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The Roles and Availability of Specialized Word Lists in EAP Learning and Teaching for Thai Engineering Students

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Abstract

Many word lists have been created in the past decades with different purposes to fit the target market and needs. This paper explores the availability of word lists in English for academic purposes and the possibility of applying word lists in the Thai context, especially for engineering students. Apart from reporting on the brief details of the word lists, which include which corpus it was based on, the method deployed, and the possible applications of the word list, the author discusses the similarities and differences of particular word lists and also how applicable these word lists are to Thai engineering students, with a focus on second language learning. Some suggestions are discussed regarding what requirement should be added in order to facilitate students' learning.

1. Introduction

Many studies have indicated that engineering graduates cannot communicate in English as well as employers expect (Riemer, 2002). This can lead educators to investigating the learning process and content being taught. If a lot of grammar rules are taught and explained to learners in detail, their overall performance might improve a little; however, if learners are presented with vocabulary, it can result in much improvement (Thornbury, 2005). Emphasizing on increasing the learner's vocabulary is part of the language teaching that teachers should pay attention to; nonetheless, equipping learners with the vocabulary needed involves some difficulties. Considering the people involved in the process, the problem affects both instructors and students

The second problem occurs with students as they may have trouble reading English textbooks and producing their own writing in English. Some learners may find it difficult to guess the meaning of unknown vocabulary from the context, especially when they do not have much background in or understanding of that specific issue (Nation, 2001). Even though techniques in reading for contextual cues are taught in the classroom to help learners read faster, learners should put effort into exploring new vocabulary on their own (Nation, 2001). The techniques for reading comprehension can be applied to external reading, reading that does not involve English classroom assignments. In this case, the target is to obtain new vocabulary and apply it as a tool in the next step of learning. This is similar to the idea or reading to learn (Ediger, 2014) as the reader can learn more vocabulary while he or she is reading and later on use it to deal with the new content, thus leading to self-learning.

A large vocabulary bank is good not only for reading but also provides solutions to English learners in terms of writing. According to Martinez et al. (2009), graduates and researchers in Latin American countries have received some pressure to publish their work in English and not in Spanish as they had done in the past if they want to receive funds and career advancement. For these specialists, their problem is not the content but the language. The ambiguity of which word in their native language refers to which word in English can be solved through the use of word lists. Specialized word lists can be used to help them write a paper with more confidence as the word lists are provided as a guideline. This idea supports what Kastenhofer et al. (2010) has added that specialized word lists can support engineering staff and support them in their research. Some instructors can be affected by the low-level of students' vocabulary size (Ward, 2009). In order to assist both EAP instructors and engineering students, this paper aims at exploring the role of specialized word lists in EAP teaching and learning and the availability of specialized word lists, especially in the engineering field.

2. Word List Overview

Most people believe that the number of words needed for English learners to communicate with others is about 2000, which is close to the number that English native speakers use in their daily life (Thornbury, 2005). This means that if the instructor can supply the English learners with the essential 2000-word list, the learners will probably be ready for communicating in English. That is the case of regular English learners. Undergraduate students would of course need to have a greater word bank ready for use. Many researchers believe that undergraduates would need about 20,000 words in order to accomplish their educational goals (Nation, 2001). However, a question remains: What kind of word list we can rely on?

Many word lists have been compiled since the first famous General Service List was published in 1953. Different categories of word lists were provided to suit the teachers' needs. However, only word lists that are relevant to the learning of engineering students are discussed in this research. Some of them might not be specifically made for this research purpose, but they provide background information on to how word lists were developed since the very beginning. As the focus of the paper is on vocabulary for engineering students, the word lists mentioned would concern such group. The word lists selected are divided into two categories; word lists for general academic purposes and word lists for engineering purposes. Additionally, some of the important reasons why the current word lists were created will be discussed.

Most word lists are comprised of a list of words that are used with high frequency together with the frequency rate. Some word lists may provide further information on the meanings of the words and their collocations. Categorized into two, the next section presents information concerning the important and relevant word lists, arranged according to the time they were developed.

Word Lists for General Academic Purposes

General Service List of English words (GSL)

Michael West published the GSL in 1953. This word list stems from a reissue of the Interim Report on Vocabulary Selection (Faucett, Palmer, Thorndike, & West, 1936), when two conferences were held to accumulate the word corpus from academics in the UK. The list is based on a 5-million word corpus (Gilner, 2011) and contains about 2000 words that are used in daily life with the frequency count stated. The list was designed to group the words according to their lemmas, which allowed the words within the same word families to be included under the same category. The list also provided the frequency of each word in terms of percentage, meaning, and included example sentences. The example of the word "care" in the GSL is shown.

Picture 1: An example of the original printed GSL

CARE 1134e

care, n. ? [(1) *(anxiety; rather literary)*
Cast all your cares aside
The cares of office **14%]**
(2) *(caution)*
Take care, or you'll fall **22%**
(3) *(responsibility)*
Take care of the baby
Take great care of it; it's glass
In his care
J. Smith, care of Mrs. Jones, 22 High St. **25%**

care, v. (1) *(feel anxious for)*
He cares only for his own interests (4%)
I don't care! I don't care what you do (7%) **11%**
(2) *(idea of responsibility)*
The child has been well cared for **8%**
(3) *(wish—usually in questions, negatives, or hypothetical)*
Would you care to read this?
Do you care to come out for a walk?
I don't much care for dancing **14%**
? [(4) *(love)*
Does she really care for him? **2.4%]**

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careful, adj. 244e A careful person; careful work; be careful not to break it **97%**

careless, adj. 102e A careless worker; careless work **94%**

The University Word List (UWL)

Xue and Nation developed the UWL in 1984 by combining the word lists from five different sources, as shown in the table (Xue & Nation, 1984). Most of the words were derived from two sources:

Table 1: Sources of the University Word List

Word Lists Entries	Words included in the combined list
500 most common words in the Campion and Elley list	323
The Praninskas list	291
The 3,200 word list in Campion and Elley list	64
The Lyon list	54
The Ghadessy list	5
Total words	737

1. The Campion and Elley list is a part of the entrance exam for international students that wish to study in New Zealand. This word list was created from the corpus which contained 301,800 words from research and exams.
2. The Praninskas list was built for university-level students that were not learning English as a first language. The word list was based on a 272,466-word corpus, which was compiled from 10 textbooks used to teach 1st year students.

Table 2: The twenty most frequent words in UWL

A	
abandon	accurate
abnormal	achieve
absorb	acid
abstract	acquire
academic	adapt
accelerate	adequate
access	adhere
accompany	adjacent
accomplish	adjective
accumulate	adjust

Originally, the number of words in the UWL was 737, considering only the lemmas. Table 1 shows a list of the twenty most frequent words.
Table 3: The twenty most frequent words in sublist 1

Sublist 1	
alternative	conclude
analyse	consist
approach	constant
arbitrary	construct
assess	context
assign	criterion
assume	data

Sublist 1		
	compensate	define
	complex	donate
	concept	derive

The UWL divided the words into ten groups according to their usefulness. The first group, which was called sublist 1 was believed to be the most relevant for those that were staying at the university level. The words in each group are listed alphabetically as shown in Table 3.

Academic Word List (AWL)

Developed by Averil Coxhead in 2000 as a part of her Master of Arts thesis, the AWL contributed mainly to English teachers. It contains 570 words, as Coxhead excluded the words that were listed in the GSL to make the list purely academic. The rule for selecting the words was that their occurrences had to be found over 100 times in a 3.5-million word corpus derived from 4 academic fields: arts, commerce, law, and science. Similar to the GSL, the words in the AWL were generated through the use of headwords (Coxhead, 2000). However, Coxhead could only provide the word list in alphabetical order together with the frequency categorized into 10 sub-lists, beginning with the first sub-list with the most frequent words to the tenth with the least frequent words. An example of the AWL is shown below while more information can be acquired from her article.

Table 4: The twenty most frequent words in AWL

A	Word	Frequency group	Word	Frequency group
	abandon	8	acquire	2
	abstract	6	adapt	7
	academy	5	adequate	4
	access	4	adjacent	10
	accommodate	9	adjust	5
	accompany	8	administrative	2
	accumulate	8	adult	7
	accurate	6	advocate	7
	achieve	2	affect	2
	acknowledge	6	aggregate	6

The words are listed alphabetically with the frequency group to indicate the order to be learnt. As seen above, the word ‘achieve’ is categorized into group 2 while the word ‘abandon’ is in group 8 meaning that ‘achieve’ should be taught to students before ‘abandon’.

A New General Service List (NGSL)

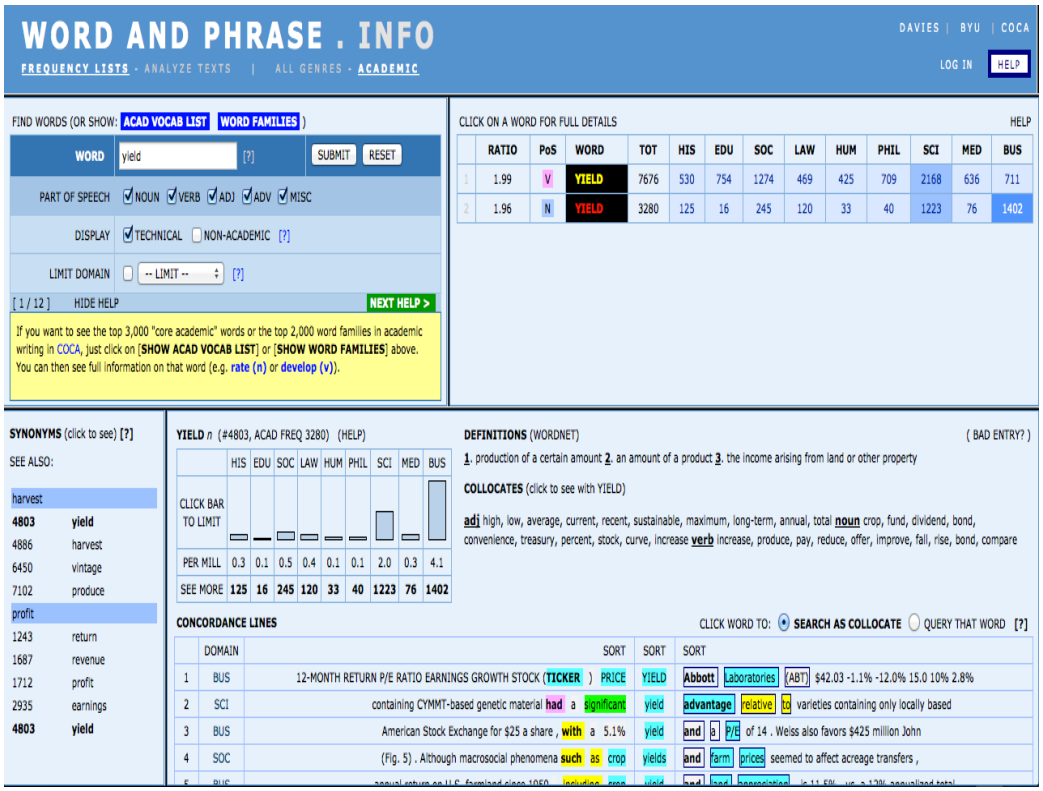
As the GSL was used over fifty years, some people believed that language use has changed over time and that the list should be updated or a new list should be made (Gardner & Davies, 2013). A push for a more current version came in 2013. This word list was an

updated web version of the GSL accomplished through the collaboration of Paul Nation, Charles Browne, Brent Culligan, and Joseph Phillips. It was based on a 273-million word corpus and was last updated on April 4, 2014. The corpus used in the study is a part of the Cambridge English Corpus, which accumulated spoken and written forms of British and American style. Similar to the GSL, and headwords and frequency were presented. This word list is comprised of 2,801 words and can be downloaded from http://www.newgeneralservicelist.org/, which provides not only the wordlist and its definitions but also level tests, quizzes, and related research.

Academic Vocabulary List (AVL)

Allowing the user to access the word list through the website by typing the word in the program, AVL seems to be the most equipped word list for English instructors. This online interface word list was developed by Dee Gardner and Mark Davies in 2013. It contains 3,000 lemmas and 2,000 word families (Gardner and Davies, 2013). The display of the program, as shown above, provides information about the words, considering the definition, frequency, collocation, examples of collocation, and synonyms. One feature that makes this word list different from the others is that it presents the frequency statistics of the word according to nine listed fields, which are History, Education, Social Science, Law and Political Science, Humanities, Philosophy, Religion and Psychology, Science and Technology, Medicine and Health, and Business and Finance. In addition, the program provides a huge amount of examples of collocations, which for some words can be up to 200 examples. If the users do not want to use the online program, the AVL can be downloaded as well.

Picture 2: An example of the AVL web page



Word Lists for Engineering Purposes

Student Engineering Word List

The Student Engineering Word List was developed by Olga Mudraya in 2006 using WordSmith Tools to calculate frequency and to come up with a list of 100 words. This study compiled a specialized word list from the Student Engineering English Corpus (SEEC) with the aim of facilitating learners in the engineering field as the researcher had experienced problems when teaching engineering students at Walailak University in Thailand. The words found were compared to the BNC corpus. Mudraya listed words according to their frequency of use and also suggested how word lists can be applied in the classroom.

Table 5: The twenty most frequent words in Student Engineering Word List

Word	Frequency	Word	Frequency
use	10,313	equation	5771
force	9247	point	5236
form	7075	angle	4923
flow	7045	act/react/interact/transact/counteract	4666
pressure	7016	velocity	4614
show	7002	system	4540
determine	6896	value	4484
figure/configure	6650	apply	4327
section	6404	problem	4278
line	5812	work	4198

Basic Engineering List (BEL)

Jeremy Ward (2009) developed the BEL in 2011. It was based on a 271,000-word engineering corpus, which was taken from roughly 10,000 words in five engineering textbooks used by third and fourth year engineering students at Suranaree University of Technology. The list contains 299 words. With the help of engineering instructors, the researchers obtained the corpus from random pages in suggested engineering textbooks.

Table 6: The thirty-two most encountered words in *BEL*

No.	Word	Frequency	Word	Frequency
1	system	924	determine	502
2	shown	853	time	500
3	equation	758	figure	476
4	example	643	using	450
5	value	568	model	430
6	design	564	rate	413
7	used	555	force	399
8	section	532	table	396
9	flow	529	control	388
10	given	507	number	384

ETWL (Engineering Technology Word List)

ETWL was developed by Ng Yu Jin, Lee Yi Ling, Chong Seng Tong, Nurhanis Sahiddan, and Alicia Philip in 2013. Using two programs, WordSmith Tools and Range, they

generated 313 words that did not include the words from the GSL or AWL since they wanted to make certain that this word list would represent the engineering field because the words in engineering technology are used widely in every engineering field (Ng et al., 2013). The researchers based the list on two vocational textbooks prescribed by the Malaysian Ministry of Education. The ETWL was comprised of words alphabetically listed with no frequency stated.

Table 7: The twenty most frequently-used words in ETWL

Engineering Technology Word List	
actuator	analogue
actuators	antenna
adhesive	anvil
adhesives	anvils
adjustable	arc
alloy	architect
alternative	archi
ampere	armature
ating	asbestos
analog	audio

3. Discussion

If the aim of language educators is to engage engineering students in life-long learning, the courses introduced to them should provide fundamental knowledge, and this can begin with technical words (Kastenhofer et al., 2010). Engineering students should be supplied with specialized words before applying them in real situations (Kastenhofer et al., 2010). Of course, it is not easy to remember words that do not occur frequently in everyday English (Ng et al., 2013). Although technical words occur frequently in specialized textbooks, this does not mean that the learners will be able to remember the meaning of the words just from reading them (Nation, 2001). In addition, vocabulary leaning should be accompanied by clear explanations, which is a role that the word lists can play (Nation, 2001).

Research on the difficulty in reading English engineering textbooks by Malaysian engineering students claims that new vocabulary is introduced with every 7-9 words (Ng et al., 2013). This means that if the word list is presented beforehand as a guideline or is taught in class, the students might have less difficulty comprehending the reading. Some people may argue that specialized word lists may not be essential for learners as they will finally learn the vocabulary from their courses. It is true that during the students' program, they will gradually learn the vocabulary on their own or after they have studied some courses in their specific field. In fact, some learners may achieve their essential vocabulary goals by the time they finish their bachelor degree. Thus, using word lists might not be useful for them since the specialized vocabulary is a part of their academic field. However, the point of word list applications goes beyond that. Specialized word lists can be used as fundamental knowledge for learners to get them ready for future courses apart from their current English class (Shamsudin, Husin & Manan, 2012). Students can feel prepared when attending the class or feel comfortable when they are assigned to read an English engineering textbook if they are equipped with help from word lists of unknown words. In addition, their engineering courses

can be taught more quickly if the students have already acquired the concepts before class. Instead of spending time in the classroom asking about the concept of some terms, the students and teacher can spend time discussing interesting issues that might come up during classes. As a result, word lists might help enhance the quality of the discussion in class.

While many word lists are available for use online, instructors should carefully consider finding appropriate word list for students. If a word list is too general and does not focus on any specific field, building it would not help the students (Ward, 2009). Creating an appropriate word list would involve identifying the aims of the course and the targeted students. Two word lists that are the most relevant to the present author's field of interest, engineering, are the BEL and AWL. In order to investigate what current engineering word lists can provide us, a comparison of their similarities, differences, and application to Thai engineering students is made as follows.

Similarities

When comparing the two word lists, it was found that they share some similarities in terms of the method of creating the word lists, which were using engineering textbooks and corpora, being based on local use, focusing on raw words, and having no meaning and collocation given. According to Martinez et al. (2009), the word list should be generated from the context in which it is being employed. In the case of the BEL and ETWL, both of their researchers set their goal on producing a specialized word list for the engineering field; they used only engineering textbooks and corpora in searching for words used with high frequency. Furthermore, both the BEL and ETWL employed the same method in selecting high frequency words, which was focusing on raw words. For example, in the BEL, as shown above, the different forms of the word "use,"—using, use, and used—were listed among the first 30 high-frequency words. Similar to the ETWL, the top high frequency words were listed as an individual category, although their differences were only in terms of plurality and part of speech. One additional resemblance the two word lists shared was that they only offered words with their frequency record, but no meaning or collocation was given. Every word in the BEL was followed by its frequency number. The reason for such a result of the BEL stems from the fact that the purpose of the study was only to find the high-frequency words, which was similar to the ETWL except that the ETWL researchers did not include the exact number of the frequency of the words and they arranged the words alphabetically. The ETWL researchers also identified a source from which the user could find definitions of the terms.

Differences

In the present author's opinion, the BEL is similar to the AWL since it did not exclude the AWL list from its research. Instead of representing a list that was considered to be specialized in their field, the BEL listed mostly general academic words. This may have been because the author wanted to cover all of the engineering fields, which are chemical, civil, electrical, industrial, and mechanical. Despite the fact that they were parts of the engineering field, the high-frequency words that they all shared did not suggestively distinguish them from other academic fields or academic word lists. In this way, most of the high-frequency words in the list fell into the category of general academic words, as shown above, and the words were listed according to their frequency, beginning with the highest in the left column to the lower frequency in the right column.

Although the BEL corpus was taken from the textbook of third- and fourth-year engineering students, most of the words listed tended to be the same as in the AWL. If the BEL and AWL are compared side by side, not much difference can be found between them. This means that instead of giving the engineering learners the BEL list, the AWL can be given interchangeably. This problem may lie in the corpus from which the words were selected and also the fact that the researcher did not exclude words in the AWL.

Table 8: Summary of similarities and differences between BEL and AWL

	BEL	AWL
Similarities	- Local textbooks use - Focus on raw words - No meaning, frequency number and collocation given	
Differences	- Include AWL - Listed according to frequency	- Exclude AWL - Listed alphabetically

The two engineering word lists have shown some interesting points in terms of the method they were based on and the reasons for obtaining the frequency. Even if these two word lists were made for the engineering field, the present author believes that it is better to develop a new list that is user friendly and one that fits Thai engineering students in terms of their specialized field, providing lemmas and word families, collocations, defining the meaning in both English and Thai, and providing pronunciation in Thai. These factors were chosen from what the Nation (2001) suggested concerning what is required to know a word, that is, meaning, frequency, connotations, register, collocations, derivations, grammatical behavior, the written form, and the spoken form of the word. An example of an information chart of a word that provides all of the categories that the Nation (2001) specifies is shown above.

Picture 3: A picture of suggestions for a word-list application for Thai engineering students

First of all, each specialized word list is different depending on each individual's interest, work, and environment (Nation, 2001). Focusing on a specialized field allows the researcher to find out the words that are relevant and that are frequently used in that field. An example of a successful high-frequency word list, which is relevant to the specific field, is the ETWL. Second, word lists that would be perfect for Thai engineering students should separate lemmas or headwords when selecting the words frequently used. The lists obtained in the BEL and ETWL came from the raw word method, and it is believed that this does not indicate any important significance in terms of the usage of the word. In other words, the BEL and ETWL do not present "real" high-frequency words. The results of both word lists contain many same words that vary in singular, plural, past-tense and –ing forms. This is due to the process of word selection that did not extract words from the same family. Though Ward (2009) has argued that learning and remembering words should be done as a whole and that lemmas should not be used in developing a word list due to learners' low English proficiency level and insufficient vocabulary knowledge, it is the intention of the author to have Thai engineering learners acquire words as headwords in various contexts rather than rote learning on a set of words. However, lemmas can encourage life-long learning as students can base the meaning on root words and develop cues to the meaning of new words.

The next option that should be added to Thai engineering word lists is providing collocations. The focus of learning additional vocabulary should not be on new words only, but also on learning known words with different concurrences (Woolard, 2000). Presenting collocations to the learners can help explain the meaning and especially how the word is used (Lewis, 2000). Collocations can help the learners form a strong vocabulary base in terms of meaning and usage (Durrant, 2009). In other words, collocations can offer users more ideas about how words can be used in other contexts or with other words with a similar meaning.

Defining the exact meaning of words should be included in the word list to make learning easier for Thai engineering learners. If no meanings are given, students will have to look for the meaning on their own and the chance of applying words with a distorted meaning can occur. In that case, providing them only with a word list might not be as useful as expected but will jeopardize their understanding if they learn the wrong meaning. However, definitions should be readily available both in English and Thai. This can confirm the proper definition for weak students who cannot comprehend the meaning of the words in English alone.

Last, the system of English pronunciation is not akin to the Thai language, which has specific rules for how each written vowel should be pronounced. . In our opinion, language teachers should teach the students to read the International Phonetic Alphabet (IPA), which is used widely where each alphabet represents the sounds of Spoken English. Basically, dictionaries have both American and British pronunciations which may help the students understand both standard ways when pronouncing words. Based on our experience as teachers and students, we experienced some difficulties at the beginning because the IPA phonetic symbols look alien to us. But after one or two sessions of training, we felt at ease and able to read them fluently. Thus, correct pronunciation is achieved accordingly. On the whole, we believe that we have been equipped with learning skills resulting in life-long learning. Pronunciation using Thai spelling is then recommended if any future studies aim to develop specialized word lists for Thai engineering students.

4. Conclusion

Many studies have created a corpus and a high-frequency word list in order to facilitate second language learning. This paper focuses on the word lists developed for academic, engineering in particular. The required elements for knowing the words were discussed with a consideration for the Thai context. The suggested categories for specialized word lists for engineering students might not be exactly what Thornbury (2005) recommended; however, it is believed that the list will be important enough for Thai engineering students. There is an opportunity for further investigation of the history of word lists in other fields. Any future research on developing specialized word lists that fit the Thai context might consider the factors mentioned in this review.

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