Academic vocabulary in an EAP course: Opportunities for incidental learning from printed teaching materials developed in-house

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Highlights

- We examined academic vocabulary in EAP printed teaching materials developed in-house
- We searched the printed teaching materials for Academic Vocabulary List (AVL) lemmas
- 846 lemmas (28.07% of the AVL) appeared in the printed materials
- The average repetition rate of academic vocabulary was below 10 occurrences
- A list of the AVL lemmas in the printed materials is provided.

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Abstract

Teaching materials developed in-house are commonly used in EAP courses; however, research on their linguistic content, which can have important pedagogical implications, is scarce. This study examines the occurrence and repetition of general academic vocabulary, operationalised as the Academic Vocabulary List (AVL) (Gardner & Davies, 2014), in the printed teaching materials developed in-house and used in a presessional EAP course at a UK university. The course was divided into three modules and taught over five weeks. At the end of each week, teachers provided us with photocopies of the printed teaching materials they had used. A corpus was compiled from the printed materials of each module. The results show that 846 AVL lemmas (i.e., 28.07% of the lemmas in the AVL) appeared in the materials. They were not equally distributed among the three modules and only 90 AVL lemmas overlapped across modules. The results also show that the average repetition rate of AVL lemmas in the materials was unlikely to lead to the incidental development of recall knowledge from exposure to these materials alone. Recommendations are made for the development of in-house EAP materials and teaching activities that increase students' exposure to academic vocabulary and facilitate its learning.

Keywords: EAP, teaching materials, vocabulary, vocabulary learning, vocabulary repetition

1. Introduction

Commonly defined as the words used more frequently in academic writing and speech across disciplines than in non-academic discourse (e.g., Nation, 2013), general English academic words pose challenges to both English as a second-language (L2) (e.g., Evans & Green, 2007) and first-language (L1) students (e.g., Spencer, Clegg, Lowe & Stackhouse, 2017). However, academic words are not typically taught at school (e.g., Beck, McKeown and Kucan, 2013) nor within subject area courses at university (e.g., Mudraya, 2006). Within EAP courses, given their typically short duration, multiple goals and students' varied vocabulary needs, few academic words can be taught explicitly. Researchers have therefore highlighted the value of incidental vocabulary learning through reading (Gardner, 2013) and teaching materials as sources of academic vocabulary exposure (Stoller, 2016) in EAP provision. Of particular relevance to promoting incidental vocabulary learning via reading are printed teaching materials, i.e., materials written and presented in paper-based or digital formats to be consumed via reading, such as textbooks and teacher-created handouts.

Research on the vocabulary input provided by teaching materials has focused on textbooks, particularly those for general English language teaching (e.g., Criado, 2009; Matsuoka & Hirsch, 2010), while EAP textbooks have been examined less commonly (e.g., Miller, 2011). However, studying textbooks alone provides only partial insights into students' academic vocabulary exposure through printed materials in EAP contexts, since EAP provision typically draws on materials developed in-house (Jones & Durrant, 2010; Stoller, 2016). Such materials combine parts of different textbooks and/or supplement textbooks with materials selected or created by EAP practitioners to respond to specific student needs, such as journal articles, locally produced course booklets, and teacher-created handouts with exercises or guidelines.

There is, therefore, both a research gap and a practical need to examine the extent to which printed EAP teaching materials developed in-house expose students to academic vocabulary, thus offering opportunities for incidental learning of academic vocabulary. In line with these goals, this exploratory study examines the occurrence of general English academic words, operationalised as Gardner and Davies's (2014) Academic Vocabulary List (AVL), in the printed EAP teaching materials created in-house for a presessional EAP course. It also examines how frequently general academic words are repeated in these printed materials to see whether this repetition rate aligns with the guidance provided by research into incidental vocabulary learning from reading.

1.1. Operationalising English academic vocabulary

Academic vocabulary is often operationalised as one of the wordlists which identify academic lexical items likely to be useful to students preparing for or already at university. We operationalised English academic vocabulary as the AVL for the following reasons.

The AVL lists the most frequent 3,014[1] academic lemmas in the Corpus of Contemporary American English (COCA). It consists of words from all frequency bands of COCA which occur at least 50% more frequently in the Academic section of COCA than would normally be expected, are evenly distributed across its disciplinary sections and occur in at least seven of COCA's eight disciplinary sections. This wordlist was preferred over wordlists which distinguish between very frequent and academic vocabulary, such as Coxhead's (2000)

[1] The AVL really contains 3,014 lemmas because in the 3,015-lemma AVL provided as supplementary material in Gardner and Davies (2014) the entry *disproportionately* appears twice (Durrant, 2016).

Academic Word List (AWL), because defining academic vocabulary as different from high-frequency vocabulary means that some words can be labelled 'general' or 'academic' depending on which words one considers 'high-frequency' (e.g., Masrai & Milton, 2018). The frequency-based distinction between general and academic vocabulary has also been contested because words in the most frequent 2,000 word families may have academic meanings whereas less frequent words may not (e.g., Eldridge, 2008).

Another reason for choosing the AVL is that it uses the lemma (i.e., the root word form with a specific part of speech (POS) and its inflected forms) as its unit. The lemma seems to be a better unit than the word family because word-family wordlists assume that learners are able to infer the meanings of unknown words in their academic reading thanks to their knowledge of inflectional suffixes and derivational affixes (Coxhead, 2000), an assumption which has not been supported by research (e.g., Ward & Chuenjundaeng, 2009). Moreover, the lack of POS tagging in word-family wordlists means that words with the same spelling are counted together although their frequency and meaning may differ depending on POS. For example, the noun *group* is lemma number 2 in the AVL, whereas the verb *group* is lemma number 1,339.

In addition to the aforementioned reasons, we operationalised English academic words as the AVL because of research findings about its pedagogical relevance to students' reading and writing academic vocabulary needs, which is in line with our focus on academic vocabulary in printed EAP teaching materials. These findings are discussed in the rest of this section.

Text coverage (i.e., the percentage of running words a wordlist can cover) has been used to estimate how well an academic wordlist caters to students' reading vocabulary needs. The rationale is that wordlists covering a large percentage of text tokens include words worthy of learning for reading-comprehension purposes. The AVL provides nearly double the coverage of the academic sections of COCA and BNC (13.8% and 13.7%, respectively) than the AWL (7.2% and 6.9%, respectively) (Gardner & Davies, 2014).

As for students' writing academic vocabulary needs, Durrant (2016) examined the utility of the AVL for students' writing by locating AVL lemmas in the British Academic Written English (BAWE) corpus, a corpus of the written assignments of undergraduate and Masters level students at four British universities. The AVL provided high coverage of BAWE (16.82%) but this coverage was higher for Social Science than Hard Science writing. 427 AVL lemmas – all from the most frequent 1,000 AVL lemmas – appeared more than 12 times per million tokens in 28 or more of the 31 BAWE disciplines. Durrant (2016) considers these 427 AVL lemmas useful for the writing needs of all university students. However, due to the low text numbers for some disciplines, BAWE is not equally representative of students' writing across disciplines (Durrant, 2016); thus, an AVL-search of a more representative student writing corpus may indicate a longer list of shared AVL lemmas. Moreover, most of the BAWE texts were written by undergraduate students, thus leaving the possibility for a longer list of AVL lemmas shared across disciplines in a corpus balanced between undergraduate and postgraduate writing samples. For these reasons and others (see Gardner & Davies, 2016), it is unclear whether only these 427 AVL lemmas or more are used across disciplines in students' university writing. Despite these limitations, this list is a good indication of the academic vocabulary students need for writing at university, particularly in the UK context.

In conclusion, we consider the AVL a relatively good operationalisation of English academic words because it provides high coverage of expert writing, which university students are likely to read, and the AVL lemmas which are frequent in BAWE provide a good estimate of the English academic words students across various disciplines are likely to use in their writing tasks.

The following section will examine the role that vocabulary frequency can play in incidental vocabulary learning which can, in turn, support performance in reading and writing tasks at university.

1.2. Vocabulary frequency and incidental vocabulary learning

Most studies indicate that the more frequent a word is in a learner's input, the more likely it is to be learned (Reynolds & Wible, 2014). As can be expected, however, other factors, such as learner characteristics and characteristics of the learning activity as well as the kind of vocabulary knowledge (recognition or recall) that is being tested, affect study results as well (Uchihara, Webb, & Yanagisawa, 2019). Since studies on incidental vocabulary learning differ in terms of the aforementioned factors, they have, unsurprisingly, led to various estimates of the repetition rate that can ensure vocabulary learning for a large proportion of the learners participating in a study. This rate ranges from 8-10 occurrences (e.g., Webb, 2007) to at least 20 occurrences (e.g., Waring & Takaki, 2003).

Recent research on the role of vocabulary knowledge in reading comprehension indicates that the ability to recall word meaning (meaning recall) is a more reliable predictor of reading comprehension than the ability to recognise word meaning (meaning recognition) (e.g., McLean, Stewart, & Batty, 2020). These findings mean that the traditional view that vocabulary recognition knowledge is sufficient for good reading comprehension and vocabulary recall knowledge is necessary only for writing (e.g., see Paquot, 2010, pp. 15-16) needs to be abandoned. They also mean that helping students build their ability to recall knowledge of vocabulary, both academic and general, is advisable for the development not only of writing but also reading performance. Therefore, a blanket recommendation could be to present words to learners as many times as required for recall knowledge to develop. As mentioned above, given the various factors that affect incidental vocabulary learning, no specific number of word occurrences can ensure the development of recall knowledge for word form, meaning, collocation and syntactic properties. However, if a threshold is to be specified for pedagogical purposes, at least 10 occurrences of a word are advisable in printed materials (e.g., Webb, 2007).

1.3. Academic vocabulary in EAP materials

Teaching materials include a broad range of written and audio(visual) texts, from teacher-designed worksheets to textbooks. Research on the linguistic content of EAP materials falls under two categories. One is based on comparisons of selected linguistic and discursive features in corpora of naturally occurring language with their occurrence in textbooks to determine whether textbooks accurately represent them. For example, Conrad (2004) found numerous discrepancies between linguistic patterns in a practice academic lecture in a textbook and a corpus of real-world university lectures, concluding that textbooks do not provide students with appropriate preparation for listening to lectures.

Researchers have also compared selected linguistic features of EAP textbooks and introductory university textbooks in specific disciplines to determine whether EAP textbooks provide students with appropriate preparation for reading subject textbooks. Of particular interest is Miller's (2011) comparison of academic vocabulary, among other features, in 75 passages from three textbooks commonly used in intensive English reading courses in US universities and in textbooks used in the first two years of undergraduate study in 18 disciplines. Miller (2011) found statistically significant differences in the percentages of AWL vocabulary in the two corpora, with AWL items constituting 4.78% and 8.8% of the total running words in the reading textbook and university textbook corpora, respectively. Miller (2011) concludes that the English reading skills textbooks provided low exposure to the academic vocabulary students would encounter in undergraduate subject textbooks and recommends the use of supplementary materials on the reading course.

Materials research has been criticised for predominantly focusing on textbooks (e.g., Harwood, 2014). This criticism is even more pertinent to EAP teaching materials, which are typically developed in-house; EAP practitioners tend to combine textbook and authentic materials and create their own materials in response to their students' needs (Jones & Durrant, 2010; Stoller, 2016). Although there are excellent accounts of in-house materials development for EAP and ESP courses (e.g., Feak & Swales, 2010), research on the linguistic content of in-house EAP materials is rare. The only such study, to our knowledge, is Jones and Durrant's (2010) small-scale analysis of academic vocabulary in a sample of in-house reading and writing EAP materials in a UK university. Using the non-academic parts of the BNC as their reference corpus, the researchers identified keywords in the materials (i.e., words uniquely frequent in the materials corpus in comparison to the reference corpus). The fifty most frequent keywords in the materials included the AWL words *academic* and *project,* with other AWL items featuring further down on the frequency list. They tentatively conclude that in-house materials 'may be suitable for the teaching of academic vocabulary' (p. 393) and offer recommendations for in-house materials development and for corpus-based approaches to vocabulary teaching such as awareness-raising tasks based on concordance lines.

In conclusion, research on academic vocabulary input provided by EAP materials, particularly those produced in-house, is limited. Given the widespread use of in-house materials in EAP courses, it is important to understand the extent to which such materials provide students with exposure to general academic vocabulary.

2. The present study

Given the central role materials play in language learning and the very limited research on the academic vocabulary students are exposed to through EAP materials developed in-house (see section 1.3), this study aims to examine general academic vocabulary in the in-house printed materials used in an EAP course. In addition to examining which general academic words appear in these materials, this study also examines whether their repetition rate is sufficient – according to research-based recommendations (see section 1.2) – for the development of word recall knowledge necessary for reading and writing tasks. *General academic vocabulary* is operationalised as the AVL (Gardner & Davies, 2014) (see section 1.1). The AVL lemmas which appeared more than 12 times per million word tokens in BAWE in 28 disciplines or more (Durrant, 2016), referred to as 'AVL-in-BAWE' henceforth, are the operationalisation for academic words likely to be useful for students' academic writing (see section 1.1).

This study is guided by the following questions:

1. To what extent do the in-house printed EAP materials used in a UK university presessional EAP course expose students to general academic words, operationalised as the AVL?

2. To what extent do the printed EAP materials used in this course expose students to academic words which they may need to use in their academic writing, operationalised as the AVL-in-BAWE wordlist?

3. Are the AVL lemmas in the printed EAP materials repeated frequently enough for the incidental development of recall knowledge?

3. Method

3.1. Context of the study

This study identified AVL lemmas in the materials used in a presessional course at a British university. This course was offered to prospective students with an IELTS overall score of 5.5 or 6, who had applied for MA courses in Social science subjects for which the English language entry requirement was 6 or 7, respectively.

This presessional course was intensive (24 hours per week). English for General Academic Purposes (EGAP) instruction was provided in the first five weeks, followed by English for Specific Academic Purposes (ESAP) instruction in the remaining 10 weeks. We focused on the EGAP course to obtain findings as relevant as possible to similar university contexts; different universities teach ESAP differently, depending on the disciplines taught, but EGAP instruction is offered across universities.

In this EGAP course, teaching was structured in terms of the language skills and language knowledge that students need to develop to perform well in tasks at university. Three modules were taught, each by a different teacher: Reading and Writing (Reading/Writing), Listening and Speaking (Listening/Speaking), and Vocabulary and Grammar (Vocabulary/Grammar).

Research ethics approval to collect data from the EAP teachers was granted by the university offering this course. Before the course started and after receiving permission from the course director, we emailed the teachers a call for participation detailing the study's aims and what participating teachers would do. All teachers agreed to participate. At the end of the study they received £30 as compensation.

3.2. Printed teaching materials

The printed materials used during the EGAP presessional course were developed in-house over the years by the EAP team. The EAP provision at this university was accredited by BALEAP (https://www.baleap.org), attesting to its high quality. Teachers also had the autonomy to adapt the materials during the course. As we aimed to collect the materials actually used in the course, at the end of each week, each teacher provided us with photocopies of the printed materials used that week. Since the study examines the general academic vocabulary included in printed in-house EAP materials, audio(visual) materials were not collected.

The printed materials of the Reading/Writing module included (i) a course booklet, which contained information about the course (e.g., timetable), information on aspects of academic writing conventions (e.g., citing) and exercises based on set readings, and (ii) four research articles from academic journals of which three formed a thematic set (focusing on international students studying abroad). The Vocabulary/Grammar module used units from the textbook *Oxford EAP intermediate/B1+* (de Chazal & Rogers, 2013) and teacher-prepared handouts with tasks and assignment instructions. The printed materials of the Listening/Speaking module consisted of teacher-prepared handouts with tasks, brief explanations (e.g., of the phonetic alphabet), and presentation guidelines.

Teachers were also interviewed at the end of each week of the course about the materials and tasks used that week. Here we only report on their decisions to supplement the existing materials regarding academic vocabulary. All three teachers reported supplementing the in-house materials by the materials they selected or created; two such instances were reported that concerned academic vocabulary directly or indirectly. The Vocabulary/Grammar teacher,

while mostly drawing on selected units from the *EAP Oxford EAP intermediate/B1+* (de Chazal & Rogers, 2013), which she considered 'a good standard' and 'good as a base', developed multiple worksheets with exercises to 'scaffold a bit', i.e. facilitate students' engagement with textbook linguistic content. In week 2 she used a vocabulary building worksheet focusing on selected words from the textbook she believed students needed more practice with. The task required students to supply family members of the words, many of which were AVL lemmas (e.g., the adverb *theoretically* when given *theory* as a cue). Seeing students struggle with the jargon-heavy research article she had used, the Reading/Writing teacher decided to include two additional research articles in week 3, which she had selected as a more suitable model for teaching the components of research articles while using less technical vocabulary and addressing a topic closer to students' experience (the experiences of international students studying abroad). The Listening/Speaking teacher also used his own materials; however, he did not refer to vocabulary when explaining their purpose.

It is important to highlight that although teachers' materials selection was based on their ongoing assessment of the students' needs and progress, they did not report having examined their chosen materials for academic vocabulary instances or repetition. The corpus in this study, therefore, allows us to examine materials resulting from experienced EAP teachers' authentic context-driven and pedagogically-informed decisions. While the actual materials are specific to this course, the processes of their development and compilation are likely to be common across similar EAP programmes.

3.3. Corpus

Photocopies of the teaching materials were scanned and converted to plain text via optical character recognition software.

Table 1 summarises the breakdown of tokens among module subcorpora and weeks of teaching. As can be seen, the corpus contains 83,991 tokens. Most tokens (72.71%) appear in the Reading/Writing subcorpus, followed by the Vocabulary/Grammar subcorpus (22.36%) and the Listening/Speaking subcorpus (0.53%).

Table 1 about here

Table 1 indicates that students were not given new materials in the Reading/Writing module in weeks 2, 4 and 5 and in the Listening/Speaking module in week 5. The interviews with the teachers reveal the reasons for this. In the Reading/Writing module, in week 2 students worked with an article they had been given in week 1; in week 4 they were engaged in reading and writing activities based on the two articles presented in week 3. In week 5, students did in-class writing in the Reading/Writing module and delivered oral presentations in the Listening/Speaking module.

3.4. Procedure

Files were converted into .txt files. They were then POS tagged via TagAnt (Anthony, 2015), a free POS tagger. TagAnt flags out potentially wrong POS codes in its output. These codes were manually checked and corrected where necessary by the first author.

The corpus was lemmatised because we needed to identify the lexical lemmas in general and the AVL lemmas in particular to answer Research question 1. To ensure correct lemmatisation, instead of following the common practice of lemmatising the raw corpus, we lemmatised the POS-tagged corpus using a POS-tagged lemma list[2].

In particular, the AntBNC lemma list (available at https://www.laurenceanthony.net/software/antconc/) was modified by the first author in two ways:

a) AVL lemmas were identified in the AntBNC lemma list. Then, the word forms which belonged to each lemma were identified in the 100,000 word COCA frequency lists (available at https://www.wordfrequency.info/100k_samples.asp). Word forms additional to those in the AntBNC lemma list were added to the list.
b) POS tags matching those used in TagAnt were added to all word forms in the list.

Data were analysed with SPSS 25.

4. Results

[2] To our knowledge, no existing lemmatiser software produces error-free results. Errors occur in terms of word stemming (e.g., *encouraging* may be an adjective in a sentence but a lemmatiser may wrongly map it onto the verb *encourage*); words forms ambiguous between two lemmas may be assigned to the wrong lemma (e.g., *process* may be a noun in a sentence but a lemmatiser tags it as a verb).

This section begins with addressing Research question 1 ('To what extent do the in-house printed EAP materials used in a UK presessional EAP course expose students to general academic words, operationalised as the AVL?') in section 4.1. The coverage that AVL tokens and lemmas provide to the printed materials corpus is examined first, followed by the AVL lemmas which appear in the corpus. Findings in relation to Research question 2 ('To what extent do the EAP materials used in this course expose students to academic words which they may need to use in their academic writing, operationalised as the AVL-in-BAWE wordlist?') are reported in section 4.2. Findings in relation to Research question 3 ('Are the AVL lemmas in the printed materials repeated frequently enough for the incidental development of recall knowledge?') are reported in section 4.3.

4.1. To what extent do the in-house printed EAP materials used in a UK presessional EAP course expose students to general academic words, operationalised as the AVL?

The AVL covers 5.3% of the word tokens in the corpus. This coverage is lower than that of the academic section of COCA (13.8%) and the BNC (13.7%) (see section 1.4). This difference can be due to the different functions of these corpora: the presessional EAP teaching materials were created to help international students improve their English proficiency level and familiarise themselves with the demands of UK university study whereas the reference corpora contain academic journal articles, a form of scholarly communication among peers. The more limited variety of topics addressed in the presessional EAP teaching materials than in the reference corpora is another possible reason. Differences in topic variety are to be expected

given not only the different functions of the texts in these two kinds of corpora but also their different corpus sizes; the printed materials corpus is 83,991 tokens whereas BNC academic is 32,828,961 tokens and COCA academic was 120,847,709 when the AVL was compiled (Gardner & Davies, 2014).

4.1.1. Lexical-word corpus coverage by the AVL

The AVL coverage of lexical word (i.e., noun, verb, adjective and adverb) tokens was examined because the AVL contains only lexical words (see also Durrant, 2016 for this approach to examining corpus coverage by the AVL). Table 2 shows the cumulative lexical coverage by AVL lemmas; the total lexical coverage (13.44%) is divided into 2% segments.

Table 2 about here

Table 2 indicates that, similarly to previous research (e.g., Durrant, 2016), most of the coverage comes from a relatively small number of AVL lemmas. Out of the 846 AVL lemmas appearing in the materials, 62 (7.33%) account for nearly half (6%) of the coverage. The fact that most of the lexical coverage is taken up by a few AVL lemmas is reflected in the diminishing maximum, minimum and median AVL lemma counts (i.e., instances per AVL lemma unique

to each 2% lexical-token corpus increment) as we move down the table. For example, there is a stark contrast between the maximum, minimum and median counts of the 14 AVL lemmas that account for the first 2% of the lexical coverage and these descriptive statistics for the 470 AVL lemmas which account for the last 2% increment.

Table 3 provides more detail about corpus coverage by the AVL. It shows the lexical-word coverage of the tokens of lexical words in the materials of each module and in the whole corpus by each AVL frequency band[3] and the AVL overall[4]. It indicates that AVL lemmas from the first band provided nearly all of the AVL coverage of the materials used in every module.

Table 3 about here

A comparison across subcorpora shows that AVL coverage was the highest for the Vocabulary/Grammar subcorpus (25.83%), second highest for the Listening/Speaking subcorpus (19.3%) and relatively low for the Reading/Writing subcorpus (8.68%). A chi-squared test indicates that these differences are significant overall, $\chi^2(2) = 1129.17$, $p < .001$.

[3] Gardner and Davies (2014) do not divide the AVL list into bands. Throughout this paper, the 'first AVL band' and the 'second AVL band' each consist of 1,000 lemmas and 'the third AVL band' consists of 1,014 lemmas.

[4] In all tables percentage numbers are rounded to the second decimal place.

Pairwise comparisons via z-tests with Bonferroni correction indicate that AVL-to-lexical token proportions differed significantly in all pairs of subcorpora.

These significant differences among subcorpora in terms of AVL coverage may reflect differences in AVL lemma variation and/or repetition. The more varied the lemmas in a text/corpus are, the more likely they are to cover more text; conversely, the more lemmas are repeated in a text/corpus on average, the lower the coverage they offer. The roles that AVL lemma variation and repetition played in AVL coverage across subcorpora and the AVL lemmas in the materials per subcorpus are examined in section 4.2.

4.1.2. AVL lemmas per subcorpus

In total, 846 AVL lemmas appeared in the EAP printed materials. File 1 in the Supplementary materials lists the AVL lemmas in the teaching materials.

Table 4 shows the coverage that AVL lemmas provide to all lexical lemmas (i.e., AVL and non-AVL lemmas) and to AVL tokens inside the materials of each module.

Table 4 about here

The column 'AVL lemmas in the materials' in Table 4 indicates that AVL lemmas in the Listening/Speaking and Vocabulary/Grammar subcorpora form a higher percentage of lexical lemmas than in the Reading/Writing subcorpus. A chi squared test comparing the number of AVL and non-AVL lexical lemmas across subcorpora indicates that these proportions differed

among subcorpora, $\chi^2(2) = 149.55$, $p < .001$. Z tests with Bonferroni correction indicate that the AVL to non-AVL lemma ratio a) was significantly lower in the Reading/Writing subcorpus than that in either of the other two subcorpora and b) did not differ significantly between the Listening/Speaking and Vocabulary/Grammar subcorpora. These results indicate that the lower coverage of lexical tokens by the AVL in the Reading/Writing subcorpus than in the other two subcorpora (see section 4.1.1) is due, at least in part, to the more limited AVL lemma variation in this subcorpus than in either of the other subcorpora.

The last column in Table 4 shows the coverage of AVL tokens from AVL lemmas per subcorpus. A chi-squared test indicates that AVL lemma-to-token proportions differed significantly among subcorpora, $\chi^2(2) = 32.65$, $p < .001$. Z tests with Bonferroni correction indicate that AVL lemma-to-token proportion is significantly higher in the Listening/Speaking subcorpus than in each of the other subcorpora. Therefore, higher AVL lemma repetition rate can explain the lower coverage of lexical tokens by the AVL in the Reading/Writing subcorpus when it is compared with the Listening/Speaking subcorpus but not when it is compared with the Vocabulary/Grammar subcorpus. Differences in AVL lemma repetition among subcorpora are further explored in section 4.3.

4.1.3. AVL-lemma overlap among and between subcorpora

Half (423) of the AVL lemmas in the printed materials corpus are shared, some by pairs of subcorpora and others by all subcorpora. Table 5 offers a detailed breakdown of AVL lemmas

across the subcorpora. It first shows all the AVL lemmas in each subcorpus per AVL frequency band. It then shows how many of these AVL lemmas are shared between and across subcorpora and how many are unique to each subcorpus. Inside parentheses are the percentages of lemmas from each AVL frequency band, where the total of lemmas in each of the first two bands is 1,000 and in the third band 1,014.

Table 5 about here

As expected, the vast majority of AVL lemmas unique to a subcorpus occurred in the two large subcorpora, Vocabulary/Grammar and Reading/Writing. These subcorpora also mutually reinforced their AVL lemma repetition rate since they shared 199 AVL lemmas (i.e., 37.9% of the AVL lemmas in the Reading/Writing subcorpus and 34.73% of those in the Vocabulary/Grammar subcorpus). Conversely, the Listening/Speaking subcorpus overlapped to a small extent with each of the other subcorpora: The AVL lemma overlap between each of these subcorpora and the Listening/Speaking subcorpus accounted for about 4% of the total AVL lemmas in each of the large subcorpora (4.36% of the AVL lemmas in the Vocabulary/Grammar subcorpus and 3.62% of those in the Reading/Writing subcorpus) and for around 10% of the total AVL lemmas in the Listening/Speaking subcorpus (14.62% and 11.11%, respectively).

Table 5 indicates that most AVL lemmas come from the first AVL band, irrespective of whether we consider all AVL lemmas in each subcorpus, only those shared by two or all subcorpora or those unique to each subcorpus. This predominance of first-band AVL lemmas in the materials indicates that many AVL lemmas which occurred more than 12 times per

million word tokens in BAWE in 28 disciplines or more (Durrant, 2016) are likely to appear in the materials. The next section examines this issue.

4.2. To what extent do the EAP materials used in this course expose students to academic words which they may need to use in their academic writing, operationalised as the AVL-in-BAWE wordlist?

Table 6 presents the breakdown of the 427 AVL-in-BAWE lemmas (Durrant, 2016) across subcorpora.

Table 6 about here

Since BAWE is a corpus of university students' written assignments, we were particularly interested in seeing how many AVL-in-BAWE lemmas were included in the Reading/Writing and Vocabulary/Grammar subcorpora, i.e., the materials used to foster students' academic reading and writing skills. High percentages of the lemmas in this list appear in the Reading/Writing and Vocabulary/Grammar subcorpora and one third of the list is shared between them.

The Listening/Speaking subcorpus, however, includes only 26.7% of the AVL-in-BAWE lemmas and overlaps very little with each of the other subcorpora. These findings are to be

expected since academic vocabulary lists extracted from written corpora do not offer as good a coverage for corpora of academic spoken English as they do for corpora of academic written English (e.g., Dang & Webb, 2014).

An encouraging finding is that the coverage that the AVL-in-BAWE sublists (i.e., the lemmas shared by all, 30, 29 or 28 BAWE subdisciplines) offer to the materials subcorpora follows a falling trend as we move from the highest to the lowest number of BAWE subdisciplines. This falling trend is disrupted only by a minor difference between the coverage of the 29-discipline (10.39% coverage) and 28-discipline (14.29% coverage) sublists in the Listening/Speaking materials.

After taking into consideration the lemmas that overlap between and among subcorpora, 363 AVL-in-BAWE lemmas appear in the teaching materials. This number represents 85.01% of all AVL-in-BAWE lemmas.

4.3. Are the AVL lemmas in the printed materials repeated frequently enough for the incidental development of recall knowledge?

This section will report on findings in relation to Research question 3. Section 4.3.1 addresses Research question 3 in terms of AVL-lemma repetition in the printed materials. Section 4.3.2 addresses it in terms of AVL-in-BAWE lemma repetition in the printed materials.

4.3.1. How many AVL lemmas receive the repetition level considered necessary for the incidental development of recall vocabulary knowledge through reading?

We examine how many of the AVL lemmas meet the 10-or-more occurrences requirement because this number of occurrences has been found to be necessary for form and meaning recall of at least about one third of the unknown words encountered in reading (e.g., Webb, 2007). Since the EAP course this study focuses on was an intensive one, it would be too demanding to expect students unfamiliar with the AVL words in the materials to learn more than about one third of them. File 2 in the supplemental materials provides a table with descriptive statistics about AVL lemma repetition in the printed materials.

AVL lemma counts in the materials were divided into three bands. First, a distinction was made between words which occurred in the printed materials 10 or more times and those which occurred less than 10 times because we aimed to see whether the printed materials provided students with enough lemma occurrences so that they were likely to be able to recall the meaning and form of at least one third of the academic lemmas in the materials. Second, a distinction was made between words which occur only once and those which occur more than once because the former are less likely to be learned than the latter (e.g., Waring & Takaki, 2003). Consequently, Band 1 included the AVL lemmas occurring once, Band 2 included those occurring 2-9 times and Band 3 included those occurring 10 or more times.

Figure 1 shows the percentage of AVL lemmas appearing inside the materials with each of these frequency levels. These percentages are organised per AVL frequency band. In addition to percentages, the bar labels show how many times lemmas inside each AVL frequency band appeared in the materials once, 2-9 times or 10 or more times.

Figure 1 about here

Figure 1 indicates that AVL lemmas that occurred 2-9 times form the majority (45.86%) of AVL lemmas in the materials. Only 13.59% of all the AVL lemmas in the materials occur 10 or more times; all but three come from the most frequent 1,000 lemmas in the AVL. Therefore, an AVL lemma was more likely to appear 10 or more times in the materials if it was among the most frequent 1,000 AVL lemmas. To examine whether this tendency also exists in each subcorpus, Figures 2, 3 and 4 summarise these findings per subcorpus.

Figure 2 about here

Figure 3 about here

Figure 4 about here

A comparison between Figures 2, 3 and 4 on one hand and Figure 1 on the other indicates that the Reading/Writing and Vocabulary/Grammar subcorpora have the same pattern of AVL-lemma occurrence band frequencies as the whole corpus. In each of these subcorpora most of the AVL band-1 lemmas occur 2-9 times, the 2-9 occurrences band dominates overall (42.48% of the AVL-lemma occurrences in the Reading/Writing subcorpus and 49.56% of the AVL-

lemma occurrences in the Vocabulary/Grammar subcorpus) and most lemmas from the other AVL bands occur only once. Conversely, in the Listening/Speaking subcorpus most AVL lemmas occur only once (63.75%) and single occurrences are predominant for lemmas from any AVL band.

As shown in Table 5, 90 lemmas were shared among all subcorpora. 62.22% appeared 10 or more times and the rest appeared 2-9 times. Conversely, most AVL lemmas shared by only two subcorpora - even when these were the large Reading/Writing and Vocabulary/Grammar subcorpora - occurred 2-9 times in total (see File 3 in the Supplementary materials). Therefore, for most AVL words, occurring in all three subcorpora was necessary to reach the 10-or-more-occurrences threshold.

4.3.2. AVL-in-BAWE lemma repetition in the materials

AVL-in-BAWE lemma repetition in the materials was examined because how many times AVL-in-BAWE lemmas occur in EAP materials may affect students' ability to recall words. This ability in turn predicts performance not only in academic writing tasks but also in reading tasks (see section 1.3). This section reports on AVL-in-BAWE lemma occurrences in the materials as a whole and in each subcorpus, focusing specifically on the materials which aimed to foster the development of academic reading and writing skills. Descriptive statistics of the repetition rate of AVL-in-BAWE lemmas in the whole corpus and in the subcorpora are provided in File 4 in the Supplementary materials.

Figure 5 presents the percentage of AVL-in-BAWE lemmas which occurred less than or 10-or-more times in the corpus.

Figure 5 about here

There are two patterns in Figure 5. First, as is the case for all AVL lemmas in the corpus (see Figure 1), AVL-in-BAWE lemmas that occurred 2-9 times form the majority (59.68%) of AVL-in-BAWE lemmas in the materials. Only about a quarter (25.62%) of all the AVL-in-BAWE lemmas in the materials occur 10 or more times. Second, there is a falling trend in the frequency of AVL-in-BAWE lemmas in the materials as we move from AVL lemmas shared across all 31 BAWE disciplinary subcorpora to those shared by 28 subcorpora; therefore, the higher the disciplinary range of an AVL lemma in BAWE, the more likely it was to be repeated in the materials.

Table 7 indicates that these two patterns exist also in each subcorpus, but in the Listening/Speaking subcorpus there is no appreciable difference in lemma frequency between AVL lemmas shared between 29 and 28 BAWE disciplinary subcorpora.

Table 7 about here

5. Discussion and Conclusion

This study has examined general academic vocabulary occurrence and repetition rate in printed EAP course materials developed in-house, thus providing an initial insight into the academic-vocabulary exposure that students receive from such teaching materials.

In terms of the exposure to general academic vocabulary provided by the materials, nearly one third of AVL lemmas appear in the materials. Most of them are among the most frequent 1,000 AVL lemmas. This dominance of highly frequent AVL lemmas (e.g., *system*, *social*, *provide*, *however*, *include*) in the materials is evident in all module subcorpora and irrespective of whether AVL lemmas occurred in only one module subcorpus or were shared between/among subcorpora (see Table 5). This study also found that nearly all the AVL lemmas which commonly occur in the BAWE corpus occur in the materials.

These findings are encouraging because they indicate that even when EAP teachers do not specifically aim to include AVL lemmas when selecting and creating their printed materials (see section 3.2), their in-house developed printed materials do include many. Further, the finding that the most frequent AVL lemmas are given prominence in the materials of all modules indicates that the in-house materials examined in this study do not display the weaknesses often identified in textbooks, such as omitting features frequent in academic discourse or subject university textbooks while foregrounding infrequent ones (for a review of corpus-based textbook research, see Harwood, 2014).

The comparison of AVL coverage and lemmas across the subcorpora of the three modules in this EAP course indicated that the Vocabulary/Grammar printed materials included most AVL lemmas, closely followed by the Reading/Writing materials while their number in the Speaking/Listening materials was much lower. The lower number of AVL lemmas in the Speaking/Listening materials is to be expected because it is the smallest subcorpus; this small corpus size was, in turn, to be expected since the printed materials of a module aiming to

develop students' listening and speaking skills were complemented with audio(visual) materials, which were not examined in this study. The higher number of AVL lemmas in the Vocabulary/Grammar subcorpus than in the Reading/Writing subcorpus is likely to be due to the different nature of the texts they contain; the brief texts and various activities in the Vocabulary/Grammar subcorpus are likely to expose students to more varied vocabulary than the full-length published articles and instructions to writing activities in the Reading/Writing subcorpus. As the main materials on these two modules were an EAP textbook (Vocabulary/Grammar) and research articles (Reading/Writing), the findings suggest that these types of materials may provide academic vocabulary input in complementary ways: while they contained similar numbers of AVL lemmas, their AVL coverage was significantly different, exposing students to different AVL density in texts. The fact that the different subcorpora complemented each other in terms of AVL exposure is also indicated by the small AVL overlap among subcorpora and the large number of lemmas unique to each subcorpus.

However, the low level of AVL-lemma overlap among subcorpora has impacted on the repetition rate of AVL lemmas in the printed materials of this course. Even when AVL lemmas were shared between the two largest subcorpora (Vocabulary/Grammar and Reading/Writing), the average repetition rate was below 10 occurrences, the repetition rate necessary for recall vocabulary knowledge to develop incidentally from reading (see File 3 in the Supplementary materials). Conversely, nearly two thirds of the AVL lemmas shared among all subcorpora appeared 10 or more times in the materials. The same pattern of findings appeared when we searched for AVL-in-BAWE lemmas in the materials. These findings mean that the repetition rate of AVL items was too low for recall vocabulary knowledge to develop incidentally for at least one third of the AVL words in the materials.

5.1. Pedagogical recommendations

Since EAP materials are typically developed in-house and further adapted and/or supplemented during the course in response to students' needs, as in this study, to help EAP practitioners make well-informed decisions regarding materials, they should be equipped with tools that can facilitate the selection of materials which include general academic vocabulary. Teachers can check whether the materials considered for inclusion contain academic vocabulary via freely accessible online tools such as Word and Phrase (https://www.wordandphrase.info). This software highlights all the AVL items in a text, provides information about their frequency based on the academic subcorpus of the COCA, and creates concordance lines for the words selected. When deciding which AVL items to focus on for teaching, teachers can use word-frequency information provided in Word and Phrase or consult Durrant's (2016) list of the 427 AVL lemmas commonly used in BAWE. These wordlists and tools should form part of EAP teacher training and development courses.

Since only a limited number of words can be taught explicitly during an intensive presessional course, exposure to academic vocabulary via materials leading to incidental learning is crucial. EAP practitioners should therefore aim to include materials containing a wide range of AVL lemmas. However, given the findings in this and previous studies about the low vocabulary repetition rate, tasks and activities that encourage vocabulary recycling should be included to maximise the vocabulary learning potential of materials and increase the number of encounters with target AVL lemmas. Examples include post-reading tasks requiring detailed re-reading of the texts through preparation of an oral or written summary, evaluation, comparison and commentary on the readings.

Students can also benefit from being familiarised with the AVL and the tools mentioned above so that they can check their own use of academic words in their writing. In addition, tasks involving the use of the AVL can be designed to encourage noticing and uptake. These types of tasks go particularly well with corpus-assisted and data-driven learning, encouraging students to independently exploit corpora for learning (Jones & Durrant, 2010). A small corpus of relevant texts can be created to support the course, with AVL-focused tasks designed by the teacher. Alternatively, students can be encouraged to create their own corpora of articles in their field or on a specific topic (see, e.g., Charles, 2012), which they can explore to complete AVL-focused tasks set by the teacher and report their findings to the class.

5.2. Limitations and implications for future research

As the first study to examine general academic vocabulary in in-house EAP teaching materials used in a presessional course, including those added by the teachers during the course, the present study is, necessarily, exploratory. It examines general academic vocabulary in printed only (not audio-visual as well) materials used in only one presessional EAP course. The exploratory nature of this study means that the generalisability of the findings remains to be tested in follow-up studies. In particular, since in-house materials are context-specific, research is needed to examine academic vocabulary in materials used in EAP courses at other universities. Moreover, to have a more complete picture of English academic vocabulary instruction in EAP courses, in addition to examinations of written teaching materials, such studies should explore the role of academic vocabulary in teachers' materials selection and development and how teachers use these materials in the classroom. For the time being, EAP

practitioners can estimate the relevance of our findings to their courses by comparing the context of our study (see section 3.1) to theirs.

In this study data were analysed quantitatively to identify AVL lemmas in the written materials and examine their repetition rate. Research into how many of these AVL lemmas were the focus of direct teaching in the EAP materials and what kinds of vocabulary knowledge (e.g., meaning, collocations, grammatical properties) were targeted in vocabulary activities is necessary to provide a more thorough examination of how well EAP teaching materials cater towards students' academic vocabulary needs.

References

Anthony, L. (2015). TagAnt (Version 1.2.0) [Computer Software]. Tokyo, Japan: Waseda University. Available from http://www.antlab.sci.waseda.ac.jp/

Beck, I. L., McKeown, M. G., & Kucan, L. (2013). *Bringing words to life. Robust vocabulary instruction.* New York: Guilford Press.

Charles, M. (2012). 'Proper vocabulary and juicy collocations': EAP students evaluate do-it yourself corpus-building. *English for Specific Purposes, 31*, 93–102.

Conrad, S. (2004). Corpus linguistics, language variation, and language teaching. In J. Sinclair (Ed.), *How to use corpora in language teaching* (pp. 67–85). Amsterdam: John Benjamins.

Coxhead, A. (2000). A new academic word list. *TESOL Quarterly*, *34*, 213–238.

Criado, R. (2009). The distribution of the lexical component in ELT coursebooks and its

suitability for vocabulary acquisition from a cognitive perspective. A case study. *International Journal of English Studies, 9*, 39–60.

Csomay, E., & Prades. A. (2018). Academic vocabulary in ESL student papers: A corpus-based study. *Journal of English for Academic Purposes, 33,* 100–118.

Dang, T. N. Y., Coxhead, A. & Webb, S. (2017). The Academic Spoken Word List. *Language Learning, 67*, 959–997.

Dang, T. N. Y., & Webb, S. (2014). The lexical profile of academic spoken English. *English for Specific Purposes, 33*, 66–76.

De Chazal, E. & Rogers, L. (2013). *Oxford EAP intermediate/B1+.* Oxford: Oxford University Press.

Durrant, P. (2016). To what extent is the Academic Vocabulary List relevant to university student writing? *English for Specific Purposes, 43*, 49–61.

Eldridge, J. (2008). "No, there isn't an 'academic vocabulary', but…": A reader responds to K. Hyland and P. Tse's "Is there an academic vocabulary?" *TESOL Quarterly, 42*, 109–113.

Evans, S., & Green, C. (2007). Why EAP is necessary: A survey of Hong Kong tertiary students. *Journal of English for Academic Purposes, 6*, 3–17.

Feak, C.B., & Swales, J.M. (2010). Writing for publication: Corpus-informed materials for postdoctoral fellows in perinatology. In N. Harwood (Ed.), *English language teaching materials. Theory and practice* (pp. 279–300). Cambridge: Cambridge University Press.

Gardner, D. (2013). *Exploring vocabulary: Language in action.* New York: Routledge.

Gardner, D., & Davies, M. (2014). A new Academic Vocabulary List. *Applied Linguistics,*

35, 305–327.

Gardner, D., & Davies, M. (2016). A response to "To what extent is the Academic Vocabulary List relevant to university student writing?" *English for Specific Purposes, 43*, 62–68.

Harwood, N. (2014). Content, consumption, and production: Three levels of textbook research. In N. Harwood (Ed.), *English language teaching textbooks: Content, consumption, production* (pp.1–41). Basingstoke: Palgrave Macmillan.

Jones, M., & Durrant, P. (2010). Corpora and vocabulary teaching materials. In O'Keefe, A., & McCarthy, M. (Eds.), *The Routledge Handbook of corpus linguistics* (pp. 387–400). Abingdon: Routledge.

Masrai, A., & Milton, J. (2018). Measuring the contribution of academic and general vocabulary knowledge to learners' academic achievement. *Journal of English for Academic Purposes*, *31*, 44–57.

Matsuoka, W., & Hirsh, D. (2010). Vocabulary learning through reading: Does an ELT course book provide good opportunities? *Reading in a Foreign Language, 22,* 56–70.

McLean, S. Stewart, J., & Batty, A. O. (2020). Predicting L2 reading proficiency with modalities of vocabulary knowledge: A bootstrapping approach. *Language Testing*. Advance online publication. https://doi: 10.1177/0265532219898380

Miller, D. (2011). ESL reading textbooks vs. university textbooks: Are we giving our students the input they may need? *Journal of Academic Purposes, 10,* 32–46.

Mudraya, O. (2006). Engineering English: A lexical frequency instructional model. *English for Specific Purposes, 25,* 235–256.

Nation, P. (2013). *Learning vocabulary in another language.* Cambridge: Cambridge University Press.

Reynolds, B. L. & Wible, D. (2014). Frequency in incidental vocabulary acquisition research: An undefined concept and some consequences. *TESOL Quarterly, 48,* 843–861.

Schmitt, N. (1997). Vocabulary learning strategies. In N. Schmitt & M. McCarthy (Eds.) *Vocabulary: Description, acquisition, and pedagogy* (pp. 199–227). Cambridge: Cambridge University Press.

Schmitt, N., Jiang, X., & Grabe, W. (2011). The percentage of words known in a text and reading comprehension. *Modern Language Journal*, *95*, 26–43.

Spencer, S., Clegg, J., Lowe, H., & Stackhouse, J. (2017). Increasing adolescents' depth of understanding of cross-curriculum words: an intervention study. *International Journal of Language & Communication Disorders 52*(5), 652–668.

Stoller, F.L. (2016). EAP materials and tasks. In K. Hyland, & P. Shaw (Eds.), *The Routledge handbook of English for Academic Purposes* (pp. 577–591). Abingdon: Routledge.

Uchihara, T., Webb, S., & Yanagisawa, A. (2019). The effects of repetition on incidental vocabulary learning: a meta-analysis of correlational studies. *Language Learning, 69*, 559–599.

Ward, J., & Chuenjundaeng, J. (2009). Suffix knowledge: Acquisition and applications. *System*, *37,* 461–469.

Waring, R. & Takaki, M. (2003). At what rate do learners learn and retain new vocabulary from reading a graded reader? *Reading in a Foreign Language, 15,* 130–163.

Webb, S. (2007). The effects of repetition on vocabulary knowledge. *Applied Linguistics, 28,* 46–65.

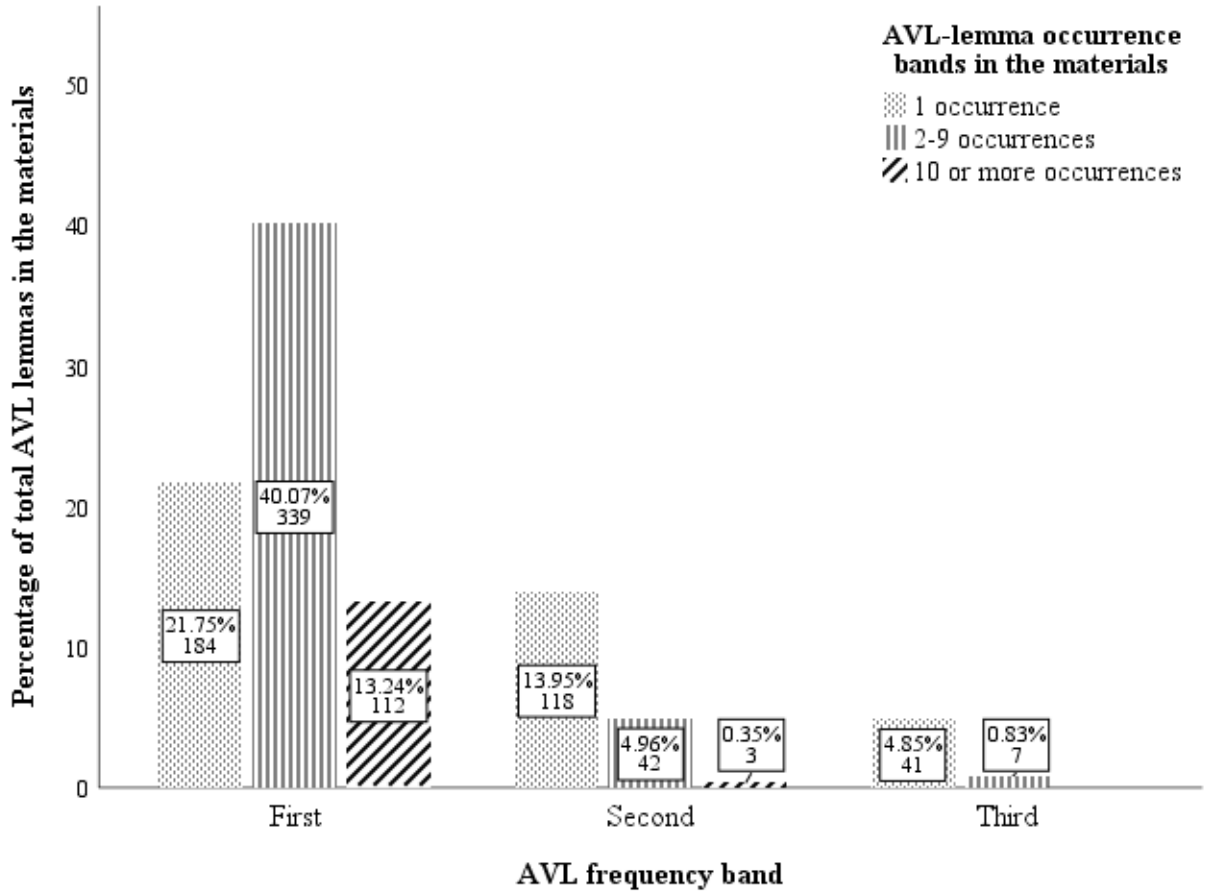

Figure 1. Percentage of AVL lemmas occurring once, 2-9 times and 10 or more times in the materials per AVL frequency band.

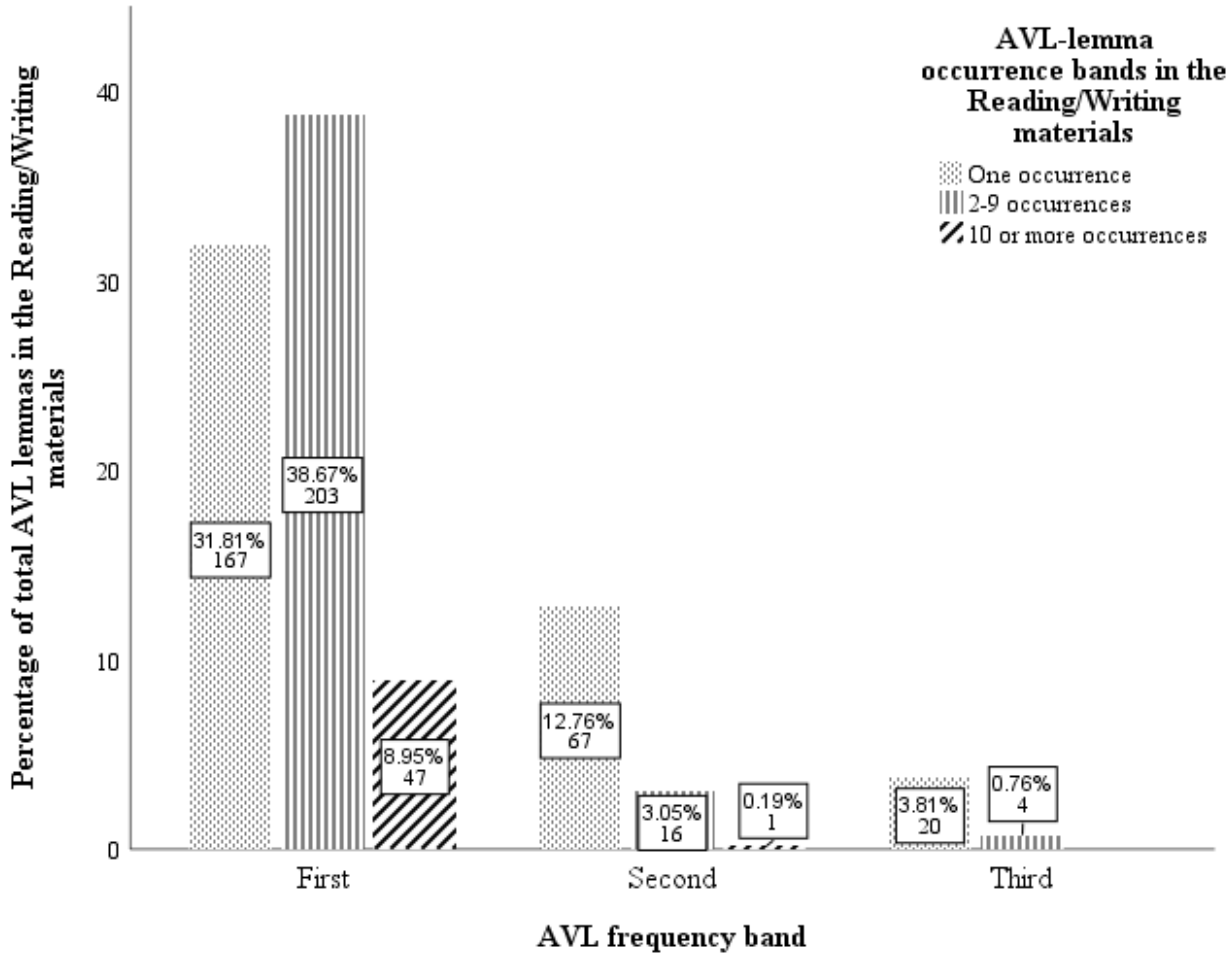

Figure 2. Percentage of AVL lemmas occurring once, 2-9 times and 10 or more times in the Reading/Writing materials per AVL frequency band.

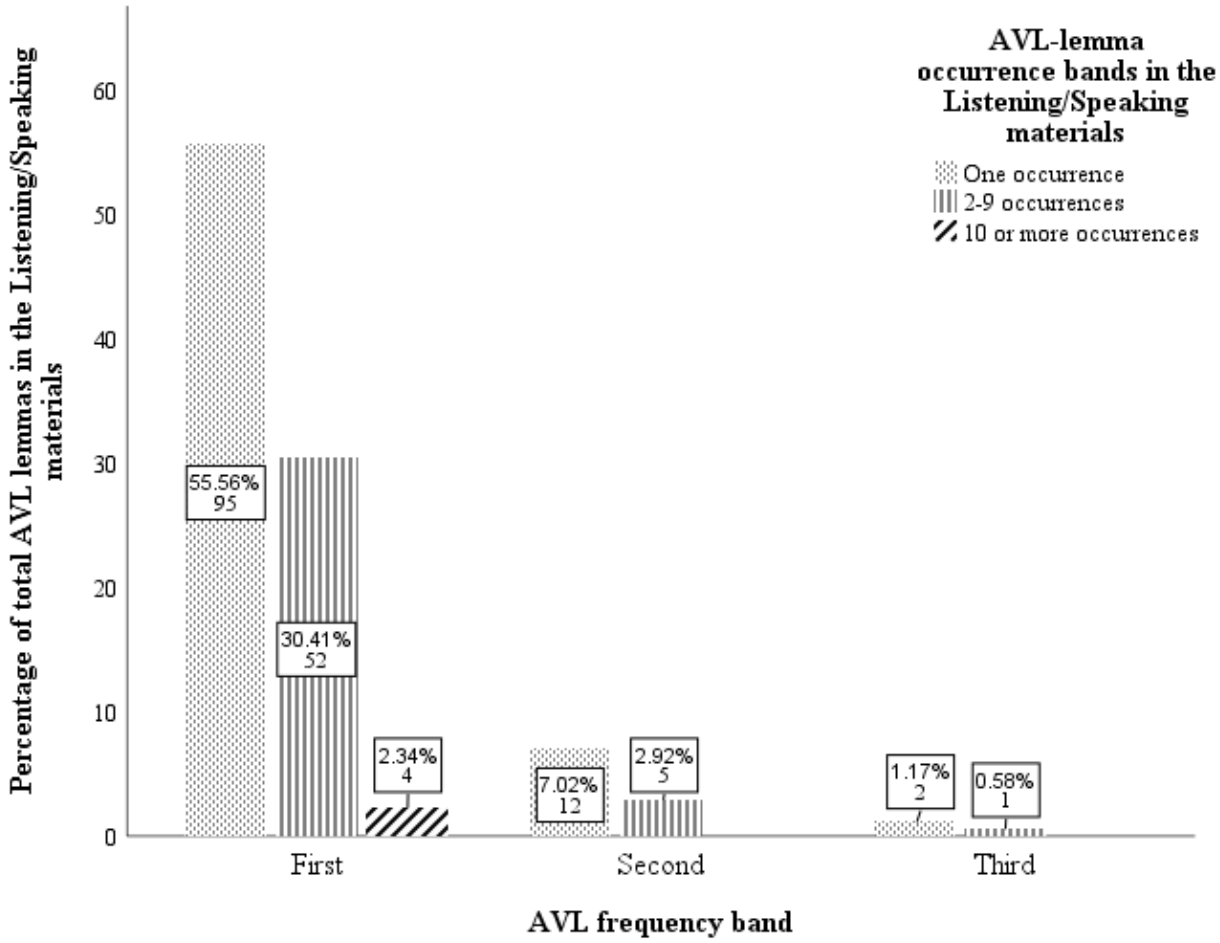

Figure 3. Percentage of AVL lemmas occurring once, 2-9 times and 10 or more times in the Listening/Speaking materials per AVL frequency band.

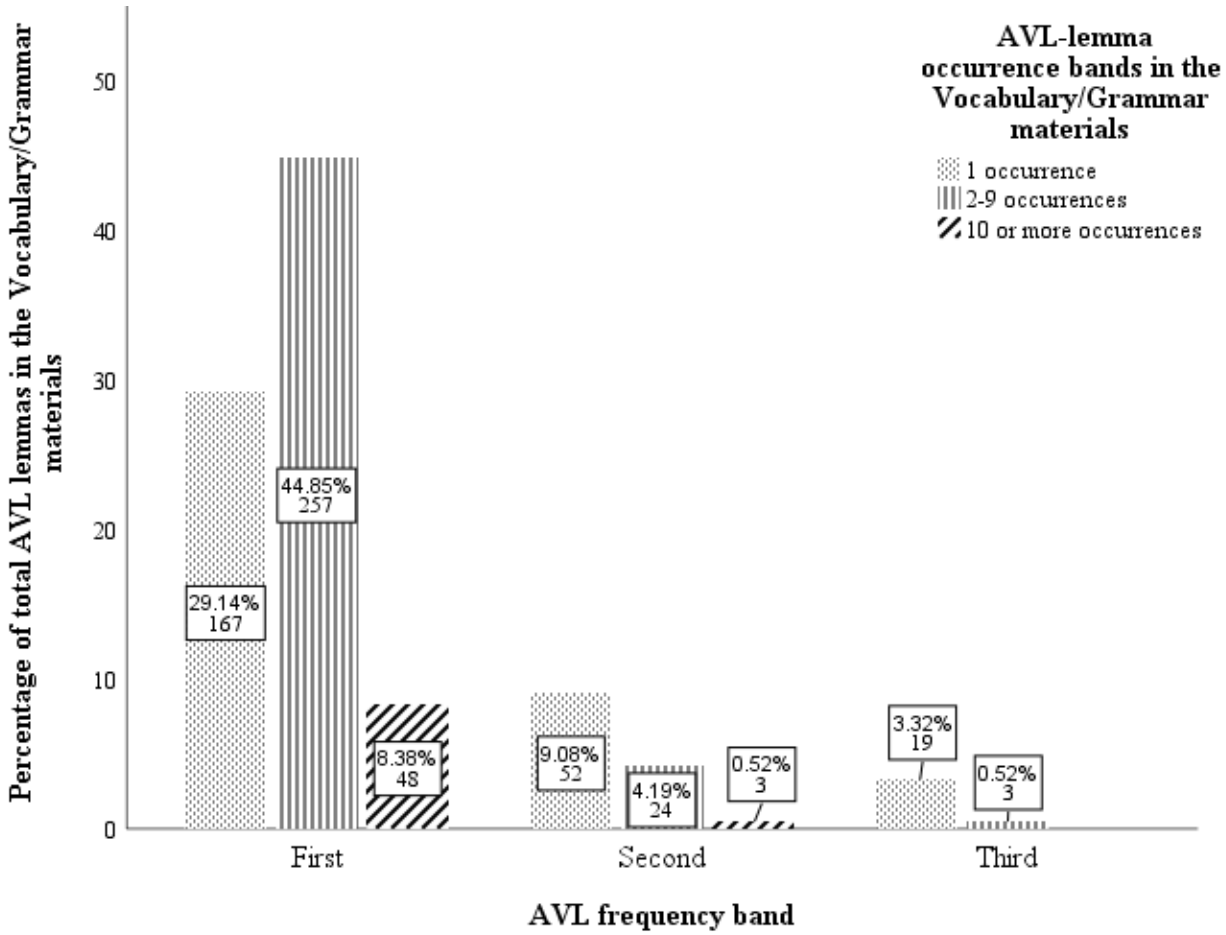

Figure 4. Percentage of AVL lemmas occurring once, 2-9 times and 10 or more times in the Vocabulary/Grammar teaching materials per AVL frequency band.

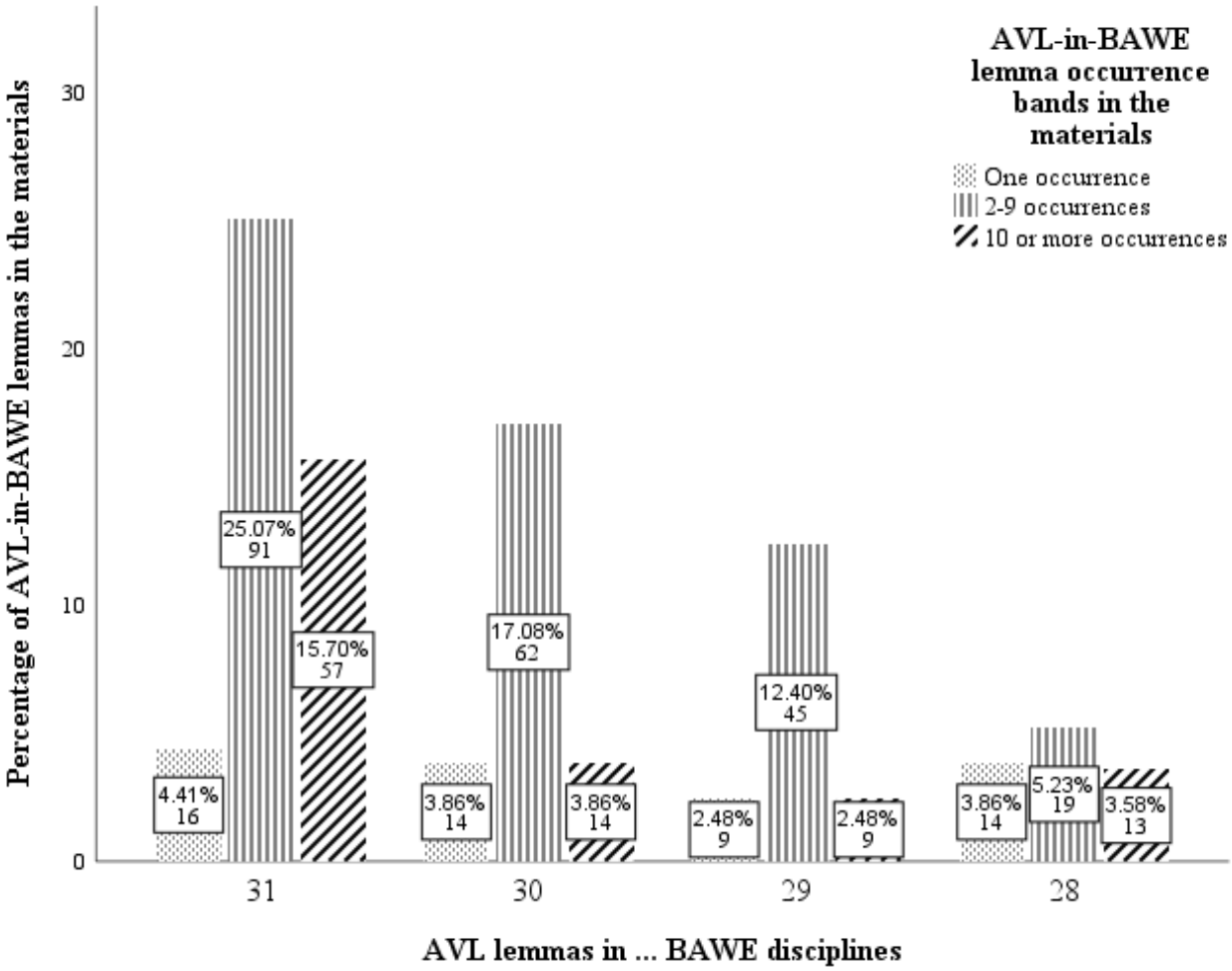

Figure 5. Percentage of AVL-in-BAWE lemmas occurring once, 2-9 times and 10 or more times in the materials per the number of BAWE disciplines which shared AVL lemmas.

Table 1
Word tokens and lemmas in the corpus by module and week

Module	Week					**Total words**
	1	2	3	4	5	
Reading/Writing	21,024	0	39,796	0	0	60,820
Listening/Speaking	841	915	658	1976	0	4,390
Vocabulary/Grammar	4880	2,844	2,756	4,170	4,131	18,781
Total words	26,745	3,759	43,210	6,146	4,131	83,991

Table 2
Lexical coverage from AVL lemmas

Cumulative coverage	AVL lemmas unique to each 2% lexical-token corpus increment	Counts in the materials of AVL lemmas unique to each 2% lexical-token corpus increment			Cumulative AVL lemmas
		Maximum	Minimum	Median	
2%	14	92	37	42	14
4%	15	37	25	30	29
6%	33	25	16	20	62
8%	52	16	10	13	114
10%	89	10	6	7	203
12%	173	6	3	4	376
13.44%	470	3	1	1	846

Table 3
AVL corpus coverage per teaching module

Module	Lexical word tokens	Tokens per AVL frequency band (percentage of lexical word tokens)			Total AVL tokens
		1	**2**	**3**	
Reading/ Writing	23,244	1,829 (7.9%)	161 (0.69%)	28 (0.12%)	2,018 (8.68%)
Listening/ Speaking	1,902	331 (17.4%)	32 (1.68%)	4 (0.21%)	367 (19.3%)
Vocabulary/ Grammar	8,022	1,885 (23.5%)	159 (1.98%)	28 (0.35%)	2,072 (25.83%)
All modules	33,168	4,045 (12.2%)	352 (1.06%)	60 (0.18%)	4,457 (13.44%)

Table 4
Lexical lemmas and AVL lemmas per module and in all the materials

Module	Lexical lemmas	AVL lemmas in the materials (percentage of lexical lemmas)	Coverage of AVL tokens by AVL lemmas
Reading/ Writing	4,418	525 (11.88%)	26.02%
Listening/ Speaking	858	171 (19.93%)	48.17%
Vocabulary/ Grammar	2,512	573 (22.81%)	27.56%
All modules	5,896	846 (14.35%)	18.98%

Table 5
AVL lemmas per subcorpus, shared between and among subcorpora, and unique to each subcorpus

AVL lemmas	Subcorpora	AVL frequency band			Total AVL lemmas
		1	2	3	
In	Reading/Writing	417 (41.7%)	84 (8.4%)	24 (2.37%)	525
	Listening/Speaking	151 (15.1%)	17 (1.7%)	3 (0.3%)	171
	Vocabulary/Grammar	472 (47.2%)	79 (7.9%)	22 (2.2%)	573
Shared	by all subcorpora	89 (8.9%)	1 (0.1%)	0	90
shared only between	Reading/Writing and Listening/Speaking	16 (1.6%)	2 (0.2%)	1 (0.1%)	19
	Reading/Writing and Vocabulary/Grammar	186 (18.6%)	13 (1.3%)	0	199
	Listening/Speaking and Vocabulary/Grammar	25 (2.5%)	0	0	25
unique to	Reading/Writing	126 (12.6%)	68 (6.8%)	23 (2.27%)	217
	Listening/Speaking	21 (2.1%)	14 (1.4%)	2 (0.2%)	37
	Vocabulary/Grammar	172 (17.2%)	65 (6.5%)	22 (2.17%)	259

Table 6
AVL-in-BAWE lemmas per subcorpus, shared between and among subcorpora, and unique to each subcorpus. The percentage of AVL lemmas in all (175 lemmas), 30 (105 lemmas), 29 (77 lemmas) and 28 BAWE disciplines (70 lemmas) per subcorpus (combination) appears within parentheses.

		AVL lemmas shared by … BAWE disciplines				**Total**
	Subcorpora	All	30	29	28	
In	Reading/Writing	145 (82.86%)	60 (57.14%)	43 (55.84%)	29 (41.43%)	277 (64.87%)
	Listening/Speaking	73 (41.71%)	23 (21.91%)	8 (10.39%)	10 (14.29%)	114 (26.7%)
	Vocabulary/Grammar	142 (81.14%)	69 (65.71%)	53 (68.83%)	36 (51.43%)	300 (70.26%)
Shared by	Reading/Writing and Listening/Speaking	7 (4%)	4 (3.81%)	0	0	11 (2.58%)
	Reading/Writing and Vocabulary/Grammar	63 (36%)	33 (31.43%)	30 (38.96%)	15 (21.43%)	141 (33.02%)
	Listening/Speaking and Vocabulary/Grammar	2 (1.14%)	7 (6.67%)	1 (1.3%)	4 (5.71%)	14 (3.28%)
	all subcorpora	62 (35.43%)	9 (8.57%)	5 (6.49%)	5 (7.14%)	81 (18.97%)
Unique to	Reading/Writing	13 (7.43%)	14 (13.33%)	8 (10.39%)	9 (12.86%)	44 (10.3%)
	Listening/Speaking	2 (1.14%)	3 (2.86%)	2 (2.6%)	1 (1.43%)	8 (1.87%)
	Vocabulary/Grammar	15 (8.57%)	20 (19.05%)	17 (22.08%)	12 (17.14%)	64 (14.99%)

Table 7
Numbers and percentages of AVL-in-BAWE lemmas occurring once, 2-9 times and 10 or more times per teaching materials subcorpus and per the number of BAWE disciplines which shared AVL lemmas

Subcorpus	Occurrences	AVL in … BAWE disciplines			
		31	30	29	28
Reading/Writing	1	42 (15.16%)	20 (7.22%)	12 (4.33%)	10 (3.61%)
	2-9	82 (29.6%)	35 (12.64%)	25 (9.03%)	13 (4.69%)
	10 or more	21 (7.58%)	5 (1.81%)	6 (2.17%)	6 (2.17%)
Listening/Speaking	1	44 (38.6%)	15 (13.16%)	3 (2.63%)	4 (3.51%)
	2-9	27 (23.68%)	7 (6.14%)	5 (4.39%)	6 (5.26%)
	10 or more	2 (1.75%)	1 (0.88%)	0	0
Vocabulary/Grammar	1	32 (10.77%)	15 (5.05%)	12 (4.04%)	12 (4.04%)
	2-9	87 (29.29%)	47 (15.82%)	35 (11.78%)	18 (6.06%)
	10 or more	21 (7.07%)	7 (2.36%)	5 (1.68%)	6 (2.02%)

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Supplementary material 1

Item number in the AVL	AVL items in the EAP materials	Part of Speech
1	study	noun
2	group	noun
3	system	noun
4	social	adjective
5	provide	verb
6	however	adverb
7	research	noun
8	level	noun
9	result	noun
10	include	verb
11	important	adjective
12	process	noun
13	use	noun
14	development	noun
15	data	noun
16	information	noun
17	effect	noun
18	change	noun
19	table	noun
20	policy	noun
21	university	noun
22	model	noun
23	experience	noun
24	activity	noun
25	human	adjective
26	history	noun
27	develop	verb
28	suggest	verb
29	economic	adjective
30	low	adjective
31	relationship	noun
32	both	adverb
33	value	noun
34	require	verb
35	role	noun
36	difference	noun
37	analysis	noun
38	practice	noun
39	society	noun
40	thus	adverb
42	form	noun
43	report	verb

44	rate	noun
45	significant	adjective
46	figure	noun
47	factor	noun
48	interest	noun
49	culture	noun
50	need	noun
51	base	verb
52	population	noun
53	international	adjective
54	technology	noun
55	individual	noun
56	type	noun
57	describe	verb
58	indicate	verb
60	subject	noun
61	science	noun
62	material	noun
63	produce	verb
64	condition	noun
65	identify	verb
66	knowledge	noun
67	support	noun
69	project	noun
70	response	noun
71	approach	noun
72	support	verb
73	period	noun
74	organization	noun
75	increase	verb
76	environmental	adjective
77	source	noun
78	nature	noun
79	cultural	adjective
80	resource	noun
81	century	noun
82	strategy	noun
83	theory	noun
84	product	noun
85	method	noun
87	likely	adjective
88	note	verb
89	represent	verb
90	general	adjective

91	article	noun
92	similar	adjective
93	environment	noun
94	language	noun
95	determine	verb
96	structure	noun
97	section	noun
98	common	adjective
99	occur	verb
100	current	adjective
101	available	adjective
102	present	verb
103	term	noun
104	reduce	verb
105	measure	noun
106	involve	verb
107	movement	noun
108	specific	adjective
109	focus	verb
110	region	noun
111	relate	verb
113	quality	noun
114	establish	verb
115	author	noun
116	seek	verb
117	compare	verb
118	growth	noun
119	natural	adjective
120	various	adjective
121	standard	noun
122	example	noun
123	management	noun
124	scale	noun
125	argue	verb
126	degree	noun
127	design	noun
128	concern	noun
129	state	verb
130	therefore	adverb
131	examine	verb
132	pattern	noun
133	researcher	noun
134	task	noun
135	traditional	adjective

136	finding	noun
137	positive	adjective
140	impact	noun
141	reflect	verb
142	recognize	verb
143	context	noun
144	relation	noun
145	maintain	verb
147	concept	noun
148	discussion	noun
149	associate	verb
150	design	verb
151	particularly	adverb
152	purpose	noun
153	address	verb
154	define	verb
155	particular	adjective
156	benefit	noun
157	survey	noun
158	effective	adjective
159	apply	verb
160	contain	verb
161	understanding	noun
162	production	noun
163	form	verb
164	association	noun
165	reveal	verb
166	range	noun
167	affect	verb
168	attitude	noun
169	status	noun
170	necessary	adjective
171	function	noun
172	indeed	adverb
173	present	adjective
174	global	adjective
175	conflict	noun
176	achieve	verb
177	conduct	verb
178	critical	adjective
179	perform	verb
180	discuss	verb
181	exist	verb
182	improve	verb

183	observe	verb
184	demonstrate	verb
185	unit	noun
186	total	adjective
187	modern	adjective
188	literature	noun
190	experience	verb
191	principle	noun
193	challenge	noun
194	control	verb
196	aspect	noun
197	perspective	noun
198	basic	adjective
199	measure	verb
201	belief	noun
202	western	adjective
203	procedure	noun
204	test	verb
205	category	noun
206	tend	verb
207	technique	noun
208	outcome	noun
209	significantly	adverb
210	generally	adverb
211	future	adjective
212	mean	noun
213	importance	noun
215	feature	noun
216	influence	noun
217	basis	noun
219	refer	verb
220	communication	noun
221	negative	adjective
222	primary	adjective
224	European	adjective
225	lack	noun
226	obtain	verb
227	potential	adjective
228	variety	noun
229	component	noun
230	following	adjective
232	contribute	verb
233	assume	verb
234	express	verb

236	promote	verb
237	participate	verb
238	labor	noun
239	engage	verb
240	review	noun
241	additional	adjective
242	highly	adverb
243	appropriate	adjective
244	publish	verb
245	encourage	verb
246	successful	adjective
247	assess	verb
248	view	verb
250	instrument	noun
252	meaning	noun
253	limit	verb
254	increase	noun
255	directly	adverb
256	previous	adjective
257	demand	noun
259	female	adjective
260	attempt	noun
261	influence	verb
262	independent	adjective
263	solution	noun
264	direct	adjective
265	conclusion	noun
266	presence	noun
268	ethnic	adjective
269	complex	adjective
270	active	adjective
274	focus	noun
275	contrast	noun
276	failure	noun
278	journal	noun
279	multiple	adjective
280	facility	noun
282	emerge	verb
284	extent	noun
285	male	adjective
286	mental	adjective
287	explore	verb
288	consequence	noun
289	generate	verb

290	content	noun
293	broad	adjective
294	observation	noun
295	visual	adjective
296	difficulty	noun
298	perceive	verb
303	increased	adjective
304	ensure	verb
305	select	verb
306	moreover	adverb
307	emphasize	verb
308	institute	noun
309	extend	verb
310	connection	noun
311	sector	noun
312	commitment	noun
313	interpretation	noun
314	evaluate	verb
315	conclude	verb
316	notion	noun
317	increasingly	adverb
319	consist	verb
320	reference	noun
321	initial	adjective
322	adopt	verb
323	comparison	noun
324	depend	verb
325	attempt	verb
326	standard	adjective
327	predict	verb
328	employ	verb
329	definition	noun
330	essential	adjective
331	contact	noun
332	frequently	adverb
333	colleague	noun
334	actual	adjective
335	account	verb
337	theme	noun
338	largely	adverb
339	link	verb
341	overall	adjective
342	useful	adjective
344	distribution	noun

346	analyze	verb
348	psychological	adjective
349	unique	adjective
350	experiment	noun
351	trend	noun
353	percentage	noun
355	implication	noun
356	contribution	noun
357	enable	verb
358	organize	verb
359	specifically	adverb
360	currently	adverb
361	emotional	adjective
362	locate	verb
363	primarily	adverb
365	enhance	verb
366	improvement	noun
369	phase	noun
371	typically	adverb
372	above	adverb
373	long-term	adjective
376	approximately	adverb
377	limited	adjective
378	propose	verb
379	framework	noun
380	existing	adjective
381	creation	noun
383	emphasis	noun
384	industrial	adjective
385	external	adjective
386	waste	noun
387	potential	noun
388	climate	noun
389	explanation	noun
390	technical	adjective
392	description	noun
393	vary	verb
394	reduction	noun
395	discipline	noun
396	construct	verb
398	origin	noun
399	rely	verb
400	fundamental	adjective
401	transition	noun

402	assumption	noun
403	German	adjective
405	formal	adjective
408	combination	noun
409	increasing	adjective
410	hypothesis	noun
411	phenomenon	noun
415	cite	verb
416	lack	verb
418	constitute	verb
419	relevant	adjective
420	typical	adjective
421	selection	noun
423	illustrate	verb
424	cycle	noun
425	depression	noun
426	consideration	noun
427	previously	adverb
428	arise	verb
429	developing	adjective
430	separate	adjective
431	recognition	noun
433	similarly	adverb
435	furthermore	adverb
436	diversity	noun
437	practical	adjective
438	anxiety	noun
439	acquire	verb
440	characterize	verb
441	differ	verb
442	review	verb
443	interpret	verb
444	creative	adjective
445	limitation	noun
446	resolution	noun
449	significance	noun
455	variation	noun
456	derive	verb
457	alternative	noun
458	widely	adverb
460	alternative	adjective
462	initiative	noun
463	employment	noun
464	regard	verb

466	effectively	adverb
468	transform	verb
469	absence	noun
470	imply	verb
471	comprehensive	adjective
472	observer	noun
473	nevertheless	adverb
475	link	noun
477	intellectual	adjective
478	signal	noun
479	passage	noun
480	facilitate	verb
482	biological	adjective
483	introduction	noun
484	boundary	noun
485	substantial	adjective
487	strongly	adverb
488	theoretical	adjective
493	yield	verb
496	territory	noun
497	conventional	adjective
498	inform	verb
503	poverty	noun
505	distinction	noun
506	relative	adjective
507	identification	noun
508	shift	noun
510	domain	noun
511	integration	noun
513	subsequent	adjective
514	strategic	adjective
515	preference	noun
522	dependent	adjective
523	presentation	noun
524	proportion	noun
525	universal	adjective
526	norm	noun
527	tendency	noun
528	considerable	adjective
530	equally	adverb
531	resolve	verb
532	competitive	adjective
535	consumption	noun
537	dominant	adjective

538	extensive	adjective
539	barrier	noun
540	advanced	adjective
542	adjustment	noun
543	shape	verb
544	integrate	verb
545	dominate	verb
546	establishment	noun
548	visible	adjective
549	stability	noun
554	given	adjective
555	sufficient	adjective
557	distinct	adjective
558	enterprise	noun
565	electronic	adjective
567	distinguish	verb
569	expansion	noun
570	evolve	verb
571	incentive	noun
573	recommendation	noun
576	encounter	verb
578	rapidly	adverb
579	adapt	verb
581	initially	adverb
582	intention	noun
583	rapid	adjective
585	reinforce	verb
586	ethical	adjective
587	exhibit	verb
588	ongoing	adjective
589	function	verb
590	communicate	verb
592	detailed	adjective
593	potentially	adverb
595	trait	noun
598	adequate	adjective
600	instance	noun
602	indicator	noun
603	strengthen	verb
604	statistics	noun
606	accurate	adjective
608	acceptance	noun
611	guideline	noun
615	attribute	verb

616	scenario	noun
618	exclude	verb
620	regardless	adverb
622	consensus	noun
623	mutual	adjective
625	commonly	adverb
628	evident	adjective
632	efficient	adjective
633	practitioner	noun
634	highlight	verb
635	successfully	adverb
636	intensity	noun
637	complexity	noun
638	input	noun
639	mainly	adverb
641	consequently	adverb
642	agriculture	noun
643	distribute	verb
645	scheme	noun
646	ethics	noun
648	exceed	verb
649	summary	noun
652	technological	adjective
655	innovation	noun
656	obligation	noun
660	etc	adverb
663	empirical	adjective
665	widespread	adjective
671	helpful	adjective
672	simultaneously	adverb
674	dynamic	adjective
677	economics	noun
680	changing	adjective
681	undertake	verb
684	graph	noun
689	frequent	adjective
690	aim	noun
691	accuracy	noun
692	acceptable	adjective
696	comprise	verb
706	absolute	adjective
710	interact	verb
712	separation	noun
713	concern	verb

714	abstract	adjective
719	well-being	noun
721	undermine	verb
722	uncertainty	noun
724	civilization	noun
729	classify	verb
730	expertise	noun
734	prediction	noun
735	improved	adjective
736	everyday	adjective
738	access	verb
739	encounter	noun
743	quantity	noun
744	productivity	noun
745	integrated	adjective
751	reliable	adjective
759	informal	adjective
761	acquisition	noun
763	likelihood	noun
764	similarity	noun
766	actively	adverb
773	likewise	adverb
777	linear	adjective
783	forum	noun
785	convey	verb
786	weakness	noun
790	obstacle	noun
792	equality	noun
793	productive	adjective
794	dilemma	noun
798	classification	noun
805	required	adjective
807	rational	adjective
808	summarize	verb
810	attribute	noun
811	identical	adjective
813	objective	adjective
814	sum	noun
815	isolation	noun
817	sustainable	adjective
818	representative	adjective
821	calculation	noun
823	comparable	adjective
827	willingness	noun

828	flexibility	noun
830	promotion	noun
832	developed	adjective
834	adaptation	noun
836	neutral	adjective
839	exclusively	adverb
840	precise	adjective
842	flexible	adjective
846	valid	adjective
848	stimulate	verb
849	modification	noun
851	subjective	adjective
853	diminish	verb
857	comparative	adjective
861	innovative	adjective
862	influential	adjective
864	induce	verb
867	accurately	adverb
869	patent	noun
870	emergence	noun
871	outline	verb
872	appreciation	noun
877	namely	adverb
878	philosopher	noun
881	tolerance	noun
883	resulting	adjective
888	preliminary	adjective
889	commodity	noun
891	short-term	adjective
893	logical	adjective
894	globalization	noun
896	exploit	verb
899	dependence	noun
900	clarify	verb
901	considerably	adverb
905	excessive	adjective
907	theorist	noun
912	partially	adverb
915	manifest	verb
918	correctly	adverb
920	respective	adjective
923	suitable	adjective
933	stance	noun
939	recruitment	noun

941	novel	adjective
943	manual	noun
945	intensive	adjective
953	interactive	adjective
955	differentiate	verb
958	reproduce	verb
960	revision	noun
961	passive	adjective
964	isolated	adjective
965	dual	adjective
969	thesis	noun
971	occurrence	noun
974	relevance	noun
977	municipal	adjective
979	correspondence	noun
984	erosion	noun
985	striking	adjective
987	contradiction	noun
992	importantly	adverb
995	varying	adjective
999	large-scale	adjective
1009	contrast	verb
1012	within	adverb
1017	repeated	adjective
1019	allocation	noun
1022	sufficiently	adverb
1026	separately	adverb
1031	revise	verb
1036	purely	adverb
1043	dominance	noun
1044	hostility	noun
1045	embed	verb
1052	endeavor	noun
1054	disagreement	noun
1056	mediate	verb
1057	neglect	verb
1063	farming	noun
1066	applicable	adjective
1067	cultivate	verb
1075	pathway	noun
1077	confine	verb
1080	fulfill	verb
1083	elicit	verb
1084	hypothesize	verb

1087	analytical	adjective
1090	improving	adjective
1091	synthesis	noun
1098	paragraph	noun
1100	overview	noun
1110	viewpoint	noun
1112	harmful	adjective
1116	thinker	noun
1121	reliance	noun
1122	formally	adverb
1123	academic	noun
1125	exploitation	noun
1130	variable	adjective
1138	destructive	adjective
1141	disadvantage	noun
1143	coherent	adjective
1150	monopoly	noun
1154	prevailing	adjective
1159	appropriate	verb
1165	interestingly	adverb
1170	conversely	adverb
1174	educated	adjective
1179	supplement	verb
1182	sustainability	noun
1187	gradual	adjective
1189	conflicting	adjective
1201	efficiently	adverb
1204	refusal	noun
1209	thorough	adjective
1211	informed	adjective
1212	plausible	adjective
1213	workforce	noun
1223	elaborate	verb
1225	paradox	noun
1229	critically	adverb
1234	petroleum	noun
1235	arbitrary	adjective
1236	rigorous	adjective
1237	feasible	adjective
1238	specification	noun
1241	traumatic	adjective
1252	Greek	noun
1255	reconcile	verb
1262	pragmatic	adjective

1267	dissatisfaction	noun
1274	marked	adjective
1282	preceding	adjective
1287	accumulation	noun
1296	wholly	adverb
1304	complement	verb
1307	arguably	adverb
1308	successive	adjective
1309	definitive	adjective
1310	adulthood	noun
1315	contradict	verb
1317	hypothetical	adjective
1320	infer	verb
1323	enrich	verb
1327	simultaneous	adjective
1332	alleviate	verb
1337	sociology	noun
1340	theoretically	adverb
1347	acknowledgment	noun
1348	discriminate	verb
1349	denote	verb
1350	hinder	verb
1356	determinant	noun
1357	advent	noun
1359	terminology	noun
1361	ideally	adverb
1377	cultivation	noun
1383	sound	adjective
1386	ethic	noun
1388	submission	noun
1395	myriad	noun
1410	segregation	noun
1411	usefulness	noun
1413	consciously	adverb
1427	citation	noun
1437	alternatively	adverb
1450	facet	noun
1456	preoccupation	noun
1457	multinational	adjective
1467	disseminate	verb
1475	factual	adjective
1476	indicative	adjective
1484	sociological	adjective
1489	overt	adjective

1511	suppression	noun
1531	unpublished	adjective
1532	template	noun
1539	universally	adverb
1546	prescribed	adjective
1548	induction	noun
1556	restricted	adjective
1557	synthesize	verb
1584	marginalize	verb
1595	chosen	adjective
1601	detrimental	adjective
1610	high-level	adjective
1616	globally	adverb
1624	theorize	verb
1625	identifiable	adjective
1629	outweigh	verb
1633	imagined	adjective
1634	intellect	noun
1652	ethos	noun
1660	connected	adjective
1671	predominant	adjective
1681	following	adverb
1683	hamper	verb
1688	underline	verb
1698	manufacture	noun
1705	stated	adjective
1706	decreasing	adjective
1713	lecturer	noun
1717	accelerated	adjective
1725	prominently	adverb
1738	micro	noun
1739	further	verb
1743	purchasing	noun
1757	contrasting	adjective
1761	concentrated	adjective
1821	multidisciplinary	adjective
1846	naturalist	noun
1868	suggested	adjective
1874	evolving	adjective
1882	lastly	adverb
1889	separated	adjective
1892	assertive	adjective
1893	applicability	noun
1894	immersion	noun

1910	deficient	adjective
1938	informational	adjective
1942	cohesive	adjective
1950	intertwine	verb
1951	oppositional	adjective
1961	technologically	adverb
1962	transformative	adjective
1970	impersonal	adjective
2009	recur	verb
2021	underpin	verb
2023	preparatory	adjective
2029	approximate	adjective
2049	creatively	adverb
2058	excessively	adverb
2068	acquired	adjective
2086	envisage	verb
2095	gratification	noun
2110	multifaceted	adjective
2132	condense	verb
2139	organizing	adjective
2160	hereditary	adjective
2194	predictability	noun
2218	deconstruct	verb
2244	inconclusive	adjective
2248	justified	adjective
2249	unsatisfactory	adjective
2263	italics	noun
2305	achievable	adjective
2323	passively	adverb
2359	absent	verb
2383	globalized	adjective
2390	synonym	noun
2408	familiarize	verb
2428	well-documented	adjective
2443	fluctuating	adjective
2449	invalid	adjective
2479	derivation	noun
2487	simplification	noun
2500	sequence	verb
2526	harvesting	noun
2564	innovate	verb
2596	distributive	adjective
2640	unpredictability	noun
2654	deviance	noun

2682	misinterpretation	noun
2777	succinct	adjective
2789	industrialize	verb
2799	globalize	verb
2803	edited	adjective
2828	identifying	adjective
2857	prefix	noun
2895	dissimilarity	noun
2968	copying	noun
2978	arguable	adjective
2981	separable	adjective
2987	bibliographic	adjective

Supplementary material 2

Table A
Descriptive statistics for AVL repetition rate

AVL lemmas	Subcorpora	Mean	Median	Min	Max	Interquartile range	SD	Skewness	Kurtosis
in	Reading/Writing	3.84	2	1	56	3	6.36	4.35	23.54
	Listening/Speaking	2.15	1	1	40	1	3.56	7.77	76.49
	Vocabulary/Grammar	3.62	2	1	49	3	4.64	3.94	24.45
	the whole corpus	5.27	2	1	92	4	8.53	4.28	26.23
shared by all subcorpora	Reading/Writing	8.01	5	1	56	8	10.25	2.95	9.7
	Listening/Speaking	2.17	1	1	13	1	2.5	3.11	9.83
	Vocabulary/Grammar	7.17	5	1	49	8	7.35	2.92	12.49
	whole corpus	17.34	14	3	92	14	15.69	2.39	7.39
unique to	Reading/Writing	1.96	1	1	36	1	3.14	7.36	69.68
	Listening/Speaking	2.32	1	1	40	0	6.41	5.96	35.96
	Vocabulary/Grammar	2.13	1	1	17	1	2.36	3.52	14.6

Supplementary material 3

Figure A. Percentage of the AVL lemmas shared by any two subcorpora that occurred 2-9 times and 10 or more times in the teaching materials per AVL frequency band

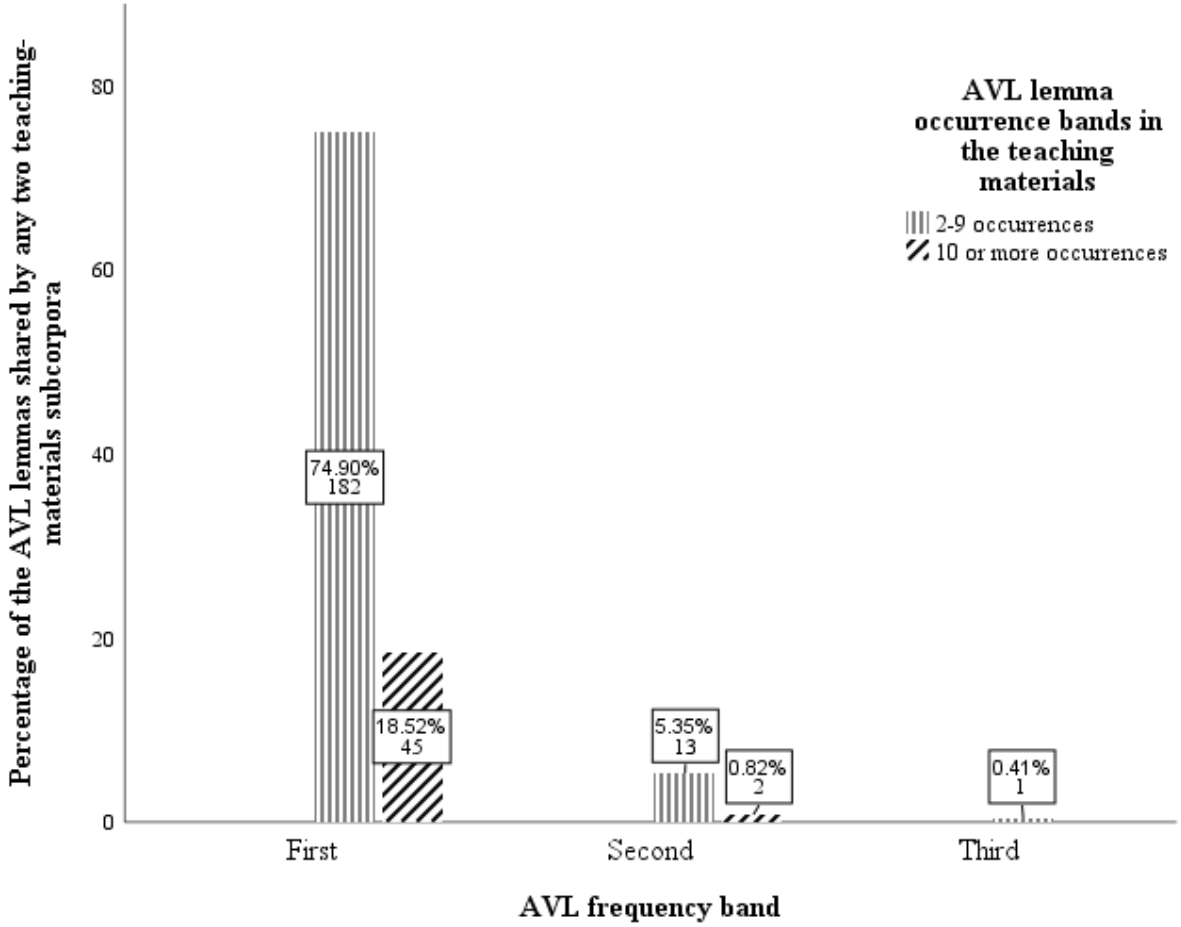
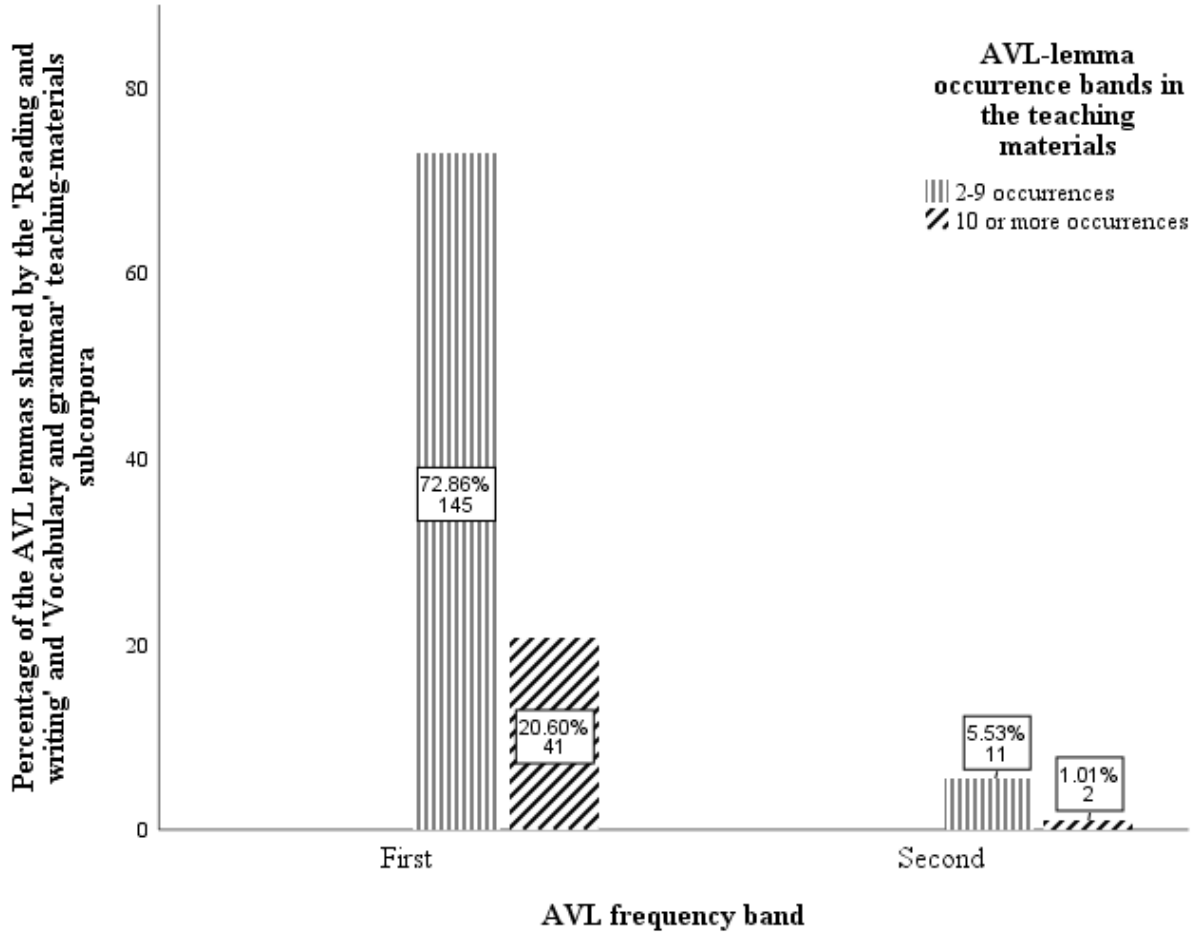


Figure B. Percentage per AVL frequency band of the AVL lemmas shared by the ‘Reading and writing’ and ‘Vocabulary and grammar’ subcorpora that occurred in each AVL-lemma occurrence band



Supplementary material 4

Table B
Descriptive statistics for AVL-in-BAWE lemma repetition rate

AVL-in-BAWE lemmas	Subcorpora	Mean	Median	Min	Max	Interquartile range	SD	Skewness	Kurtosis
in	Reading/Writing	4.92	1	1	56	4	6.98	3.92	20.41
	Listening/Speaking	2.31	1	1	40	1	4.09	7.41	69.99
	Vocabulary/Grammar	4.77	3	1	49	4	5.28	3.44	19.62
	the whole corpus	8.42	5	1	92	8	10.55	3.5	18.07
shared by all modules	Reading/Writing	7.51	9.6	1	56	8	9.6	3.4	13.64
	Listening/Speaking	2.05	1	1	13	1	2.26	3.35	11.84
	Vocabulary/Grammar	7.27	5	1	49	9	7.63	2.87	11.74
	whole corpus	16.83	14	3	92	13	15.36	2.66	9.26
unique to	Reading/Writing	2.11	1	1	9	1	1.83	2.37	5.81
	Listening/Speaking	6.5	2	1	40	1	13.54	2.82	7.97
	Vocabulary/Grammar	2.94	2	1	16	2	2.94	2.36	6.3