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From the Editors

Investigating the technical vocabulary of Plumbing

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ABSTRACT

Knowledge of a trade such as Plumbing involves understanding and use of its technical vocabulary. Trainee plumbers need support for the development of their language as they grow in their knowledge of their profession, and yet little is known about this vocabulary. This article reports on the challenges of dealing with technical vocabulary from the point of view of tutors in a polytechnic in Aotearoa/New Zealand, and analysis of a written corpus (565,881 running words) and a spoken corpus (133,093 running words) of Plumbing developed at the same institution. Technical vocabulary was identified from the written corpus, using frequency principles, a semantic analysis of a rating task for tutors, and checking the corpus and technical dictionaries. A word list of Plumbing was developed, along with a list of technical abbreviations and another of proper nouns. The Plumbing word list covers over 30% of the written corpus and just over 11% of the spoken corpus. Nation's (2012) BNC/COCA frequency lists were adapted and a vocabulary load analysis found over 8,000 word families plus supplementary lists for 98% coverage of written and 5,000 word families plus supplementary lists for spoken Plumbing texts. The article ends with suggestions for pedagogy and suggestions for future research.

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1. Introduction

Research into specialised or technical vocabulary has focused primarily on producing word lists of technical vocabulary in professional fields of expertise in English for Specific Purposes (ESP), such as Nursing (Yang, 2015), Engineering (Hsu, 2014; Ward, 2009; Watson-Todd, 2017), Medicine (see Hsu, 2013), university level study in English for Academic Purposes such as Science (Coxhead & Hirsh, 2007; Coxhead & Quero, 2015), general academic vocabulary (Coxhead, 2000; Gardner & Davies, 2014), and Middle School vocabulary (Greene & Coxhead, 2015). Word lists can be used to help identify the vocabulary needed by particular language learners, set learning goals, estimate the vocabulary load of a text or corpus (how many words are needed to be able to comprehend the text in reading or while listening), and find out more about the nature of specialised vocabulary in a field (Nation, 2016).

This extensive work is important, but there are several key reasons for focussing on technical vocabulary in the trades. Firstly, ESP research has contributed to academic, occupational and professional fields, but trades education has received little attention so far (Coxhead, 2000). Secondly, the research reported here took place in Aotearoa/New Zealand, where English language skills are important for all trades learners, but they are also important in English as a second or foreign language contexts. In Tonga, for example, trades instruction is based on English language materials from New Zealand and Australia

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(Coxhead, Demecheleer, & McLaughlin (2016)) and a study by Ababneh and Al-Momani (2011) in Jordan suggested trades-based learners had weaknesses in their lexical and grammatical knowledge and reading skills in English. Finally, workers who are educated in the trades report a willingness to move internationally, according to a survey of 200,000 people in 189 countries (Strack, Booker, von der Linden, & Strohmayer, 2014) and English-speaking countries were seen as attractive destinations.

This article investigates technical vocabulary in a specialised domain, Plumbing, from several perspectives. One perspective comes from tutors of Plumbing from a Polytechnic in Aotearoa/New Zealand who were interviewed about technical vocabulary and the needs of their students, and asked to provide their expert opinions on whether lexical items from a corpus of written texts from their courses were technical or general. A second perspective comes from an analysis of the vocabulary loads of written and spoken corpora of Plumbing. A final view of Plumbing vocabulary comes from the development of a technical word list of Plumbing and a subsequent analysis of the coverage of this list specialised corpora and other corpora. This study provides some insight into how large a technical vocabulary of Plumbing might be. Note that in this article, 'technical' and 'specialised' are used as synonyms.

2. Literature review

2.1. Learning in the trades

Learning in the trades, according to Chan (2017), involves observation, imitation, repetition, and seeking opportunities to ask questions and gain feedback. A study of language in the trades therefore ideally needs to include both written and spoken language to take into account what Gamble (2016, p. 223) refers to as *situated* (unwritten; procedural or 'how to' knowledge; craft knowledge, including visual images) and *formal* (written; codified; scientific) elements of knowledge. Parkinson and Mackay (2016) investigated formal knowledge development in their work on the literacy approaches of carpentry tutors and further research investigated how learners learn to write like a builder (Parkinson, Demecheleer, & Mackay, 2017). To the best of our knowledge, only one study has focused on identifying technical vocabulary in the trades (Coxhead et al., 2016), also in Carpentry. In that study, interviews with tutors and students in Carpentry were carried out. Coxhead et al. (2016) found that one of the main challenges of technical vocabulary in the trades was the heavy load on listening for learning in courses. Another challenge was that the words in Carpentry could be quite unusual, for example *soffit*, and learners found these lexical items difficult to spell and remember. Students reported that support for vocabulary learning in Carpentry was provided in context by tutors, which helped with remembering technical vocabulary and its meanings. One student reported:

Probably just like the tutor like draws out on the whiteboard and then like write a plan ... you know...what to do next. On the way, there will be new words but they, the tutor, use pictures to explain what is it, where does it go, so you know what, where does it go in between. If it is a stud, is a normal stud. A dwang is horizontal and the the studs are verticals so within the frame ... yea...within the frame there are studs and dwangs supporting...yea...supporting the studs.... So you know its function....yea...you know the dwang's function...yea...

(Coxhead et al., 2016, pp. 46–47)

These insights from students help with understanding the challenges of learning in Carpentry. This article focuses on several tutors' perspectives on technical vocabulary in Plumbing to help understand what they see as challenges of this vocabulary in their teaching.

2.2. Technical vocabulary

Technical vocabulary has several important features. By nature, technical vocabulary belongs to a narrow area of language (Nation, 2008). In Plumbing, words, such as *niting*, *sparge*, and *mercaptan*, are very unlikely to be known by people who are not plumbers. That said, some technical words may well be shared with related trades, such as Carpentry, and have the same technical meaning. Some everyday words in English can have a technical meaning in a particular field, such as *plant*, *bulb*, and *baffle*. Also, proper nouns, abbreviations and compounds might also be technical items in Plumbing and they need to be taken into account when considering the technical vocabulary of a trade.

Technical vocabulary can make up a large proportion of the words in a text. Chung and Nation (2004) analysed the technical vocabulary in an Anatomy textbook and an Applied Linguistics textbook. They found that roughly one word in three (30%) of the vocabulary in the Anatomy textbook and one word in five (20%) of the Applied Linguistics textbook was technical. Some of these technical words will occur more often than others, which is an important consideration for learning and teaching. Nation (2013) advocated learning high frequency words first because they give greater return for learning; that is, these words have a high 'surrender value', a concept that was adopted from insurance and used by early English language teaching thinkers Harold Palmer and Michael West (see Howatt & Widdowson, 2004). An important point about frequency and technical vocabulary arose in a translation study by Coxhead, Parkinson, & Tu'amoheloa (2017), who found that high frequency technical vocabulary in Tongan were more likely to be Tonganised (e.g. *coil/koila*; *sewer/sua*) than low frequency vocabulary which require glossing (*effluent/vai 'uli 'oku fakatafe ki tu'a*/dirty water drain out).

Peters and Fernández (2013, p. 240) identified three main categories of technical vocabulary in self-report data from 110 Spanish students studying architecture. The students identified up to 20 words from their academic reading that caused them to reach for a dictionary. The categories were: architecture and building systems terms (Type A), e.g. *cladding* and *duct*;

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