



Visible words: Second language vocabulary learning during reading

Full Report

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Executive Summary

Introduction

Attracting more international students into New Zealand tertiary education programmes is a part of the *Growing International Linkage* priority of the New Zealand Tertiary Education Strategy; it is also a goal articulated in strategic plans of most of the New Zealand universities. A significant proportion of international students in New Zealand are from East and South East Asia, of whom a high percentage are from China. Accepting these students, who speak English as a second language (L2), into English-medium education programmes means that they are expected to achieve academically at a comparable level with native English speakers. However, for students who come from non-English speaking backgrounds, in particular, those whose native language (L1) orthography and writing system are dramatically different from English (e.g., Chinese speakers), the heavily text-based tertiary education presents language-related challenges that go over and above issues experienced by New Zealand English-speaking school leavers starting their university tertiary degree programmes.

Reading is a key source of knowledge and learning in tertiary studies, and a robust vocabulary is a prerequisite for effective and efficient reading. Fluent and accurate word recognition and seamless retrieval of context-appropriate meanings during reading create conditions necessary for ideational processes to occur, including higher-level understanding of new concepts and propositions, linking ideas and evaluating claims.

English as a second language (ESL) students often come across unknown words in their course readings in English. Although a common approach to dealing with these situations is to guess word meanings from context, focus on the spelling of a new word may be equally or even more beneficial, in particular, for students whose native language is non-alphabetic. The original study, supported by funding from the Central Hub of Ako Aotearoa grant and Victoria University of Wellington, set out to investigate whether word-writing can significantly improve contextual word learning (i.e., ability to 'pick up' new vocabulary from reading) for Chinese speakers. This research was later replicated with a group of Dutch-speaking

university participants, to ascertain to what degree word-writing is useful for non-native English speakers whose native language is alphabetic. The second study was supported by the Victoria University of Wellington Research and Study Leave grant and additional funding provided by Ghent University in Belgium.

Aims

1. The overarching aim of the present project is to improve the quality of learning experiences and learning outcomes for ESL students entering NZ tertiary education. The study findings also have implications for ESL training programmes, more broadly.
2. Specifically, the study compares two approaches to increasing readers' engagement with novel words during reading: the traditional approach of guessing word meanings from context and the less common approach of writing down (copying) unfamiliar words from the text.

Method

The New Zealand study was conducted with 47 native speakers of Chinese, who were either in their first year of university study in New Zealand or enrolled in a university pre-degree English proficiency programme¹. In the learning phase of the study, the participants encountered previously unknown English vocabulary during reading and were instructed to either (1) copy the unknown words into their vocabulary booklets (*word-writing condition*) or (2) derive the meanings of these words from context (*meaning-focused elaboration condition*). The word knowledge gained as a result of these two learning approaches was measured in a series of tests. These tests evaluated the knowledge of form and meaning of the contextually-learned words. Another test was used to check whether the learners could recognise the words under time pressure. These tests were used because immediate and effortless word recognition and access to their contextually-relevant meanings are critical for reading comprehension. The learners were also interviewed about their preferred approaches to learning L2 words from reading.

Findings

Across all measures, a statistically significant advantage was found for the word-writing condition over the meaning-focused elaboration. Supplementing contextual word learning with word-writing was also the preferred way of learning for 89% of the Chinese-speaking participants, as shown in the post-study interviews. One common theme in the participants' comments was that writing makes it easier to "remember the word".

¹ A second (replication) study was later conducted with Dutch speaking students in Belgium.

Implications of the study findings

The study underscores the importance of learning the form of new words encountered in reading. This technique is efficient, effective and easy to use both in- and out-of-class. Educators working in the tertiary and secondary sectors should actively encourage ESL students to copy unfamiliar words into a vocabulary notebook while reading. This approach is likely to work best in conjunction with using electronic dictionaries that allow students to check the pronunciation of the novel words and verify their meanings, when needed. TESOL programmes that prepare L2 students for academic study in New Zealand and other English speaking countries will do well to introduce and promote this approach to vocabulary building as part of their academic study skill set. This is because increasing efficiency of contextual word learning will contribute to ESL students' reading comprehension and, consequently, their academic success.

Please refer to *Tips for ESOL Educators* (in Appendix A) and *Tips for ESL Students Starting Tertiary Education* (in Appendix B) for further word learning recommendations.

For a detailed describing of this research, please refer to

Contextual Word Learning with Form-Focused and Meaning-Focused Elaboration

Irina Elgort; Sarah Candry; Thomas J. Boutorwick; June Eyckmans; Marc Brysbaert
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Commentary on the study

Introduction

Because the main study is published in *Applied Linguistics* and can be accessed online, in this report, I provide a commentary on the study rather than the full description of this research and its findings. In particular, I discuss the design and methodology I've used and explain why I chose to use them. In the *Students' perceptions and practices* section, I also discuss the self-report data collected from the study participants that were not included in the published paper.

Formulating research questions and hypotheses

The formulation of research questions and study hypotheses are a critical stage in any research project. This process is based on some combination of prior readings of academic literature on the topic, learning or educational theories, empirical data, and personal observations and hunches. In the present study, an important original driver for the project was the role of vocabulary in language comprehension and production (no comprehension or production is possible without words). In other words, if we can fine-tune learning instructions to help ESL students 'pick up' new vocabulary from reading effectively and efficiently, these students may be able to engage at a deeper level with the content of their course materials, and achieve better academically. Hence the focus of the present research is on establishing more effective ways of learning new words from reading.

A further refinement of the research question was informed by research on indicators of *high-quality* word (lexical) knowledge (in the first and second language), and how the development of such high-quality knowledge can be facilitated using instructional or learning approaches. In this area, the work of [Professor Charles Perfetti](#) at the University of Pittsburgh has been highly influential. High-quality word knowledge is characterized by a precise knowledge of spelling and pronunciation (formal aspects), ability to fluently retrieve relevant meaning from form and vice versa (form-meaning mapping), and robust integration of individual words into the learner's L2 lexical and semantic networks (the mental lexicon). In reading, for example, fast and accurate visual processing of English word forms and automatic access to their contextually-appropriate meanings create conditions needed for fluent reading with understanding (Grabe, 2009; Grabe & Stoller, 2002; Perfetti, 2007).

This understanding of *high-quality lexical knowledge* informed the formulation of our main hypothesis that adding a learning activity that facilitates a more accurate encoding of the word *form* (its spelling and pronunciation) during reading (i.e., encountering words in

meaningful contexts) would result not only in a more precise knowledge of form, but would also help learners with form-meaning mapping. We predicted that adding a word copying activity during reading would be more beneficial than adding a task to deliberately derive its meaning from context (because readers tend to infer meanings of unfamiliar words during reading anyway, whether they are fully aware of it, or not). We did not compare these two contextual word learning activities with 'reading only'. This is because previous research has clearly shown that word learning from reading is more effective when it is accompanied by deliberate learning procedures that direct readers' attention to the word (Laufer, 2005; Schmitt, 2008), and there was no need to test this again.

The following research question was therefore posed in the study to test our hypothesis: *Is word-writing a more beneficial additional form of engagement with unfamiliar L2 words in contextual word learning than a conscious effort to infer their meaning?*

Method

Study design

There are two main quantitative paradigms that can be used to conduct research in social sciences (such as education and applied linguistics): observational and experimental. The observational paradigm involves formulating hypotheses based on the data collected in the course of a naturally occurring activity or phenomenon. The advantage of this approach is that it is environmentally valid; the problem is that it requires multiple replications to confirm that the findings are robust. In some cases, the effect of specific primary-interest variables in observational studies is very difficult to distil from that of a range of other variables (context of the study, characteristics of individual participants, materials used, time spent, other learning taking places outside of the classroom, etc.). For this reason, much of quantitative research in applied linguistics is experimental. In experimental research, a researcher randomly assigns treatments (conditions) to study participants, and attempts to control for the effect of variables that are not being investigated. The variables that cannot be controlled, may be included in the analysis as covariates.

In our study, we used a *counterbalanced within-participant design*. We used 48 previously unknown vocabulary items, 24 of which were presented in one learning condition (form-focused elaboration, i.e., word-writing) and 24 in another (meaning-focused elaboration, i.e., deriving word meaning from context). Each participant experienced learning in both conditions, equally distributed across the 48 items. This design makes experimental findings more generalizable across items and learner populations. We also used inferential statistics

that make it possible to account for both participant and item variability in the data analysis, i.e., linear (and generalised-linear) mixed-effect modelling.

We controlled the native language of the study participants, using only Chinese-speaking students in the first study (and only Dutch-speaking students in the second study). This is because we argued that form-focused learning would be particularly beneficial for the speakers of a non-alphabetic language, such as Chinese, but may have a less dramatic effect on the speakers of another alphabetic language, such as Dutch. We also controlled the characteristics of the vocabulary items used in the study – they were 5-7 letters long, concrete nouns that related to either the topic of building/housing or cooking/food. We limited the range of formal characteristics of these items, but had to account for the orthographic neighbourhood (number of words that share all but one letter, e.g., *word* – *lord*, *ward*, *work*) in the analysis. In the learning phase of the study, we presented these vocabulary items in three informative sentence contexts, in order to help participants infer their meaning during reading.

Measures of learning

In a research study, the importance of clear, well-justified conceptualisations of the core constructs and explicit links between these constructs and the main variables cannot be overestimated. Without this alignment, the research validity of a study may be compromised. In our research, vocabulary knowledge was conceptualised in terms of *lexical quality* (Perfetti, 2007), where higher quality is characterised by participants' ability to accurately and fluently recognise and retrieve form and meaning of the contextually-learned words. These aspects of word knowledge are fundamental to real language use outside the experiment environment. In reading, for example, we see word forms and need to be able to quickly and accurately recognise them, retrieve their context-appropriate meanings and integrate these meanings into the local (sentence) and broader (text) context. Therefore, it is not enough to test declarative word knowledge only (e.g., asking participants to provide meanings for given words); we also need to know whether participants can process words fluently, under time pressure (i.e., test procedural knowledge). This is why, the dependent variables in our research were selected to evaluate both declarative and procedural knowledge of the contextually-learned words.

Results and discussion

The results of both the original study with the Chinese participants, and the replication study with Dutch participants are straightforward. Better word learning was observed when reading

was accompanied by the word-writing activity, compared to the meaning guessing activity. Both Chinese and Dutch students received reliably higher scores on both measures of declarative knowledge (i.e., accuracy of spelling in the dictation task and accuracy of meaning in the meaning retrieval task) for the words that were learned in the writing condition.

On measures of procedural knowledge (tests conducted under time pressure), the Chinese participants were also significantly more accurate (but not faster) in recognising the newly-learned words, when these words were learned through word-writing. The word-writing activity was also more beneficial than the meaning guessing activity for the Dutch-speaking readers: they were faster (but equally accurate) in recognising the words learned in the writing condition.

Overall, these results show that L2 readers develop higher-quality knowledge of word form and meaning from reading when they copy unfamiliar words into their notebooks, compared to actively deriving their meanings from context. This is irrespective of whether their native language is alphabetic or non-alphabetic. However, the advantages are greater for the Chinese-speaking participants. The Chinese participants benefitted from the word copying task even more, when the words they had to learn had atypical spelling (i.e., there were no or few other English words with similar spelling). Presumably, using word copying helped the Chinese students establish more accurate orthographic knowledge for these words. The writing activity was particularly beneficial for the learners with higher working memory capacity, who could take better advantage of the word-writing practice in the meaning-focused reading task.

Under time pressure, the Chinese speakers were overall slower and less accurate in distinguishing between real and nonsense words, compared to the Dutch speakers. However, their response accuracy was boosted for the vocabulary items learned in the word-writing condition. For the Dutch speakers, who were highly accurate in recognising real and nonsense words, the word-writing condition improved their fluency of access to word knowledge under time pressure.

Conclusion

In the original proposal for the study, we hypothesised that deliberate focus on the written form of new L2 (English) words during reading would be particularly beneficial for students whose native language is logographic, e.g., Chinese speakers. This is because speakers of logographic and alphabetic languages rely on different linguistic decoding and encoding

processes. The results of this research support this conjecture; the writing techniques was found to be more useful for L2 word learning during reading than the deliberate meaning inferencing, for Chinese students. However, the word-writing technique exceeded our expectations; it was also beneficial for Dutch speakers, whose native language is alphabetic. Our research also disproves an assumption made in previous studies that word-writing may have a negative effect on the learning of new words because it may consume L2 readers' cognitive resources needed for the learning of meaning. In fact, in our study, a better form-meaning mapping was established in the word-writing condition for the novel L2 words encountered in reading than in the meaning-focused learning condition.

The results of our study suggest that the word-writing technique is extremely effective and should be used across different L1 populations of ESL students. This refutes our original conjecture that different approaches may need to be used with ESL students from different L1 backgrounds. Although we found differences in the locus and magnitude of the effect produced by the word-writing procedure on Chinese and Dutch speakers, in both cases the effect was positive and statistically reliable. Therefore, we conclude that the proposed word-writing method of L2 vocabulary learning during reading is beneficial irrespective of the L1 of the reader.

Students' perceptions and practices

In this section I report on the results of the immediate and delayed post-study surveys and interviews that were not included in the main article, due to the word limits.

Post-study interviews

The Chinese students were debriefed immediately after the study, in order to find out which of the two learning activities they preferred and why. Once the data were collected, I identified common themes, summarised in Table 1.

Table 1: Chinese participants' views on the two learning activities used in the study

Word-writing practice (WW) Preferred by: n=42 ; Comments: n=48	Deriving meaning from context (DM) Preferred by: n=15 ; Comments: n=36
<i>Positive comments about WW: n=43</i>	<i>Positive comments about DM: n=21</i>
n=24: helps me remember the word n=5: is the method I've used in the past n=4: is related to pronunciation n=2: helps me remember word structure n=2: helps me learn both form and meaning n=2: helps me with word use	n=4: made me pay attention to context n=4: helped me understand (word/sentence) n=3: forced me to think about meaning n=3: I could check if my guess was right n=2: will help me use this word in the future n=1: encouraged deep learning n=1: helps my reading
<i>Negative comments about WW: n=5</i>	<i>Negative comments about DM: n=16</i>
<i>When I practise writing:</i> n=1: I may ignore meaning n=1: I may not understand the meaning n=1: I may not remember the meaning n=1: writing is too mechanical	<i>Guessing meaning from context:</i> n=7: I may guess wrong n=6: doesn't help me remember the word n=2: was difficult; didn't have enough time n=1: didn't pay attention to form/spelling

These results show that word-writing was preferred over meaning guessing by the majority of the study participants (n=42=89% vs. n=15=32%, note, in some cases participants indicated that they found both methods useful). Twice as many positive comments were made about the word-writing activity compared with the meaning guessing activity (43 vs. 21); and three times as many negative comments were made about the meaning guess activity compared to the word-writing activity (16 vs. 5). Taken together the results show that the Chinese

students perceived the word-writing activity as more effective. The key reason mentioned in support of the word-writing approach was, “writing down a new word helps me remember it”.

In the second part of the post-study interview, the participants were asked to describe their personal strategies for dealing with unfamiliar words during L1 (Chinese) and L2 (English) reading. When reading in Chinese, the most frequent strategy was *guessing word meanings* (n=31), followed by *dictionary lookup* (n=29), followed by *not using a strategy* (i.e., ignoring unfamiliar words) (n=15). When reading in English, the most frequent strategy was *dictionary lookup* (n=41), followed by *guessing meaning from context and word structure* (n=33), followed by some form of *word learning* (n=11) or *not using a strategy* (ignoring unfamiliar words) (n=10). This suggests that these students are more likely to lookup unfamiliar words and less likely to ignore them when reading in L2, than in L1. Overwhelmingly, when searching for an English word, the participants preferred using electronic bilingual (English-Chinese) dictionaries (on their mobile phones or computers) or online searches (n=36), rather than using paper dictionaries (n=3) and English-English dictionaries (n=4). However, many also mentioned that they should be using English-English dictionaries more, because they provide more accurate definitions and examples of use.

The guessing strategy was used by about the same number of participants in L1 and L2 reading but, in Chinese, it was more likely to be based on the morphological clues (because words are commonly composed of meaningful characters), while in English guessing word meanings from context was used more often. Interestingly, in many cases, strategies that were preferred by a participant in L1 reading were also preferred by the same participant in L2 reading. When reading in Chinese, the most common initial strategy was guessing (n=23); when reading in English, guessing and dictionary lookup were used by the same number of participants (n=19) as their initial strategy for dealing with unfamiliar words. Another interesting result of the post-study interview was that some participants used word learning strategies when encountering unfamiliar English words, such as writing (n=8), pronunciation practice (n=5), memorising (n=5), trying to use the word (n=4), other types of practice (n=4), and underlining (n=1). This suggests that some Chinese speakers saw the value of and were willing to spend time learning new words during reading. However, it is clear that guessing from context is used far more often than word-writing in contextual word learning. This overuse of guessing strategies, and underuse of word-writing as a means of word learning is what motivated this research, in the first place. Because the study findings show how beneficial word-writing is for the development of lexical knowledge from L2 reading, it is important for the ESL students (and their teachers) to start using this approach more widely.

Final survey

At the end of the academic year, an online survey was conducted to further explore the study participants' experiences with their course readings in English, and to find out how their lexical development progressed in the 6-9 months of their university study. The survey was completed by 25 out of the 47 original study participants. The survey showed that only about half of these participants (54%) found it easy to read required and recommended course materials, and understand their lecturers and classmates. Although 84% of the students reported that their vocabulary knowledge in English improved in their first year of academic study (mostly, as a result of course related readings), 92% admitted that they still had to re-read course texts more than once to achieve good understanding and 32% reported that their insufficient knowledge of English vocabulary slowed them down during reading. In their course readings, the top strategies used were guessing word meaning from context (84%) and looking up words in a dictionary or online (80%). Disappointingly, only 32% (n=8) of respondents reported using word-writing.

Half of the students (52%) deliberately tried to increase their vocabulary knowledge during this period, primarily through contextual word learning, using dictionaries, and using new words in writing and speaking. Over 90% of the participants expressed an interest in receiving help and advice on how to best increase and improve their vocabulary knowledge, being willing to spend between 30 minutes and two hours a week specifically on developing their vocabularies. This demonstrates that ESL (Chinese-speaking) university students are cognisant of the importance of L2 vocabulary development as a path to academic success, and (contrary to popular belief) are willing to spend time on deliberate vocabulary practice.

In summary, the results of the present study show that student do not tend to use word-writing as a word learning strategy in their academic reading; and, yet, this learning approach is significantly more effective in promoting lexical quality than guessing meaning from context, which is well-known and used by most ESL students. Word-writing (copying) is not a time consuming or cognitively demanding activity; it is therefore unlikely to have a negative effect on students' engagement with the text.

A strong recommendation that comes out of this research is that all ESL students (those whose native language is logographic and those whose native language is alphabetic) should be encouraged to hand-copy new words they encounter while reading in English. This will help them develop L2 vocabulary knowledge faster and more effectively, improving the depth of their engagement with course materials and, consequently, their academic success.

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APPENDIX A. Tips for ESOL Educators

ESL students planning to enter tertiary study in New Zealand need sufficient academic and specialist vocabulary to critically engage with reading in English and to participate in spoken and written academic discourses. Achieving this goal requires regular practice, time investment and understanding of how to learn. ESOL teachers can help their students develop effective vocabulary learning habits and strategies that students can continue using independently. Below are some areas teachers can focus on when preparing students for independent vocabulary learning:

- Techniques for noticing unfamiliar words during reading and listening
- Vocabulary learning strategies
 - Copying words identified as unfamiliar to vocabulary notebooks
 - Guessing meaning from context and using word parts to guess meaning
 - Using digital reference tools for checking pronunciation and meaning
- Deliberate learning
 - Using flashcards (paper or electronic) to learn frequently used academic words, collocations and specialist vocabulary
 - Using general and specialist academic word and collocation lists, such as,
<http://www.victoria.ac.nz/lals/resources/academicwordlist>
<http://www.uefap.com/vocab/vocfram.htm>
<http://pearsonpte.com/research/academic-collocation-list/>
- Using of vocabulary tests to estimate vocabulary size and monitor progress, e.g.
 - Vocabulary Size Test <http://my.vocabularysize.com/>
 - Vocabulary Levels Tests <http://www.er.uqam.ca/nobel/r21270/levels/> and https://vuw.qualtrics.com/jfe/form/SV_6Wrb5aUvXjIAs6h
 - WordORnot <http://vocabulary.ugent.be>
 - CATSS – Computer-adaptive test of size and strength <http://catss.ga>

APPENDIX B. Tips for ESL Students Starting Tertiary Education

On the path to academic success, one of the challenges for ESL students is vocabulary. Research shows that vocabulary is one of the main reasons for the comprehension difficulties experienced by ESL readers. As an ESL student, you need to know about ten thousand English word families to read specialised academic texts with ease and sufficient understanding.

Here are some research-based suggestions on how to improve word learning:

1. **Get to know your course textbooks.** Textbooks contain core subject-specific (technical) and general academic vocabulary needed to understand key concepts and topics in your chosen field of study. When reading a textbook, you meet useful technical words *multiple times in meaningful contexts*; this helps you learn the right vocabulary for your subject. Some textbooks also include glossaries of key vocabulary (terms and concepts) that explain subject-specific, relevant meaning of the words. These glossaries are worth paying attention to because they are helpful in improving accuracy of word knowledge.
2. **Read your course materials regularly.** In order to increase vocabulary size in English, you need to meet new English words, *again and again*, in *diverse contexts*. By keeping up with weekly course readings, you 'pick up' the technical vocabulary needed in your subject area.
3. **Pay attention to new words.** When we read for meaning, we may ignore unfamiliar words if the overall message is clear. This is a luxury language learners cannot afford. *Paying attention to new words speeds up vocabulary development.*
4. **Write it down.** As an ESL student, you will benefit from *writing* (copying) new words every time you notice them in their course readings. When you hand copy a word from the book into your notebook, your attention is drawn to the form of the word, its precise spelling. This helps you encode the new word in memory and link its form and meaning.
5. **Use flashcards.** An effective way to facilitate the learning of new words is to use *flashcards*. After noticing a new word in context, write it on a card and put a short simple definition and/or example on the back of the card (or use a flashcard App on a mobile device). Regular practice with flashcards is a sure way to learn new words.
6. **Check your vocabulary knowledge.** To see how many words you know and watch your vocabulary grow, use online vocabulary tests designed by vocabulary researchers: <http://vocabularysize.com> and <http://vocabulary.ugent.be>.