CHAPTER TWENTY ONE

Researching Vocabulary

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Vocabulary has become a well-researched area within second language studies, with particular research interest in investigating key questions which could inform the vocabulary learning and teaching process. This chapter will highlight the main lines of inquiry which vocabulary research has to take account of, present research methods and tools associated with good vocabulary research, discuss some key challenges facing vocabulary researchers and conclude by presenting a study which aimed to take account of some of these issues.

Current thinking and related research

This section looks at some of the dominant themes and related studies associated with current thinking in researching vocabulary.

Determining what a word is

A suitable place to begin a discussion of important thinking and research in vocabulary studies is to look at what is a *word*. The current thinking is that words are, from a teaching and learning perspective, most suitably treated as *word families*. A word family is a group of word forms derived from a core word and conveying a core meaning or meanings. Researchers need to deal objectively with what constitutes a word family. Bauer and Nation (1993) provide guidelines for determining word family membership

in the form of commonly occurring, productive and regular inflexed and derived forms which a language learner could reasonably be expected to recognize when applied to a word they already know. The guidelines would group *contribute*, *contributes*, *contributed*, *contributing*, *contribution*, *contributions*, *contributor* and *contributors* into one word family. Examples of some commonly used inflexed and derived forms appear in Figure 21.1.

Inflexed forms	Derived forms	
-- s	un --	-- ity
-- ed	pre --	-- ness
-- ing	anti --	-- ful

FIGURE 21.1 *Common inflexed and derived forms (Bauer & Nation 1993, pp. 253–279)*

Schmitt and Zimmerman (2002) tested the extent to which knowledge of one member of a word family facilitates easy recognition of other members of the family, with a particular interest in productive uses of words. They found that knowledge of other word family members was linked to familiarity with derived forms and that knowledge of derived forms increased with general language proficiency. Mochizuki and Aizawa (2000) were similarly interested in knowledge of affixes (synonymous with derived forms here) and found moderate correlations between the vocabulary size of second language learners and their knowledge of prefixes (0.58) and suffixes (0.54).

Conditions for vocabulary learning

Another major issue for vocabulary researchers is how words are learnt. There is some contention regarding the merits of direct learning of vocabulary as opposed to incidental learning, where the learning is not deliberate but rather through exposure to and use of language. The backdrop for this debate is studies which have examined conditions which promote vocabulary learning and strategies that enhance vocabulary learning and retention (see Laufer & Hulstijn 2001). The debate over the merits of direct learning will continue, with recent research indicating that direct vocabulary learning can be an effective means of vocabulary learning (see Elgort 2013). Nation (2001) sees an important role for both incidental learning and direct learning of vocabulary in second language programs and makes the important point that, in both cases, the quality of learning is dependent upon what happens when a new word is met.

Nation (2001) has identified three key conditions which increase the quality of vocabulary learning in the case of direct learning. These are *noticing*, *spaced retrieval* and *generative use*. *Noticing* highlights the need for the learner to focus on a new word as a specific language learning goal; *spaced retrieval* highlights the value of recalling the new word's meaning at a later time; and *generative use* highlights the importance of using a newly learned word productively in writing or speaking. Following this line of inquiry, Godfroid, Boers and Housen (2013), using head-mounted eye-tracking equipment with twenty-eight female Dutch-speaking participants, showed that unknown words received more attention than known words.

The quality of both incidental and direct vocabulary learning are conditional on the amount of learner involvement while processing words. Laufer and Hulstijn (2001) have identified three key dimensions which have been linked to learner involvement during incidental vocabulary learning. They are *need* (motivational need to use a new word), *search* (attempt to find the word meaning or form) and *evaluation* (comparison of the new word with known words). The themes of *learner involvement* and *deep processing* are frequent in studies of vocabulary learning and are evident in Laufer and Hulstijn's (2001) *Involvement Load Hypothesis*, which states that the effectiveness of word retention is dependent upon the amount of motivation and cognitive loading associated with the task in which words are learnt. The hypothesis builds on studies such as Newton (1995) which investigated the effect of negotiation of word meaning in group interactive tasks; finding negotiated words were retained better than words not negotiated; and Joe (1995) who investigated the effect of generated use of new words in learner language, finding that generated words were retained better than words not generated.

In related research, Kim (2008) investigated the effect of different levels of task- induced involvement on initial word learning and subsequent word retention and found that tasks which had higher levels of learner involvement resulted in improved initial word learning and improved word retention. Following a similar line of inquiry, Min (2008) investigated the impact of reading and vocabulary-focused activities on vocabulary learning and retention, finding that tasks that induced higher involvement loads resulted in enhanced vocabulary learning and thus greater vocabulary gains over time. More recently, Lee and Hirsh (2012) provided scientific evidence that tasks seen as inducing lower involvement load (such as multiple-choice questions) can result in more effective vocabulary learning and vocabulary retention than tasks seen as inducing higher involvement load (such as sentence writing) in certain learning contexts. This particular study was carried out in a university setting in Taiwan.

Categories of words

Another major issue in vocabulary research is how words are categorized into groups. Not all words are equal when it comes to language use, with common distinctions made between *high frequency* words, *academic* words, *technical* words and *low frequency* words. The 2,000 most frequently occurring words in English, termed high frequency vocabulary, are regarded as critical for communication in English. They provide 90 per cent lexical coverage (the percentage of word occurrences used from this list) of conversation (Nation 2001); up to 90 per cent coverage of fiction (Hirsh & Nation 1992) and about 80 per cent coverage of newspapers (Hwang & Nation 1989); and are widely accepted as the starting point for second language vocabulary learning.

Beyond high frequency words, research has focused on specialized groups of words. Academic vocabulary occurs frequently in academic texts across a range of subject areas. Technical words are associated with specific subject areas. A further category, low frequency words, is a default term describing words which do not appear frequently in a text or sample of language being looked at. Many specialized technical terms would be regarded as low frequency when occurring in contexts outside their subject area. Technical vocabulary is a relatively under-researched area in light of its important role in specialized reading (see Chung & Nation 2003).

Vocabulary size

A further important issue for vocabulary researchers is counting and grouping words: the number of words in English, the most useful words for different communicative tasks and the vocabulary size of groups of users. This has identified thresholds for effective language use and has given rise to the concept of a vocabulary gap in second language learning.

One line of inquiry has examined vocabulary size for first and second language users. Goulden et al. (1990) estimate that there are 117,000 word families in English, of which their participant group of English as a first language university students knew on average 17,200, suggesting acquisition of 1,000 new words during each year of schooling and a very large number of words never learnt and in many cases never met in spoken or written language. A considerably lower vocabulary size of 1,200 word families was determined by Nurweni and Read (1999) for a group of second language college students in Indonesia.

Another line of inquiry has examined the vocabulary size required for specific uses of language. Studies of this type have assumed that, although a language user needs to be familiar with 95 per cent of the words in a spoken or written text (i.e. nineteen out of twenty word occurrences) for satisfactory comprehension (Laufer 1989), closer to 98 per cent of the words

(i.e., forty-nine out of fifty) is required for more pleasurable and effective language use (Hu & Nation 2000). Below the 95 per cent threshold, there is likely to be inadequate familiar language for the meaning of unknown words to be determined based on contextual clues. Laufer (1992) identified a turning point in second language reading comprehension occurring at the 3,000 word level, suggesting this as a minimum threshold for reading. Nation (2006), aiming for 98 per cent lexical coverage, estimated 6,000–7,000 word families required for listening to movies and discussions and 8,000–9,000 word families required for reading novels and newspapers. A middle-ground benchmark of 4,000 word families has been suggested (see Alderson 2007).

Researchers have sought to identify stages of vocabulary knowledge beyond the 2,000 word list to address the vocabulary gap between second language vocabulary size and the vocabulary required for effective use of English in different contexts. The focus has largely been on prioritizing, that is to identify the words that provide the best return in terms of comprehension and communicative quality. Studies of this type have examined word occurrence in specific uses of English to identify core vocabularies.

A series of studies have focused on the vocabulary of academic study as one area of language learning. One approach has been to identify commonly used academic words. Coxhead (2000) identified 570 candidates for an Academic Word List, representing words occurring frequently in first-year undergraduate reading in a broad range of subject areas. Another approach has been to identify the vocabulary for specific areas of study. Ward (1999) followed this approach to identify the most useful vocabulary for reading undergraduate engineering texts, Coxhead and Hirsh (2007) developed a word list for science students, and, more recently, Hsu (2013) constructed a Medical Word List designed to bridge the gap between non-technical and technical vocabulary. These approaches represent targeted vocabulary lists which would provide good return for learning effort for specific groups of learners.

Aside from interest in vocabulary gaps and growth, there is research interest in vocabulary loss (or attrition). The study of vocabulary attrition for participants no longer using a language draws on data collected at intervals of months or even years to chart a pattern of lexical loss over time. Min (2008) found significant vocabulary loss three months after language instruction ended, with indications that most receptive and productive word knowledge became partially known words, suggesting that only formal knowledge of most target vocabulary is retained. Related to this line of inquiry is interest in how words are stored in memory, and the impact loss of one word has on the recall and use of other words (see Meara 2004) and mirrors interest in how knowledge of one word impacts on the learning of others (see Laufer 1990). This view of vocabulary knowledge as interrelated challenges the more simplistic methodologies based on the counting of isolated word items.

Receptive and productive knowledge

There are two remaining issues to be highlighted here for vocabulary researchers. The first concerns the widely accepted view that people know more words than they use. A clear distinction is made in vocabulary research between receptive and productive vocabulary knowledge (see Laufer 1998). Receptive knowledge of words relates to word recognition in written and spoken texts, and tests of receptive vocabulary knowledge assess the ability to attach a meaning to a word in written form or to transcribe words presented in oral language. Productive knowledge of words relates to word use in meaningful contexts, either written or spoken.

Tests of receptive and productive vocabulary knowledge measure different forms of word knowledge and require different units of measurement (Nation, personal communication, 18 April 2008). It can be assumed that receptive knowledge of a word form or type (e.g. *succeed*) indicates receptive knowledge of other members of the word family (i.e. *succeeds*, *success*, *successes*, *succeeding*, *succeeded*, *successfully*, *unsuccessful*, *unsuccessfully*). Productive knowledge, on the other hand, concerns retrieval from memory of a single word type (or *lemma*). It cannot be assumed that productive knowledge of one word form indicates productive knowledge of other word forms in the word family. This is because people do not productively use all the words they know. Thus, while measures of receptive knowledge should count and report in *word family* units, productive knowledge measures should count and report in *word type* units.

The company words keep

The final issue to be discussed here regarding vocabulary research is how words appear in the language. Vocabulary lists present words in isolation, detached from meaningful contexts and the words they appear commonly with in spoken or written language. In contrast, concordance data displays words in context, with scope through use of corpora to focus on a word's use in specific contexts. A researcher could examine how a word is commonly used in a particular kind of text (e.g. newspapers) or in a particular subject area (e.g. nursing). Differences between spoken and written uses of a word can be examined, as can differences in word use between groups of language users. The range of data available depends on the nature of the corpus and the complexity of the word analysis programs used. One line of inquiry in this area is the investigation of *lexical bundles*, or recurring multiword sequences, also referred to as *lexical phrases* and *lexical chunking*. Lexical bundles are frequently occurring sequences of words such as *has to do with*, *one of the things* and *you're never going to believe this*, differing from idiomatic expressions such as *in a nutshell*, and assuming important discourse functions in the language (see Biber & Barbieri 2007).

Research stages and related test instruments

This section looks at a sample of research tools and test instruments associated with some of the main lines of inquiry in vocabulary research.

Investigating depth of vocabulary knowledge

One test instrument draws on elements of Nation's (2001) well-established model of word knowledge at three levels: *form* (spelling, sound, word parts), *meaning* (associations) and *use* (grammar, collocations, constraints on use). Read (1998) developed a word associates test to allow investigation of the semantic associations between words, as an indicator of depth of word knowledge. This tool focuses on identifying words with a meaning associated with a target word item, and requires test-takers to select suitable responses from those provided. Distractor items which have no association with the target word are included in the possible choices. An example of this test format is provided in Figure 21.2.

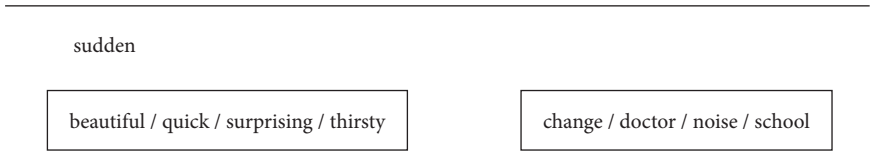

FIGURE 21.2 *Sample item from the word associates test (adapted from Read 1998, p. 46)*

In the example given in Figure 21.2, knowledge of word associations for the target word *sudden* is being tested. In this test format, the group of four adjectives in the left hand box includes two words which are synonyms of the target word or represent one aspect of the target word meaning (e.g. *sudden-quick*; *sudden-surprising*), and two distractor items. The group of four nouns in the right hand box includes two collocates of the target word, meaning that the two words occur together frequently in the language (e.g. *sudden change*; *sudden noise*), and two distractor items.

Investigating vocabulary demands for specific uses

Computer-based programs can be used to examine the lexical demands of communicative tasks such as reading, writing or listening, by determining how many words are required for the task. Research in this area involves

preparing an electronic version of a text, spoken or written, to be analysed, and examining word occurrence in the text using a computer program. *Range* (Heatley & Nation 1998) is a program designed to list words and their frequency of occurrence in a text according to word family lists: the 1,000 most frequently occurring words in English; the second 1,000 most frequently occurring words; and academic words. Words occurring in a text which are not from these three word lists are reported as *other words*. An example of a results summary for a sample of text produced by a second language writer using Range appears in Figure 21.3.

Word list	Percentage coverage
one (first 1,000 words)	72
two (second 1,000 words)	4
three (academic words)	10
other words	14
Total	100

FIGURE 21.3 *Lexical profile of a sample of second language writing*

Figure 21.3 shows how Range has been used to statistically present word use in the text, indicating that 72 per cent of all words in the text were words from the first 1,000 word level, while 4 per cent of words were from the second 1,000 word level and 10 per cent of words in the text were academic words. The combined lexical coverage of high frequency (the first and second thousand words) and academic vocabulary for a text is the added values for these three levels, in this case 86 per cent. The remaining 14 per cent of words shown in Figure 21.3 as *other words* could be misspelt words, proper nouns, technical words related to the subject area of the text or low frequency words.

Investigating vocabulary size

A series of test instruments have been developed to enable researchers to reliably investigate how many words a group of language users know. Tests tend to distinguish between receptive vocabulary knowledge and productive vocabulary knowledge, with tests developed to measure productive vocabulary knowledge in both controlled (measurement of correct elicitation of target items) and free (no specific target items being elicited) formats. This gives rise to three widely used formats for vocabulary size measurement: receptive, controlled productive and free productive (see Laufer 1998) as presented in Figure 21.4.

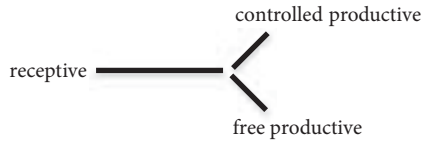

FIGURE 21.4 *Types of vocabulary knowledge (adapted from Zhong 2008, p. 13)*

A test instrument designed to measure receptive vocabulary size is the *Vocabulary Levels Test* (Nation 1983). This employs a word-meaning format to assess word meaning recognition at five word levels: 2,000, 3,000, 5,000, 10,000 and academic words. An example of a test item from the 2,000 word section of a version of this test format appears in Figure 21.5.

Choose the right word to go with each meaning. Write the number of that word next to its meaning.

1. copy	
2. event	___ end or highest point
3. motor	___ this moves a car
4. pity	___ thing made to be like another
5. profit	
6. tip	

FIGURE 21.5 *Sample of the 2,000 word section of the Vocabulary Levels Test (adapted from Schmitt, Schmitt & Clapham 2001, p. 82)*

A test instrument designed to measure productive vocabulary knowledge in a controlled format is the *Controlled Productive Vocabulary Levels Test* (Laufer & Nation 1999). This assesses the ability to complete the missing letters in a target word presented in a sentence at five word levels: 2,000, 3,000, 5,000, 10,000 and academic vocabulary. An example of a test item from the 2,000 word section appears in Figure 21.6.

Complete the underlined words.

1. I'm glad we had this opp_____ to talk.

FIGURE 21.6 *Sample of the 2,000 word section of the Controlled Productive Vocabulary Levels Test (adapted from Laufer & Nation 1999, p. 46)*

A tool designed to measure lexical richness in a student's writing is the *Lexical Frequency Profile* (Laufer & Nation 1995). This instrument statistically compares the proportion of high frequency words and academic words in a sample of writing through computer analysis of word use in the text.

Another test instrument designed to measure productive vocabulary knowledge in a free way is Lex30 (Meara & Fitzpatrick 2000). In this test, participants are instructed to list words associated with a high frequency prompt word. All the words produced by an individual test-taker are examined in terms of word frequency, that is, the proportion of words within and outside the 2,000 word list, to indicate lexical richness. An example of words listed by a test-taker which are associated with the target word *attack* are indicated in Figure 21.7. These words are *war*, *castle*, *guns* and *armour*, indicating that the test-taker thought of these words when prompted by the target word.

1. attack: war, castle, guns, armour

FIGURE 21.7 *Lex30 test item and sample answers (adapted from Meara & Fitzpatrick 2000, p. 28)*

New methodologies in vocabulary size assessment will continue to be developed in the search for more robust reporting.

Investigating vocabulary growth

Methodologies have been developed to allow researchers to investigate how many words are learnt or acquired during a certain period, such as a semester or a year of study. Two main approaches have been used. One approach is to compare the vocabulary size of groups of learners representing different stages of learning, such as the fifth (grade 5) and sixth (grade 6) years of schooling, in the same learning environment. Laufer (1998) used this approach in a study of the productive vocabulary knowledge growth of grade 10 (aged 16 years) and grade 11 (aged 17 years) second language high school students in Israel. Another approach is to collect data from one group of learners at two different stages of learning (e.g. 12 weeks apart) using a pre-test and post-test format. Horst and Collins (2006) used this approach at intervals of 100 hours of instruction with second language elementary school students in Quebec. In either approach, decisions need to be made on which vocabulary knowledge test instruments (receptive, controlled productive or free productive) to employ.

Investigating strategies in vocabulary learning and vocabulary use

An area of vocabulary research which has involved rich data collection is strategy use, with the focus largely on determining which vocabulary learning strategies are associated with effective vocabulary learning and effective vocabulary use. Methodologies used in such studies include *participant questionnaires*, focusing on strategies used and their effectiveness, *student logs*, comprising written reflections of strategy use while reading and *think-aloud protocols*, where participants explain processes as they use the language.

Gu (2003) investigated vocabulary strategy use of two successful adult English as a foreign language learners at three stages of an intensive reading task: meeting new words, committing words to memory and use of new words. The study was designed to determine which strategies were used by participants as they encountered new words in a text on pollution in Athens which, it was estimated by the researcher, contained about one new word in fifty (i.e. the participants would know 98 per cent of the words in the text). Think-aloud protocols and follow-up interviews were used to focus on task-specific as well as more general vocabulary learning strategy use. The findings indicated that both learners displayed high levels of motivation to learn new words and employed a wide range of metacognitive and cognitive strategies. Metacognitive strategy use included self-initiation to learn beyond what was required, conscious selection of strategy use and applying criteria such as relevance, interest and importance in selecting words to learn. Cognitive strategy use included using contextual clues, negotiating between dictionary meaning and contextual meaning and using newly learnt words productively.

Analysis of lexical bundles

The last type of research tool discussed here is concerned with studies of how individual words are used in different linguistic contexts. While vocabulary lists present words in isolation, research on lexical bundles explores the way words are used in the language, with particular interest in identifying recurring groups of words which could be used as a model for language learners and language assessment. Research of this type requires access to a corpus of language and appropriate software. The focus for the research will indicate the type of corpus and program required and the parameters of the analysis. Oxford Wordsmith Tools (Oxford University Press 2008) is one program available to researchers which reports concordance data from which recurring lexical bundles could be identified. An example of data from a concordance results file for *issue* appears in Figure 21.8.

social and economic issues

public moral issues

environmental issues

the key issues

FIGURE 21.8 *Concordance data on the word issue (adapted from Thurstun & Candlin 1997, p. 2)*

Challenges associated with vocabulary research

Vocabulary researchers are faced with some predictable challenges, each with appropriate responses. One challenge inherent in research involving participants is minimizing the effect of participant reorientation to suit the study focus or goals. Reorientation, in this sense, describes the process of study participants temporarily changing their behaviour because of the study. This is called the *Hawthorne Effect* (Landsberger 1958) and can occur if information about the study is shared with learners prior to or during collection of data. Studies of vocabulary learning strategy use and classroom vocabulary learning would be particularly susceptible to reorientation on the part of language learners and their teachers. There is an ethical requirement for informed and voluntary participation in studies of this type. Careful consideration should thus be placed to the information being shared with the participants (e.g. learners) and their teachers and the timing of this.

When using parallel pre-tests and post-tests, preventive measures to minimize the impact of the pre-test on subsequent vocabulary learning can include: collection of all copies of pre-tests; not communicating test results with participants or teachers during the survey period between the two sets of tests (pre and post); and not indicating to participants or teachers the relationship between the pre-tests and post-tests.

Another challenge in studies of participant vocabulary knowledge relates to the use of test instruments and the data they generate. Researchers face dual concerns of sampling a sufficient number of vocabulary items to address reliability and validity needs while minimizing the effect of participant test fatigue. Vocabulary levels tests sampling receptive knowledge at five levels of vocabulary (2,000, 3,000, 5,000, 10,000 and academic vocabulary) and including thirty test items per vocabulary level can be completed within 30 minutes. This test format represents a response to these dual concerns.

A further challenge in vocabulary research can occur in the measurement of vocabulary growth. Such studies use pre-tests and post-tests to indicate changes in performance on the test instruments. These tests need to be comparable in what they test and how they test it, in order for meaningful

comparisons to be made. Use of test instruments in longitudinal studies of vocabulary growth should be subject to reliability assessment, particularly where multiple versions of a test format are used on the assumption that the test versions are parallel – that is, that they measure similar aspects of knowledge at a similar level. Xing and Fulcher (2007) have indicated that the 2,000, 3,000 and academic vocabulary levels of two different versions of the receptive vocabulary levels test are highly correlated – that is they can be used reliably in a parallel format but that the 5,000 word-level versions are not parallel (i.e. one version is more difficult) and thus are in need of revision.

A sample study

I have selected a vocabulary study to show how it took account of a number of issues, methods and challenges in the research design. The study (Zhong 2008) was conducted by one of my research students, Hua Zhong. She was interested in investigating vocabulary learning in a high school setting in China, employing pre-tests and post-tests for a single group of participants. The constraints of the study period restricted the duration of the study period to 10 weeks. She was interested in both receptive and productive knowledge of words at four word levels (2,000, 3,000, 5,000 and academic vocabulary). The study built on earlier findings that receptive and productive vocabulary knowledge grows at different rates (see Laufer 1998).

The study dealt with a series of methodological issues. It employed the use of identical pre-tests and post-tests, and thus one key concern was to ensure that the pre-tests had minimal impact on the English language learning program during the 10-week study period. The test instruments used were the receptive vocabulary levels test (Nation 1983) and controlled productive vocabulary levels test (Laufer & Nation 1999). A pilot test was conducted to determine which test items in these two test instruments would be suitable for the selected group of learners in terms of content and language level. Marking criteria were developed to ensure reliability and objectivity in making decisions on whether partial words were satisfactorily completed in the controlled productive vocabulary levels test. Procedures for data analysis were developed and pilot tested to ensure findings were empirically sound. Each of these issues is discussed.

One feature of the study was its longitudinal nature, conducted during 10 weeks of the school semester. It was decided that vocabulary learning during this 10-week period could be measured most accurately if the pre-tests and post-tests were the same, and analysis was made of one group of learners at two stages of their learning. The thinking was that if data from the pre-tests and post-tests were fully comparable, then differences between the test scores could be used as indicators of vocabulary learning.

It was realized that the study participants and their teacher could not be told about the relationship between the pre-tests and post-tests until the completion of the study, for fear of the pre-tests being regarded as a vocabulary learning goal for the subsequent 10 weeks. As preventive measures, the researcher ensured that all copies of the pre-tests were collected and that no pre-test results were passed on to the teacher or research participants until completion of the study.

Another feature of the study was its focus on a homogenous study population of high school students learning English as a foreign language in China. The study employed a pilot test with a small number of Chinese background participants who had a similar language proficiency to the main participant group. The pilot test was designed to check that the test instruments were appropriate for this participant group in terms of content and language level. The pilot test indicated which test items were unsuitable, and which word levels of the existing test instruments (2,000, 3,000, 5,000, 10,000 and academic words) would be applicable to the study and in particular whether the 10,000 word level should be used. It became clear that the 10,000 level would be unlikely to generate any useful data due to anticipated low levels of both initial vocabulary knowledge and subsequent vocabulary learning over 10 weeks for this participant group.

The pilot test was also used to generate a small amount of raw data which the researcher used to refine procedures for ensuring objectivity in marking decisions in the case of the controlled productive vocabulary levels test where variable answers were possible for each test item. Guidelines were developed and tested to standardize marking decisions to take account of differences in the spelling and grammatical form (e.g. singular or plural noun forms) of target vocabulary items. Minor spelling mistakes and grammatical errors were ignored on this basis: for spelling, one missing, added or wrong letter per word or two adjacent letters in the wrong order were ignored; for grammar, errors in suffix endings involving *–ed*, *–s* and *–ing* were ignored. The intention of the marking guidelines was to focus on vocabulary knowledge while dealing objectively with variations in form and accuracy of productive use.

Another feature of the study was its small participant size for quantitative research. From eighty-three students approached, sixty-four gave their consent to participate in the study indicating a 77.1 per cent participation rate. From this, forty-one participants completed all the required tests allowing their data to be utilized in the study. This indicated a 35.9 per cent attrition rate. The number of participants in the study impacted on the statistical tools to be used in the data analysis. Taking account of the small number of participants, the researcher employed descriptive statistics to describe the trends and patterns evident in the data, in the form of mean scores and ratios. Parametric techniques,

widely used to enable generalizations to be made regarding the data, were not used in the study due to the small sample size and to the abnormal distribution of data indicated through descriptive statistics to compare scores for mean, median and mode.

The adjustment of the methodology to suit the study enabled meaningful findings to be generated. They indicated significant levels of useful vocabulary growth, particularly of academic vocabulary, as well as overall higher levels of growth for productive vocabulary knowledge than for receptive vocabulary knowledge during the 10 weeks. The researcher was able to relate the study findings to previous research in the area, having employed similar principles and methodologies to earlier studies of this type while having ensured that issues of reliability and validity were built into the research model.

Resources for further reading

Bogaards, P & Laufer, B (eds), 2004, *Vocabulary in a Second Language*, John Benjamins, Amsterdam.

The editors of this book have assembled eleven chapters, primarily from papers presented at the Second Language Vocabulary Acquisition Colloquium held at Leiden University in 2002. The volume provides a host of new insights into experimental research covering the areas of selection, acquisition and testing of vocabulary.

Nation, ISP 2001, *Learning Vocabulary in Another Language*, Cambridge University Press, Cambridge.

Paul Nation provides a thorough overview of research on vocabulary spanning decades, providing insights on theory and practice, case studies and large-scale empirical studies, which inform contemporary approaches to the teaching and learning of vocabulary.

Read, J 2000, *Assessing Vocabulary*, Cambridge University Press, Cambridge.

This book focuses on a broad range of assessment tools and procedures for investigating vocabulary learning, knowledge and use. The book highlights and evaluates key studies, examines the role of corpus analysis and identifies areas for future research in vocabulary assessment.

Read, J 2013, 'Second language vocabulary assessment', *Language Teaching*, vol. 46, no. 1, pp. 41–52.

This article written by John Read provides a comprehensive timeline spanning 1935 to 2012 of the development and validation of measures to assess the vocabulary knowledge and ability of second language learners.

Nation, ISP & Webb, S 2011, *Researching and Analyzing Vocabulary*, Heinle Cengage Learning, Boston, MA.

Paul Nation and Stuart Webb have provided a comprehensive overview of major areas of research in the field of vocabulary studies, incorporating guidance on carrying out research with particular attention given to classroom learning and teaching.

Schmitt, N 2010, *Researching Vocabulary: A Vocabulary Research Manual*, Palgrave Macmillan, Basingstoke.

In this book, Norbert Schmitt has assembled a comprehensive literature review and how-to guide for researchers in the area of vocabulary studies, including example research projects and vocabulary resources.

Schmitt, N & McCarthy, M (eds), 1997, *Vocabulary: Description, Acquisition and Pedagogy*, Cambridge University Press, Cambridge.

This edited volume presents fifteen papers covering the theory and practice of vocabulary teaching and learning, with relevant chapters on approaches to research in key areas of vocabulary studies such as word knowledge and lexical chunks.

Online resources

Compleat Lexical Tutor, www.lextutor.ca, viewed 2 July 2014.

Tom Cobb has assembled a range of online tools and resources with open access for language researchers, teachers and learners. The site includes vocabulary levels tests, lexical profile software, concordance software with accompanying corpora and information on word lists.

Range, http://www.victoria.ac.nz/lals/about/staff/paul-nation, viewed 2 July 2014.

Range is a computer-based program designed to report on word occurrence in written texts at set vocabulary levels. Paul Nation has provided on his web-page an open-access link to two downloadable versions of Range, each with corresponding word lists and instruction files, including word lists developed from the British National Corpus.

References

Alderson, JC 2007, 'Judging the frequency of English words', *Applied Linguistics*, vol. 26, no. 3, pp. 383–409.

Bauer, L & Nation, P 1993, 'Word families', *International Journal of Lexicography*, vol. 6, no. 4, pp. 253–279.

Biber, D & Barbieri, F 2007, 'Lexical bundles in university spoken and written registers', *English for Specific Purposes*, vol. 26, no. 3, pp. 263–286.

Chung, T & Nation, P 2003, 'Technical vocabulary in specialized texts', *Reading in a Foreign Language*, vol. 15, no. 2, pp. 103–116.

Coxhead, A 2000, 'A new academic word list', *TESOL Quarterly*, vol. 34, no. 2, pp. 213–238.

Coxhead, A & Hirsh, D 2007, 'A pilot science-specific word list', *Revue Française de Linguistique Appliqueé*, vol. 7, no. 2, pp. 65–78.
Elgort, I 2013, 'Deliberate learning and vocabulary acquisition in a second language', *Language Learning*, vol. 61, no. 2, pp. 367–413.
Godfroid, A, Boers, F & Housen, A 2013, 'An eye for words: Gauging the role of attention in incidental L2 vocabulary acquisition by means of eye-tracking', *Studies in Second Language Acquisition*, vol. 35, no. 3, pp. 483–517.
Goulden, R, Nation, P & Read, J 1990, 'How large can a receptive vocabulary be?', *Applied Linguistics*, vol. 11, no. 4, pp. 341–363.
Gu, P 2003, 'Fine brush and freehand: The vocabulary-learning art of two successful Chinese EFL learners', *TESOL Quarterly*, vol. 37, no. 1, pp. 73–104.
Heatley, A & Nation, P 1998, Range, School of Linguistics and Applied Language Studies, Victoria University of Wellington, Wellington, viewed 2 July 2014, http://www.victoria.ac.nz/lals/about/staff/paul-nation
Hirsh, D & Nation, P 1992, 'What vocabulary size is needed to read unsimplified texts for pleasure?', *Reading in a Foreign Language*, vol. 8, no. 2, pp. 689–696.
Horst, M & Collins, L 2006, 'From *faible* to strong: How does their vocabulary grow?', *Canadian Modern Language Review*, vol. 63, no. 1, pp. 83–106.
Hsu, W 2013, 'Bridging the vocabulary gap for EFL medical undergraduates: The establishment of a medical word list', *Language Teaching Research*, vol. 17, no. 4, pp. 454–484.
Hu, M & Nation, P 2000, 'Unknown vocabulary density and reading comprehension', *Reading in a Foreign Language*, vol. 13, no. 1, pp. 403–430.
Hwang, K & Nation, P 1989, 'Reducing the vocabulary load and encouraging vocabulary learning through reading newspapers', *Reading in a Foreign Language*, vol. 6, no. 1, pp. 323–335.
Joe, A 1995, 'Text-based tasks and incidental vocabulary learning', *Second Language Research*, vol. 11, no. 2, pp. 149–158.
Kim, Y 2008, 'The role of task-induced involvement and learner proficiency in L2 vocabulary acquisition', *Language Learning*, vol. 58, no. s1, pp. 285–325.
Landsberger, H 1958, *Hawthorne Revisited: Management and the Worker, Its Critics, and Developments in Human Relations in Industry*, Cornell University, Ithaca, NY.
Laufer, B 1989, 'What percentage of text-lexis is essential for comprehension?', in C Lauren & M Nordman (eds), *Special Language: From Humans Thinking to Thinking Machines*, Multilingual Matters, Clevedon, pp. 316–323.
——— 1990, 'Words you know: How they affect the words you learn', in J Fisiak (ed.), *Further Insights into Contrastive Analysis*, John Benjamins, Amsterdam, pp. 573–593.
——— 1992, 'How much lexis is necessary for reading comprehension?', in P Arnaud & H Bejoint (eds), *Vocabulary and Applied Linguistics*, Macmillan, London, pp. 126–132.
——— 1998, 'The development of passive and active vocabulary in a second language: Same or different?', *Applied Linguistics*, vol. 19, no. 2, pp. 255–271.
Laufer, B & Hulstijn, J 2001, 'Incidental vocabulary acquisition in a second language: The effect of task-induced involvement load', *Applied Linguistics*, vol. 22, no. 3, pp. 1–26.
Laufer, B & Nation, P 1995, 'Vocabulary size and use: Lexical richness in L2 written production', *Applied Linguistics*, vol. 16, no. 3, pp. 307–322.

——— 1999, 'A vocabulary size test of controlled productive ability', *Language Testing*, vol. 16, no. 1, pp. 33–51.
Lee, Y & Hirsh, D 2012, 'Quality and quantity of exposure in L2 vocabulary learning', in D Hirsh (ed.), *Current Perspectives in Second Language Vocabulary Research*, Peter Lang, Bern, pp. 79–116.
Meara, P 2004, 'Modelling vocabulary loss', *Applied Linguistics*, vol. 25, no. 2, pp. 137–155.
Meara, P & Fitzpatrick, T 2000, 'Lex30: An improved method of assessing productive vocabulary in an L2', *System*, vol. 28, no. 1, pp. 19–30.
Min, H 2008, 'EFL vocabulary acquisition and retention: Reading plus vocabulary enhancement activities and narrow reading', *Language Learning*, vol. 58, no. 1, pp. 73–115.
Mochizuki, M & Aizawa, K 2000, 'An affix acquisition order for EFL learners: An exploratory study', *System*, vol. 28, no. 2, pp. 291–304.
Nation, P 1983, 'Testing and teaching vocabulary', *Guidelines*, vol. 5, no. 1, pp. 12–25.
——— 2001, *Learning Vocabulary in Another Language*, Cambridge University Press, Cambridge.
——— 2006, 'How large a vocabulary is needed for reading and listening?', *Canadian Modern Language Review*, vol. 63, no. 1, pp. 59–82.
Newton, J 1995, 'Task-based interaction and incidental vocabulary learning: A case study', *Second Language Research*, vol. 11, no. 2, pp. 159–177.
Nurweni, A & Read, J 1999, 'The English vocabulary knowledge of Indonesian university students', *English for Specific Purposes*, vol. 18, no. 2, pp. 161–175.
Oxford University Press 2008, Oxford Wordsmith Tools 4.0, viewed 2 July 2014, http://www.lexically.net/wordsmith/
Read, J 1998, 'Validating a test to measure depth of vocabulary knowledge', in A Kunnan (ed.), *Validation in Language Assessment*, Erlbaum, Mahwah, NJ, pp. 41–60.
Schmitt, N, Schmitt, D & Clapham, C 2001, 'Developing and exploring the behaviour of two new versions of the Vocabulary Levels Test', *Language Testing*, vol. 18, no. 1, pp. 55–88.
Schmitt, N & Zimmerman, C 2002, 'Derivative word forms: What do learners know?', *TESOL Quarterly*, vol. 36, no. 2, pp. 145–171.
Thurstun, J & Candlin, C 1997, *Exploring Academic English: A Workbook for Student Essay Writing*, National Centre for English Language Teaching and Research, Sydney.
Ward, J 1999, 'How large a vocabulary do EAP engineering students need?', *Reading in a Foreign Language*, vol. 12, no. 2, pp. 309–324.
Xing, P & Fulcher, G 2007, 'Reliability assessment for two versions of vocabulary levels tests', *System*, vol. 35, no. 2, pp. 182–191.
Zhong, H 2008, 'Vocabulary size development: A study of Chinese high school students', MEd TESOL dissertation, University of Sydney, Sydney.