

# Replication Studies

## Classroom-based L2 vocabulary learning and comprehension: Replications of Lesaux, Kieffer, Faller & Kelley (2010)

**Aydin Yücesan Durgunoğlu** University of Minnesota, Duluth, USA  
[adurguno@d.umn.edu](mailto:adurguno@d.umn.edu)

**Martha Bigelow** University of Minnesota, Twin Cities, USA  
[mbigelow@umn.edu](mailto:mbigelow@umn.edu)

*The field of language teaching and learning is in dire need of replications of vocabulary and comprehension research with diverse populations of learners. We propose for replication one large-scale vocabulary intervention carried out successfully in a middle-school with monolingual and multilingual students. This study was carried out several years ago, was published in the Reading Research Quarterly, and has been generously cited since then. The findings and the instruments from this study have been leveraged in subsequent extension studies by the same group of researchers, but have not been replicated in different contexts. We offer multiple reasons and methods of replicating this study in high school and adult contexts in which there is a serious need for learners to comprehend technical or academic materials using deep, nuanced foundations of vocabulary.*

### 1. Introduction

There are occasions when research with language learners can be informed by large-scale studies done in contexts that differ from those exclusively designed for language learning. This is the case of the vocabulary acquisition study we recommend be replicated in new language learning contexts with older learners. We applaud the fact that *Language Teaching* is taking up the topic of replication studies in our field in a dedicated column. King & Mackey (2016) aptly point out that it is often very challenging to replicate studies in our field given the wide range of participant background characteristics (e.g., educational experience, mother tongue). We argue that conceptual or partial replication studies are useful for testing findings with new populations and across contexts.

### 2. Background

Decades of research have clearly illustrated that there is a strong reciprocal relationship between reading comprehension and vocabulary development. Knowledge of many words

leads to successful comprehension, while comprehension leads to increased reading and further opportunities for word learning (Freebody & Anderson 1983; Anderson & Pearson 1984; Stanovich 1986; Nagy & Scott 2000; Perfetti 2007; Kieffer & Vukovic 2012). Moreover, this relationship is found in both first (L1) and second language (L2) contexts (Droop & Verhoeven 1998, 2003; Proctor et al. 2005). (Although we use L2 to specify the new language of the learner, we are aware that the new language may be the third or even fourth language of some learners.)

Existing vocabulary research can be categorized into two broadly construed strands: (a) Cognition studies with the goal of identifying the constituents of vocabulary knowledge, especially in monolinguals (e.g., Perfetti 2007) and (b) Education studies with the goal of implementing and evaluating vocabulary and comprehension interventions, especially in L2 contexts (e.g., Laufer & Nation 1999; Laufer et al. 2004; Meara & Alcoy 2010). Despite overlapping interests and findings, the two areas have developed relatively independently of each other. Therefore, it would be useful to focus on studies that straddle both strands of research.

Our goal in this paper is to first provide a short overview of these two strands, basic vocabulary research and principles of effective vocabulary instruction. We then suggest one particular study to be replicated to determine if these instructional principles are just as effective with other language learners across different educational contexts and materials. We argue that because the instructional intervention in this study is grounded in deep and wide-reaching research with learners, many of whom are multilingual, it is acceptable to attempt this intervention with different populations.

## 2.1 Nature of vocabulary proficiency

A rich representation of a single word or a phrase (hereafter called an ‘item’ to emphasize that we are not only talking about single words, but also groups of words and phrases) includes, among others, strong and redundant connections between the item’s orthographic, phonological, semantic, and syntactic properties; knowledge about its use in different contexts; its relationships to other words (Nagy & Scott 2000), or what Perfetti (2007: 360) calls a ‘high quality lexical representation’. High quality representations contain rich interrelated information on the lexical items, and they are precise but flexible. For example, the word ‘quaint’ means ‘unusual’, but its precise use requires that it be utilized only if the unusual object also includes the dimension of being old-fashioned, and carries a positive connotation. ‘Quaint’ is also used flexibly to describe many different concepts (e.g., house, village, even a sense of humor). However, one’s young Goth neighbor may be ‘unusual’ and ‘eccentric’, but probably not ‘quaint’.

In short, vocabulary knowledge is multi-dimensional, interrelated, and context dependent. This complexity has three important implications: (a) Vocabulary knowledge of an individual is not necessarily only reflected by the number of words that are known (breadth) but also by how rich and integrated the representations are for each item (depth); (b) High quality lexical representations develop incrementally through multiple exposures to the item in different contexts and uses; (c) Noticing the different contexts and uses of an item requires a

rich conceptual understanding of the topic that forms the skeleton for that item. This rich knowledge base provides a scaffold for the learner to converge on a specific definition of an item or a nuanced understanding of the shades of meaning. For example, ‘arms’ means something different in a text about wars than in a text about body parts. Likewise ‘loan’ and ‘donate’ both imply a recipient getting something, but the nuance is the different expectations on the part of the recipient.

A substantial and growing body of work also points to the importance of academic language, and academic vocabulary in particular, for accessing the content of academic texts and talk; for learning to think and learn in subject areas; and for overall academic achievement (Nagy, Herman & Anderson 1985; Scarcella 2003; Baumann & Graves 2010; Snow 2010; Nagy & Townsend 2012). Academic items are even more challenging because they tend to be low in frequency, abstract, dense in meaning, and usually morphologically complex (Nagy & Townsend 2012). In addition, different content areas have different types of specialized phrases that signal certain relationships in that content area (Schleppegrell 2004; Zwiers 2014). For example, in science and language arts texts, phrases that signal cause–effect relationships are salient (‘Consequently’; ‘As a result of’; ‘The character did that because . . .’) whereas in history texts, there are many phrases that signal chronological relationships (‘Following the establishment of’; ‘Prior to’).

Limited academic vocabulary has consistently been identified as an obstacle to student success (e.g., Snow & Kim 2007), restricting reading comprehension, and serving as a potential source of reading difficulty both for native English speakers as well as English Learners (ELs) (Biancarosa & Snow 2006). Reading comprehension is multi-faceted, requiring higher level processing (e.g., drawing on background knowledge); resolution of semantic and syntactic ambiguities; and the integration of many specific skills (word reading) with cultural and context knowledge. Each component of reading comprehension demands vocabulary knowledge, which is, in turn, multi-dimensional: it requires knowledge not only of a word’s definition but also of its context-dependent connotations; its relationships to other words; and its morphological variations. Word knowledge is generally believed to develop over time, through multiple, contextualized encounters. This is particularly true of abstract, academic words.

Thus, vocabulary is both a key MECHANISM IN and an important EFFECT OF the metacognitive process within the reading comprehension process. More specifically, students who know a great number of words have more abstract language at their disposal which they can use strategically while reading; in turn, students with a developed, complex understanding of language and strategies to manipulate language have the capacity to learn novel, challenging words more successfully (Sweet & Snow 2003). Furthermore, because less proficient readers tend to read less than their typically achieving peers, they encounter fewer numbers of words, and in particular, fewer low-frequency words, than do skilled readers (Stanovich 1986). Struggling learners also tend to have less developed metacognitive strategies for word learning; for instance, they are poorly equipped to use surrounding words and grammatical clues to glean the meaning of unfamiliar words from the context, (e.g., Stoller & Grabe 1993). Put together, this results in less or superficial content learning through academic texts, and, therefore, slower academic progress and overall lower levels of content-area knowledge (Nagy & Townsend 2012). While these general mechanisms are

at work in shaping the learning process for all students, ELs are particularly likely to have underdeveloped English language vocabularies (August et al. 2005).

## 2.2 Vocabulary and comprehension interventions

There have been many discussions of vocabulary interventions (see McKeown et al. 1985; Stahl 2003; Francis et al. 2006; Graves 2006; Marulis & Neuman 2010; Pollard-Durodola et al. 2011; Neuman & Wright 2014; Silverman et al. 2014) and although their targeted learners and contexts may differ, effective vocabulary and comprehension interventions tend to embody several characteristics, listed below, that enable their learners to develop rich, interrelated, precise, and flexible representations of items:

- a. promoting a deep understanding of a relatively small number of critical items that are selected carefully, in contrast to the usual practice of facilitating a basic familiarity with a large number of words;
- b. providing explicit instruction on the items, in addition to creating opportunities for incidental learning through exposure;
- c. including reading, writing, listening, speaking, as well as multimedia in instruction;
- d. discussing items in meaningful contexts that also provide a rich conceptual scaffold;
- e. providing multiple exposures to the items in varied contexts;
- f. acknowledging the specialized nature of academic language and its interrelatedness with content-area knowledge;
- g. providing the learners with the analytic tools and strategies to understand the roots and different morphological forms (inflections, derivations) of words; and
- h. developing a rich knowledge network that facilitates the discovery of an unfamiliar item's meaning and how it fits and enriches the content knowledge.

## 3. The original study

We suggest Lesaux et al.'s (2010) quasi-experimental study of the effectiveness of an academic vocabulary program in multilingual, urban middle-schools be replicated to find out if the positive results hold in different language learning contexts. The original study is described in sufficient detail to allow for replication. The program is not a scripted intervention, but rather is based on well-researched principles of vocabulary acquisition (e.g., gaining a deep understanding of few words, balancing direct teaching with word-learning strategies to determine word meanings using structural and contextual clues, integrating modalities, encouraging active processing of the materials, integrating the literacy and language instruction with content-area instruction). Teachers are involved in developing the lessons, thus learning about how to teach vocabulary in many research-based ways, and have some autonomy in how they are implemented.

The study was conducted on a large scale in 21 classes (13 treatment groups matched to 8 control groups), with 19 teachers in 7 schools and with 476 sixth-grade students, of which 346 were from language minority groups. The intervention was 18 weeks long,

and the teachers offered a very different curriculum than was being used elsewhere in the school district. Research methods included measures of student vocabulary and reading, classroom observations, and teacher logs. Student vocabulary knowledge included measuring the meanings of the words taught, morphological awareness, and discovering the word meanings as presented in expository text, for which the program had a significant and positive effect. Assessment tools also measured depth of word knowledge and reading comprehension, which showed marginally significant but promising effects, and a norm-referenced vocabulary measure, for which there were no effects.

The study was designed to be grounded in the theory of vocabulary learning as well as address the practical need for a feasible vocabulary teaching program for diverse middle school students. The authors used the technical characteristics from Slavin et al. (2008) to guide the study and the intervention (e.g., randomly assigned control group designs, dependent measures of reading performance, minimum of 12 weeks of study duration).

Findings from this study show that the program worked on many levels for middle school students. The results indicated that the treatment led to a significantly better understanding of the target words, both in isolation and in context, and higher levels of morphological awareness. There were also marginally significant effects of treatment on reading comprehension. More importantly, the patterns were very similar for both native English speakers and language minority students.

#### 4. Approaches for replication

These promising results suggest that it is worth exploring whether this academic vocabulary program can be implemented in different educational settings, with different types of learners and different content areas. After all, the efficacy of an intervention is not only indicated by how it works within its original implementation, but also how it can be generalized to different educational contexts. The replications conducted in varied settings will not only test the effectiveness of the original framework but also indicate which aspects of the original intervention will need to be modified for a particular context.

Indeed, the research reported in Lesaux et al. (2010) has been cited to develop the justification for using similar vocabulary teaching with vastly different populations. For instance, Tighe & Schatschneider (2015) leverage the Lesaux et al. research to make the case for fostering morphological awareness as a predictor of adult reading comprehension abilities, despite the fact that this work was carried out largely with children. Likewise, the authors themselves believe that their middle-school techniques are an important base needed for high school content learning (Kieffer & Lesaux 2010), but to date, we do not know of any studies that test the strategies in a high school context.

In the next section we will outline the replication suggestions under two main headings: different types of learners and different content areas.

There is a dearth of empirically informed guidance on which approaches and materials are most appropriate for which type of EL across middle and high school grade levels (Lesaux et al. 2010). This is particularly true for high-need ELs, including recent arrivals with limited formal schooling and long-term ELs. While there are a number of commercially

available academic language and vocabulary focused materials (e.g., *Vocabulary Power: Processing Essential Words*, and the *Word Generation program* <http://wg.serpmedia.org/index.html>) as well as pedagogical approaches (e.g., *SIOP, MALP*), there is very little applied work on how these can best be adapted, differentiated, and utilized for high-need, older EL students who are called upon to learn high level content with emerging English language skills.

Language learners are a very heterogeneous group (National Research Council 2012). In order to highlight the crucial dimensions creating this diversity and the implications for different replication studies, we bring to the forefront the following variables: Age, previous formal educational experience, L1 proficiency, L2 proficiency, and educational setting. L2 learners have different profiles and educational needs as a function of the combination of these (interrelated) variables and thus may respond differently to the original intervention.

AGE is a pretty straightforward factor as children, adolescents, and adults can be assumed to constitute the three main educational groups. Replication studies across different age groups need to consider (a) the nature of the materials that are selected for the intervention (b) the existing conceptual knowledge of the learners and (c) the kind of information the learners need. To give a simple example, an L2 text on reproductive health is not appropriate for children, but can be considered essential for adolescents and adults.

PREVIOUS FORMAL EDUCATIONAL EXPERIENCE can be operationally defined as the last grade that was completed. This variable is related to age but does not completely overlap. For example, language minority children who have completed Grade 5 and are continuing with their education are different from adolescents or adults who have left school after Grade 5 and are now coming back to further their education in their L2.

L1 PROFICIENCY is related to last grade completed, but not completely. L1 proficiency indicates how strong the home language is. Some individuals (such as English as a foreign language (EFL) students in a college setting) who had 12 years of instruction in their home language will have strong reading, writing, listening, speaking, and academic language skills in their L1. On the other hand, a child from a Spanish-speaking home in a US school who never had any formal instruction in Spanish may have good conversational skills but limited academic language proficiency in their L1.

L2 PROFICIENCY is how familiar the L2 is, both linguistically and in terms of cultural and background knowledge. This is an important consideration for the replications of the original intervention because L2 proficiency determines both the content of the intervention as well as how much foundational work has to be done (more below).

EDUCATIONAL SETTING reflects where the intervention will be implemented. Language learners can be found in highly variable settings as a function of location, socioeconomic status, and educational system. For example, adolescents in private schools learning an L2 are quite different from recent immigrants in English as a second language (ESL) classes in adult education settings, in terms of support, resources, and goals.

#### 4.1 Replications across different learners

If the original program is so effective, it could also work for learners of different ages and proficiency levels who are learning academic content and English in different settings. It

would be valuable for educators to know if this academic vocabulary learning program can be adapted and used across a range of educational contexts with similar outcomes.

Therefore, the first set of replications that we propose is to implement the program with individuals with increasing degrees of difference as compared to the original study population. The original study was conducted with middle schoolers, both native speakers and language minority students, using 4–6th grade reading materials. The closest replication would be to implement the intervention with high school ELs with emerging language needs. In the original study, the content was engaging (e.g., cyberbullying) and such content could be interesting for older readers as well. The material was selected to be at 4–6th grade reading level. In the first replication, the same materials could be used with high school students with reading levels around 6th grade. This will constitute a close replication, keeping the instructional strategies and content constant but with an older group. Other replications will need to keep the instructional approaches constant but include engaging texts with higher readability levels. Of course in these replications with different texts, another issue that awaits further study is how the specific target words and phrases can be selected with this content (Sagar, Fagan & Durgunoğlu 2014). We propose collaborating with educators and learners to identify topics which would be of interest to different populations, but also push their vocabulary skills toward more and more complex academic topics. Educators can also be instrumental in identifying the words that should be the focus of the intervention. Academic language corpora exist (e.g., the Academic Word List that was used in the original study (Coxhead 2000)) that enable researchers and educators to select words systematically.

These studies could also be done with EFL learners in college. Although EFL students in universities may be more privileged in terms of economic/class background compared to the language minority students in the original article, it is worth exploring whether the same instructional approaches can work with different content. Furthermore, the original study design includes two key features which help to make the curriculum appropriate and relevant to the learners and the learning context: (1) engaging texts to use in the intervention can be selected in consultation with teachers, and tailored to students' interests and needs, and (2) monthly meetings with teachers to be responsive to their implementation needs, which included troubleshooting difficult lessons.

As we move to learners of different ages and different educational settings, some of the instructional strategies may need to be modified. For example, in a replication with recent immigrants in adult ESL classrooms, the same instructional approach from the original study can be adopted, but given the learners' relatively less familiarity with their new culture, a new part of the instruction has to be the laying of the groundwork for some cultural practices before starting vocabulary and content instruction. For example, before discussing cyberbullying (and how young people, especially girls, are silenced with this mechanism), some cultural foundations of gender roles may be covered.

Close replications can provide us with an indication of the boundary conditions for the applicability of the original intervention. Although there is a risk in implementing an intervention based on a certain population with a new group, the risk is mitigated in this particular case because the intervention strategies are based on a solid empirical and theoretical foundation. In addition, we are not arguing for reckless use of research designs, methods, and instruments from other studies to new populations, but through

the collaboration with practitioners and careful ascertaining of whether underlying learning/teaching processes may be similar, it may be worth the effort to gain access to new settings and try out an intervention not originally intended for the learners.

## 4.2 Replications on conceptual knowledge

A second general focus for replication is the creating and activation of conceptual knowledge. Vocabulary items are meaningful within an overall conceptual framework; thus, how they are understood and interpreted depend on an understanding of the basic information surrounding them. To use the classic example, the object that comes to mind is different when the identical label 'ball' is encountered in a text describing a tennis match as compared to a text about a soccer match. The first context elicits the mental representation of a small, yellow and furry round object, whereas the second context might elicit the representation of a larger black and white round object. Likewise, the term 'President' has different meanings in different political systems. It can be a ceremonial post with a prime minister having more power (as in Turkey) or it can be a powerful position itself (as in the USA). Hence, the understanding of a single vocabulary item also requires some understanding of the context surrounding that item, or its conceptual scaffold. A second area proposed for replication is to explicitly examine the role of conceptual knowledge.

In the original study, the 'engaging informational' texts used in the intervention were selected from a magazine with the parameters that they would be of interest to an adolescent reader. Texts were on topics such as single-gender classrooms, high tech bullying, and TV viewing rates.

In classrooms, students are expected to understand academic texts and develop vocabulary knowledge about relatively unfamiliar (and because of unfamiliarity, sometimes perceived to be uninteresting) topics. Therefore, an important conceptual replication is to evaluate this intervention in unfamiliar and, consequently, (perceived to be) less engaging domains. These replications will add a needed dimension to the existing intervention structure, namely building a conceptual framework before the intervention. These can be hands-on activities in science classes (e.g., showing how a chemical worked and then introducing the vocabulary item 'enzyme', or providing visual representations of objects (e.g., detailed drawings of parts of a car engine before introducing the vocabulary item 'axle')).

Providing a conceptual framework before studying vocabulary items can be a useful strategy (Pollard-Durodola et al. 2011). In a recent pilot study, we have provided a conceptual framework before introducing history and civics vocabulary with adult ELs. Initial data indicate that situating the new vocabulary item within a conceptual scaffold improved its acquisition (Durgunoğlu et al. 2013).

Another factor that can be manipulated in developing this conceptual framework is L1. In college EFL settings and for certain adult education classes, the learners are likely to have acquired a strong educational foundation in their L1, becoming knowledgeable in certain content areas (e.g., history, geography, science). In contrast, the language minority students in the original study had no or limited instruction in their L1. In the replication studies with older learners, it may be possible to use their L1 content knowledge as a basis for

building their English vocabulary, by situating the vocabulary items within their existing conceptual knowledge of topics. This can be accomplished by techniques such as activating the prior knowledge acquired in their L1 or enabling them to make cross-cultural comparisons (Durgunoğlu et al. 2013). It may also be possible to use the translations of complex concepts in the L1 of learners to provide a starting point. Of course, translations overlap to a larger extent in languages that share cognates (e.g., English and Spanish) or in fields like biology and medicine using slightly different versions of Latin- or Greek-based terminology (*insulin* in English, *insulina* in Spanish, *ensülin* in Turkish), but not necessarily for others. As we envision a conceptual replication of Lesaux et al., we would include more home language supports. These would include, for example, direct translations of items and activation of existing knowledge from L1 culture in order to establish the conceptual scaffolding for a complex topic. These supports would ideally undergo a piloting phase to ascertain their utility and then integrate accordingly.

In the original study with middle schoolers, the texts that were used were about social studies, more specifically, cultural studies. In Durgunoğlu et al. (2013), the materials were about civics and history. Given the theoretical and practical grounding in existence, it can be expected that the approach in the original study can be used in other content areas, especially in fields such as biology or astronomy with their domain-specific words and phrases. Applying this approach to other content areas also awaits replication studies to assess if these instructional principles are generalizable to other fields. In these replications, the principles of instruction will remain constant, but the content area and the relevant vocabulary will be modified.

## 5. Conclusion

In sum, we believe that the replication of the Lesaux et al. (2010) study is likely to be fruitful. Replications in other contexts, with different language learners, would put to the test ‘best practices’ in vocabulary instruction and offer a blueprint for ways in which vocabulary is a building block of academic/technical literacies needed for a wide range of academic and vocational learner goals. The process of carrying out the replication would bring much-needed training on vocabulary and comprehension instruction to the teachers who are involved, and build their capacity as leaders in reading instruction and assessment in general, and in the area of vocabulary teaching across content areas in particular. To this end, we stress that teachers must be involved in creating the curriculum for the replication in order for it to be successful, as was the case in the original study.

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AYDIN YÜCESAN DURGUNOĞLU is Professor in the Department of Psychology at the University of Minnesota, Duluth. Her research focuses on the topics of language and literacy development for children and adults, with a particular focus on multilinguals.

MARTHA BIGELOW is Professor in the Department of Curriculum and Instruction at the University of Minnesota, Twin Cities. Her research focuses on adolescent immigrants and refugees who are becoming print literate largely in a second language.