MEMORANDUM March 22, 2019

TO: Annie Wolfe
Officer, Secondary Curriculum and Development

FROM: Carla Stevens
Assistant Superintendent, Research and Accountability

SUBJECT: **VOCABULARY.COM: USAGE AND IMPACT ON READING AND ENGLISH PERFORMANCE IN HISD, 2017–2018**

Vocabulary.com is an online adaptive game that teaches students words by systematic exposure to a variety of question types and activities and by understanding all the word meanings and nuances as they are learned. Vocabulary.com teaches 14,000 words using over 208,000 questions. It has been implemented with the Houston Independent School District's (HISD) fifth through twelfth grade students since the 2014–2015 school year.

This evaluation used a quasi-experimental design to determine how Vocabulary.com impacted students' performance on the 2018 State of Texas Assessments of Academic Readiness (STAAR) Grades 3–8 reading and English 1 End-of Course (EOC) exams.

Key findings include:

- The correlation between the number of words students mastered and questions answered correctly on Vocabulary.com ranged from 0.78 to 0.96 for the study sample. On average, the ratio of questions answered correctly to words mastered was 18:1.

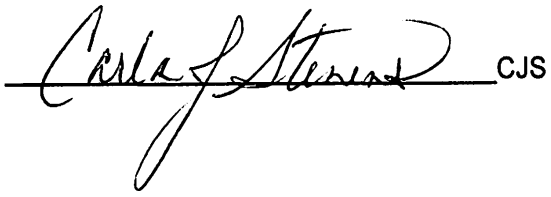
- The highest proportion of eighth- (97.6%) and ninth-grade (95.7%) students who met the Approaches Grade Level standard on the 2018 STAAR 3–8 reading and English I EOC exams, respectively, mastered at least 100 words on Vocabulary.com.

- Most sixth- to eighth-grade students who showed gains (78.0–86.3%) on the 2018 STAAR 3–8 reading scale scores did not master any words on Vocabulary.com.

- Treatment effects showed that, on average, sixth- to ninth-grade students in the sample who used Vocabulary.com met the Approaches Grade Level standard on the 2018 STAAR 3–8 reading and English I EOC tests without mastering any Vocabulary.com words.

- The strongest predictor of students' performance on Vocabulary.com on the sixth- to eighth-grade 2018 STAAR reading was their prior (2017 STAAR 3–8) reading scale score. They predicted between 50 to 62 percent of the variance in students' scale scores.

Further distribution of this report is at your discretion. Should you have any questions, please contact me at 713-556-6700.



Attachment

cc: Noelia Longoria
Jessica Chevalier

HOUSTON INDEPENDENT SCHOOL DISTRICT

RESEARCH

Educational Program Report

VOCABULARY.COM: USAGE AND IMPACT ON READING AND ENGLISH PERFORMANCE IN HISD, 2017–2018

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VOCABULARY.COM: USAGE AND IMPACT ON READING AND ENGLISH PERFORMANCE IN HISD, 2017–2018

Executive Summary

According to its website, Vocabulary.com is an online-based adaptive game that teaches students words by systematic exposure to a variety of question types and activities and understanding all the word meanings and nuances as they are learned (Vocabulary.com, n.d). Vocabulary.com teaches 14,000 words using over 208,000 questions. Fifth- to twelfth-grade students in the Houston Independent School District (HISD) have been using Vocabulary.com since the 2014–2015 school year. This report is an evaluation of the effect of Vocabulary.com on the reading and English performance of sixth- to twelfth-grade student participants. The report, however, focused on the sixth to ninth grades and particularly, the eighth and ninth grade, which had the largest number of students in the sample of 3,869. Students who answered at least one question on Vocabulary.com, were first-time testers, and had a score on the 2018 State of Texas Assessments of Academic Readiness (STAAR) 3–8 or the English I End-of-Course (EOC) regular tests were included in the sample. Students' participation was incentivized with prizes and there were shout-outs for high performing students. In addition, students participated in a national Vocabulary Bowl.

The evaluation used a quasi-experimental design, multivalued treatment effects, descriptive and regression analyses, and KonFound-It© (a software for validating inference) to determine how Vocabulary.com impacted students' performance on the 2018 STAAR 3–8 reading and EOC English I exams.

Key findings

- The correlation between the number of words students mastered and questions answered correctly on Vocabulary.com ranged from 0.77 to 0.96 for the study sample. On average, the ratio of questions answered correctly to words mastered was 18:1.

- The highest proportion of eighth- (97.6%) and ninth-grade (95.7%) students who met the Approaches Grade Level standard on the 2018 STAAR 3–8 reading and English I EOC assessments, respectively, mastered at least 100 words on Vocabulary.com.

- Larger percentages of sixth- to eighth-grade students (78.0–86.3%) who showed gains in their 2018 STAAR 3–8 reading scale scores did not master any words on Vocabulary.com.

- Treatment effects showed that, on average, sixth- to ninth-grade students in the sample who used Vocabulary.com met the Approaches Grade Level standard on the 2018 STAAR 3–8 reading and English I EOC tests without mastering any Vocabulary.com words.

- Eighth-grade students who mastered at least 100 words on Vocabulary.com, would have, on average, met the Masters Grade Level standard, and ninth-grade students who mastered at least one word on Vocabulary.com would have, on average, met the Meets Grade Level Standard on the 2018 STAAR 3–8 reading exams.

- The strongest predictor of students' performance on the sixth- to eighth-grade 2018 STAAR 3–8 reading exam was their prior (2017 STAAR 3–8) reading scale score, accounting for between 50 to 62 percent of the variance in students' scale scores. Vocabulary.com indicators were not statistically significant predictors of STAAR performance.

Recommendations

- Greater effort may have to be made to increase the number of students who consistently use Vocabulary.com because when disaggregated, fewer students in the sample had mastered more than 20 words compared to those who mastered no words or less than 20 words.

- Classroom observations and participant surveys may be required in future evaluations to determine how Vocabulary.com is incorporated into classroom instruction and how it is promoted to achieve the kind of sustained use that is necessary for word mastery since, on average, students mastered one word for every 18 questions answered correctly.

- Evaluation assessments that are more compatible with the word content in Vocabulary.com may be required to determine its true impact on learning, given that the positive relationship between question answered and word mastery is already established, but its correlation to STAAR test scores was weak and its predictability on STAAR was not statistically significant.

Introduction

Commenting on Scientifically-Based Reading Research (SBRR), Moats (2007) asserts that "as children progress in reading, the variance between good and poor readers is increasingly explained by students' knowledge of vocabulary: the more vocabulary one commands, the more fluid and accurate one's reading knowledge" (p. 16). Low-income preschoolers who come to school without a strong vocabulary experience have a lasting disadvantage. They only know about half as many words as their middle-class counterparts on starting school and acquire additional vocabulary at a slower rate (Moats, 2007). Moats (2007) recommended continued instruction in word meaning tied to content learning and teachers' own verbal habits as strategies for improving student vocabulary.

The U.S. Department of Education, What Works Clearinghouse (WWC), recommended the provision of extensive and varied vocabulary instruction to include in-depth teaching of essential content words, and the "use of instructional time to address the meaning of common words, phrases, and expressions not yet learned" as they provide strong evidence of vocabulary effectiveness (Gersten, Baker, & Shanahan, et al., 2007, p. 19). This report focuses on English learners. Given the importance of vocabulary in overall learning, reading comprehension, and fleuncy, the Houston Independent School District (HISD) has provided access to Vocabulary.com as part of its digital resources available to all teachers on the Hub (the district's learning management system).

According to its website, Vocabulary.com is an online platform for introducing students to new words and building their vocabulary by systematically exposing them to a wide array of question types, real world examples, and activities (Vocabulary.com, n.d.). It combines a "smart" dictionary with an adaptive learning game for mastering new words. Vocabulary.com is premised on the belief that students only master a word after they have demonstrated an understanding of all the word's meanings and have encountered it in multiple contexts (Vocabulary.com, n.d.). Vocabulary.com serves students from fifth grade to adulthood and teaches over 14,000 words using over 208,000 questions and the science of learning to model how new words are learned. Vocabulary.com personalizes students' learning experiences by comparing their answers to hundreds of millions of other answers given by other Vocabulary.com readers and choosing the best just-in-time questions for users (Vocabulary.com, n.d.).

In using Vocabulary.com, teachers can create classes and assignments, custom quizzes, and monitor students' progress. Vocabulary.com facilitates school and district wide reporting. Vocabulary.com uses computer adaptive testing (CAT) technology to scaffold students' learning based on their abilities, which is determined, as they attempt and complete questions posed. These questions become increasingly difficult and complex with success. As a computer adaptive test, Vocabulary.com provides a more realistic picture of how well learners know the meaning of the words tested and allows for efficient student testing at different levels using different number of items (Vocabulary.com, n.d.). HISD students were exposed to Vocabulary.com from the 2014–2015 to 2017–2018 school years.

The purpose of this evaluation is to report on the usage of Vocabulary.com among HISD students and to determine the effect of Vocabulary.com word mastery on students' reading performance and their performance on English I for the 2017–2018 school year. The evaluation was designed to answer the following questions:

1. What were the characteristics of students who participated in Vocabulary.com during the 2017–2018 school year?

2. How did Vocabulary.com participants perform on the 2018 STAAR Assessments?

3. What were the effects of Vocabulary.com word mastery on students' 2018 STAAR 3–8 reading and English I EOC test performance?

4. What were the predictors of reading and English I performance of students with word mastery on Vocabulary.com during the 2017–2018 school year?

Literature Review

The International Literacy Association (2009) advocated for the use of 21st century technologies in literacy instruction. The preponderance of internet access in American schools makes the use of web or computer based-technologies a distinct possibility (Dalton & Grisham, 2011). The use of web or computer-based technology for vocabulary instruction and learning is referred to as eVoc strategies. eVoc strategies are electronic or technology-based strategies teachers can use to develop students' word and vocabulary interests and learning (Dalton & Grisham, 2011).

Dalton and Grisham (2011) identified ten eVoc strategies that can be used to build vocabulary. Among them are (1) learning the visual display of word relationships with text, (2) taking advantage of online word reference tools that are also teaching tools, (3) using language translators for just-in-time help for English learners (EL), (4) increasing reading volume by reading digital texts, and (5) increasing reading volume by listening to digital texts with a text-to-speech tool and audio books. The National Reading Panel suggested the use of text-related direct vocabulary instruction, the use of a variety of vocabulary instruction methods, including computer-based methods and multiple exposures to words in their varying contexts, among others, as key to mastering vocabulary, and enhancing comprehension and reading abilities (Butler, Urrutia, Buenger, Gonzalez, Hunt, & Eisenhart, 2010).

An Iranian study involving 52 Persian-speaking, high school English learners (ELs) was designed to compare paper-based (PB) and computer-based (CB) contextualization in vocabulary learning of ELs (Ahmadian, Amerian & Goodarzi, 2015). The experimental study assigned 26 students to the PB group and 26 to the CB group. Using repeated measures pretest, posttest, immediate and delayed posttests, the study found that CB contextualization had more effects on vocabulary learning of Iranian ELs than PB contextualization of words (Ahmadian, Amerian, & Goodarzi, 2015). The study was confined to one high school in a single Iranian province, severely restricting its external validity and generalizability to the larger Iranian population of high school students.

A single school study in the U.S. used students from a tenth-grade English language arts (ELA), a twelfth-grade regular level English literature course, and an Advanced Placement (AP) English literature course to determine the effect of computer-based self-access learning on weekly vocabulary test scores (Dreyer, 2014). Ninety percent of the 95 study participants were African American. Participants were observed over 14 weeks. Students were given weekly vocabulary tests and daily online Quizlet[1] activities. Students were encouraged to use Quizlet in their spare time. There was a strong correlation between the online vocabulary review program and short-term vocabulary retention, although most students did not utilize Quizlet and were treated as an elective control rather than a treatment group (Dreyer, 2014). Students who paced themselves and spread out their study sessions did better than those who used the program last minute as a 'cram' session. The use of Quizlet also improved the scores of most students, and the multiple use rather than the single use of Quizlet for review resulted in higher scores. Students who were proficient in the notebook system of learning vocabulary appeared not to need the treatment (Dreyer, 2014). Unlike most studies of this type, which tended to focus on English learners in college settings, this study focused on high school students in mainstream American classrooms.

[1] Quizlet is a site with online-created study guides and reviews that prepare students for tests and exams.

Laufer and Goldstein (2004) studied 435 English learners (EL) to determine, among others, the extent to which word knowledge is most closely related to second-language (L2) achievement. The study focused on the number of words these learners knew, "vocabulary strength, and a combination of four aspects of knowledge meaning that are assumed to constitute a hierarchy of word difficulty: passive recognition (easiest), active recognition, passive recall, active recall (hardest)" (Laufer & Goldstein, 2014, p. 399). The study results showed that the hypothesized hierarchy was present at all word-frequency levels, and passive recall was the best predictor of classroom language performance, "and that vocabulary growth varied with different word strength modalities" (Laufer & Goldstein, 2014, 399).

A study on the effectiveness of computer software in learning a common list of unfamiliar words among eleventh-grade students was conducted by comparing the program's instructional approach that incorporates definitional and contextual word knowledge with approaches that use definitional and contextual information only (Kolich, 1991). The results showed that students who used a modified mixed approach that provided sentence context, definitional or synonyms clue, and optional word choices learned more words than did students who received definitional information only (Kolich, 1991).

Two groups of 300 randomly-assigned participants were used to measure vocabulary retention from web-based and paper-based learning among Iranian foreign-language learners (Gorjian, 2012). Gorjian (2012) administered two-quizzes, two weeks apart, based on twelve expository passages to determine short- and long-term retention effect of learning vocabulary. Findings indicated that there was a significant effect of the Web-Based Language Learning (WBLL) on short-term vocabulary retention; however, posttest results showed that in the long-term, the treatment effect faded (Gorjian, 2012).

Overall, there appear to be strong and significant links between vocabulary learning and web- or computer-based approaches to learning. It appears, that in the long term, the vocabulary retention effects fade. It also appears that more frequent use of eVoc web-based or computer-based strategies tend to result in better vocabulary outcomes even though studies tended to be foreign-based and focused on English language learners. However, few studies appeared to link vocabulary to students' performance on standardized tests. This study will focus on U.S. middle and high-school students in one urban school district using state standardized tests.

Method

This is a quasi-experimental study designed to determine the effects of Vocabulary.com word mastery on students' reading and English I performance. Student results on the State of Texas Assessments of Academic Readiness (STAAR) Grades 3–8 reading and English I End-of-Course (EOC) tests were used as the performance measures. Initially, students are graded based on the number of correct items (raw score) on each test. Raw scores are standardized and reported as scale scores. Cut scores are determined to identify students who met Approaches, Meets, or Masters Grade Level standards on the STAAR tests. STAAR neither administers a vocabulary assessment nor disaggregates scores to demonstrate student's vocabulary performance. Notwithstanding, the assumption is that words students encountered in Vocabulary.com are possibly similar to those contained in the STAAR tests. However, the correlation between students' mastery of vocabulary and STAAR 3–8 reading/English I EOC results in this study sample was weak, although significant.

Data Collection

Vocabulary.com recorded the number of questions students answered correctly and the number of words they mastered. A list of students who used vocabulary.com was obtained from the program vendors through the relevant HISD curriculum manager. The data were transmitted via email using a password protected Microsoft Excel spreadsheet. The dataset included the number of questions answered correctly by each

student, and the number of words each student mastered. Students were expected to answer about 20 questions correctly to master one word on Vocabulary.com.

A total of 29,066 students made up the 2017–2018 dataset from Vocabulary.com. Only students who had answered at least one question correctly were included in the analysis. On average, students answered 932 questions correctly and mastered 52 words.

Students' educational and demographic data were obtained from the Public Education Information Management System (PEIMS) and merged with the 2017–2018 STAAR 3–8 and EOC performance data and Vocabulary.com data unique identifiers. Students in the sample were first-time testers who took the STAAR tests. Data for sixth-, seventh-, eighth-, and ninth-grade students were used for the analyses since they represented the largest group of students in the sample, which, when disaggregated, would be sufficient to produce reportable results (five or more participants). Additionally, most first-time testers who took the 2018 STAAR English I EOC exams were enrolled in the ninth grade. The sample comprised of 3,869 students (2,150 ninth- to twelfth-grade students and 1,719 sixth- to eighth-grade students). Statistical power test using an online sample size calculator indicates that a total of 379 students would be adequate to make inferential statements of the Vocabulary.com population using a confidence level of 95 percent and a confidence interval (CI) of 5.

Data Analysis

The data analyses sought to describe the performance of students with word mastery on Vocabulary.com and determine the effects of the number of Vocabulary.com words students mastered on students' reading or EOC English I performance on the STAAR 3–8 and EOC assessments. Preliminary review of the data showed strong correlation by grade between the number of questions students answered correctly, and the number of words they mastered in Vocabulary.com. The evaluation used a multivalued treatment model to determine the effect of Vocabulary.com word mastery on students' scale scores. Multivalued treatment models are useful where there are more than two treatment or intervention levels. The treatment was restricted only to students who had mastered at least one word in Vocabulary.com. Those who did not master any words were treated as the comparison or untreated group. Because of the wide range in the number of words mastered (0–4739), the treatment was divided in seven levels (0 to 6) based on the number of words mastered: 0 = 0; 1 = 1–19; 2 = 20–39; 3 = 40–59; 4 = 60–79; 5 = 80–99; and 6 = ≥ 100. The data were analyzed using multivalued treatment effects without control for other demographic variables since convergence was not possible on models when disaggregated by grade indicating insufficient data at that level to model the outcome after adjustments.

The average treatment effect on the treated (ATET) was reported as a measure of how students who mastered at least one Vocabulary.com word performed, on average, compared to if they had not mastered any words (potential outcome means). The study assumed that word mastery would have a positive effect on STAAR 3–8 reading and English I EOC assessments. This is based on the premise that the words mastered, and outcome scale scores were adequately related. The evaluation also predicted students' performance on the Vocabulary.com who had test results using multiple linear regression. Students' 2017 STAAR 3–8 reading scores, Vocabulary.com variables, and key demographic and educational variables were used in the regression models.

Finally, the study used KonFound-It© (Frank, Maroulis, Duong, Kelcey, 2013), an online software for validating confounding inferences. The largest statistically significant predictors in the regression models were used to test these inferences. KonFound-It© uses the regression coefficient, the standard error, sample size, p-value (0.05), and the number of covariates in a regression model to determine if the inference regarding a predictor is valid and what would be required to invalidate that inference. The higher the percentage of cases required for invalidation, the more robust the inference and validity. Konfound.It©

also indicates what it would take for an omitted variable, if added to the model, to change the validation in linear regressions (Frank, 2000).

The data were tested for and met normality, homoscedasticity, and collinearity conditions using the Shapiro-Wilk test, the normal Q-Q plot, and the Detrended normal Q-Q plot on the SPSS statistical analysis software. Data were presented using summary tables and charts.

Limitations

- Because schools, classrooms, and students self-selected to use Vocabulary.com, finding a comparable group of non-users with equal motivation to use the platform was not feasible. As a result, the students who did not master any words were used as a comparison or "untreated" group to determine the effect of Vocabulary.com on students' reading and English I performance.

- STAAR reading and English I assessments do not report vocabulary performance. Their usefulness in determining Vocabulary.com effect was limited. PSAT and SAT word-in-context scores were considered as alternatives but, similarly, showed weak correlations.

- The challenge of obtaining convergence on the maximum likelihood indicators between words mastered and STAAR outcomes limits the robustness of the analyses, particularly, when the outcome is modeled using key demographic and educational variables. The results, therefore, should be interpreted with caution. Konfound.It© was used to ensure robustness and validity of inferences.

Results

What were the characteristics of students who participated in Vocabulary.com during the 2017–2018 school year?

Table 1 shows the demographic and educational characteristics of the evaluation sample.

Table 1. Demographic and Educational Characteristics of the Evaluation Sample, 2017–2018

Attributes		Sixth Grade		Seventh Grade		Eighth Grade		Ninth Grade	
		n = 77	%	n = 139	%	n = 1,503	%	n = 975	%
Gender	Female	38	**49.4**	70	50.4	825	**54.9**	518	**53.1**
	Male	39	**50.7**	69	**49.6**	678	**45.1**	457	**46.9**
Econ. Disadv.	No	36	**46.8**	45	**32.4**	742	**49.4**	398	**40.8**
	Yes	41	**53.3**	94	**67.7**	761	**50.6**	577	**59.2**
At-Risk	No	49	**63.6**	66	**47.5**	779	**51.8**	429	**44.0**
	Yes	28	**36.4**	73	**52.5**	724	**48.2**	546	**56.0**
Special Education	No	70	**90.9**	129	**92.8**	1,413	**94.0**	921	**94.5**
	Yes	7	**9.1**	10	**7.2**	90	**6.0**	54	**5.5**
LEP	No	63	**81.2**	118	**84.9**	1,336	**88.9**	838	**86.0**
	Yes	14	**18.2**	21	**15.1**	167	**11.1**	137	**14.1**
Ethnicity	Asian	3	*	5	**3.6**	131	**8.7**	71	**7.3**
	African American	13	**16.9**	26	**18.7**	387	**25.8**	131	**13.4**
	Hispanic	50	**64.9**	80	**57.6**	671	**44.6**	609	**62.5**
	White	8	**10.4**	27	**19.4**	286	**19.0**	142	**14.7**
G/T	No	34	**44.2**	86	**61.9**	859	**57.2**	-	-
	Yes	43	**55.8**	53	**38.1**	644	**42.9**	-	-

Source: Vocabulary.com (data only).
*Denotes less than 5 students.
Note: Figures may exceed 100 percent due to rounding.

- Most students in the evaluation sample were Hispanic (44.6–64.9%). In addition, most students were economically-disadvantaged (50.6–67.7%).

- A higher proportion of gifted and talented (G/T) students in the sixth grade (55.8%) compared to their non-G/T counterparts (44.2%) comprised the sample.

- There was a higher proportion of non-at-risk students compared to their at-risk peers who comprised the sample in sixth and seventh grade (63.6 and 51.8%, respectively). The opposite was true for seventh and ninth grades.

- There were lower percentages of students with limited English proficiency among all grades in the sample (11.1–18.2%). Special education students in the sample ranged from 5.5 to 9.1 percent.

Table 2 shows the percentage distribution of students by grade who mastered Vocabulary.com words during the 2017–2018 school year.

Table 2. Percentage Distribution of Words Mastered on Vocabulary.com by Grade, 2017–2018

Words Mastered	Sixth Grade		Seventh Grade		Eighth Grade		Ninth Grade		Tenth Grade		Eleventh Grade		Twelfth Grade	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
0	46	**59.7**	91	**65.5**	593	**39.5**	459	**47.1**	214	**55.4**	260	**52.7**	149	**55.2**
1-19	23	**29.9**	24	**17.3**	359	**23.9**	249	**25.5**	108	**28.0**	152	**30.8**	82	**30.4**
20-39	2	*	5	**3.6**	116	**7.7**	85	**8.7**	37	**9.6**	35	**7.1**	23	**8.5**
40-59	2	*	3	*	70	**4.7**	42	**4.3**	8	**2.1**	17	**3.5**	7	**2.6**
60-79	2	*	4	*	46	**3.1**	28	**2.9**	4	*	12	**2.4**	2	*
80-99	-	-	1	*	23	**1.5**	18	**1.9**	10	**2.6**	9	**1.8**	2	*
≥100	2	*	11	**7.9**	296	**19.7**	94	**9.6**	5	**1.3**	8	**1.6**	5	**1.9**
Total	77		139		1,503		975		386		493		270	

Source: Vocabulary.com (data only).
*Denotes less than five students.
Note: Figures may exceed 100 percent due to rounding.

- Most Vocabulary.com participants in the sample were enrolled in the eighth (1,503) and ninth-grades (975).

- Most students in the sample by grade (39.5–65.5%) did not master any words on Vocabulary.com, followed by students who mastered 1–19 words (17.3–30.8%).

- About 20 percent of eighth-grade students mastered at least 100 words, followed by 9.6 percent of ninth-grade students.

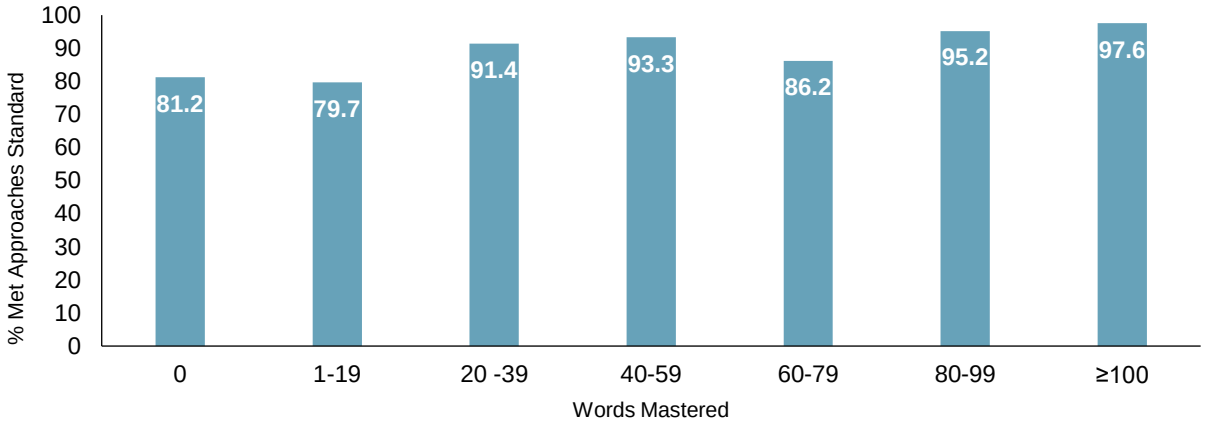
- On average, students answered 932 Vocabularly.com questions correctly and mastered 52 words. This is equivalent to a ratio of approximately 1:18.

- The correlation between words mastered and questions answered correctly ranged from 0.82 to 0.95 for sixth to eighth grade and 0.77 to 0.96 for ninth to twelfth grades.

How did Vocabulary.com participants perform on the 2018 STAAR Assessments?

Figure 1 shows eighth-grade Vocabulary.com students' performance on the 2018 STAAR 3–8 reading exam. Details for sixth and seventh grades are in **Table 3**, p. 16.

Figure 1. Percentage of Eighth-Grade Students Who Met Approaches Grade Level Standard on STAAR 3–8 Reading by the Number of Vocabulary.com Words Mastered, 2017–2018



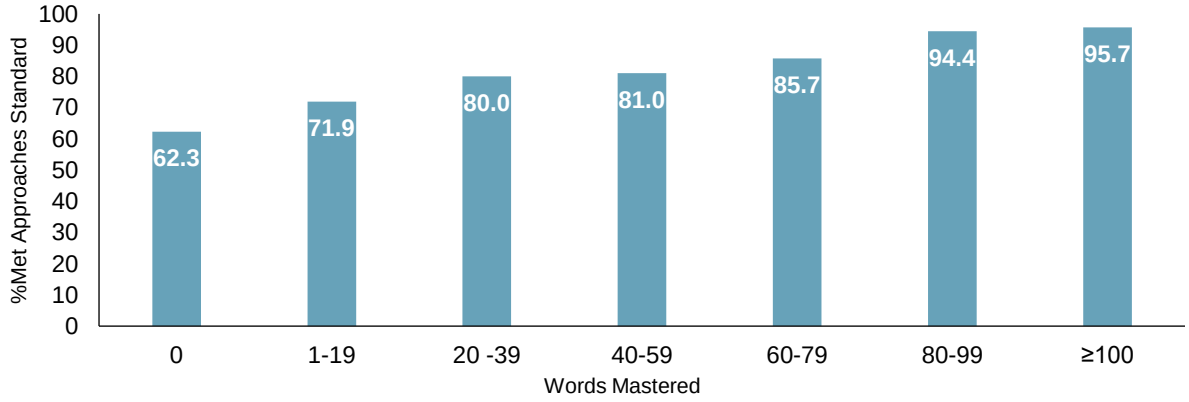
- The highest percentage of eighth-grade students in the sample (97.6%) who met the Approaches Grade Level standard on the 2018 STAAR 3–8 reading was those who mastered at least 100 words on Vocabulary.com.

- Students in the sample who mastered 1–19 words on Vocabulary.com had the lowest proportion of students (79.7%) who met the Approaches Grade Level standard on the 2018 STAAR 3–8 reading test.

- According to Figure 1, 81.2 percent of eighth-grade students who did not master any words on Vocabulary.com met the Approaches Grade Level standard on the 2018 STAAR 3–8 reading test.

Figure 2 shows the performance of ninth-grade Vocabulary.com students on the 2018 STAAR English I EOC exam.

Figure 2. Percentage of Ninth-Grade Students who met the Approaches Grade Level Standard on STAAR English I EOC by the Number of Vocabulary.com Words Mastered, 2017–2018



- The percentage of ninth-grade Vocabulary.com students in the sample who met Approaches Grade Level standard increased progressively from those who did not master any words to those who mastered at least 100 words.

- The highest percentage of ninth-grade students in the sample (95.7%) who met the Approaches Grade Level standard on the 2018 STAAR English I EOC was those who mastered at least 100 words on Vocabulary.com.

- The lowest proportion of ninth-students in the sample (62.3%) who met the Approaches Grade Level standard on the 2018 STAAR 3–8 reading test did not master any words on Vocabulary.com.

Table 4 (p. 16) displays the distribution of gains in reading scale scores by the number of words students in the sample mastered on Vocabulary.com.

- The largest percentage of sixth (78.3%) and eighth grade (86.3%) students who made gains on their 2018 STAAR 3–8 reading scale scores from the previous year did not master any words on Vocabulary.com.

- The largest percentage of seventh-grade students (87.5%) who made scale score gains on the 2018 STAAR 3–8 reading mastered between 1 and 19 words on Vocabulary.com.

What were the effects of Vocabulary.com word mastery on students' 2018 STAAR 3–8 reading and English I EOC test performance?

Multivalued treatment effects with regression adjustment analysis was used to determine the treatment effect (ATET) of Vocabulary.com on students' STAAR reading and English I EOC test performance. As mentioned earlier, the intervention variable (words mastered) was divided into six groups of 20 words each. **Table 5** to **Table 8** (pp. 17–18) display the effects of Vocabulary.com words mastered on the 2018 STAAR 3–8 sixth-, seventh-, and eighth-grade reading and ninth-grade English I EOC tests.

Sixth Grade

- Had students not mastered any words (potential outcome means (POM)) on Vocabulary.com, they would have, on average, attained a statistically significant mean reading scale score of 1598.1 ($p < .05$, one-tailed) or they would have met, on average, the Approaches Grade Level standard on the 2018 STAAR 3–8 reading exam (Table 5, p. 17).

- On average, only students who had mastered 60–79 (4 vs. 0) words on Vocabulary.com demonstrated a statistically significant increase (164.93 scale score points (ssp)) in their reading scale scores above that of students who would not have mastered any words (1598.1 ssp), $p < .05$ (one-tailed) (Table 5, p. 17). These students, on average, would have performed at the Masters Grade Level standard.

Seventh Grade

- Had seventh-grade students in the sample not mastered any words (POM) on Vocabulary.com, they would have, on average, attained a statistically significant mean reading scale score of 1673.6 ($p < .001$ (one-tailed)). On average, they would have also met the Approaches Grade Level standard on the 2018 STAAR 3–8 seventh-grade reading test (**Table 6**, p. 17).

- On average, only students who had mastered 80–99 words (5 vs. 0) on Vocabulary.com demonstrated a statistically significant increase (243.4 scale score points (ssp)) in their average reading scale score

above that of students who would not have mastered any words (1673.6 ssp), $p < .05$ (one-tailed) (Table 6, p. 17). On average, these students would have met the Masters Grade Level standard on the 2018 STAAR 3–8 seventh-grade reading exam (Table 6, p. 17).

Eighth Grade

- Had eighth-grade students in the sample not mastered any words (POM) on Vocabulary.com, they would have, on average, attained a statistically significant mean reading scale score of 1688.0 ($p < .001$ (one-tailed)). On average, they would have also met the Approaches Grade Level standard on the 2018 STAAR 3–8 seventh-grade reading test (**Table 7**, p. 17).

- On average, all students except those who had mastered 80–99 words (5 vs.0) on Vocabulary.com, demonstrated a statistically-significant increase in their 2018 STAAR 3–8 reading scale scores above that of students who would not have mastered any words (1688.0 ssp) (Table 7, p. 17). On average, these eight-grade students would have met the Meets Grade Level standard.

- Eighth-grade students who mastered at least 100 words had the largest statistically significant increase (144.5 ssp) ($p < .001$), which would have placed them, on average, at the Masters Grade Level standard, followed by students who mastered 60–79 words (53.8 ssp) ($p < .05$), and students who mastered 20–39 words (43.2 ssp) ($p < .05$), (Table 7, p. 17) on the 2018 STAAR 3–8 reading test, which would have placed them, on average, at the Meets, Grade Level standard.

Ninth Grade

- Had ninth-grade students in the sample not mastered any words (POM) on Vocabulary.com, they would have, on average, attained a statistically significant mean reading scale score of 3969.8 ($p < .001$, one-tailed). On average, they would have also met the Approaches Grade Level standard on the 2018 STAAR English I EOC exam at the ninth grade (Table 8, p. 18).

- On average, all ninth-grade students, who mastered at least one word on Vocabulary.com, demonstrated a statistically significant increase in their 2018 STAAR English I EOC scale scores above that of students who would not have mastered any words (3969.8 ssp), (Table 8, p. 18).

- Ninth-grade students who mastered at least 100 words (6 vs.0) had the largest statistically significant increase (687.7 ssp) ($p < .001$), followed by students who mastered 80–99 words (5 vs.0) (526.8 ssp) ($p < .001$), and students who mastered 60–69 words (4 vs. 0) (314.0 ssp) ($p < .05$), (Table 8, p. 18) on the 2018 English I EOC test.

What were the predictors of reading and English I performance of students with word mastery on Vocabulary.com during the 2017–2018 school year?

Table 9 to **Table 12** (pp 19–20) predicted the STAAR performance of sixth, seventh, eighth, and ninth-grade Vocabulary.com students in the sample. Eight predictors were used in each model and the Beta was reported as a standardized measure for ease of comparison. The eight predictors were Vocabulary.com words mastered, and questions answered correctly; economically disadvantaged, at risk, special education, limited English proficiency (LEP), G/T, and STAAR prior reading scores where they exist. G/T designation was not reported as a ninth-grade predictor. The KonFound-It© software was used to validate the inference of the strongest predictor in each model.

Sixth Grade

- Overall, the sixth-grade model predicted about 85.3 percent of the variance in the reading scale scores of sixth-grade Vocabulary.com students in the sample (Table 9, p. 19).

- None of the two Vocabulary.com predictors were statistically significant predictors of students' performance on the 2018 STAAR 3–8 sixth-grade reading exam (Table 9, p. 19).

- There were two statistically significant predictors. Students' prior (2017 STAAR 3–8) reading score predicted 62 percent of the variance in their performance and being enrolled in special education predicted 18 percent of the variance in their performance on the STAAR 3–8 sixth-grade reading test. Special education was a negative predictor (Table 9, p. 19).

- As shown, students' prior reading score predicted 62 percent of the variance in sixth-grade reading performance. To make this prediction invalid, 70 percent of this estimated prediction would have to be biased and 70 percent (54) of the sixth-grade students in the sample would have to be replaced with students for whom the effect of their prior reading score is zero.

Seventh Grade

- Overall, the seventh-grade model predicted 71.2 percent of the variance in the 2018 STAAR 3–8 reading scale scores of seventh-grade Vocabulary.com students in the sample (**Table 10**, p. 19).

- Neither of the two Vocabulary.com predictors were statistically significant predictors of students' performance on the 2018 STAAR 3–8 seventh-grade reading exam (Table 10, p. 19).

- There were three statistically significant predictors. Students' prior reading score predicted 50% of the variance in the 2018 STAAR 3–8 seventh-grade reading performance, G/T predicted 24 percent, and LEP predicted 14 percent of the variance. LEP was a negative predictor (Table 10, p. 19).

- As noted, students' prior reading score predicted 50 percent of the variance in seventh-grade reading performance. To make this prediction invalid, 72 percent of this estimated prediction would have to be biased and 72 percent (100) of the seventh-grade students in the sample would have to be replaced with students for whom the effect of their prior reading score is zero.

Eighth Grade

- Overall, the eighth-grade model predicted 69.2 percent of the variance in the 2018 STAAR 3–8 reading scale scores of eighth-grade Vocabulary.com students in the sample (**Table 11**, p. 20).

- Neither of the two Vocabulary.com predictors were statistically significant for students' performance on the 2018 STAAR 3–8 eighth-grade reading exam (Table 11, p. 20).

- There were six statistically significant predictors. Students' prior reading score predicted 56 percent of the variance in the 2018 STAAR 3–8 eighth-grade reading performance, at-risk predicted 16 percent, special education predicted 11 percent, G/T predicted nine percent, and limited English proficiency and economically disadvantaged predicted five percent, each of the variance. G/T and prior reading scores were positive predictors (Table 11, p. 20).

- As noted, students' prior reading score predicted 56 percent of the variance in eighth-grade reading performance. To make this prediction invalid, 93 percent of this estimated prediction would have to be biased and 93 percent (1,392) of the eighth-grade students in the sample would have to be replaced with students for whom the effect of their prior reading score is zero.

Ninth Grade

- Overall, the ninth-grade model predicted about 60.0 percent of the variance in the 2018 STAAR English I EOC scale scores of Vocabulary.com students in the sample (Table 12, p. 20).

- There were four statistically significant negative predictors. Being at risk predicted 55 percent of the variance in the 2018 STAAR ninth-grade English I EOC performance, LEP predicted 22 percent, special education predicted 15 percent, and economically disadvantaged status predicted 12 percent of the variance (Table 13, p. 20).

- As noted, being at risk predicted 55 percent of the variance in the ninth-grade reading performance. To make this prediction invalid, 92 percent of this estimated prediction would have to be biased and 92 percent (893) of the ninth-grade students in the sample would have to be replaced with students for whom the effect of being at-risk is zero.

Discussion

Several things stood out with respect to the effect of Vocabulary.com word mastery on students' STAAR 3–8 reading and English I EOC test performance. The data showed that 81.2 percent of eighth-grade and 62.3 percent of ninth-grade students in the sample who did not master any words on Vocabulary.com met the Approaches Grade Level standard on the 2018 STAAR 3–8 reading tests. Students may not have required Vocabulary.com word mastery to meet the lowest level of passing on the STAAR exams. However, mastering more than 100 words was associated with a passing rate of 97.6 percent and 95.7 percent, respectively.

Further analysis indicated that neither the number of words mastered, nor questions answered correctly, were significant predictors of students' performance. Possible explanations include the weak correlations between the number of words mastered or questions answered correctly on Vocabulary.com and STAAR test results used in the study. Additionally, STAAR tests are designed to assess grammar and comprehension rather than vocabulary. Unless there is compatibility or overlap between the words in the predictor variable and the outcome variable, it may not be possible to obtain significant data congruence. Another issue may be retention. When students' short and long-term vocabulary retention were tested, results showed that long-term effects faded (Gorjian, 2012). Dreyer (2014) found similar short-term retention in his vocabulary intervention study of high school students in the U.S. Further, effective vocabulary intervention appeared to be associated with the use of multiple quizzes, student pacing, repeated use of the software (Dreyer, 2014), and in this case, word mastery, as postulated earlier.

Analyses of the effects of Vocabulary.com on students' STAAR reading and English I EOC performance suggested that students exposed to the software, that is, who answered questions correctly, on average, would have met the Approaches Grade Level standard. Data on their exposure to or utilization of the software were not available nor was information on how the software was incorporated in the classroom reading or English I instruction. Kolich's (1991) study found that students who used a modified mixed approach that provided sentence context, definitional and synonyms clues, and optional word choices learned more words than did students who received definitional information only. Contextualization appears to be a critical component in effective vocabulary instruction, learning, and retention as postulated by the

National Reading Association (Butler, et al., 2010) and supported by Ahmadian, Amerian, and Goodarzi (2015) on Persian-speaking high school English learners. Vocabulary.com appeared to have that contextualized critera.

Most Vocabulary.com participants were enrolled either in the eight-grade or ninth grade. It may be assumed that the grades' proximity to when the English I EOC is commonly assessed may be a factor. The data also showed that 39.5 to 65.5 percent of students who participated in Vocabulary.com did not master any words. It is unclear how students were selected for use of the software. This is not to suggest that Vocabulary.com does not improve students' word mastery because it does. In this sample, there is a high correlation between the number of questions answered and the number of words students mastered. It is translating this mastery into test performance, when all key factors are controlled, that is being evaluated in this paper. Moreover, because Vocabulary.com is adaptive and meets students at their level of performance, that level may not always coincide with the levels required to meet standards on STAAR exams.

The study also showed that most Vocabulary.com students who made reading gains on the 2018 STAAR 3–8 tests, either did not master any words or mastered less than 20 words. On average, students in this study needed to answer 18 questions correctly to master one word. Of those who answered less than 20 questions correctly, about 99 percent did not master any words.

As noted, it was students' prior scores, where available, that largely predicted students' performance on the 2018 STAAR 3–8 reading tests. In the regression models, students' prior (2017 STAAR 3–8) reading scores were the strongest predictors of their performance. Students who came to Vocabulary.com doing well continued to do well. The number of students mastering more words needs to increase but this comes with increasing usage and the attainment of better congruence between Vocabulary.com words and words associated with the STAAR exams unless appropriate and alternative vocabulary measures are identified or developed. Vocabulary.com provided incentives for increased word mastery.

The Vocabulary.com predictors used in this evaluation were not statistically significant in determining students' reading or English I EOC performance on the 2018 STAAR tests. Where applicable, G/T was the only other positive predictor. All other statistically significant predictors by grade reduced students' performance on the 2018 STAAR 3–8 reading and English I EOC tests.

Overall, students who used Vocabulary.com achieved word mastery. The data in this sample showed very strong correlation between questions answered correctly and word mastery on Vocabulary.com. STAAR 3–8 and EOC, as standardized tests, may not have been appropriate measures of the effectiveness of Vocabulary.com beyond mastery. A more appropriate measure that is congruent with the words and contexts in Vocabulary.com may need to be identified.

Recommendations

- Greater effort may have to be made to increase the number of students who consistently use Vocabulary.com because when disaggregated, fewer students in the sample had mastered more than 20 words compared to those who mastered no words or less than 20 words.

- Classroom observations and participant surveys may be required in future evaluations to determine how Vocabulary.com is incorporated into classroom instruction and how it is promoted to achieve the kind of sustained use that is necessary for word mastery since, on average, students mastered one word for every 18 questions answered correctly.

- Evaluation assessments that are more compatible with the word content in Vocabulary.com may be required to determine its true impact on learning, given that the positive relationship between question

answered and word mastery is already established, but its correlation to STAAR test scores was weak and its predictability on STAAR was not statistically significant.

References

Ahmadian, M., Amerian, M., & Goodarzi, A. (2015). A compartive study of paper-based and computer-based contextualization in vocabulary learning of EFL students. *Advances in Language and Literacy Studies 6 (2)*, 96–102.

Butler, S., Urrutia, K., Buenger, A., Gonzalez, N., Hunt, M., & Eisenhart, C. (2010). *A review of the current research on vocabulary instruction: A research synthesis.* Washington, DC: National Reading Technical Assistance Center, RMC Research Cooperation, U.S. Department of Education.

Dalton, B., & Grisham, D. L. (2011). eVoc Strategies: 10 ways to use technology to build vocabulary. *The Reading Teacher 64(5)*, 306–317.

Dreyer, J. (2014). The effect of computer-based self-access learning on weekly vocabulary test scores. *Studies in self-Access Learning Journal 5(3)*, 217–234.

Frank, K. (2000). Impact of a confounding variable on the inference of a regression coefficient. *Sociological Methods and Research, 29(2)*, 147–194.

Frank, K. A., Maroulis, S., Duong, M., & Kelcey, B. (2013). What would it take to change an inference?: Using Rubin's Causal Model to interpret robustness of causal inferences. *Education, Evaluation and Policy Analysis, 35*, 437–460.

Gersten, R., Baker, S. K., Shanahan, T., Linan-Thompson, S., Collins, P., & Scarcella, R. (2007). *Effective literacy and English language instruction for English learners in elementary grades (NCEE 2007-4011).* Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education Retrieved from http://ies.ed.gov/nceeand http??ies.ed.gov/ncee/wwc/publications/practiceguides.

Gorjian, B. (2012). Teaching vocabulary through Web-Based Language Learning (WBLL) approach. *Procedia Technology 1*, 334–339.

Kolich, E. M. (1991). Effects of computer-assisted vocabulary training on word knowledge. *The Journal of Educational Research 84(3)*, 177–182.

International Literacy Association. (2009). New literacies and 21st-century technologies: A position statement of the International Reading Association. Newark, DE: Author.

Laufer, B., & Goldstein, Z. (2004). Testing vocabulary knowledge: Size, strength, and computer adaptiveness. *Learning Language 53(4)*, 399–436.

Moats, L. (2007). *Whole-language high jinks: How to tell when "scientifically based reading instruction" isn't.* Washington, DC: Thomas B. Fordham Institute.

Vocabulary.com. (n.d.). *Educator edition*. Retrieved from Vocabulary.com: https://www.vocabulary.com/educator-edition/.

APPENDIX

Table 3. Percentage of HISD Students in the Sample who Performed at or Above the Approaches Grade Level Standard on STAAR 3-8 Reading, 2017–2018

	Sixth Grade			Seventh Grade			Eight Grade		
Words Mastered	n = 77	n App.	% App.	n = 139	n App.	% App.	n = 1,503	n App.	% App.
0	46	32	**69.6**	91	66	**72.5**	593	434	**73.2**
1-19	23	20	**87.0**	24	13	**54.2**	359	293	**81.6**
20 -39	2	2	*	5	3	**60.0**	116	93	**80.2**
40-59	2	1	*	3	3	*	70	55	**78.6**
60-79	2	2	*	4	3	*	46	40	**87.0**
80-99	-	-	-	1	1	*	23	19	**82.6**
≥100	2	1	*	11	7	63.6	296	291	**98.3**
Total	77	58	**67.2**	139	96	**76.0**	1,503	1,225	**81.5**

Source: Vocabulary.com; STAAR 3–8, Spring 2018 (data only)

Table 4. Percentage Distribution of Reading Scale Score Gains by Grade Among Vocabulary.com Students, 2016–2017 to 2017–2018

Words Mastered	**Fifth to Sixth Grade**			**Sixth to Seventh Grade**			**Seventh to Eighth Grade**		
	n = 77	n Gain	% Gain	n = 139	n Gain	% Gain	n = 1,503	n Gain	% Gain
0	46	36	**78.3**	91	71	**78.0**	593	408	**68.3**
1-19	23	15	**65.2**	24	21	**87.5**	359	261	**72.7**
20-39	2	1	*****	5	3	**60.0**	116	86	**74.1**
40-49	2	1	**50.0**	3	3	*****	70	33	**47.1**
60-79	2	1	*****	5	2	*****	46	24	**52.2**
80-99	-	-	**-**	1	1	*****	23	12	**52.2**
≥100	3	2	*****	11	8	**72.7**	296	178	**60.1**
Total	77	56	**72.7**	139	109	**78.4**	1,503	999	**66.5**

Source: Vocabulary.com; STAAR 3–8 Spring 2018 (data only), STAAR regular, first time testers

Table 5. Multivalued Treatment Effect of Vocabulary.com Words Mastered on Sixth-Grade STAAR 3–8 Reading, 2017–2018

Sixth Grade Reading (n = 77)		Coefficient	Robust Std. Err.	z	p>z	95% CI
ATET						
Words Mastered Group						
	(1 vs 0)	**45.41**	32.95	1.38	0.168	[-19.16, 109.99]
	(2 vs 0)	**185.93**	96.82	1.92	0.055	[-3.84, 375.70]
	(3 vs 0)	**13.93**	78.41	0.18	0.859	[-139.75, 167.62]
	(4 vs 0)	**164.93**	55.23	2.99	0.003	[56.68, 373.19]
	(6 vs 0)	**9.43**	126.91	0.07	0.941	[-239.31, 258.18]
Potential Outcome Mean						
Words Mastered Group						
	0	**1598.07**	23.03	69.4	0	[1552.93, 1643.20]

Note: 1 = 1–19 words, 2 = 20–39 words; 3 = 40–59 words; 4 = 60–79 words; 5 = 80–99 words; and 6 = ≥100 words
Grade Level standards: Approaches: 1517–1616; Meets: 1629–1692; Masters: 1718–2056.
STAAR regular, first-time testers

Table 6. Multivalued Treatment Effect of Vocabulary.com Words Mastered on Seventh-Grade STAAR 3–8 Reading, 2017–2018

Grade 7 Reading (n = 139)		Coefficient	Robust Std. Err.	z	p>z	[95% Conf. Interval]
ATET						
Words Mastered Group						
	(1 vs 0)	**-43.42**	35.71	-1.22	0.224	[-113.40, 26.57]
	(2 vs 0)	**-50.58**	56.33	-0.90	0.369	[-160.99, 59.83]
	(3 vs 0)	**65.42**	76.92	0.85	0.395	[-85.35, 216.19]
	(4 vs 0)	**-31.33**	56.84	-0.55	0.581	[-142.74, 80.07]
	(5 vs 0)	**243.42**	15.02	16.20	0.000	[213.97, 272.86]
	(6 vs 0)	**-25.76**	51.91	-0.50	0.620	[-127.51, 75.98]
Potential Outcome Mean						
Words Mastered Group						
	0	**1673.58**	15.02	111.39	0	[1644.14, 1703.02]

Source: Cognos
Note: 1 = 1–19 words, 2 = 20–39 words; 3 = 40–59 words; 4 = 60–79 words; 5 = 80–99 words; and 6 = ≥100 words.
Grade Level standards: Approaches: 1567–1662; Meets: 1674–1728; Masters: 1753–2142.
STAAR regular, first-time testers

Table 7. Multivalued Treatment Effect of Vocabulary.com Words Mastered on Eighth-Grade STAAR 3–8 Reading, 2017–2018

Grade 8 Reading (n = 1,503)		Coefficient	Robust Std. Err.	z	p>z	[95% Conf. Interval]
ATET						
Words Mastered Group						
	(1 vs 0)	**35.74**	9.85	3.63	0.000	[16.43, 55.05]
	(2 vs 0)	**43.23**	15.17	2.85	0.004	[13.5, 72.96]
	(3 vs 0)	**38.47**	17.47	2.20	0.028	[4.23, 72.72]
	(4 vs 0)	**53.76**	19.27	2.79	0.005	[15.99, [91.53]
	(5 vs 0)	**35.70**	30.22	1.18	0.238	[-23.54, 94.94]
	(6 vs 0)	**144.46**	8.70	16.60	0.000	[127.41, 161.52
Potential Outcome Mean						
Words Mastered Group						
	0	1688.00	5.92	285.31	0.00	[1676.40, 1699.59]

Note: 1 = 1–19 words, 2 = 20–39 words; 3 = 40–59 words; 4 = 60–79 words; 5 = 80–99 words; and 6 = ≥100 words.
Grade Level standards: Approaches: 1587–1691; Meets: 1700–1759; Masters: 1783–2141.
STAAR regular, first-time testers

Table 8. Multivalued Treatment Effect of Vocabulary.com Words Mastered on Ninth-Grade STAAR English I EOC, 2017–2018

Grade 9 EOC English I (n = 975)		Coefficient.	Robust Std. Err.	z	p>z	[95% Conf. Interval]
ATET						
Word Mastered Group						
	(1 vs 0)	**167.89**	50.65	3.32	0.001	[68.63, 276.16]
	(2 vs 0)	**264.85**	61.01	4.34	0.000	[145.28, 384.42]
	(3 vs 0)	**294.91**	90.40	3.26	0.001	[117.74, 42.09]
	(4 vs 0)	**314.00**	128.89	2.44	0.015	[61.37, 566.62]
	(5 vs 0)	**526.75**	100.86	5.22	0.000	[329.06, 724.43]
	(6 vs 0)	**687.70**	60.35	11.39	0.000	[569.41, 806.00]
Potential Outcome Mean						
Word Mastered Group						
	0	3969.75	26.96	147.27	0.000	[3916.92, 4022.59]

Note: 1 = 1–19 words, 2 = 20–39 words; 3 = 40–59 words; 4 = 60–79 words; 5 = 80–99 words; and 6 = ≥100 words.
Grade Level standards: Approaches: (2012–2015): 3750 ;3775–3976; Meets: 4000–4644; Masters: 4691–6357.
STAAR regular, First-time testers.

Table 9. Selected Predictors of Performance of HISD Sixth-Grade STAAR 3–8 Reading, 2017–2018

Sixth Grade Reading	Coefficient	Beta	95% CI
Constant	790.69**		[548.63, 1032.76]
Words Mastered	0.15	**0.05**	[-0.78, 1.08]
Questions Answered Correctly	0.00	**0.01**	[-0.05, 0.05]
Economically Disadvantaged	-18.37	**-0.06**	[-50.14, 13.39]
At-Risk	-15.16	**-0.05**	[-66.06, 35.75]
Special Ed.	-92.95*	**-0.18***	[-154.81, -31.10]
LEP	-37.73	**-0.10**	[-87.66, 12.21]
G/T	35.49	**0.12**	[-17.58, 88.56]
Prior Reading Score	0.53**	**0.62****	[0.37, 0.68]
F	56.1**		
Adjusted R^2 (%)	85.3		

*p < .05; **p < .001

Table 10. Selected Predictors of Performance of HISD Seventh-Grade STAAR 3–8 Reading, 2017–2018

Seventh Grade Reading	Coefficient	Beta	95% CI
Constant	885.12**	.	[650.02, 1120.19]
Words Mastered	-0.16	**-0.06**	[-0.60, 0.29]
Questions Answered Correctly	0.00	**0.02**	[-0.02,0.02
Economically Disadvantaged	-6.32	**-0.02**	[-36.39, 23.74]
At-Risk	-34.57	**-0.12**	[-73.99, 4.48]
Special Ed.	-18.45	**-0.03**	[-74.64, 37.74]
LEP	-57.19*	**-0.14***	[-99.22, -15.16]
G/T	73.27**	**0.24****	[35.18, 111.36]
Prior Reading Score	0.49**	**0.50****	[0.35, 0.63]
F	43.6**		
Adjusted R^2 (%)	71.2		

*p < .05; **p < .001

Table 11. Selected Predictors of Performance of HISD Eighth-Grade STAAR 3–8 Reading, 2017–2018

Eighth Grade Reading	Coefficient	Beta	95% CI
Constant	863.91**		[788.40, 939.42]
Words Mastered	0.02	**0.02**	-0.04, 0.07]
Questions Answered Correctly	0.00	**-0.02**	-0.01, 0.00]
Economically Disadvantaged	-15.04*	**-0.05***	-24.34, -5.74]
At-Risk	-48.23**	**-0.16****	-60.62, -35.43]
Special Ed.	-66.12**	**-0.11****	-84.75, -47.49]
LEP	-22.39*	**-0.05***	-37.36, -7.42]
G/T	28.44**	**0.09****	17.06, 39.83]
Prior Reading Score	0.02**	**0.56****	0.48, 0.58
F	422.7**		
Adjusted R^2 (%)	69.2		

*p < .05; **p < .001

Table 12. Selected Predictors of Performance of HISD Ninth-Grade STAAR English I EOC, 2017–2018

Ninth Grade English I	Coefficient	Beta	95% CI
Constant	4686.36**		[4641.73, 4371.00]
Words Mastered	0.306	**0.13**	[-0.038, 0.651]
Questions Answered	-0.008	**-0.06**	[-0.028, 0.012]
Economically Disadvantaged	-151.02**	**-0.12****	[-207.021, -95.019]
At-Risk	-697.52**	**-0.55****	[-756.366, -638.682]
Special Education	-404.25**	**-0.15****	[-517.193, -291.3017]
LEP	0.306**	**-0.22****	[-479.063, -322.691]
F	237.8**		
Adjusted R^2 (%)	59.5		

*p < .05; **p < .001