Introduction

Many high school graduates do not possess adequate vocabulary knowledge for success in college and careers (ACT, 2010; NCES, 2009). Unfortunately, research evidence and evidence-based resources for high school vocabulary instruction are lacking. To address this gap, this project is aimed at the iterative development and evaluation of a web-based vocabulary intervention platform, DictionarySquared (DS), to provide high-quality, individualized vocabulary instruction to high school students. The long-term goals are to (a) develop a platform that can provide effective, individualized instruction of virtually any English word, and (b) to test whether regular usage of the platform increases students’ overall vocabulary knowledge and reading comprehension.

The Theory of Change is informed by the following:

- A primary source of individual differences in word knowledge is differences in the quantity and quality of word experiences (Stahl & Nagy, 1998; Beck & Perfetti, 2003; Perfetti, 2007; Stahl, 1996).
- Cumulative experiences with words in varying contexts enable learners to acquire rich, decentralized representations of word meanings (Beck & Perfetti, 2003; Nagy & Scott, 2000).
- Although research of vocabulary learning is incipient, explicit instruction can enable effective and efficient learning of specific target words (cf., Cai & et al., 2007; Beck & et al., 2013).
- Providing definitions in addition to usage examples may assist learners in encoding the correct meaning (cf., Bolger et al., 2008; Signt et al., 2016).
- Distributed practice and intermittent testing results in better retention of learned information than massed practice or study alone (Epple, Vul, Rothen, Wisted, & Paheir, 2008; Roediger & Karpic, 2000).

Thus, the Instructional Components of the intervention include dictionary definitions, authentic contextual examples of usage, activities to encourage active processing, and a spaced practice schedule featuring intermittent test opportunities.

Target Words

Although the long-term goals to develop a scalable platform that can be used to teach any word in the English language, we limited the set of target words during iterative development to afford quality control. The core set of 1,000 target words is divided into 10 difficulty bands, based on word frequency and age of acquisition. Words within each band were carefully selected according to criteria described by vocabulary experts for choosing “useful,” words for instruction (Cech, McRae, & Ornstein, 1997; Nation, 2001; Stahl & Nagy, 2000). Overall, vocabulary words that are more frequent may be more peripheral to learners’ current knowledge and more useful to the, the utility of teaching words in the lower/easier bands may be more obvious than words in the higher bands. However, considering the wide range of individual differences in high school students’ vocabulary knowledge, our goal was to create an array of challenging yet useful words to stretch the vocabularies of students from very low to very high ability levels.

Sample Target Words from Each Difficulty Band

<table>
<thead>
<tr>
<th>Difficulty Band</th>
<th>Sample Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very low</td>
<td>alleviate,腠理, scintillation</td>
</tr>
<tr>
<td>Low</td>
<td>default, foreign, bellow</td>
</tr>
<tr>
<td>Medium</td>
<td>alleviate, bellow, maverick, advanced</td>
</tr>
<tr>
<td>High</td>
<td>ebullient, literati, scurrilous</td>
</tr>
<tr>
<td>Very high</td>
<td>analogy, cephalopod, rubric</td>
</tr>
</tbody>
</table>

Note: SFI = Standardized Frequency Index (Zeno et al., 1995); AoA = Age of Acquisition (Kucera et al., 2012)

Acknowledgments

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Pilot Study 1

Method
- Participants: 275 9th grade students, from public schools in South Carolina (11 class sections taught by 4 teachers)
- Protocols: randomly assigned at Pretest, and posttest 18 days after pretest

Results
- Students’ total usage time varied from 0-142 minutes (Mean = 43.18 minutes, SD = 33.66 minutes)
- Students encountered between 0-185 words on D’ (Mean = 97.30, SD = 51.12)
- Test scores were significantly higher than pretest (t = .30, p = .02)

General Discussion and Next Steps
- Results of two studies indicate the feasibility of conducting a large-scale study examining DS effects
- Feedback from students and teachers was generally positive; > 80% of student respondents said DS was and “useful” or “fun” way to learn vocabulary, and > 80% reported that DS was somewhat or very helpful in teaching them vocabulary.
- Stronger evidence of potential efficacy for Study 2 may be related to timing of posttest, consistency of usage across participants, and/or student motivation.
- Suggests importance of encouraging sufficient usage during entire intervention period.
- No control group in pilot studies; randomized control trial now underway