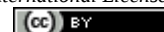


Exploring Lexical Density in English Reading Passages for Senior Vocational High School Students

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A B S T R A C T

This study explores the lexical density of an English reading text designed for 11th-grade vocational high school students, with the aim of evaluating its suitability for educational use. Lexical density refers to the ratio of content words to the total number of words in a text, which serves as an indicator of text complexity and information load. The study uses a qualitative descriptive approach, supported by content analysis, to measure lexical density in four paragraphs discussing historical topics: the Black Death, the Industrial Revolution, and the First World War. The findings indicate a consistently high lexical density across all four paragraphs, ranging from 51.05% to 53.13%. This indicates that the text contains a significant proportion of content words, reflecting an appropriate level of academic rigor for vocational high school students. Despite the high lexical density, the text remains clear and easy to read due to its manageable grammatical structure. These results align with previous research, which suggests that a lexical density between 40% and 60% is suitable for learning texts. The study concludes that the analyzed reading text is a valuable educational resource. This reading effectively balances information richness with accessibility, supporting vocabulary development, reading comprehension, and academic literacy. These findings highlight the importance of lexical density as a linguistic feature and pedagogical tool in the evaluation and design of English as a Foreign Language (EFL) reading materials.

1. Introduction

Reading serves not only as a gateway to language comprehension but also as a cornerstone in academic success. Within the context of English as a foreign language (EFL), students are frequently exposed to reading passages that contain a wide range of vocabulary and grammatical structures, many of which are cognitively demanding. Reading comprehension involves understanding and interpreting information in written texts—skills that are crucial for both language mastery and broader academic achievement [1]. That reading contributes significantly to language acquisition [2]. In addition, through the Lexical Approach, argues that vocabulary is not just a component of language learning it is the very foundation on which language proficiency is built [3]. In line with this, lexical density defined as the ratio between content words (nouns, verbs, adjectives, and adverbs) and function words (articles, prepositions, conjunctions, etc.) has become a central concept in measuring the complexity of written texts [4].

A text with high lexical density tends to be more information-rich and formal, thus posing greater cognitive challenges to readers. Lexical density can reflect the degree to which a text conveys substantive meaning [5]. Lexical complexity arises from how

vocabulary is developed and employed [6]. Understanding lexical density is therefore vital, especially in educational contexts where the appropriateness of instructional materials must be evaluated based on students' comprehension capabilities. Lexical density as a measurement of the amount of content information in a clause or text, which is calculated by dividing the number of lexical words by the total number of words in the clause [7]. Meanwhile, lexical density as the presentation of dense information through lexical like items nouns, verbs, adjectives, and adverbs rather than grammatical or function words. These perspectives emphasize that lexical density does not merely reflect vocabulary usage but also how ideas are packed within sentences, affecting how readers process and interpret texts [8].

From a practical standpoint, measuring lexical density aids in assessing whether a given text is too difficult or too simplistic for its intended audience. That this measurement helps determine the ideal level of difficulty for reading materials in textbooks, especially for Indonesian EFL learners [9]. That lexical density, alongside syntactic structure and coherence, can be instrumental in identifying the key elements that contribute to text complexity [10].

Several researchers have explored lexical density in Indonesian Senior vocational high school textbooks. For instance, analyzed nine reading texts from the English Interlanguage textbook and found that their lexical densities ranged from 40% to 60%. Their study concluded that these materials were sufficiently dense yet comprehensible for tenth-grade learners [11]. In another study, investigated the Look Ahead textbook and discovered that explanation texts had the highest lexical density at 58.42%, suggesting they were more difficult to understand than narrative or review texts [12]. Meanwhile, other researchers expanded the analysis by considering not only lexical density but also grammatical intricacy [13].

Her study on the English Alive textbook showed that both high lexical density and a high number of complex clauses made reading texts more challenging. Moreover, the comparison between government and non-government EFL textbooks conducted revealed that the latter generally contain texts with higher lexical density. This variation indicates that not all textbooks adhere to the same readability standards, and it underscores the need for careful evaluation when selecting instructional materials [14].

Despite these insightful findings, there remains a lack of attention to the lexical density of English reading passages found in standardized assessments, such as high school entrance exams. While textbooks have been the subject of numerous studies, test materials though equally important in shaping students' academic outcomes have not received similar scrutiny. This study addresses that gap by focusing on a Grade 11 English reading passage used in an entrance exam. The aim is to determine whether the lexical density of this passage aligns with the cognitive and linguistic abilities of Senior vocational high school. In doing so, the study hopes to contribute to the ongoing discussion on how to create and evaluate EFL reading materials that are both educationally valuable and appropriately challenging.

2. Research Method

This study applies a qualitative descriptive method supported by content analysis to assess the lexical density of an English reading passage designed for Grade 11 students. The approach is based on Systemic Functional Linguistics (SFL), which sees language as a meaning-making resource in context. In SFL, lexical density is a key construct that reflects how much information is embedded in a text and how that impacts its comprehensibility for learners.

The primary data used in this study is a historical passage from a senior high school English entrance exam. The text discusses three pivotal events in world history that is the Black Death, the Industrial Revolution, and the Great War. Each section of the passage is structured topically and contextually, making it a representative model for evaluating lexical density

in academic reading materials. The passage is segmented into four paragraphs based on thematic focus. The researcher conducted a step-by-step analysis as follows:

1. Text segmentation that is the passage was divided into four clearly marked paragraphs.
2. Word classification that is each word in the paragraph was categorized as either a lexical item (nouns, verbs, adjectives, adverbs) or a grammatical item (prepositions, determiners, conjunctions, etc.). Lexical items are open-class words that can bear multiple meanings and contribute significantly to the overall message [13].
3. Calculation of lexical density that is lexical density was determined using the following Equality (1).

Lexical density (%)

$$= \left(\frac{\text{Number of lexical words}}{\text{Total number of words}} \right) \times 100 \quad \text{Equality (1)}$$

This formula helps measure the content word density in each paragraph and thus determine the cognitive demands of the text. This analytical framework is rooted in previous studies that used similar methods to analyze the readability of textbooks, and that associated certain genres with varying levels of lexical density [11], [12]. The use of lexical density metrics to select appropriate materials for students avoids texts that are too complex or too simple [14]. This methodological approach offers insights into the distribution of lexical items in relation to grammatical elements and contributes to a better understanding of how reading passages align with students' proficiency levels. In turn, it informs educators, material developers, and exam designers in selecting and crafting effective and accessible reading materials for senior high school learners.

3. Result and Discussion

3.1. Result

This section presents a comprehensive analysis of lexical density in the English reading passage taken from a Grade 11 entrance examination. The passage, which comprises four paragraphs, focuses on three significant historical themes that is the Black Death, the Industrial Revolution, and the Great War. Lexical density is used as a metric to measure the proportion of content words relative to the total number of words in each paragraph. This approach is consistent with what has been suggested, which defines lexical density as the ratio of open-class words (nouns, verbs, adjectives, and adverbs) to closed-class words (function words such as prepositions, pronouns, conjunctions, and articles) [15]. Lexical density can be evaluated based on the number of lexical words either compared to grammatical words or to the total number of words [16]. The lexical density of each paragraph in the reading is presented in Table 1.

Table 1. The Total of Lexical Density on Reading Passage

Paragraph	Topic	Total Words	Lexical Words	Lexical Density
1	Introduction	32	17	53.13%
2	The Black Death	190	97	51.05%
3	Industrial Revolution	130	67	51.54%
4	The Great War	147	76	51.70%

3.1.1. Paragraph 1 - Introduction

Anyone who studies the history of Europe will learn about three important events that changed this region of the world. These three events are the Black Death, the Industrial Revolution, and The Great War. The first paragraph serves as an introductory overview, listing the three events that the passage will examine. Despite its brevity, this section contains a high lexical density of 53.13%. Lexical items include history, Europe, events, and the names of historical periods (Black Death, Industrial Revolution, Great War). These terms are significant in establishing the thematic orientation of the passage and immediately provide semantic weight.

Texts with a high number of content words signal a more formal, academic style intended for readers with background knowledge. The high proportion of lexical items in this introductory paragraph is appropriate for signaling the academic nature of the reading passage [17]. Lexical density in introductory texts, even short ones, is important in engaging students at the onset. The purposeful use of dense vocabulary early in a passage may also activate schema or prior knowledge in readers, which is especially beneficial in reading comprehension contexts [18]. Moreover, introductory statements with high lexical load tend to function as topic signals, aiding students in setting expectations about the type of information that will follow. This aligns with the instructional purpose of academic texts, where clarity of theme and intention is essential for guiding readers' processing strategies.

3.1.2. Paragraph 2 - The Black Death

"Firstly, let's examine the 'Black Death'. The bubonic plague (which was also known as the 'Black Death') was a disease which was brought to most parts of Asia, North Africa, and Europe. The first outbreak of this plague was recorded in 1331 CE in China, and it spread rapidly from there to Europe. The plague started as a bloody swelling in the pit of the arms or in the area of the body where the legs join the front of the body. The disease was very contagious this means that it spread easily from person to person, and it killed approximately seventy million to two hundred million people. Almost half the population of Europe died as a result of the Black Death. The disease probably began in Asia and then spread throughout Europe. The disease was carried by fleas which lived in the fur of the black rat. These rats lived close to humans, and thus they spread the disease. The bodies of dead people were left out in the road for

people to collect. This caused the disease to spread even further. A person normally died within two to three days after contracting the disease."

This paragraph contains the largest number of total words (190), with 97 lexical items, resulting in a lexical density of 51.05%. The lexical items include medical and historical terminology such as plague, disease, contagious, flea, and bacteria. These lexical words function as carriers of critical information, conveying detailed historical and epidemiological facts. Such lexical items are part of an open set and play a major role in meaning-making. Meanwhile, function words such as the, was, and of maintain the grammatical structure without contributing substantial content [19].

Grammatical items are drawn from closed sets and serve structural purposes rather than semantic load. Therefore, the balance between content and grammatical words in this paragraph supports the information-heavy yet coherent style of academic texts. When lexical items dominate, the result is higher lexical density, which can increase the level of difficulty in processing the text [20]. This paragraph also illustrates how lexical choices influence reader engagement and comprehension. For students, encountering domain-specific terms related to health and history may stimulate interest, but it also imposes cognitive demands. Denser lexical patterns correlate with increased processing complexity. Still, this challenge is pedagogically valuable, as it cultivates academic literacy and specialized vocabulary acquisition in a contextualized manner [21].

3.1.3. Paragraph 3 - The Industrial Revolution

Secondly, the 'Industrial Revolution' is actually one of the largest changes in the history of the world, not only in the history of Europe. It started in Britain in the 18th century CE. As the 'Workshop of the World', Britain was the first home of new machines, new types of materials, and new ways of producing power. This was the age of coal and iron, of gas and electricity, of railways and factories. These factories created millions of new jobs. As a result, many people began to leave the countryside in order to find work in the towns and cities. Houses and factories had to be built for them. By 1850, over 60% of people in Britain lived in towns and cities. Adults who worked in factories had a very hard life. They often worked for fourteen hours a day, six days a week. Often, children were used as workers in factories.

The third paragraph contains 130 words, including 67 lexical items, producing a lexical density of 51.54%.

Lexical terms such as machines, coal, electricity, factories, and jobs dominate the paragraph, reflecting the thematic focus on technological and social transformation. Lexical items are central to conveying meaning within a sentence, and their frequency often determines the complexity of the text [22]. In addition, this paragraph demonstrates the connection between lexical density and conceptual scope. The level of lexical richness often reveals how abstract or concrete the text's subject matter is [16].

The presence of tangible industrial objects (machines, railways) alongside social outcomes (migration, urbanization) creates a text that is both informational and explanatory. This facilitates students' ability to link historical context with modern societal structures, strengthening interdisciplinary learning. Another notable feature is the use of temporal and causal linking words, which function as grammatical scaffolds for the dense lexical content. These assist readers in navigating chronological and cause-effect sequences. Lexical density is not only a reflection of content words but also of how tightly ideas are packed within minimal syntactic space [8]. Moreover, this paragraph demonstrates how lexical density may vary depending on the complexity of the subject and the number of abstract concepts introduced. Although the content is highly informative, the density does not compromise the text's readability due to the deliberate use of concise phrases and controlled sentence structures.

3.1.4. Paragraph 4 - The Great War

Thirdly, the 'Great War' in Europe from 1914-1918 is also known as the First World War. It is estimated that around 37 million people [soldiers and civilians] died in this war which makes this one of the deadliest wars in human history. Before this war, Germany had built up its navy to match the strength of the British Navy. From the start of the Great War, British war ships blockaded German ports. Therefore, Britain's navy prevented supplies from reaching Germany. This caused severe shortages of food and other goods. The Germans hit back with their submarines. After 1915, the German submarines attacked both warships and merchant ships that carried supplies to Britain. (Merchant ships are ships that are used for trade and business). In May 1915, a German torpedo hit a British passenger ship called the *Lusitania*. This ship carried nearly 2,000 passengers. Approximately 1,200 of the people on board this ship died.

In the final paragraph, the lexical density stands at 51.70%, with 76 lexical items out of 147 total words. The vocabulary includes specific wartime terms such as "submarines," "blockade," "merchant ships," "navy," and "torpedo." These lexical items provide crucial context and detail about the First World War. The syntactic and lexical features of a passage can either enhance or hinder comprehension depending on how densely packed the content is [23].

The inclusion of strategic and military terms contributes to the academic and thematic weight of the passage. However, the clarity is maintained through a carefully balanced sentence structure, featuring compound and complex constructions. Lexical density reflects how content is realized, not just in vocabulary, but also in how information is distributed throughout a clause [7]. Additionally, the use of lexical collocations like "German torpedo" or "British passenger ship" demonstrates semantic compactness. These collocations enhance understanding and increase the expressive range of the text without needing lengthy grammatical explanations. Lexical bundling is often a sign of efficient and purposeful communication in formal and academic discourse [21].

3.1.5. Lexical Trends and Implications

Across all four paragraphs, the lexical density remains remarkably consistent, ranging from 51.05% to 53.13%. This consistency supports the hypothesis that the passage was constructed with intentional lexical richness. Lexical density is a measure of how informative a text is in relation to its length, and values around 50% are typical of texts used in academic and educational settings [24]. In terms of readability, the extent to which a learner can easily understand a passage intended for a specific learning objective. While the lexical density in this passage is relatively high, the supporting grammatical structure maintains comprehensibility. The text avoids overly complex sentence constructions, which could compromise understanding, and instead employs consistent terminology and transitional devices [25].

The data confirm that the lexical items in the passage are drawn from open-class word sets, contributing substantially to the semantic structure of each paragraph. The consistent use of high-frequency lexical terms, alongside sufficient grammatical items, ensures that the passage maintains its academic tone while remaining accessible to senior high school students [19]. The analysis also reflects lexical density as a measurement of the amount of content information present in a text, realized by lexical words. When a text presents a balance of open and closed class words, it facilitates reader comprehension while maintaining academic integrity [7].

In this case, the text's lexical density aligns well with the cognitive and linguistic abilities expected at the Senior vocational high school. From an educational perspective, this consistency in lexical density provides an optimal platform for enhancing language acquisition, promoting vocabulary enrichment, and supporting content learning. It demonstrates the feasibility of using historical reading passages as dual-purpose texts: to impart knowledge and to build academic literacy in EFL settings.

It is also worth noting that lexical density plays an indirect role in shaping classroom instruction and assessment practices. Teachers may use lexical density as a benchmark for selecting appropriate texts for classroom reading activities or exam preparation. The balance between receptive vocabulary exposure and productive vocabulary use must be considered when crafting or choosing materials [26]. A moderately high lexical density like the one observed in this passage supports deeper cognitive engagement and encourages learners to expand their lexical repertoire. Thus, the result confirms that lexical density is a valuable metric not only for evaluating vocabulary richness but also for ensuring that educational texts align with readability and comprehension standards appropriate to learners' levels.

3.2. Discussion

The findings of this study reveal a consistent lexical density across all paragraphs of the English reading passage analyzed, with values ranging from 51.05% to 53.13%. This range suggests a balanced proportion of lexical (content) and grammatical (function) words, indicating that the text is rich in information while still maintaining a reasonable level of readability. Lexical density is defined as the proportion of lexical items to grammatical items, where lexical words belong to open word classes such as nouns, verbs, adjectives, and adverbs, and grammatical items derive from closed sets such as prepositions, determiners, and conjunctions [15], [16].

When compared with previous studies, the results of this research align with several key findings while also offering new perspectives. Lexical density of texts in the English Interlanguage textbook ranged from 40% to 60%, with the average value falling within the same range as this current study [11]. They concluded that the materials were clear and understandable for tenth-grade students. Similarly, the present passage maintains its academic tone and informativeness without becoming overly complex, which corresponds to the standard expectation for senior high school reading materials.

Lexical densities between 42% and 58% across different genres in the Look Ahead textbook. They noted that explanation texts exhibited the highest density, making them the most challenging [12]. The passage in this study, while not genre-specific like narrative or review, demonstrates a consistent density that leans toward the higher end of the spectrum. Texts with more content words tend to be more academic in nature and thus require a certain level of background knowledge [17]. This pattern is particularly important in academic settings, where the ability to process high-density material correlates with students' preparedness for advanced studies.

Both lexical density and grammatical intricacy in the English Alive textbook, concluding that texts with high lexical and syntactic complexity are harder for students

to comprehend [13]. In the present study, while the lexical density is moderately high, the grammatical structure is relatively simple, comprising a mix of compound and complex sentences that aid readability. This balance suggests that syntactic structure and lexical density must be aligned to ensure comprehension, especially in instructional contexts. Complex ideas must be presented in syntactically digestible formats, especially for learners navigating a second language [23].

This study also provides a meaningful comparison. They highlight that non-government textbooks tend to be more lexically dense than government-published textbooks. Although this study analyzed a subset of assessment contexts and not textbooks, the levels of lexical density found were more aligned with the non-government type, suggesting that the reading materials were designed to challenge students while remaining accessible. This further highlights the need for curriculum evaluators to assess not only the relevance of content but also the level of linguistic challenge through tools such as lexical density [14].

Theoretically, lexical items, or content words, are drawn from the open class and serve to carry the semantic load of the text. This is particularly important in educational materials where vocabulary is both a tool and a target of instruction [19]. The presence and proportion of lexical items directly contribute to the cognitive demands placed on readers, and this is reinforced by the conclusion that higher lexical density increases cognitive load. Essentially, the vocabulary balance in a text should consider not only the content but also the learner's cognitive pace [21], [22].

Two ways to measure lexical density are by comparing lexical words to grammatical words or by calculating the proportion of lexical words to the total number of words. Both interpretations validate the method used in this study and confirm that a lexical density slightly above 50% falls within the range that demonstrates academic rigor while maintaining clarity. This balance highlights that lexical density is not an inherent problem but must be understood within the context of its instruction [16].

Text readability should also be considered. Readability is defined as the ease or difficulty experienced by learners in understanding a text. Although the text in this study exhibits relatively high density, the structure and clarity of the writing enhance its accessibility [25]. Texts with a predominance of grammatical elements are generally easier to understand. However, the current analysis reveals that even with a greater proportion of lexical elements, readability can be maintained if sentence structure is managed appropriately. This suggests that effective readability arises from the synergy between vocabulary load and syntactic control [20].

Lexical density is defined as the number of content words in relation to all words (tokens) in a text. This quantitative representation, when considered alongside qualitative features such as sentence clarity, cohesion, and theme development, offers a more holistic understanding of text complexity [24]. The findings of this study suggest that lexical density, when supported by a coherent grammatical framework, does not necessarily hinder comprehension but can actually enhance learning by exposing students to dense and meaningful language. The goal is to increase language exposure in a meaningful and pedagogically appropriate manner.

Texts have a variety of educational and communicative functions, and this research reinforces the idea that texts can serve both linguistic and disciplinary learning purposes [18]. The historical content used in the text provides opportunities for vocabulary enrichment, syntactic development, and the development of background knowledge, core elements of interdisciplinary literacy. This supports the idea that lexical density not only shapes language learning but can also deepen understanding of content areas.

It is also worth noting that lexical density plays an indirect role in shaping classroom teaching and assessment practices. Teachers can use lexical density as a benchmark for selecting appropriate texts for classroom reading activities or test preparation. The balance between receptive vocabulary exposure and productive vocabulary use should be considered when creating or selecting materials [26]. A sufficiently high lexical density, as observed in this passage, supports deeper cognitive engagement and encourages learners to expand their lexical repertoire.

Furthermore, the consistency of lexical density across the four paragraphs in the reading passage demonstrates intentional textual design. This uniformity reduces sudden fluctuations in complexity, making it easier for students to follow the flow of ideas. Texts with dramatic changes in lexical density can disrupt comprehension and overload cognitive processing. Thus, instructional texts benefit from maintaining a balanced and predictable lexical profile. The implications extend beyond the classroom. Text designers, test developers, and educational policymakers should consider lexical density as a valid indicator of textual difficulty. It complements other readability metrics by offering insight into how densely information is packed within a passage. Such dense text increases cognitive load. However, if applied appropriately, this method can expand learners' abilities and improve academic achievement [21].

In sum, the lexical density values observed in this study affirm the passage's status as a well-balanced academic text. It is rich in content, yet structured in a way that supports comprehension and instructional use. These findings reinforce the importance of considering both

lexical density and structural clarity when evaluating or designing reading materials for senior high school students, and they underscore the value of aligning vocabulary complexity with readers' cognitive levels and educational goals. More broadly, this analysis encourages further research into lexical density as a cornerstone of instructional text evaluation and academic literacy development.

4. Conclusion

This study investigated the lexical density of an 11th-grade English reading passage, focusing on how the proportion of content words affects text complexity and students' comprehension. The analysis revealed that the lexical density across the four paragraphs ranged from 51.05% to 53.13%. These results fall within the ideal range for instructional texts, indicating that the passages contain sufficient informational content without overwhelming the reader. The texts analyzed in this study demonstrate the effective use of lexical density in educational materials. They provide learners with meaningful content exposure, promote vocabulary acquisition, and support comprehension. These findings reaffirm the importance of lexical density not only as a linguistic concept but also as a pedagogical tool for evaluating and designing EFL reading texts.

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