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Vocabulary in English in Tertiary Contexts: Connecting Research and Learning

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Abstract

Knowledge of vocabulary is essential for learners of any language, and unfortunately, it has become clear recently the learners of English in a variety of contexts have not scored well on vocabulary tests. Low scores are problematic for language use and success in general, but they cause particular problems when it comes to the vocabulary needed in English in tertiary contexts. This article focuses on vocabulary in English for university purposes by reflecting on recent research and how its impact and connection to learning and teaching. The article focuses on six main areas of research: knowledge of vocabulary, the amount of vocabulary learners need for studying at university, frequency and vocabulary, English for General Academic Purposes (EGAP) and English for Specific Academic Purposes (EGSP) in connection with word lists, and testing, academic multiword units, and finally, word parts in academic vocabulary. These areas all shed light on different aspects of academic vocabulary, and illustrate some of the depth and commitment to this fast moving area of research over the last two decades.

INTRODUCTION

It has been my absolute pleasure in recent times to be invited by the Language Institute, Thammasat University, Bangkok, to talk about vocabulary research and its applications to language teaching and learning, with a particular focus on English for Academic Purposes (EAP). The aim of this article is to reflect on recent research into vocabulary in English in university contexts and connections to EAP classrooms, materials design, strategy training and testing. After all, knowledge of academic vocabulary is vital for learners who are planning to undertake university level studies in English medium contexts (Nation, 2013; Pecorari et al., 2019). It is several years since Phoocharoensil (2015) reported on vocabulary and EFL teaching in this journal and 20 years since the Academic Word List (Coxhead, 2000) first appeared, so I think it is a good time to step back and discuss ideas about academic vocabulary that have shaped teaching and research in EAP.

There are several important terms in this article that need to be explained. The first is about counting words. In this article, a *word family* is used to mean a headword, for example *sufficient*, and members of the family are related through derivations and inflections, such as *insufficient* and *sufficiently*. Secondly, the concept of 'lexical coverage' means the 'percentage of running words in the text known by the learners' (Nation, 2006, p. 61) and this figure relates to comprehension. Lexical coverage is usually reported using word families as the unit of counting. Laufer and Ravenhorst-Kalovsky (2010) suggest that for minimal comprehension of a written text for formal English language studies would be 95%, and an optimal level might be 98% for much better comprehension (see also van Zeeland & Schmitt, 2013). The final concept is word frequency. We all know that some words occur more often than others in English. For example, we tend to use everyday words such as *go*, *like*, *have*, and *eat* much more often than words such as *hitherto* or *aspiration*. Paul Nation (2020) has developed word lists that are based on the British National Corpus and the Corpus of Contemporary American English (BNC/COCA) from the first 1,000 (most frequent) list through to the 25th 1,000 list (find the lists here: https://www.wgtn.ac.nz/lals/resources/vocabulary-lists).

The key issues in this article on vocabulary and EAP are: knowledge of vocabulary, how many words our learners need to cope with academic spoken and written texts, frequency and academic vocabulary, English for

general purposes vs specific purposes in relation to word lists and testing, academic multiword units, and word parts for strategies. Finally, on a personal note, COVID-19 is having a major impact on our worldwide community of English language teachers, learners and researchers.

VOCABULARY KNOWLEDGE IN ENGLISH

It is clear that vocabulary is important in everyday language use when our learners and reading, listening, speaking and writing in English. Learners with a large vocabulary in English usually have high levels of proficiency. Vocabulary is an important part of understanding ideas and expressing ideas clearly in an academic context (see Malmström et al, 2018). Maxwell (2013) points out that 'nobody is a native speaker of academic English', which means that native and non-native speakers have to learn this specific 'variety' of English. When I developed the Academic Word List (AWL) (Coxhead, 2000), my starting point was that learners who were aiming to study in an English-Medium University would have a foundation of 2,000 word families. This decision was based on my experience as an EAP teacher in an English as Second Language context in Aotearoa/New Zealand. It meant that I excluded the first 2,000 word families from the AWL. I knew at the time that the decisions made in developing the GSL had an impact on the words selected for the AWL. West (1953) used principles for the development of the GSL, including *coverage*, meaning he selected one word which covered a concept rather than including two or more words for that concept. For example, *work* and *job* refer to the same concept, so West included *work*, and did not include *job* in his list. Gardner and Davies (2014), however, developed their Academic Vocabulary List without any assumption of prior knowledge, which accounts for some of the differences between the lists (see below).

However, it has become clear over the last couple of decades that language learners in foreign language contexts show low scores on vocabulary tests in English even if learners have been studying the language for some time. We can see this in research in several countries, Taiwan (Webb & Chang, 2012), Denmark (Henriksen & Danelund, 2015), an International school in Germany (Coxhead & Boutorwick, 2018), and with Chinese high school students (Sun & Dang, 2020). This research is

important because learners who are planning to study in English medium universities need to be able to read and listen to academic texts, and they need a solid basis of vocabulary to cope well. For a levels test of vocabulary from the 1st 1,000 to the 5th 1,000 words, see Webb et al. (2017).

Learners also need that base to cope with English language textbooks in high schools, as Sun and Dang (2020) demonstrate in their analysis of a series of widely used Chinese high school textbooks. One of the key findings from their research is that learners would need to know 3,000 word-families in English to reach 95% coverage of the vocabulary in their textbooks. According to Sung and Dang (2020), learners would need 9000 word-families to reach 98%. (Coxhead & Boutorwick, 2018) found that textbooks at Grade 8 (aged 12-13) in Maths required 8,000 word families plus proper nouns, compounds, and abbreviations to reach nearly 98%. More than 8,000 plus supplementary lists were needed to reach 94.62% for Grade 11 Maths, nearly 93% for Grade 8 Science and just over 96% for Grade 11 Science, In a recent study on vocabulary in Vietnamese high school English textbooks, Nguyen (2020) found that most of the reading passages had large numbers of new words for learners, few of these new words were important for text comprehension, and these words did not often recur in the texts. This study raises a couple of important questions for EAP teachers and learners. Firstly, if textbooks contain texts which learners will find difficult to understand because of the vocabulary, then as Nguyen (2020) says, learners would struggle to use strategies such as guessing meaning from context. It is very difficult to guess the meaning of an unknown word when it is in the company of many other unknown words. Secondly, repetition is important for learning vocabulary (see Nation, 2013), so if textbooks contain words that only occur once, learners are not likely to learn from texts. And finally, if high school textbooks require large vocabulary sizes in English, then what about university texts?

HOW MANY WORDS DO OUR LEARNERS NEED TO KNOW TO COPE WITH ACADEMIC ENGLISH?

One very useful avenue of research in recent years has looked at different kinds of academic texts, written and now also spoken, and how many word

families learners need to know to be able to cope with these texts. Dang and Webb (2014) investigated lectures and seminars and found that 4,000 word families were needed to reach 95% coverage and 8,000 word families were needed to reach 98%. Coxhead et al. (2017) found that 95% of laboratory sessions were reached at 3,000 word families and 98% was reached at 7,000 word families. This finding was similar at 95% for tutorials (3,000 word families) but lower at 4,000 word families for 98% coverage. A rough calculation of the vocabulary load of a 3.5 million corpus of academic texts (Coxhead, 2000) from the AWL study shows that the first 9,000 word families from Nation's BNC-COCA lists (2020) plus proper nouns, compounds and abbreviations cover around 95% of the corpus. This figure suggests that academic written texts require a much larger vocabulary than academic spoken texts, but it needs to be confirmed with a larger-scale, multidiscipline study.

FREQUENCY AND ACADEMIC VOCABULARY

One characteristic of academic vocabulary is that it can be high, mid or low frequency (Nation, 2016). It is important for at least two reasons. Firstly, if EAP learners are expecting academic words to be long, technical words, then they might not understand the importance and learning needed for high frequency words that are also academic. Secondly, most texts are mostly made up of high frequency vocabulary, including academic texts, so learners might not have much exposure to mid or low frequency vocabulary. Cobb (2000) points out that Anglo-Saxon vocabulary is vital for learners because it can account for up to 40% of the high frequency words in a written text, and accounts for even more in spoken English.

Because some words may be both academic and high frequency, learners might know words such as *significant* meaning *vital* or *important*, but not know that in statistics, *significant* has a specific meaning. Another example is *area* in Maths compared to everyday English. Learners may well think that they already know the meaning of a word, but they might have problems understanding a text if words are used with an extended or new meaning in a new subject area. Hyland and Tse (2007) investigated words from Coxhead's Academic Word List (AWL) (2000) and demonstrated that the effect that a subject area can have on the meaning of a word in

context. For example, they found that *credit* meaning 'acknowledge' occurred fewer times in their corpora of Science, Engineering and Social Sciences texts than when it means 'payment'. *Abstract* meaning 'theoretical' did not occur in their Engineering corpus, but the meaning 'précis/extract' did.

ACADEMIC VOCABULARY AND ENGLISH FOR GENERAL ACADEMIC PURPOSES (EGAP)

Another fairly recent trend in research is a division or categorisation of academic vocabulary into two main types: general and specific. English for General Academic Purposes (EGAP) vocabulary occurs across academic disciplines (Coxhead, 2020). This means learners will encounter these words in their studies, even if they are learning Biology, History, Business or Law. These words are 'not so common in other kinds of texts' (Nation, 2013, p. 291) and tend to be 'general' rather than specific, for example, *furthermore*, *research*, and *concept*. Word lists of English for General Academic Purposes include two lists based on written texts: Coxhead's (2000) AWL and Gardner and Davies (2014) Academic Vocabulary List. A recent addition is Dang et al. (2017) Academic Spoken Word List. Let's look briefly at all three of these lists, because knowing how word list developers have made their lists and what principles were employed, is vital for anyone who then decides to use a list in teaching and learning.

All three lists were developed based on academic texts which were made into corpora for computer-based analysis. The AWL (Coxhead, 2000) was developed from a corpus of 3.5 million running words across four disciplines: Arts, Commerce, Science and Law. The list contains 570 word families which cover approximately 10% of academic written texts, and the list is divided into 10 sublists. The first sublist contains the 100 most frequent word families, the second sublist contains the next 100 most frequent word families and so on until the last sublist, which contains the final 70 word families. The AWL is available at https://www.wgtn.ac.nz/lals/resources/academicwordlist; see also the EAP Foundation website for highlighting the AWL in texts and making gap fills:https://www.eapfoundation.com/vocab/academic/awllists/ Masrai and Milton (2018) developed an Academic Vocabulary Size Test based on

the AWL and found that knowledge of AWL vocabulary grows through stages of university study, from undergraduate through to MA and PhD. Versions of their test are downloadable from the *Journal of English for Academic Purposes* website. Two versions a test from Professor Paul Nation (Victoria University of Wellington), and two tests from Professor John Read (University of Auckland): a word association test and a context test. All tests have answer sheets and are available on the AWL website: https://www.wgtn.ac.nz/lals/resources/academicwordlist/academic-word-list-tests.

Gardner and Davies (2014) developed their Academic Vocabulary List using a 120 million word academic section of the Corpus of Contemporary American English (COCA) from nine subject areas: Business and Finance; Education, History, Humanities, Law and Political Science, Medicine and Health, Philosophy, Religion and Psychology, Science and Technology, and Social Sciences. The AVL was made 'from scratch', meaning that high frequency words that met the selection criteria for the AVL were included in the list. The AVL coverage of written academic texts is 14%, and the list is available in three formats: a word family list of 1991 words; a list of 3,015 lemmas; and a list of 20,845 word types. The website for the list is: http://www.academicvocabulary.info/. This website is really fantastic because it allows users to download the word list in various forms and to use an online interface (https://www.wordandphrase.info/academic/). This interface allows users to examine words from the list in academic contexts, show patterns of the words in use, and analyse texts using the AVL. See also https://www.eapfoundation.com/vocab/academic/other/avl/. There is now a test based on the AVL, developed by Pecorari et al. (2019). Two versions of the test can be found here: https://www.en.cityu.edu.hk/Vocabulary-Tests.

The Spoken Academic Word List (ASWL) (Dang et al., 2017) contains 1,741 word families and covers 90.13% of a 13 million word academic speaking corpus (and almost the same over a second academic spoken corpus). The ASWL may help learners to reach 92%-96% coverage of academic spoken English depending on their proficiency levels. The coverage of the ASWL is high over academic spoken English because there is a lot of high frequency vocabulary in academic spoken English. The list is

organised based on learners' knowledge of high frequency vocabulary and is available on a very useful website at https://osf.io/gwk45.

Coxhead and Dang (2019) investigated the coverage of the three academic word lists in their study of academic vocabulary in university tutorials and laboratory sessions. They found that the ASWL (Dang et al., 2017) covered 92.35% of tutorials and 90.58% of lab sessions, followed by the Academic Vocabulary List (Gardner & Davies, 2014) at nearly 23% over tutorials and almost 20% over lab sessions. The AVL coverage is not surprising because that list contains high frequency words in English, as you will remember. The AWL by Coxhead (2000) had the lowest coverage over tutorials (3.56%) and lab sessions (2.52%), which is again not surprising because items in the AWL had to occur outside West's General Service List of English words (1953).

ACADEMIC VOCABULARY AND ENGLISH FOR SPECIFIC ACADEMIC PURPOSES (ESAP)

Learners might not notice general academic words in texts, because they may be concentrating on the technical vocabulary of a subject area. That is, the vocabulary needed for English for Specific Academic Purposes (ESAP). This vocabulary is more technical than general in nature, is likely to have a close connection with the topic (and therefore be 'content-carrying') and is less likely to be known by people who do not know much about a subject. This vocabulary could make up to 20% to 30% of a field of study (Nation, 2013) and is therefore important for EAP learners and teachers.

There are more and more ESAP word lists appearing in journals and on websites. An example of such lists include science lists (Coxhead & Hirsh, 2007; It-ngam & Phoocharoensil, 2019), Medicine (Lei & Liu, 2016) and Engineering (Ward, 2009; Watson-Todd, 2017). For more on word lists for EAP students of Engineering in the Thai context, see Limgomolvilas et al. (2015). To identify vocabulary which is important in a discipline, for example in Science, It-ngam and Phoocharoensil (2019) used a corpus made up of research articles in 11subject areas, such as Chemistry, Biology, and Physics. The top ten items in their Science Academic Word List are *protein, species, acid, gene, mathematics, molecule, strain, matrix,*

ion, and *dense*. A similar approach was used for a Chemistry word list by Valipouri and Nassaji (2013) and Coxhead and Hirsh (2007) also investigated Science vocabulary from a corpus of 14 science subjects (the list is available here: https://www.wgtn.ac.nz/lals/about/staff/publications/Sci_EAP_sub_lists_Coxhead_and_Hirsh.pdf). Dang (2018a) presents recent research on vocabulary in the Hard Sciences (e.g. physics, chemistry, and biology) and see Dang (2018b) for a comparison of spoken academic lexis in the Hard and Soft (e.g. sociology, linguistics) Sciences.

The Ward (2009) study specifically aimed to help undergraduate Thai Engineering students whose English proficiency was not particularly high. Ward's Engineering word list contains 299 word types and it covers 16.4% of the words in the engineering textbooks which the students had to read for their studies (p. 179). The top ten words from Ward's list *are system, shown, equation, example, value, design, used, section, flow*, and *given* (p. 181). Many of these words are high frequency words in English, 188 are also in the most frequent 1,000 words in West's (1953) General Service List (GSL) of English, 28 are in West's (1953) 2nd 1000 list, and 78 are in Coxhead's (2000) AWL (p. 177). This word list demonstrates a very important principle for making word lists: it needs to be clear who the word list is for (Nation, 2016). The EAP Foundation website has subject-specific word lists. It is always important to know how a word list was made, why, and who the intended users were. Nation (2016) has a checklist for evaluating word lists and how they were made.

ACADEMIC MULTIWORD UNITS

Another avenue of research into the vocabulary of academic English involves investigations of multiword units. That is, words in strings that regularly occur together but not just by chance. Academic collocations are two-word combinations, such as *significant difference* and *basic function*. Two lists of academic collocations that have been developed in recent years are the Academic Collocation List by Ackermann and Chen (2013) and Academic English Collocation List by Lei and Liu (2018). An academic collocation test is being developed and trialled at the time of writing. Larger multiword units (three, four or longer strings) include the Academic

Formulas List (Simpson-Vlach & Ellis, 2010) which contains 607 formulas: 207 in written and spoken texts, and 200 each in written and spoken only. The AFL can be found at: https://www.eapfoundation.com/vocab/academic/afl. Texts can be uploaded on that site and the formulas in the text can be highlighted. Four word lexical bundles (e.g. *on the other hand, on the basis of, the end of the, as a result of*) (see for example, Biber, 2006; Biber et al., 2004; Hyland, 2008) are another kind of academic multiword unit. Simpson-Vlach and Ellis (2010), Biber et al. (2004) and Hyland (2008) categorised the multiword units into functions, for example, comparison and contrast or discourse organisation in texts.

WORD PARTS AND ACADEMIC VOCABULARY

Many general and specific academic words have Greek and Latin roots. Coxhead (2000) found that 80% of the Academic Word List was Greek or Latin in origin. Some languages, such as Italian, have Latin roots, which means that Italian EAP learners have an advantage over learners whose first language does not have Latin roots. Word parts usually have a meaning and can be quite easy to spot at the beginning of words, such as *anti* (against), *semi* (half), *co* (with) and *dis* (not). In my experience, EAP learners enjoy learning word parts and their meanings, because this aspect of vocabulary is tangible, and it helps them with word attack skills. I often used to ask students to find prefixes in words and how they changed the meaning of a word. There are plenty of lists of word parts on the internet, with word parts, their meanings and example words, but we need to be careful to not overwhelm students with lots and lots of prefixes at once, but rather introduce them (by frequency if possible) steadily into class and revise them often. Some word parts, such as *able* (e.g. *loveable*) are more frequent than others and can be quite easy to find. We also need to be careful not to choose word parts that look the same to learners, because they can be very easy to mix up. Be careful also to make sure learners' attention is drawn to word parts that appear in classroom texts. The Word Part Levels Tests (Sasao & Webb, 2017) are available at: http://ysasaojp.info/testen.html.

CONCLUSION

A great deal of effort, time and expertise has gone into vocabulary research in academic contexts and for academic purposes over the last twenty years, and much more than this article could ever cover. At the heart of this research has been a desire to help second language learners prepare for higher education in English. There has also been a strong desire to support EAP teachers with practical tools including word lists, tests, and investigations into the nature of academic vocabulary and multiword units. Perhaps this desire to help comes in part from researchers also being teachers themselves, and perhaps it also comes from teachers seeing a need and trying to meet it. There is much more to be done, and if the next 20 years are as fruitful and interesting as the last 20 have been, then the future looks bright indeed.

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