



ANALYZING THE LEXICAL DENSITY OF SPECIALIZED PODCASTS FOR ENGLISH FOR SPECIFIC PURPOSES: A CORPUS BASED STUDY

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Abstract

This study examines the lexical density and linguistic characteristics of specialized podcasts in the fields of business, science and technology, and history using English for Specific Purposes (ESP) frameworks. As part of a corpus-based quantitative study to determine the distribution of parts-of-speech and lexical density, 360 podcast episode transcripts totaling approximately 2.8 million words were examined with the help of the Analyse My Writing tool. History has the highest lexical density (48.19%), followed by business (45.19%) and science and technology (44.96%), according to the findings. General speech has a lower lexical density overall. Domain-specific patterns can be seen in the parts-of-speech analysis: nouns and prepositions predominate in history, verbs and pronouns predominate in business, and adjectives and adverbs predominate in science and technology. These results show that ESP podcasts give learners authentic and lexically sufficient input by combining aspects of spoken and written language. The study highlights the pedagogical benefits of podcasts as adaptable and discipline-specific resources for improving listening comprehension, vocabulary, and professional communication skills.

Keywords: *Lexical Density, Corpus, Podcasts, Nouns, Verbs, Pronouns, Adjectives, Adverbs*

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1.Introduction

The aim of English for Specific Purposes (ESP) is to enhance the language use skills of learners in particular academic, occupational, or work settings (Dudley-Evans & St John, 1998). Specialist podcasts, audio materials developed for or tailored to a specific discipline (e.g., history, science and technology, and business), have come to play a vital pedagogical role within this model. For those students who require English for study or workplace purposes, ESP podcasts offer professional terminology, authentic speech, and situated patterns of communication (Basturkmen, 2010). Students are presented with the registers, genres, and lexicon characteristic of their chosen area through listening to shows of debates on specific issues or interviews with actual professionals (Flowerdew, 2013).

As per studies, when made to fit the learner's precise requirements, podcasts improve lexical learning and listening skills. For example, Çelik and Yavuz (2022) discovered that learners who employed specialized discipline podcasts to enhance memorization of technical vocabulary and enhance engagement were medical and tourism English majors. Likewise, Rahimi and Katal (2013) concluded that incorporating ESP podcasts into blended learning enhances learner autonomy and motivation, which are critical aspects of needs-based ESP instruction. Giménez-Moreno and Skorczynska (2013) conclude that such podcasts combine case discussion, roleplays, and interviews with authentic communication to facilitate linguistic as well as practical competence. In addition to classroom-based ESP instruction, podcasts' episodic, portable nature allows for flexible, self-directed learning (Rosell-Aguilar, 2017).

Therefore, specialized podcasts are innovative instruments in ESP teaching, connecting theory and practice via connecting learners with authentic disciplinary discourse while enhancing listening, vocabulary, and communicative competence.

This research employs corpus linguistic methods to investigate the lexical density and lexical variety of ESP podcasts and how the lexical density and lexical variety differ significantly across domains of podcasts. The aim is to contribute to the understanding of how such podcasts support the learning and acquisition of domain-specific language skills and inform the selection of podcasts for language learning and teaching. By filling a void in existing studies, this study will make podcasts a more effective language learning tool, with the added practical benefit to learners and teachers.

1.1. Research Questions

1. What is the lexical density of specialized podcasts in history, science and technology, and business?
2. How are parts of speech of specialized podcasts distributed in history, science and technology, and business domains?

1.2. Research Objectives

- To examine the lexical density of specialized podcasts in history, science and technology, and business
- To analyze the distribution of parts of speech of specialized podcasts in history, science and technology, and business domains

1.3. Significance of the Study

For ESP language teachers and students, this study is of great worth. It has empirical evidence regarding the lexical complexity and burden of vocabulary learners face when engaging with authentic listening materials by systematically examining the lexical density and linguistic makeup of professional podcasts in the areas of history, science and technology, and business. The findings enhance our understanding of how lexical variation affects disciplinary communication styles, allowing instructors to choose or create podcast content suitable for students' level of skill and working demands. The study further highlights the pedagogical advantage of podcasts as dynamic, interactive, and experiential learning resources that introduce students to classroom discourse beyond learning contexts. These findings can assist curriculum developers in integrating vocabulary teaching and podcast listening tasks into ESP courses. In linking corpus linguistics and applied language pedagogy, this research eventually promotes both practice and theory and enables ESP to be taught in a more informed, empirically based way.

2. Literature Review

2.1. Lexical Density

The ratio of content words; nouns, verbs, adjectives, and adverbs, to total words in a text is called lexical density. It is an important measure of textual complexity and information load (Ure, 1971; Halliday, 1985). It helps in measuring the likely linguistic requirements of reading or listening material, particularly for language learners. Since their ideas are often presented in brief and abstract form, written texts support a greater lexical density than speech, especially everyday conversation, which has a lower density because of its interactive structure, use of fillers, and grammatical redundancy (Halliday & Hasan, 2000; Thornbury & Slade, 2006; Johansson, 2008). These generalizations are problematized by specialist spoken genres, such as business presentations, university lectures, and podcasts designed for English for Specific Purposes (ESP) material. These materials often juxtapose the dense, patterned, and technical lexis characteristics more often associated with written texts with colloquial spoken patterns (Flowerdew, 1994;

Simpson-Vlach & Ellis, 2010). Due to this, ESP podcasts can have lexical densities that are equal to or even higher than those of traditional spoken texts, and sometimes they can even approach the level of complexity of academic writing (Wingrove, 2017; Vuković-Stamatović, 2022). This disparity in lexical density across genres is emphasized by several studies. For example, Stubbs (1986) found that non-fiction books vary between 40 and 65% and fiction books between 40 and 54%, whereas Ure (1971) indicated that everyday conversation typically contains lexical density less than 40%. Although Wingrove (2017) recorded a lexical density of 47.11% in Yale's lecture series, Nesi (2001) indicated that academic lectures contain an average lexical density of 49%. Meanwhile, science documentaries were found to reach 51.36% (Vuković-Stamatović, 2022). These findings suggest that the line between spoken and written complexity is blurred when it comes to specialized formats.

Although ESP and podcast-based instruction are becoming more and more popular, few studies have thoroughly examined the lexical density and lexical demand of ESP podcasts, which are becoming a more and more common tool in L2 instruction because of their adaptability, authenticity, and multimodal potential (Siegel, 2020). The quantity of distinct and frequently technical vocabulary items required for comprehension is known as lexical demand, and it presents an additional challenge for students in ESP contexts where comprehension of domain-specific material is crucial (Coxhead, 2000; Nation, 2013; Schmitt, 2019). Lexical density and lexical complexity are two of the biggest obstacles to listening comprehension for L2 learners, particularly in time-constrained and cognitively demanding environments, according to studies like Brunfaut and Révész (2015) and Révész and Brunfaut (2013).

Corpus based research tools like *AntWordProfiler*, *AntConc*, and *Analyze My Writing* have enabled researchers to quantify lexical density and lexical sophistication across texts. These methods have been successfully applied to genres like academic textbooks (Rizkiani et al., 2022), news articles (Kembaren & Aswani, 2022), and even TOEFL listening scripts, but they are underutilized in podcast analysis. Preliminary works on podcasts have only been investigated with respect to vocabulary exposure and teaching effectiveness (Webb & Rodgers, 2009; Din & Ghani, 2020). The lexical architecture was not the subject of the work undertaken.

Nonetheless, the case of ESP podcasts is special in that they may be a combination of many things (scripted monologues, on the spot interviews) thus being a source of much interest of research. Such podcasts could be seen as one of those resources in between conversation and written language by experimenting with the extremes of these two the resources become the most difficult to fully understand, comprehend and thus the most challenging to acquire. As a result, the aim of this study is to provide an in depth

description of the lexical demand and lexical density of ESP podcasts that will identify tightly concentrated vocabulary and the vocabulary load of those using the corpus linguistic technique for analyzing domains across domains such as business, science and technology, and history.

2.2. Podcasts as a Learning Tool

Podcasts an amalgam of "iPod" and "broadcast" coined in 2004 (Wu, 2008) are audio files available for streaming or download, often used for entertainment, news, and increasingly, education (Rime, Pike, & Collins, 2022). They are primarily audio based, allowing users to multitask while listening (MacKenzie, 2019), and have evolved into diverse formats including interviews, monologues, and educational series (Chaikovoska, 2018).

Much attention is being paid to the potential of podcasts to aid in the study of the English language. Students' vocabulary, pronunciation, and listening comprehension are improved by the real world language input they get, which includes a range of accents, speech rates, and colloquial idioms (Lord, 2008; Knight, 2010; Ramirez, 2023). While podcasts meant for a general audience such as TED Talks expose listeners to practical world applications, ESL-oriented podcasts such as The English We Speak or Elementary Podcasts offer structured language instruction (Nurmukhamedov & Sadler).

Their educational importance is that they are adaptable learners can pace, stop, rewind, and repeat episodes at their own discretion (Nataatmadja & Dyson, 2008). The second advantage of podcasts is that learning is promoted both in-class and out-of-class, making students engage in prolonged listening characterized as enjoyable, comprehensible, and scale listening practice (Chang & Millet, 2013).

A number of studies show the vocabulary learning ability of podcasts. Frequent listening to podcasts, especially with transcription and error correction activities, aids vocabulary retention (Lu, 2007; Meier, 2015). Connecting students to both textbook content and podcasts was found by Putman and Kingsley (2009) to lead to greater vocabulary acquisition than students working on traditional sources in isolation. Podcasts also enable incidental vocabulary learning, where students acquire new vocabulary through repeated contextual exposure (Nation & Webb, 2011). This works particularly well in extensive listening environments, where students listen to content of their own choice and interest (Alm, 2013; Yeh, 2014). Podcasts facilitate learner autonomy through allowing students to personalize their learning process by selecting content based on their interest, regulating speed for better comprehension, and integrating podcast listening into their daily routine (Yeh, 2013; Fernandez et al., 2015).

Alm (2013) research had shown that students enjoyed choosing podcasts for themselves, and that enabled matching listening tasks with individual goals. Likewise, Yeh (2014) noted learners enjoyed podcast based learning as relevant to their academic and personal interests. The motivational effect is also complemented by surveys such as Steel and Levy's (2013), which found almost half of language learners employed podcasts to complement their studies. The fact that they are popular with university students indicates that they are seen as contemporary, accessible, and easy-to-use resources.

Lexical coverage is essential to comprehension. A study by Van Zeeland and Schmitt (2012) identifies 90–95% lexical coverage as required for the understanding of spoken language, where 2,000–3,000 word families are known as a prerequisite. Nurmukhamedov and Sharakhimov (2021) computed more than one million tokens from general-audience podcasts and identified 3,000–5,000 word families along with proper nouns and acronyms to achieve 95–98% coverage. Although their research took over from written discourse study thresholds (Hu & Nation, 2000), more recent evidence indicates that spoken input might necessitate rather than somewhat different thresholds. Other research offers comparable cut-offs for genuine media: 3,000–5,000 word families for overall spoken English (Adolphs & Schmitt, 2003; Nation, 2006), 4,000–8,000 for scholarly speech and TED Talks (Dang & Webb, 2014; Nurmukhamedov, 2017), and 10,000 for standardized test listening passages (Webb & Paribakht, 2015).

Despite their benefits, podcast-based learning is subject to several limitations. These are the digital divide, speech rate differences, and the passivity of audio content (Ramirez, 2023). Learners beginning can find authentic podcasts challenging, although sections or slower segments might remain helpful (Stanley, 2006). To get maximum benefits from podcasts, material has to be chosen in terms of learners' proficiency and interests (Rafique, 2019).

Technological advances like interactive and AI-personalized podcasts, immersive audio experiences, and user-friendly platforms are defining the future of learning through podcasts (Rime 2024).

In addition, constructing student-created podcasts enhances speaking and critical thinking skills (Stanley, 2006). Podcasts are a flexible and mobile teaching medium that efficiently bridges the knowledge gap between traditional classroom learning and independent study. They assist students in enhancing their speaking, vocabulary, and understanding skills through flexibility, learner-centric choices, and access to real-world language scenarios.

2.3. English for Specific Purposes

English for Specific Purposes (ESP), which focuses on the public's language proficiency through a variety of methods, is more of an antithesis to language instruction in general. ESP pays attention to learners' domain-related language needs instead of the standard language teaching approaches that deal with all skills in a holistic manner (i.e., listening, speaking, reading, and writing) (Hassan, 2023; Dewi et al., 2020). It is a systematized approach that links language instructions with the real life communication needs of different academic or professional fields.

The application value is what distinguishes ESP. Rather than placing students in abstract language practice, ESP concerns the use of language skills directly in real contexts that occur in specific professions (Le, 2021). Practical orientation helps students excel in the specific linguistic environment of their preferred professions, which ultimately reinforces language learning performance. ESP differ vastly from conventional language training practices by a chain of essential concepts. Among them, the technique of needs analysis is the most prominent, highlighting the importance of full awareness of the language problems particular to a specific domain (Raeisi et al., 2022). Teachers can recognize the particular linguistic competence needed for professional communication through thorough needs assessments, ensuring that training is justified also not only objective driven (Jenő, 2023).

Authenticity, as the cornerstone, is directly related to ESP. The use of real professional setting materials by the learners increases the quality of the program. Furthermore, the experience of listening to real speech also not only raises the students' participation but it also helps them to be familiar with their professional fields of practice as well as the changes that occur in it.

Learner centeredness is the third ESP element. Learning the language through ESP will also take into consideration the unique linguistic, motivation, and learning style of the given domain (Akopova, 2023). The student centered learning approach understands that there are peculiar language requirements per an area and thus offers the teachers with the right teaching methods to use.

However, the lexical needs of spoken English for Specific Purposes (ESP) have barely been of discussion, particularly in podcasts, have received little attention. Due to the use of specialized terminology and technical jargons, the English for Specific (ESP) podcasts, which are mostly based on specialized topics such as history, science and technology, and business. ESP podcasts tend to demand a higher level of lexical

knowledge for proper comprehension relative to regular spoken conversation or informal narrative.

Further developing this groundwork, the present study employs a corpus based approach in a bid to determine the level of term coverage that paves the way for the effective understanding of ESP podcasts over three domains: history, science and technology, and business. Based on an analysis of transcripts of selected episodes, the main aim of the study is to determine how broad the vocabulary size needs to be so as to account for 95% and 98% of the text, and what the lexical requirements are for various specialized genres. These results will surely enable us to learn about the vocabulary limits of ESP listening students. They will also strongly suggest the creation of a new curriculum and the application of learner preparation techniques in English for Specific Purposes instruction.

3. Research Methodology

3.1. Corpus

The data set consists of 360 transcripts of podcast episodes chosen from three important academic fields: business, science and technology, and history. These topics were selected in order to cover a broad range of vocabulary and situations that students could be exposed to in academic and real-life situations. The corpus has a total of 2,795,867 tokens; this equates to a total listening time of 254 hours, 24 minutes, and 49 seconds (see Table 1, 2, & 3). Three primary criteria were applied to assist in selecting these podcasts. The foremost key consideration was relevancy to learners of ESP, which ensured that the chosen podcasts focused on definite information in the desired fields. For facilitating accurate lexical profiling, only podcasts with correct and readily available transcripts were used. Finally, reputation and popularity were considered in the selection process since highly rated podcasts in every field were more likely to provide great content using vocabulary specific to that field.

The corpus is divided into three sub-corpora, each being a specialized domain represented. The 120 episodes of the history sub-corpus, covering more than 80 hours of verbal information across six different shows, amount to 831,567 tokens (see Table 1). In addition to having 120 episodes, the business sub-corpus has 965,416 tokens and lasts for 86 hours and 22 minutes (see Table 3). Likewise, the sub-corpus of science and technology consists of 120 episodes, which contribute 998,884 tokens and have a listening time of 88 hours and 1 minute (see Table 2). By ensuring a balanced representation of the three domains, this organized split makes it possible to compare the lexical demands of various areas of competence.

Table 1: *Information about the History Podcast Corpus.*

Podcasts	Number of episodes	Number of words	Number of hours
The Rest is History	20	208,099	17:37:28
15 Minutes History	18	54,513	06:28:31
Teaching Hard History	22	123,350	13:27:31
Dan's Snow History Hit	20	161,215	14:58:54
Revolutions	20	110,178	10:53:44
History Unplugged Podcasts	20	174,212	16:35:04
Total	120	831,567	80:01:12

Note: format: hours; minutes; and seconds.

Table 2: *Information about Science and Technology Podcast Corpus.*

Podcasts	Number of episodes	Number of words	Number of hours
BBC Inside Science	20	115,488	10:06:50
Science Vs	20	138,750	13:01:20
Science Magazine Podcast	20	118,554	11:13:07
Skeptic Guide to Universe	20	437,222	36:38:23
New Scientist Podcasts	20	111,249	09:36:08
Science Friday	20	77,621	07:25:43
Total	120	998,884	88:01:31

Note: format: hours; minutes; and seconds.

Table 3: *Information about Business Podcast Corpus.*

Podcasts	Number of episodes	Number of words	Number of hours
How I Built This	20	166,850	19:15:17
Master in Business	20	219,463	19:41:05
My First Million	20	275,460	19:54:53
The \$100 MBA Show	20	108,625	09:11:07

Masters of Scales	20	136,820	12:09:39
Ted Business	20	58,198	06:10:05
Total	120	965,416	86:22:06

Note: format: hours; minutes; and seconds.

- **Research Design** A corpus based quantitative research design is used in this study to examine the lexical requirements of specialized podcasts in the fields of business, science and technology, and history.
- **Sampling** This study employs a purposive sampling method to select podcasts appropriate for three domains i.e., History, Science and Technology and Business, ensuring they contain authentic vocabulary and are appropriate for ESP instructions. The selection criteria include how educational the content is, how authentic it feels, whether transcripts are available, and whether various domains are fairly represented.
- **Research Tool:** This study utilizes the Analyze My Writing (Version 1.0) which is an online tool designed by David Reali specifically for checking the lexical density of podcast transcripts. This free of charge tool is equipped with all the fundamental and basic linguistic 19 metrics, e.g., the number of words, sentence structure, body of words, readability indices, and parts of speech categories. In the field of ESP-related studies, particularly when delving into the content of podcasts, this tool is good at quantifying and measuring lexical density and grammatical complexity of a certain piece of text. In short, this is a tool that evaluates the text and provides information about its quality, helping in early stage text understanding. Given that it does not have any advanced features in corpus analysis or make use of standardized word-list integration, it is a good pick for a first round of study and allows users to find high density segments of ESP related text quickly.

4.Results

4.1. Lexical Density of Specialized Podcasts and its Variation across Podcasts Genres

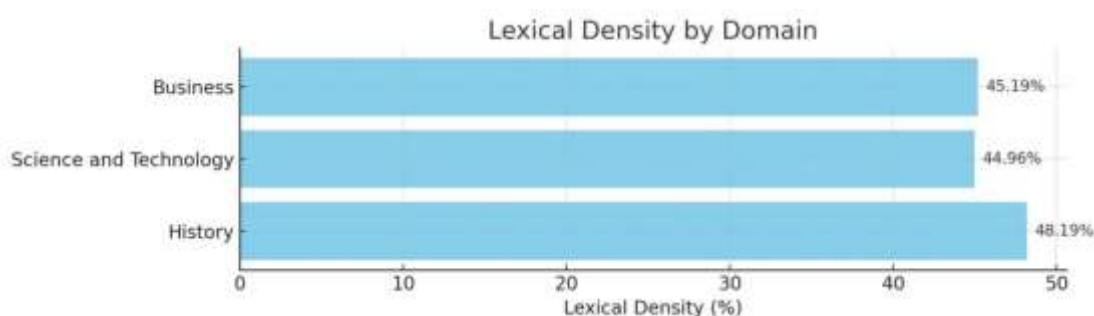


Figure 1: Lexical Density by Domain

Lexical density, as a measure of informational load, was analyzed across three domains of specialized ESP podcasts: History, Science and Technology, and Business. The results indicate that all three domains exhibit lexical density levels notably higher than what is typically observed in casual spoken discourse, which, according to Ure (1971), usually remains below 40%. In this study (Figure 1), History podcasts showed the highest lexical density at 48.19%, followed by Business at 45.19%, and Science and Technology at 44.96%. These values indicate the formal and informationally-dense nature of the genre, which puts ESP podcasts at a closer to the structured academic speech than to the spontaneous conversation.

Out of the three, History domain portrays the greatest lexical density (48.19%), which implies a very descriptive and content rich domain. This can be explained by the narrative structure of historical discourse that tends to have references to particular events, dates, names, and abstract concepts. Conversely, the Science and Technology (44.96%), and Business (45.19%) have a lexical density that is a little less yet represents a high amount of information. These values are representative of the communicative purposes of the genres: whereas Science and Technology is oriented on the explanation of technical concepts, Business genre is oriented to procedural and transactional language.

Table 4: Percentage of Parts of Speech in each Corpus

Part of speech	%age in History Corpus	%age in Science and Technology Corpus	%age in Business Corpus
Nouns	24.74%	21.3%	21.5%
Adjectives	6.38%	6.21%	5.47%
Verbs	10.94%	10.91%	12.1%
Adverbs	6.13%	6.55%	6.13%
Prepositions	13.93%	12.53%	12.21%

Pronouns	6.46%	7.91%	9.64%
Auxiliary Verbs	7.42%	8.73%	9%

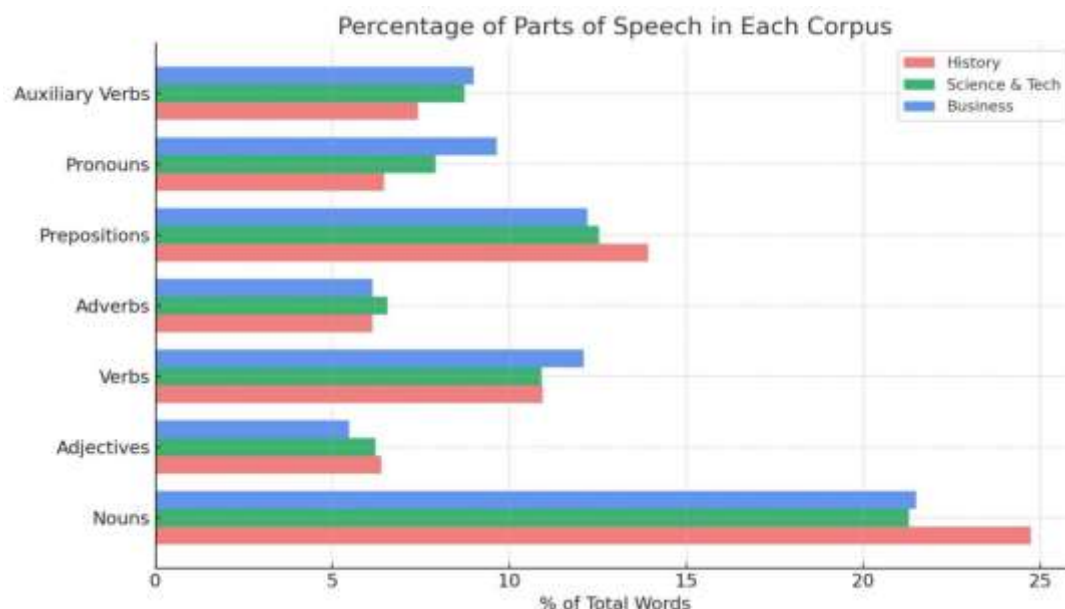


Figure 2: Percentage of Parts of Speech in Each Corpus

4.2. Parts-of-Speech Distribution

The part-of-speech (POS) analysis also explains the linguistic nature of any given field. Indeed, as it is depicted in Table 4 and Figure 2, among the three corpora, nouns are the most common word class, especially in the area of History (24.74%). Such a large percentage is consistent with the referential and descriptive need of historical accounts, which often include reference to people, places, institutions and abstract concepts.

There is a little bit more presence of verbs in the Business domain (12.1%), which means that the discourse there is more action-oriented. Business podcasts tend to discuss processes and operations, making decisions, and strategic activities, and this requires an increase in the frequency of dynamic verbs. Science and Technology and History come next with 10.91% and 10.94, respectively.

Adjectives and adverbs distribution are also relatively the same in all the three areas but there is a slight increase in Science and Technology. The fact that the domain requires precision, quantification, and description with many modifiers can be credited to this.

The use of prepositions is also the most common in the History corpus (13.93%), which is indicative of the significance of time and space relations in historical speech. These are factors that are necessary in situating events in time and place, which is one of the main jobs of historical narration.

In the meantime, pronouns (9.64%) and auxiliary verbs (9) are the most used in the domain of Business. The increased frequency can be indicative of the interactive and interactive aspects of business communication that are commonly characterized by personal references, instructions as well as modality. Business podcasts will tend to be more dialogic and inclusive, in either addressing the audience directly or faking a conversation.

5. Discussion

As to lexical density, the three domains showed above-average values in spoken discourse: History (48.19%), Business (45.19%), and Science and Technology (44.96%). These values are consistent with the findings of Wingrove (2017) and Vuković-Stamatović (2022) who found a lexical density value of more than 47 percent in academic lectures and science documentaries. Findings of this study show that ESP podcasts entail a type of hybrid discourse whereby there is a mix of spontaneous spoken contribution and the lexical profuseness of academic or written discourse. History is packed in with leading to the high density due to narrative richness and abstraction whereas Business and Science and Technology square up to technical and transactional load.

Most common were nouns with a higher percentage in History (24.74%), which is descriptive and referential language. The verbs were most frequently used in Business (12.1%), as they are an action-oriented type. Most in Business were pronouns and auxiliary verbs, which exhibited more interpersonal or directive communication. Adjectives and adverbs were more frequently used in science, which justified its accuracy in description. History had prepositions which focused on time and space.

6. Conclusion

This corpus analysis of specialized podcasts in three fields of English for Specific Purposes (ESP) history, Science and Technology, and Business provides valuable information about their characteristics of lexical specificity and pedagogical usefulness. The findings show that the three areas have moderately high levels of density of lexical levels that are beyond the average levels of spontaneous spoken language. The highest percentage of lexical density (48.19 percent) is observed in history podcasts, then the lexical density of Business (45.19 percent) and podcasts on Science and Technology

(44.96 percent), i.e., ESP podcasts are a hybrid type of discourse with both spoken and written discourse characteristics. This is their hybrid nature which renders them informational in content and has genuine but linguistically challenging input to the learners under special conditions.

The parts-of-speech analysis also highlights specific linguistic prejudices on each category. The language of history podcasts comprises a lot of nouns and prepositions, related to their referential and descriptive character, whereas Business podcasts are dominated by verbs and pronouns, which reflect the lively and interactive communicative style of the podcast. Science and Technology podcasts are characterized by the increased number of adjectives and adverbs and the focus on the level of precision and specificity of the discourse in technical aspects. They bring out the effect of disciplinary norms on lexical tendencies and demonstrate that every discipline has some specific lexical and grammatical demands of ESP students.

Pedagogically, the results ensure the applicability of podcasts in the real and multifunctional source of learning in ESP courses. Their highly lexical density and the use of technical vocabulary may also subject learners to specialized vocabulary, discourse patterns and communicative norms in their respective area of study or working. That being stated, it also implies that they will require scaffolding of some kind, be it the vocabulary pre-teaching, guided listening exercises, and transcript-based ones, e.g., to lower-level learners.

To sum up, this study adds to the existing body of research of ESP listening material because it introduces empirical evidence of the lexical difference in specialized podcast genres. It confirms that podcasts are not merely supporting resources but language resources capable of filling the gap in between scholarly communication and daily communication. Future studies can be based on the current study and investigate the roles of lexical coverage threshold, understanding of learners and the pedagogical implications of using podcasts in ESP programs. The podcasts can also be strategically implemented to form domain-specific linguistic competence and learner autonomy in instructing specialized English through such continuous research.

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