension will be difficult if the materials or the texts provided to the students are too complex. The

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comprehension stage depends on the readability level of the text. A text is readable if the students are interested in the materials, can read the text fluently, and understand the content easily (Toyama et al., 2017). Therefore, the teachers or lecturers must select or adjust the reading texts objectively to be appropriate to the different student proficiency levels.

Providing an appropriate text based on student language proficiency level is still challenging, particularly for English educators. This issue relates to how to determine the complexity level of a text so it can suit the students' needs that influence their reading comprehension. Furthermore, to maintain the student's interest in reading, the texts should be adequate for them (Stajner et al., 2020). Besides, students should also be challenged to read text by increasing the complexity levels that show their progress at school to prepare them for college and job readiness (Sheehan et al., 2010). However, in Indonesia's context, the problem occurs because most English lecturers or teachers do not know how to objectively determine the complexity of the text (Anggia & Habók, 2023). It will impact how the students comprehend the materials properly.

The complexity of the text depends on the density of information contained in it. Information density also depends on the number of lexical items occurring in the text (Halliday & Matthiessen, 2013). It indicates that the higher the number of lexical items in the text, the more complex it will be (Halliday & Webster, 2009). Besides the role of lexical items, conceptual and syntactic items also impact text complexity. In this case, lexical complexity is categorized as lexical choices, the word frequency, the number of vocabularies, and the specific terminology used in the text (Natova, 2021; Stajner et al., 2020). Moreover, syntactic complexity is the complexity in the sentence level, which is the sentence length, including the use of passive voice, the number of clauses (subordinates and coordinates), the unusual sentence structures, and the syntactic tree depth (Toyama et al., 2017). Then, the conceptual complexity is labeled into the reading comprehension model, which engages the readers to understand not only the text concept but also the individual intentions and their relations to make the story or information in the text understandable and coherent (Kintsch & Van Dijk, 1978).

One tool Halliday & Matthiessen (2013) use to analyze text complexity level is lexical density. Lexical density is viewed as the percentage of lexical items (i.e., nouns, verbs, adjectives, and adverbs) to all words presented in a text. In other words, lexical density shows the magnitude of lexical words in a text (Bani Amer & Baarah, 2021). Moreover, lexical density is deemed the most accurate measure of lexical competence to determine the complexity and readability of texts (Susoy, 2023). This tool is remarkably connected with information packaging as content words that carry information in the text (Johansson, 2008). Ure (1971) proposed a formula for calculating a written text's lexical density by counting the total number of lexical items divided by a word token and multiplied by 100. However, Halliday & Matthiessen (2004) developed and refined a formula previously proposed by Ure (1971) to calculate the lexical density by counting the total number of lexical words divided by the number of ranking clauses. The result will indicate that text with a higher number of content words is deemed to be more complex and dense as they package more information than the texts that have more functional words (prepositions, conjunctions, articles, determiners, pronouns, and auxiliary) (Maamuujav, 2021). Thus, this research used both formulas to measure the lexical density indexes in the selected written text. However, calculating lexical density to test the complexity level of a text will be time-consuming if it is done manually; Therefore, automatic software or technology is needed.

The analysis of the assessment of text complexity has become an essential topic in educational research, mainly in technology utilization. This issue occurs since qualitatively analyzing text readability or complexity takes time and provides challenges in collecting data on coding reliability (Vidal-Abarca et al., 2002). Besides, the accuracy of qualitative analysis on text complexity is also inevitable from human errors (Pearson & Hiebert, 2014). Furthermore, predicting the text complexity traditionally only results in a tiny analysis feature, i.e., word token and sentence length (Kauchak et al., 2014). However, the analysis should be more than those features, i.e., word frequency, the number of clauses, and lexical and grammatical occurrences, to provide a more solid result (Sheehan et al., 2010). Therefore, an automatic analysis of text complexity using web-based applications is needed to increase efficiency and effectiveness. In this case, Web-Based Readability Analysis Application is an automatic analysis that is needed to increase efficiency and effectiveness in calculating the text complexity level. This tool will help teachers assess and picture the appropriate texts adapted to students' reading abilities.

There have been several prior kinds of research related to web-based readability analysis to help educators determine the level of written text complexity. The first was done by Chen & Meurers (2016), who focused their research on automatically developing a web-based tool supporting text complexity analysis. The research reported that this tool shows accurate results in determining the complexity of text categorized based on the student's level of proficiency. Moreover, Quispesaravia et al. (2016) also conducted a similar issue related to web-based complexity analysis focused on documents written in Spanish. The study reported that the tools can successfully portray the complexity level of Spanish written text by calculating 45 readability indices. It indicates that teachers can quickly use this tool to select appropriate text for students based on their educational level. Furthermore, Lyashevskaya et al. (2021) conducted another research about developing an automatic application to measure text complexity for Russian learners of English. The research produced a foundation for building an online application to help educators prepare and test English text provided to the students based on their proficiency level. By using this application, teachers can quickly get information on what levels of text should be given to the students to increase their comprehension and get better exam results. However, some features are unavailable, such as data balancing, language interference errors, and spelling checks to identify errors.

The previous studies have shown the importance of automatic analysis of text complexity. However, the studies have not focused on the students' responses to the subject given the texts, which resulted in applying how the texts are appropriate to their language proficiency levels. It is essential to get the student's responses to verify the accuracy of the result provided by the application to test text complexity levels. Therefore, in this study, the researcher is interested in not only introducing the result of the present automatic tools of text complexity but also verifying the result by getting the students' subjectivity or point of view on whether the texts given to them graded by the application are appropriate with their level. Furthermore, the present study applies different theories under the framework of Systemic Functional Linguistics. It is essential to conduct this study to maintain the application's accuracy. Theoretically, this study is expected to give a new perspective in building accurate web-based readability analysis by focusing on the application result and the user's point of view. Practically, this study aims to inform educators and researchers to avoid claiming quickly the accuracy of the automatic application built before getting the users' perspective to verify the result.

From the issue above, the present study tries to answer the following research questions: (1) What are the percentages of each text lexical density index generated by the web-based readability analysis application used in this study? (2) What are the student's responses on the suitability of web-based readability analysis application result with their language proficiency level? (3) What is the appropriate text complexity level (basic, intermediate, or advanced) for Indonesia EFL undergraduate students based on the students' responses and lexical density?

## 2. Methods

This research was grounded in a mixed-methods approach, combining both qualitative and quantitative methods to gain a comprehensive understanding of students' responses on the suitability of web-based analysis application results with their language proficiency level. The qualitative component focused on content analysis of selected texts, which were analyzed in terms of lexical and functional word distribution using a web-based readability analysis application, ReadEaseAnalyzer. This application automatically categorized lexical items (nouns, verbs, adjectives, adverbs) and functional items (prepositions, articles, conjunctions, determiners, pronouns, auxiliaries) based on Halliday & Matthiessen (2013) systemic functional linguistics framework. Furthermore, to find the indexes of lexical density in the texts, the application automatically investigates quantification using simple descriptive statistics of the formula mentioned above. That is by counting the total number of lexical items divided by a word token and multiplied by 100 (Ure, 1971). This qualitative analysis aimed to describe the complexity of the texts from a systemic functional perspective by examining their lexical density.

On the other hand, quantitative data were collected through close-ended questionnaires consisting of like-scale items that measured students' perceptions of the difficulties and challenges they experienced when reading selected texts. The instrument used was a questionnaire with eight close-ended questions. The questionnaire contained statements about students' difficulties and challenges in comprehending the selected texts. Statements in the questionnaire were measured using a Likert scale i.e., 1 (Strongly Disagree), 2 (Disagree), 3 (Neutral), 4 (Agree),

and 5 (Strongly Disagree) adapted from (Alenezi, 2016). The questionnaire addressed aspects such as clarity, vocabulary difficulty, and alignment with students' English proficiency levels. Validity and reliability of the questionnaire were established through expert validation and a small-scale pilot study involving participants not included in the main sample. Internal consistency was assessed using Cronbach's Alpha, while content validity was ensured through expert review. Two experts in applied linguistics and educational measurement reviewed the questionnaire for content validity, clarity, and appropriateness. Their feedback was incorporated to refine the instrument, ensuring that it accurately captured students' experiences and perceptions related to text comprehension and lexical density levels.

The study included nine volunteers of engineering students from a private university in Garut, Indonesia. This study used purposive sampling to select participants based on the research need (Ary et al., 2010). The participants were selected from their English test result categorized into high, middle, and low achiever. Then, in this study, they were categorized into the basic, intermediate, and proficient users after doing the test conducted by the British Council. The data of the present study were taken from reading texts written in five of Cambridge's Books written by Kosta & Williams (2015) and Brook-Hart and Haines, (2014), which have been categorized based on CEFR levels proposed by the British Council (Europe, 2020), including basic user (A1 and A2), Independent User (B1 and B2), and Proficient User (C1). The books are used as the materials for General English Classes. Six texts were randomly selected from the textbook, divided into two texts for basic users, two for independent users, and two for proficient users.

The procedures began with automatically analyzing the six selected texts in terms of their complexity levels through lexical density analysis by the web-based readability analysis application used in this study under the name *ReadEaseAnalyzer,* which has yet to be used publicly. The applications provided basic statistics to show and categorize the data for the number of words (word token), the number of sentences (sentence lengths), lexical items (content words), grammatical items (functional words), and ranking clauses. Furthermore, Halliday & Matthiessen (2013) categorized the lexical items into nouns, verbs, adjectives, and adverbs and the functional items into prepositions, articles, conjunctions, determiners, pronouns, and auxiliaries. The phrasal verbs are considered one word or lexical item, and one tense is counted as one verb (Ramadhani et al., 2023). Then, the identified data were automatically tabulated by the application and categorized into basic, intermediate, and proficient levels through the lexical density theory based on the standard percentage used above. According to Ure (1971), Gerot & Wignell (1994), and Sujatna et al. (2021), a text is considered to have low lexical density (appropriate for basic users) if it ranges from 40% to 50% or below for quite or medium lexical density (appropriate for independent users) ranged from 51% to 60%, and for high lexical density (appropriate for proficient users) ranged from 61% to 70% or above. It indicates that a low number of lexical densities and vice versa influences a low number of lexical items in a text.

The following steps were to get the students' responses on the suitability of calculated texts generated by the application. The first step is to obtain the data on students' comprehension in reading the selected texts by asking students to read and answer some questions related to the texts. Each selected reading text was followed by some comprehension questions created by the book's writers. This step aimed to determine the suitability of the text level with students' comprehension stage. Furthermore, the next step was conducted to obtain student's responses and views after reading the texts categorized by the web-based readability analysis application using questionnaire.

## 3. Results and Discussion

The findings of the current study were analyzed based on the research questions.

### *3.1. The Percentages of Each Text Lexical Density Index Generated by the Web-Based Readability Analysis Application*

In this part, the texts are analyzed and described based on comprehension levels, starting from texts for basic users, then to intermediate users, and lastly for proficient users. At the basic level, two random texts are selected from the A1 and A2 books that will be analyzed using the application. The first selected basic text is entitled *"Geography People and Continents"* and is written in the A1 book. The text talks about four people named *Sanjit, Mandisa, Eduardo,* and *Maya,* describing their families and villages. The story's focus is also about the weather of their continents in different sessions. To know the lexical density indexes of this text, the analysis, including the basic statistics and lexical density result, is presented in Figure I below.

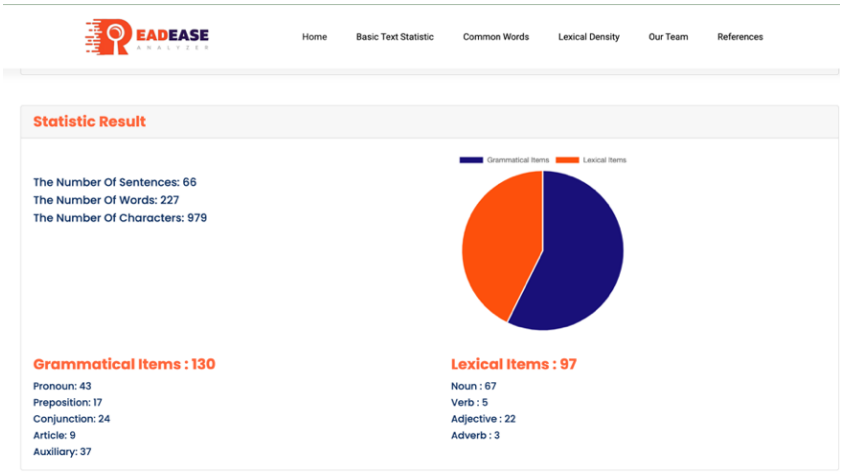


Figure 1. The basic information of the first basic A1/A2 text

Figure 1 presents an overview of the basic text data, highlighting the lexical and grammatical components used to calculate the lexical density indexes. Among the lexical items, nouns are the most frequent (67 words), while adverbs appear the least (2 words). In terms of grammatical items, pronouns dominate with 43 occurrences, while articles are the least frequent, with 9 instances. The overall analysis reveals that the text contains more grammatical items than lexical ones, suggesting, as per Gerot & Wignell (1994), that the text aligns more with spoken discourse, characterized by lower lexical density and complexity. For further validation, the lexical density index results are provided in Figure 2.

Figure 2 below shows the percentage of lexical density indexes of the second basic texts produced by the application. The result is obtained from the number of lexical words (97) divided by word token (227) multiplied by 100. After the application calculates it automatically, it is obtained that the percentage of lexical density index of the second basic text is 42,73%. However, the lexical density of the second basic text is lower than the first one. Therefore, this result indicates that the text is categorized into basic, which means the text is appropriate for basic users (A1 or A2) (Gerot & Wignell, 1994; Sujatna et al., 2021; Ure, 1971). Besides, it verifies the information obtained from the basic information previously, and it also shows that the writers of the books have accurately put the text to the appropriate level of the target users. Furthermore, this result aligns with the self-assessment grid of reading comprehension created in CEFR Level proposed by the British Council that the student read concise and simple text related to everyday materials, such as family, school, advertisement, and menu (Europe, 2020). Then, the text was tested to three basic students by answering 16 *yes/no* questions related to the information in the text. The test result shows that the first student could answer 13 questions, the second with 14 questions, and the third with 16 questions. This result implies that this text is still easy to read and appropriate with their comprehension level.

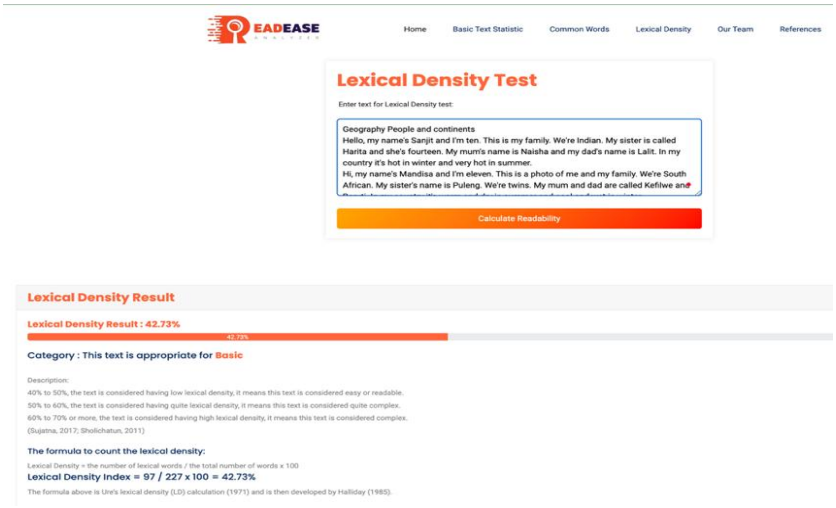


Figure 2. The lexical density indexes of the first basic A1/A2 text

The second basic text (A1/A2 users) analyzed in this study is *"Culture: The School of the Air"*. This text talks about the phenomenon where some students cannot go to physical school since there are no schools around, so they study through online learning. This case happened to one of the students in Australia named *Frank*. This text is written at the A2 level of *Prepare!* Book. The basic information of the text are presented as follows to know the result of the lexical density index produced by the application.

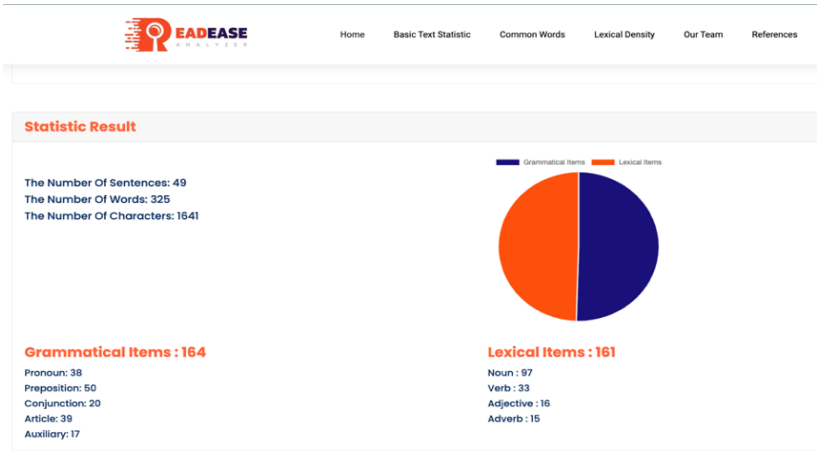


Figure 3. The basic information of the second basic A1/A2 text

Figure 3 provides a statistical summary of the third text, highlighting the lexical and grammatical components. The text contains 325 words, 49 sentences, and 1,641 characters. Lexically, nouns are the most frequent with 97 occurrences, while adjectives are the least with 16. Among the grammatical items, prepositions (50 words) appear most frequently, whereas auxiliaries (17 words) are the least. Overall, grammatical items slightly outnumber lexical ones (164 vs. 161), suggesting that the text, while more characteristic of spoken discourse, has relatively lower lexical density. The calculation results for the lexical density index are presented below for further analysis.

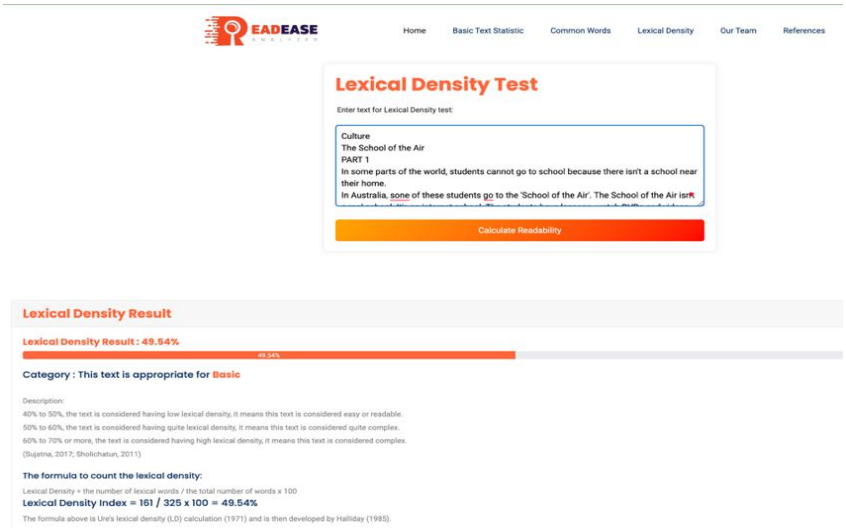


Figure 4. The lexical density indexes of the second basic A1/A2 text

After presenting the basic information used to count the lexical density index of the text, the percentage automatically analyzed by the application is presented in Figure 4. To get the result, the number of lexical words (161) is multiplied by the total number of words (325) divided by 100. It is obtained that the lexical density index of the third basic text is 49,54%. This result is higher compared to texts 1 and 2. Therefore, it indicates that, according to Ure (1971), Gerot & Wignell (1994), and Sujatna et al. (2021), this text is appropriate for basic users since the information contained in it is less complex and more readable. The result also verifies the suitability of the text level written in the book with the target users, A1 or A2 users. Then, the text was tested to the basic student level to obtain the information about their comprehension level. After tested to three basic student level by answering 16 *yes/no* and open questions, the result shows that all students can correctly answer 12 of 16 questions. This result implies that the text can still considered easy and appropriate with the level of students' proficiency.

Next, for the independent text users (intermediate level), there are also two different selected texts from the B1 and B2 levels of *Prepare!* Books were analyzed in this study using the automatic application. The first selected text is *"We Asked You: to Send Us Information about Your Favourite Shopping Experience around the World."* The text talks about four different people from different countries related to their shopping experiences worldwide. They discuss specific information on how the countries provide facilities and offer shopping experiences.

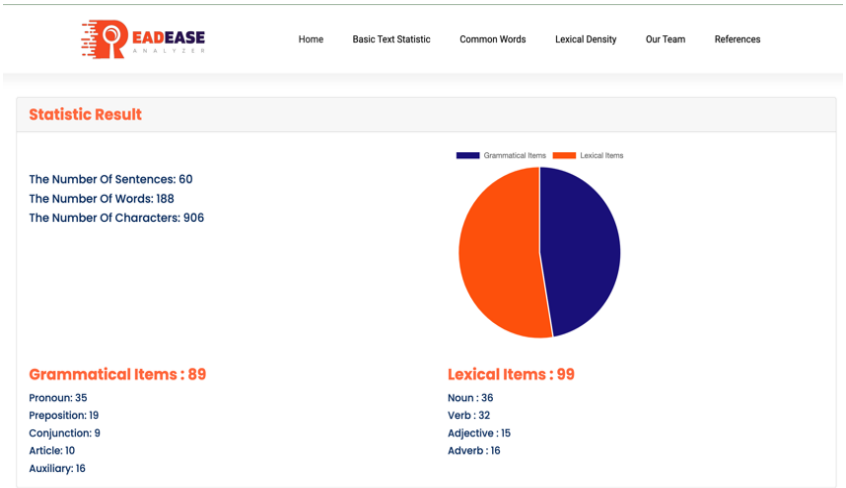


Figure 5. The basic information of the first intermediate B1/B2 text

Figure 5 above shows the basic information of the first text for independent users automatically analyzed by the application. The results present 188 words, 60 sentences, and 906 characters in the text. To determine the percentage of the lexical density index, the number of lexical and grammatical items should also be presented. The automatic analysis produced by the application shows that there are 99 words categorized as lexical items, consisting of 36 words for nouns, 32 for verbs, 15 for adjectives, and 16 for adverbs. On the other hand, 89 words are categorized as grammatical items (functional words), i.e., 35 words for pronouns, 19 for prepositions, 9 for conjunctions, 10 for articles, and 16 for auxiliaries. Therefore, the result indicates that the number of lexical items is higher than grammatical items. According to Gerot & Wignell (1994), if the text contains more lexical items (open words), the information is more dense and complex and communicated through a written form. . Furthermore, to know the complexity level of the text, the percentage of the lexical density index automatically calculated by the application is presented in figure 6.

Then, Figure 6 below shows the percentage of lexical density index automatically calculated by the application obtained from the basic statistics items. After calculating by dividing the number of lexical items (99) by the total number of words (188) multiplied by 100, it shows that the result of the lexical density index is 52,66%. Based on the result above, this text is appropriate for independent users (B1/B2). Furthermore, the text has a quiet or medium lexical density index, meaning that the information in the text is quite complex or quite dense. Moreover, this result also indicates that the text calculated and analyzed by the application matches the writer's consideration of the text complexity level in the book. Furthermore, the calculation result above is also strengthened by the three intermediate student level ability in answering 7 close and open critical questions related to the text. The result showed that one intermediate student can correctly answer all questions, one 5 questions, and the remining student 4 questions. This result implies that the text read by the students can be considered appropriate with their comprehension level although, for half of them, the text is quite challenging.

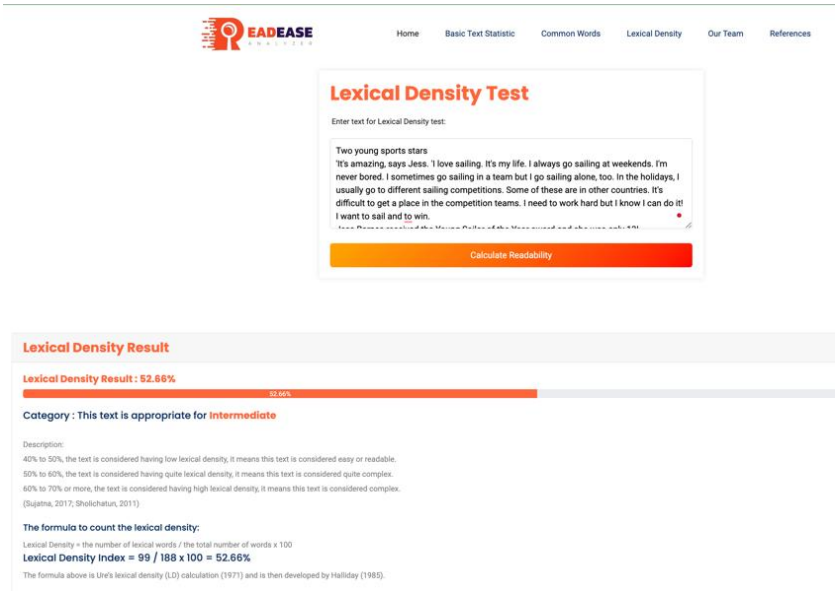


Figure 6. The lexical density indexes of the first intermediate B1/B2 text

The following text for the intermediate level (B1/B2) analyzed in this study is *"Four to Watch: Young, Talented, and Creative."* This text talks about four people who described their passion and achievement at a young age, including how they started recognizing their potential and their experiences and steps in achieving success. This text is written at the B2 level of the Cambridge Book. The basic information of the text are presented as follows.

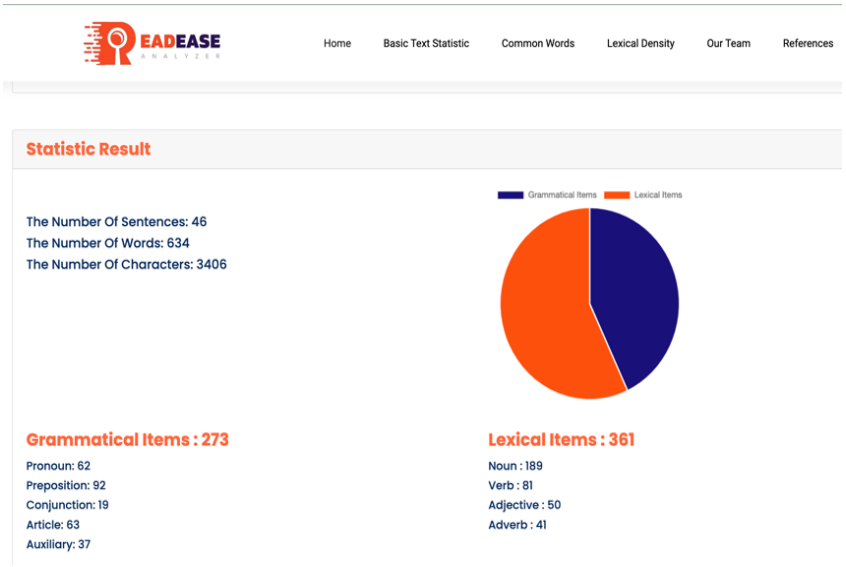


Figure 7. The basic information of the second intermediate B1/B2 text

Figure 7 provides the basic analysis of the second text for independent users (B1/B2 level), revealing a total of 634 words, 46 sentences, and 3,406 characters. Among the lexical items, nouns are the most frequent (189 words), while adverbs are the least (41 words). For grammatical items, prepositions dominate (92 words), with conjunctions being the least frequent (19 words). The overall count shows that lexical items (361 words) outnumber grammatical ones (273 words), indicating that the text is relatively dense and complex. The automatic calculation of the lexical density index, which further evaluates this complexity, is presented in Figure 8.

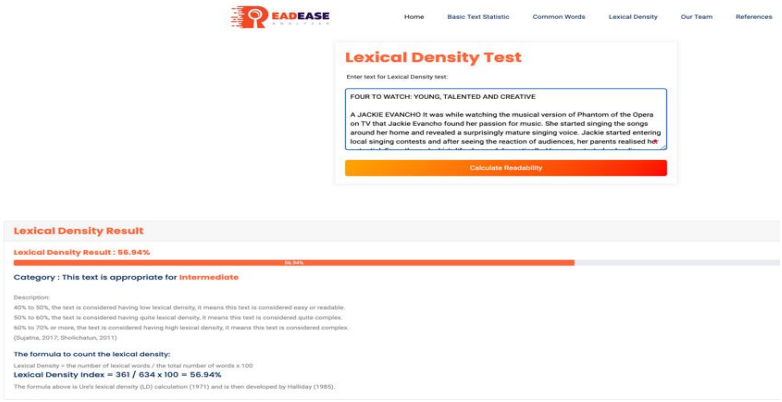


Figure 8. The lexical density indexes of the second intermediate B1/B2 text

After presenting the basic information of the text resulting from the application, the lexical density is shown in Figure 8 above. The application automatically counts the result by dividing the number of lexical items (361) by the total number of words (634) multiplied by 100, and it is obtained that the percentage of the lexical density index of the text is 56,94%. Based on the theory referred to in this study, this text is appropriate for the independent users (B1/B2 on CEFR level), which means the text has a quiet or medium lexical density. Moreover, the lexical density index of this text is higher than that of the first text. The result implies that the text could be more challenging if given to lower or basic users. Furthermore, this result also verifies that the writer had appropriately put the text at

the right level of the book. Moreover, the text was then tested to the three intermediate students by answering 10 close and open questions. The result shows that two of the intermediate students can answer 7 of 10 questions, while the remaining students can answer 6 of 10 questions. It indicates that the text was quite challenging for them, however, it still matches their comprehension level.

The last step in this section is to analyze the selected text for proficient users (C1 on CEFR levels) using the automatic application. Two different texts are selected randomly from the book marked as C1 level in the Cambridge book. The first text talks about *"Humans: The Smartest Species?"*. The basic statistical information automatically processed by the application is presented below to determine the complexity level of the text. The basic information of the text are presented as follows.

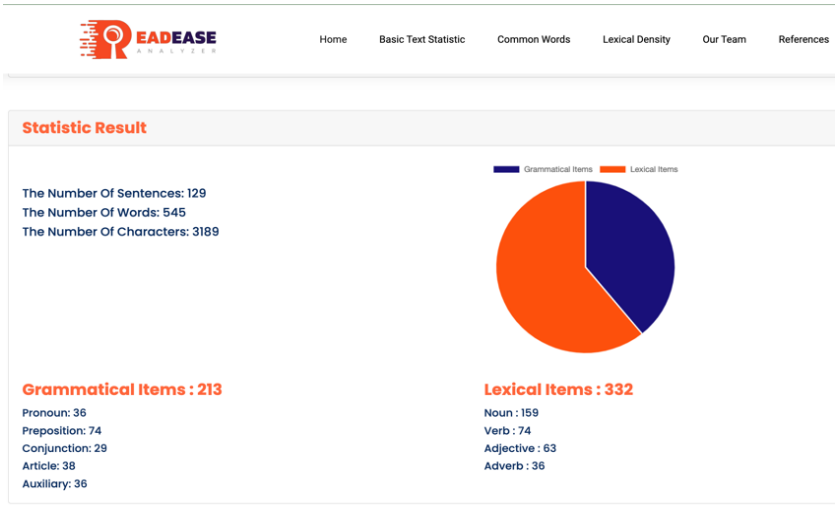


Figure 9. The basic information of the first advance C1 text

Figure 9 above shows the basic information of the first text for proficient users that is automatically analyzed by the application. It is obtained that there are 545 words, 129 sentences, and 3189 characters in the text. Then, the words are classified into two categories: lexical and grammatical items. Furthermore, there are 332 words categorized as lexical items, consisting of 159 words for nouns, 74 for verbs, 63 for adjectives, and 36 for adverbs. On the other hand, there are 213 words categorized as grammatical items, i.e., 36 words for pronouns, 74 for prepositions, 29 for conjunctions, 38 for articles, and 36 for auxiliaries. The result indicates that the text contains much higher lexical items than grammatical items. It shows that the text contains more dense and complex information. In other words, the text is very challenging to read. The following figure is presented to show the lexical density index of the text. The percentage automatically analyzed by the application is presented in Figure 10.

Figure 10 below shows the percentage of the lexical density index automatically analyzed by the application. After dividing the number of lexical items (332) by the total number of words (545) and then multiplying by 100, it is obtained that the percentage of the lexical density index of the text is 60,92%. This result indicates that the text has a higher lexical density index. The text is difficult to read and comprehend since it contains much information. Furthermore, the result implies that the text is appropriate for proficient levels (C1). Moreover, this analysis result also verifies the appropriate consideration taken by the writer to put the text into the appropriate book for proficient target users.

Furthermore, to get information about students' ability in understanding the text, a test was conducted by providing different forms of questions to three proficient student levels, including vocabulary questions, matching pairs, and critical thinking questions consisting of 15 questions in total. There are five questions for vocabularies,

five for matching pairs, and five for critical thinking questions in the form of multiple-choice questions. The result shows that, in term of vocabularies and matching pair questions, the first and second students can correctly answer six of ten questions and the third can correctly answer five of ten questions. Furthermore, related to critical thinking question in the form of inferences questions, the first student can answer three of five questions and the second and third students can answer four of five questions. The result shows that the text is very challenging to comprehend and is appropriate for higher proficiency level of students.

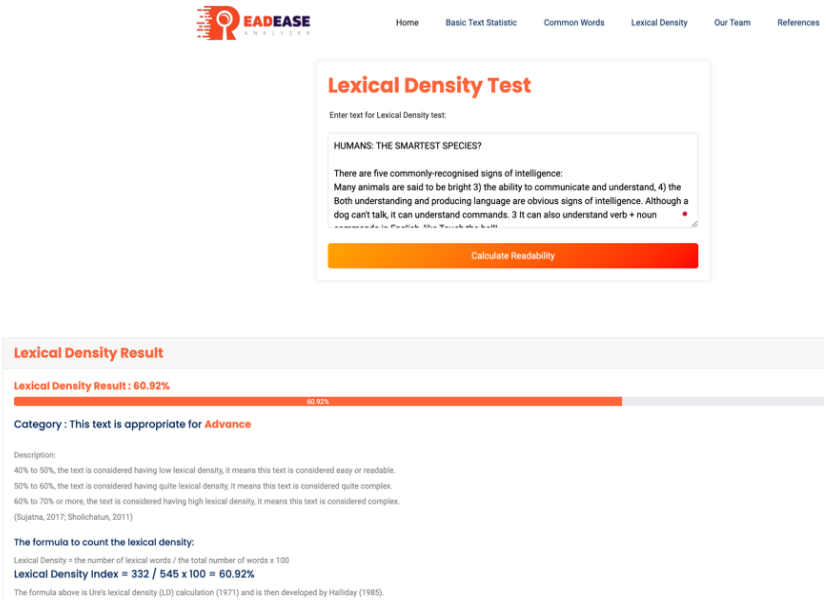


Figure 10. The lexical density indexes of the first advance C1 text

The following advanced text analyzed in this study is *"Geography: Climate Zone."* The text talks about three different places in three different countries: Tivoli *in Italy, Nuuk in Greenland, and Belem in Brazil*. The text discusses the climates and temperatures of those places and how these factors provide benefits and challenges to the places. The basic information about this text is presented as follows to calculate the lexical density index automatically done by the application.

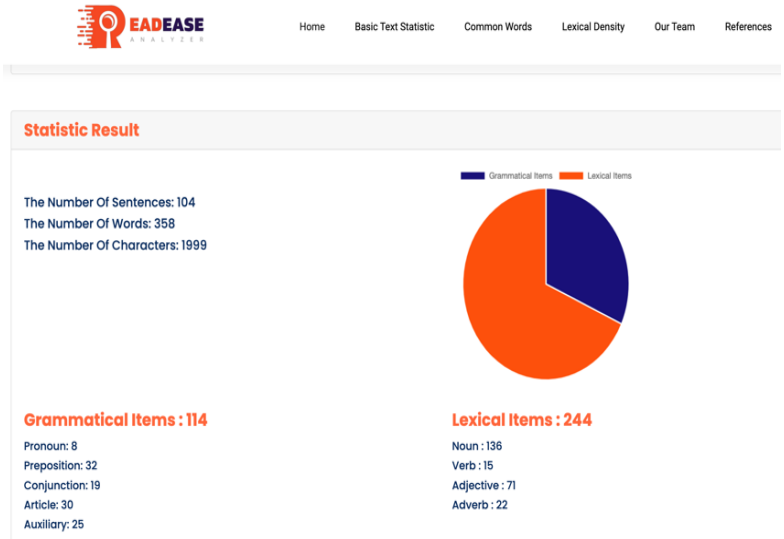

Figure 11. The basic information of the second advance C1 text

Figure 15 provides an overview of the second text for proficient users, with 358 words, 104 sentences, and 1,999 characters. The lexical items total 244, with nouns being the most frequent (136 words) and verbs the least (15 words). Among the grammatical items, prepositions occur most often (32 words), while pronouns are the least frequent (8 words). The text contains significantly more lexical items than grammatical ones (244 vs. 144), suggesting that it is highly dense and complex, making it more challenging to read. The percentage of the lexical density index, as processed by the application, is detailed in the following figure.

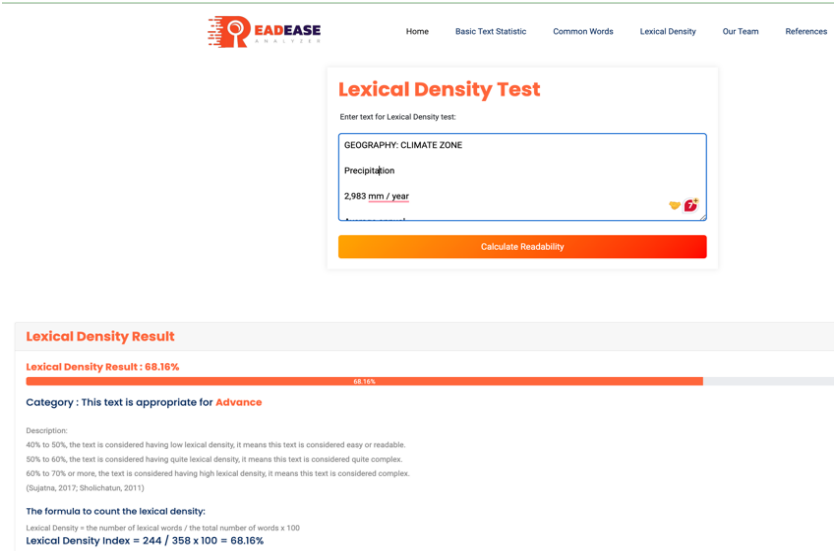


Figure 12. The Lexical Density Indexes of the Second Advance C1Text

Figure 16 above shows the percentage of the lexical density index automatically calculated by the application. After dividing the number of lexical items (244) by the total number of words (358) multiplied by 100, the percentage of this text's lexical density index is 68,16%. The result concludes that the text has a high lexical density index and is much higher than the first text. Therefore, this text is appropriate for proficient users (C1) since it is difficult to read and contains lots of information. Furthermore, the result also verifies the suitability of the writer's consideration in writing the text in the C1 book (Brook-Hart & Haines, 2014). Furthermore, the text was then tested to three proficient students by answering 10 matching pair and critical thinking question in the form of indirect detail questions. The result shows that student one and three can answer six of ten questions and the student two can answer five of ten questions. From the result, it indicates that the text is also difficult to read and is appropriate for advance students since the text is related to academic field.

The result above implies that the number of words and the sentence length in a text does not determine the complexity level of the text. Meanwhile, the more significant the number of lexical words contained in a text, the denser the information and the more complex the text is. It strengthens the research conducted by (Natova, 2021), (Rizkiani et al., 2022), and (Fadhil et al., 2023) that the complexity levels of the text are not decided by the word tokens. However, the number of lexical items in the texts depends on the calculation of lexical density index formula. Therefore, the study reveals that, after the application automatically analyzed the nine randomly selected texts in this study, all of the result texts were appropriately categorized into the complexity levels, which also matched with the book writers' consideration to put the texts based on CEFR levels proposed by British Council. The result verifies that the application successfully analyzes the complexity level of each text. Therefore, this

analysis result verifies the previous assumption that web-based readability analysis application through the framework of lexical density of Systemic Functional Linguistics can accurately help educators calculate the complexity level of the texts before distributing them to students.

### *3.2. Students' Responses on the Suitability of Web-Based Readability Analysis Application Results with their Language Proficiency Levels*

The following results of questionnaires and additional close questions adapted from Alenezi (2016) are presented to provide a broader picture of the student's responses and views toward the suitability of text generated with web-based readability analysis applications with their current proficiency level. The questionnaires are distributed to different levels of students with different text levels. The questions which are related to the perceptions were as follows:

**Qu 1**: To what extent do you agree the English reading text you read is understandable?
**Qu 2**: To what extent do you agree that the topics of the English reading text you read are complex?
**Qu 3**: To what extent do you agree that the vocabulary in the English reading text you read is complex?
**Qu 4**: To what extent do you agree that the English structures (i.e., grammar) in your reading texts are complex?
**Qu 5**: To what extent do you agree the sentence length hinders your English reading comprehension when reading the text?
**Qu 6**: To what extent do you agree that the types of reading texts you read are complex?
**Qu 7**: To what extent do you agree that the number of lexical words (nouns, verbs, adjectives, and certain adverbs) in the English reading text you read influences the complexity level of the text?
**Qu 8**: To what extent do you agree that the English reading text you read is appropriate for your current English level?

Based on the questionnaires above, the result of students' responses and views on each text level will be presented from the following charts:

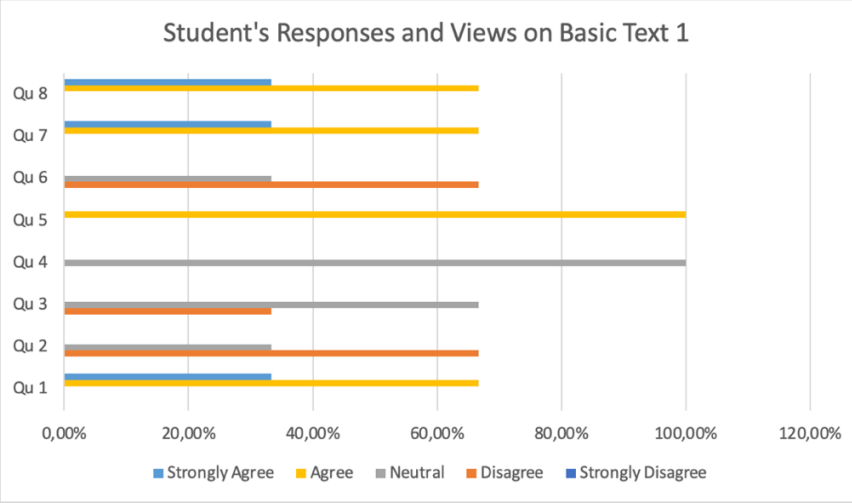


Chart 1. Students' Responses on Basic Text 1

From Chart 1 above, which is about the students' responses and views on the first English reading text for the basic level, it can be observed that most students have positive perceptions of the texts. It shows that the first text is understandable for them, with familiar vocabulary and a simple English structure. Furthermore, besides the length of the sentences, in their opinion, the number of lexical words in the text also influences their understanding. However, the students thought the first text was appropriate for their language proficiency.

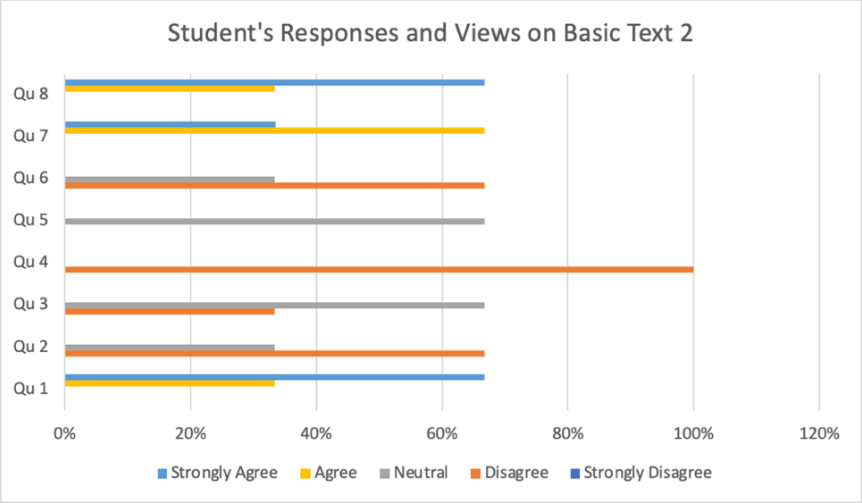


Chart 2. Students' Responses on Basic Text 2

They considered that the text was appropriate with their current level since it is still easy to read. It can be observed from Chart 2 above that the student's perception of the second English reading text for the basic level is that they have positive responses toward the texts after being tested. Most of them thought that the text was understandable and had common vocabulary. They considered the text appropriate for their current level since it is still easy to read.

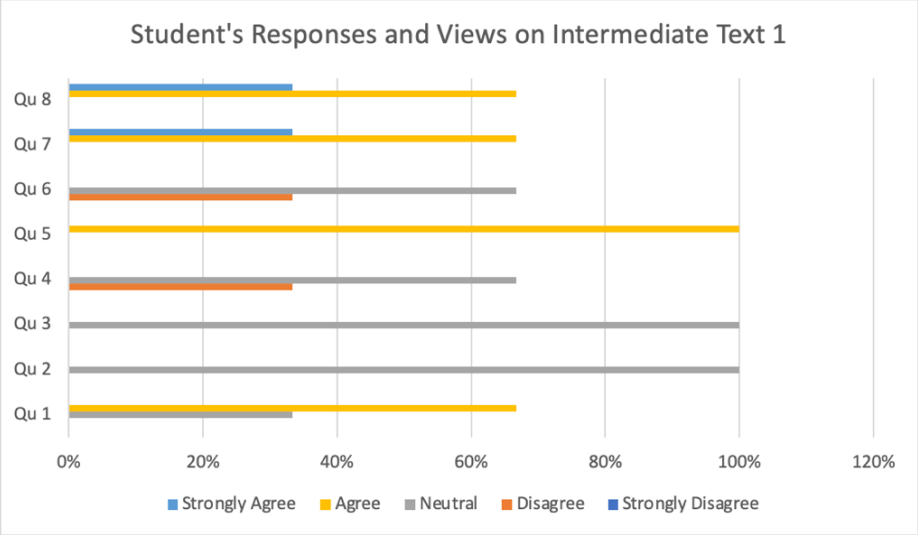


Chart 3. Students' Responses on Intermediate Text 1

Chart 3 above shows the percentage of students' responses and views toward the first English reading text for the intermediate level. It can be observed that the students also have positive perceptions towards text even though there are some unfamiliar vocabularies and quite complex sentence structures. They also thought that the length of the sentences did not influence the complexity level of the text, but the number of lexical words did.

However, it did not hinder their understanding of the text. This percentage aligns with students' score results, where they can answer the question correctly. Therefore, they consider that the text fits their proficiency level.

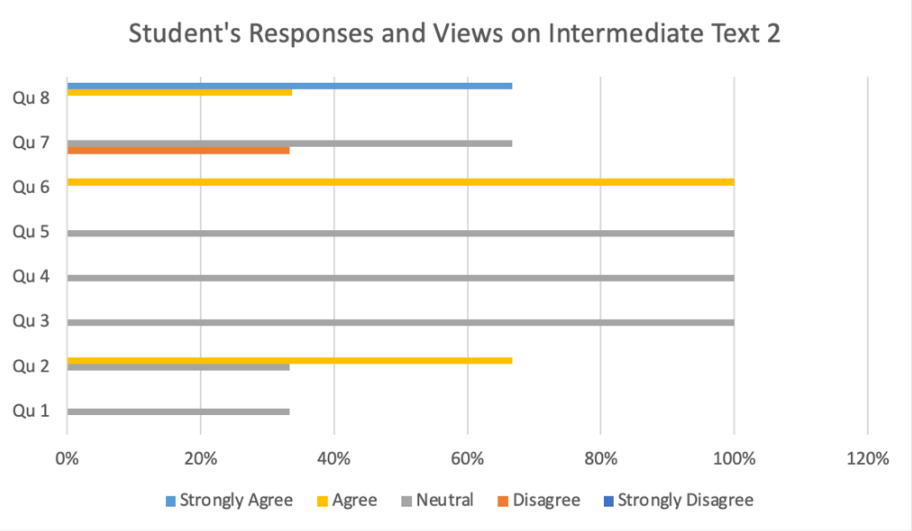


Chart 4: Students' Responses on Intermediate Text 2

Chart 4 shows the percentage of students' responses and views about the second text at the intermediate level. It is obtained that most of the students answered that the text was understandable and they had a positive perception towards the text. They can recognize the vocabulary and do not have any difficulty in sentence structure (grammar). This observation is also supported by their test score result, which shows that all students can comprehend the information in the text by answering the following questions well. The text was considered appropriate for their language comprehension level.

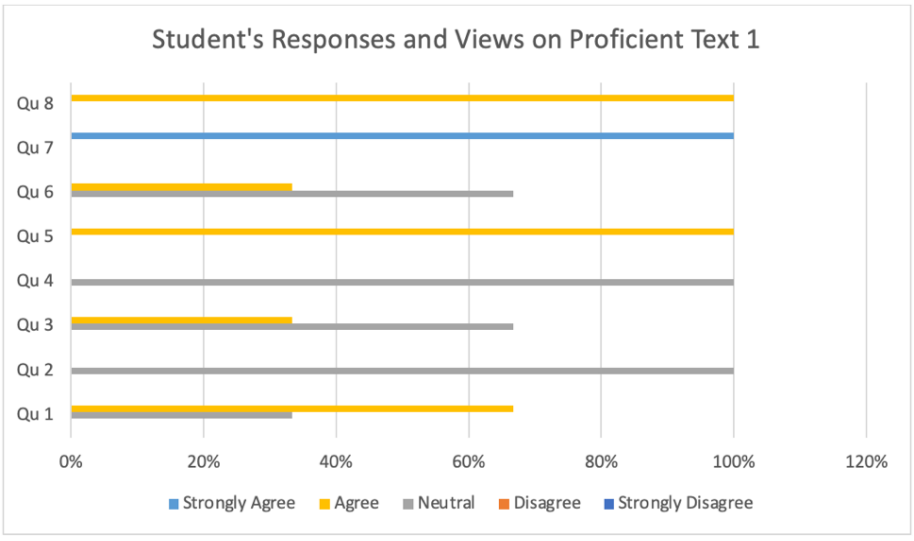


Chart 5. Students' Responses on Proficient Text 1

Chart 5 above, which is about students' responses and views toward the first English reading text for the proficient level, it is obtained that all students have positive perceptions. However, the text is quite challenging to

read since some unfamiliar vocabulary exists. Based on the additional questions asked of the students, their strategy to understand the information is to guess the meaning of the words based on the context. Furthermore, the text is challenging since it talks about an uncommon topic to them. They also thought that the number of lexical words in the text influences the complexity level of the text since the information becomes so dense. However, they can still understand the text well and fit their current level.

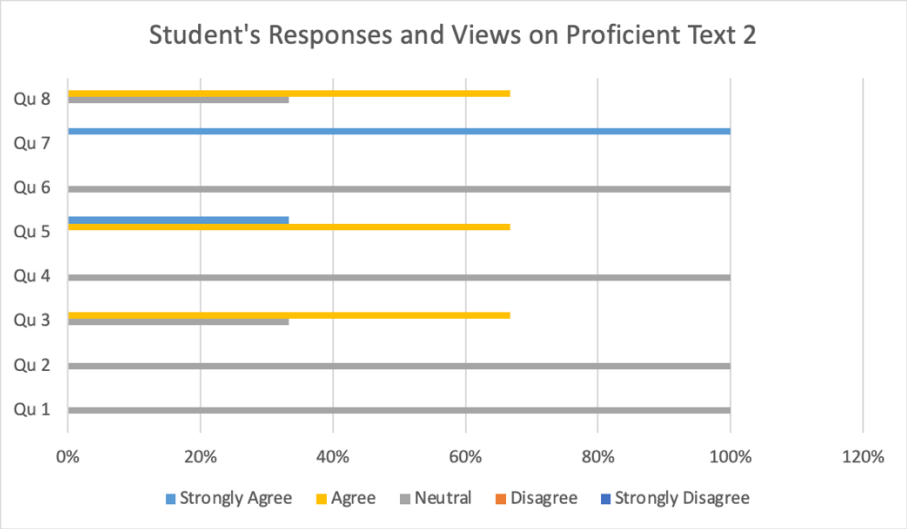


Chart 6: Students' Responses on Proficient Text 2

Chart 6 above shows the students' responses and views toward the second English reading text for the proficient level. It shows that most of the students have positive reactions, although most of their choices in the questionnaire were "neutral." It indicates that not all information in the text can be comprehended. Based on the additional questions in the questionnaire, they thought the text contained more complex vocabulary and sentence structures with unfamiliar topics. The text also contains more lexical words that make the text denser and more challenging to read. However, most thought the text was still appropriate for their language level.

### *3.3. The Appropriate Text Complexity Level for Indonesia EFL Undergraduate Students Based on the Students' responses and Lexical Density Analysis*

The result above has shown that, based on students' responses and the lexical density analysis, the appropriate level of text complexity for Indonesian EFL undergraduate students is generally at the intermediate level. It is supported by the findings that at the basic level, students overwhelmingly found the texts understandable with familiar vocabularies and simple sentence structures. It is suggested that the basic-level texts were too easy for most of the students. While they appreciated the ease of comprehension, the texts given did not fully challenge their reading abilities. Moreover, at the intermediate level, students faced a moderate amount of unfamiliar vocabulary and slightly more complex sentence structures, yet they still provided positive perceptions and successful comprehension. They mentioned that lexical word density (nouns, verbs, adjectives, and adverbs) influenced the text's complexity, but not to the extent that it hindered their understanding. Based on their responses, their ability to manage intermediate-level texts, supported by their performance on comprehension tests, indicates that this level matches their current proficiency and support their language development.

At the proficient (advanced) level, although students managed to comprehend the texts, they encountered significantly more challenges. The texts at this level contained more complex vocabulary, denser information due

to higher lexical density, and unfamiliar topics, leading to a higher number of "neutral responses. Students needed to apply reading strategies such as guessing meanings from context to understand the texts. It is suggested that while they can engage with advanced texts, the materials may be slightly beyond their comfort zone for general academic reading without extra support. Therefore, intermediate-level texts are most appropriate for Indonesia EFL undergraduate students because they provide a balanced level of challenge-promoting learning without overwhelming students.

The current research aligns with previous studies in exploring web-based readability analysis, particularly in determining the complexity of written texts for educational purposes. Similar to prior studies by Chen & Meurers (2016), Quispesaravia et al. (2016), and Lyashevskaya et al. (2021), the present research confirms the utility of web-based tools for analyzing text complexity and providing educators with insights into the suitability of texts based on student proficiency. However, this study focuses more specifically on lexical density as a key factor in assessing complexity, providing a new dimension to the understanding of how complexity is structured in educational texts.

The result above shows that all students provided positive responses. They all thought the texts were appropriate for their language comprehension level. This result verifies the accuracy of the application in producing the texts based on the student's proficiency level. Furthermore, the result aligns with what Stajner et al. (2020) stated in their study that automatic assessment of text complexity level educationally plays a crucial role in making the written text more informative and accessible for different target users. Compared with the automatic application they created, the result showed that complexity analysis of any educational text must be conducted to maintain the reader's interest in a text, increase students' knowledge by providing the text that fits with their comprehension level, and create social inclusion. The application can also successfully analyze the conceptual complexity level of the text. However, the result provided limited results since it depended only on the quality/choice of the entity linker.

Moreover, the result also strengthens the research conducted by Napolitano et al. (2015) and Chen & Meurers (2016); through the application that they created, an automatic application for complexity analysis successfully develops books better suited to target users that becomes a valuable tool for educators, researchers, and content-developer. However, the application excludes the basic information used to calculate the result of complexity levels, so users do not get the information from where the result comes. Moreover, the research conducted by Rizkiani et al. (2022) found that lexical density is the tool to analyze the complexity level of the text through the analysis of the lexical and grammatical items contained in the text.

Through this analysis, knowing the critical factors in determining the complexity of English text can help build a practical application. The result shows that determining the complexity levels of a text through lexical density analysis has yet to be applied to the other existing applications. This study provides implications that complexity analysis through lexical density framework can quickly help educators categorize the texts based on students' comprehension levels. It is in line with what (Ramadhani et al., 2023) stated that the impact of selecting an inappropriate difficulty level of the text can influence students' interest, understanding, and motivation in reading the text, so the text given should be adapted to their proficiency level to achieve the reading comprehension stage.

## 4. Conclusion

The present study explores the students' responses and views on the suitability of the text complexity level generated by the web-based readability analysis application. The investigation focused on whether the texts produced by the application matched the students' language comprehension level under the framework of Systemic Functional Linguistics through lexical density theory. From the research problems proposed in this study, it concludes that the percentages of lexical density indexes of six selected texts of Cambridge Books that have been categorized based on CEFR level used in this study and automatically analyzed by the application follow the complexity standard decided by the book's writers. The findings show that the number of lexical items in the text

determines the complexity level, not the length of the text or the total number of words contained in the text. Furthermore, the findings also revealed that the students at each level have positive perceptions of the texts tested on them and analyzed by the application. They thought the texts provided were appropriate for their comprehension level, which is seen from their capability to answer the questions in each text created by the book's writers.

Regarding the appropriate text complexity level for Indonesian EFL undergraduate students, the findings indicate that most students are able to engage with texts categorized from basic to proficient levels based on CEFR. However, while students demonstrated the ability to comprehend advanced texts, they often needed to apply specific reading strategies to aid their understanding. This suggest that although they can interact with more complex materials, advanced-level texts may till lie slightly beyond their comfort zone for general academic reading without additional support.

This study provides the implication of informing educators to utilize the web-based readability analysis used in this study to help them analyze the text automatically, accurately, and quickly. In determining the complexity level of the text, analysis of lexico-grammatical features through lexical density should be applied. It concludes that students' learning process, especially in reading activities, will be impacted if the texts provided are inappropriate for their comprehension level, which affects their ability to create meaning from the text they read. This study suggests a necessary step to analyze various texts with various resources and apply them to broader participants to make the result more accurate.

The limitations of this study include the small number of texts (six) and participants (nine), which restricts the generalizability of the findings. The study also focuses solely on lexical density as an indicator of text complexity, without considering other important factors such as grammatical structure and textual cohesion. Additionally, only one web-based readability application was used, limiting the scope of comparison with other tools or manual methods. The texts analyzed are exclusively from Cambridge books, lacking diversity in terms of text types or genres. Finally, the study centers on the CEFR framework, without exploring other models of language proficiency. Future research should expand the sample size, include various genres and resources, examine additional complexity factors, compare different readability tools, and involve participants from more diverse linguistic backgrounds to enhance the robustness and applicability of the findings.

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