# An Investigation into the Vocabulary Size of EST Students at a Japanese University Using VST

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## Abstract

This article reports on an investigation into the vocabulary competency of 553 second-year students of science and engineering majors at a Japanese university in 2014 and 2015 by using the Vocabulary Size Test (VST) developed by Nation and Beglar. The VST was given in required English classes where the students are involved in learning the major components of research papers in English by actually writing one. Vocabulary abilities are among the most fundamental competencies needed in writing papers. The measurement of vocabulary development often depends on the use of vocabulary lists or text-based or contextual comprehension of specific words. Although the use of various types of word lists does provide an objective measurement of learners' vocabulary abilities to a certain extent, criticisms against such a method, e.g. lack of context and the rationale for using selected high-frequency or low-frequency words in different contexts, are also legitimate arguments. Hence, effective measurements of EFL learners' vocabulary competence need to be addressed further. In this paper, an explanation of VST, the background of choosing this method, and the analysis of the results is provided. A comparison of the results from 2015 and 2014 is also presented.

Keywords: EAP, Vocabulary Size Test, vocabulary competency, measurement, assessment

## Introduction

An investigation into the vocabulary competency was conducted at a Japanese science and technology university in 2014 and 2015 by using the Vocabulary Size Test (VST) developed by Nation and Beglar [1]. It is understood that vocabulary abilities are among the most fundamental competencies of EFL learners and of the foremost concern of EFL teachers [2-5]. Developing vocabulary competency differs from the simple accumulation of vocabulary, and needs deliberate training for learners to cultivate [6]. A tremendous amount of research has been done on the teaching and learning of vocabulary and on the development of teaching materials in the EFL context. The measurement of vocabulary development often depends on the use of vocabulary lists or text-based or contextual comprehension of specific words [7]. Testing EFL learners' general vocabulary competency covering the whole spectrum of vocabulary learning and application skills is already challenging for classroom teachers. An objective and holistic understanding of such a competency across contexts and across countries is even more difficult. Although the use of various types of word lists is often found in reading and vocabulary components and could provide an objective measurement of learners' vocabulary abilities to a certain extent, criticisms against such a method [8, 9], e.g. lack of context and the rationale for using selected high-frequency or low-frequency words in different contexts, are also legitimate arguments. Hence, effective measurements of EFL learners' vocabulary competence need to be addressed further. In this report, an explanation of VST, the background of choosing this method, and the analysis of the results will be addressed. A comparison of the results from 2015 and 2014 will also be provided

The Vocabulary Size Test (VST) is a test to measure

the learner's proficiency by how large his/her vocabulary is [1], which measures written receptive vocabulary size in English [10]. There are several disparate versions of this test. of which the version used in the test administered in this report is composed of 100 monolingual multiple-choice questions answered in 30 minutes [10]. This version was constructed from the 20,000 most frequently used word families in English, with 5 words selected from the first 1,000, another 5 words from the second 1,000, etc., until one would have 5 words each from 20 groups of 1,000 words families, totaling 100. The source of words is the British National Corpus [3]. It is also worthy of note that certain aspects of language are not measurable by VST, such as distinguishing between receptive and productive vocabularies, collocation, connotation, and register [11, 12].

Below is a sample question from the monolingual version [10]:

1. emir:  We saw the <emir>.
   a. bird with two long curved tail feathers
   b. woman who cares for other people's children in eastern countries
   c. Middle Eastern chief with power in his own hands
   d. house made from blocks of ices

One will see that the sentence in which the question word appears is a non-defining short sentence. The word is placed in a sentence only to give it minimal context and a clue to its word class. English in the choices (a – d) is usually more difficult than in the sentence that the question word is used in. (The above choices, incidentally, are definitions for: a. peacock, b. amah, c. emir, and d. igloo. The correct answer to the sample question, therefore, is c.)

## Methods

The university where this test was conducted is a science and technology university in Tokyo, Japan, therefore much of the English taught there deals with EST (English for Science and Technology), which is a kind of ESP (English for Specific Purposes). The test was conducted as part of the campus-wide annual academic performance survey ("gakuryoku chosa") that is published in the booklet that the university compiles yearly [13, 14], The academic performance survey of English at this university is comprised

of the qualitative analysis of student production of both written and spoken English in the genre-based curriculum (for the introduction of the genre-based curriculum see Derewianka, B. [15] and DSP Literacy Project [16]) for the freshman-year students; scores of TOEIC-ITP for sophomore- and junior-year students; and scores of VST for sophomore-year students. VST was chosen for its recognition as a valid test [17], and because "[v]ocabulary size measurement is important for planning, diagnosis and research [18]," although vocabulary training is not the main purpose of the curriculum at this university.

The subjects in this study were the students in required sophomore English classes that teach them major parts of research papers by their actually conducting research and writing a paper. Existing classes were used; no control of class sizes or randomization of student proficiency levels was applied, as the results from the entire sample as a whole were analyzed and not by class. The sample sizes were 384 students in 2014 and 205 students in 2015. The monolingual (English-only) 100-word version was given in 30 minutes during regular class time in November or December depending on the university calendar or individual class schedules.

## Results

As can be seen in Figure 1 and Table 1, of the 348 test takers, the highest score in 2014 was 92 out of 100 while the lowest was 0, with the mean of 37 and standard deviation of 7.5. The majority of scores fell between 26 and 45, and it is noticeable that there are none between 66 and 90.
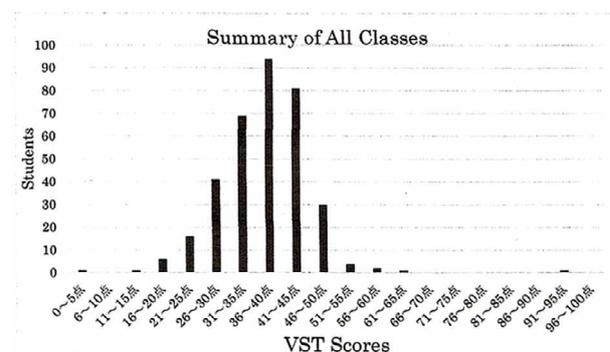


*Figure 1*.  VST scores in 5-point increments of all participating classes in 2014.  Adapted from "English" by Shi and Hauser, 2015, *Heisei 27-nendo Kiso Gakuryoku Kiso Tairyoku tou Chosa Hokokusho*, p. 102.  Copyright 2015 by The University of Elec-tro-Communications.

Table 1
*Summary of VST Results in 2014 with Regard to Sample Size, Mean, Maximum Score, Minimum Score and Standard Deviation*

| Sample Size | Mean | Max | Min | SD |
|---|---|---|---|---|
| 348 | 37 | 92 | 0 | 7.5 |

The results for the academic year 2015 are presented in Figure 2 and Table 2. In 2015, where there were 205 test takers, the highest score was 94 out of 100, and again there was a large gap between the main body of scores (31-55) and the one highest outlier. The lowest score in 2015 was 16; the mean was 41 and standard deviation was 7.9.
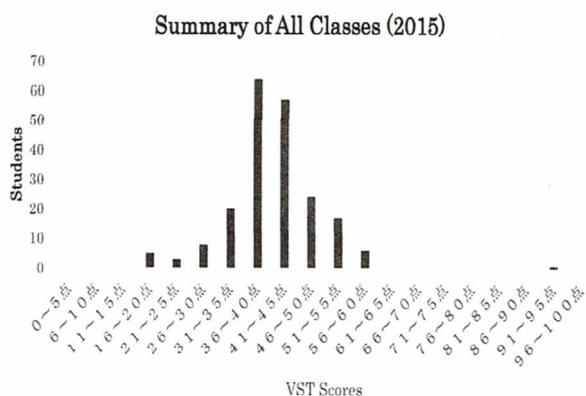


*Figure 2.* VST scores in 5-point increments of all participating classes in 2015. Adapted from "English" by Hauser and Shi, 2016, *Heisei 27-nendo Kiso Gakuryoku Kiso Tairyoku tou Chosa Hokokusho*, p. 101. Copyright 2016 by The University of Electro-Communications.

Table 2
*Summary of VST Results in 2015 with Regard to Sample Size, Mean, Maximum Score, Minimum Score and Standard Deviation*

| Sample Size | Mean | Max | Min | SD |
|---|---|---|---|---|
| 205 | 41 | 94 | 16 | 7.9 |

The 40% reduction in the sample size in 2015 compared to 2014 is due to the individual class's schedule; there were instructors who were unable to participate in VST in 2015. No further statistical analyses were applied to the results than are shown in the figures and tables above, such as calculating the correlation between the VST scores and the students' grades of English courses.

## Discussion

The results for the year 2014 show that all but two test takers fell into the ranges between the scores of 11 and 65. Estimated vocabulary sizes can be obtained by multiplying the scores by 20, based on how the VST

was constructed [3]:

Table 3
*Summary of Obtained Score Range, Percentage of Test Takers and Estimated Vocabulary Sizes in 2014*

| Score Range | Percentage of Test Takers | Estimated Vocabulary Sizes |
|---|---|---|
| 11 – 30: | 18.4% | 2,200 – 6,000 |
| 31 – 45 | 70.1% | 6,200 – 9,000 |
| 46 – 65 | 10.6% | 9,200 – 13,000 |

Table 3 indicates that the majority of the subjects lie between 6,200 and 9,000 word family levels. It is suggested that learners of English need to know 8,000 word families (test score of 40) to treat non-simplified texts [10], meaning that a sizable portion of sophomores at this university have already reached or are nearing the level. Table 4 is another summary of how many word families a learner has to know in order to understand 98% of certain texts [1].

Table 4
*Vocabulary Sizes Needed to Get 98% Coverage of Various Kinds of Texts*

| Texts | Vocabulary Size Needed for 98% Coverage |
|---|---|
| Novels | 9,000 |
| Newspapers | 8,000 |
| Spoken English | 7,000 |
| Children's movies | 6,000 |

Figure 3 presents the comparison of scores in years 2014 and 2015. In each year there was one student who displayed a near native competency by receiving a score in the 90s. A viable assumption for the one student in 2014 who received zero points is that he/she opted out of test taking all together, since it is actually difficult to miss all the questions in multiple-choice tests.
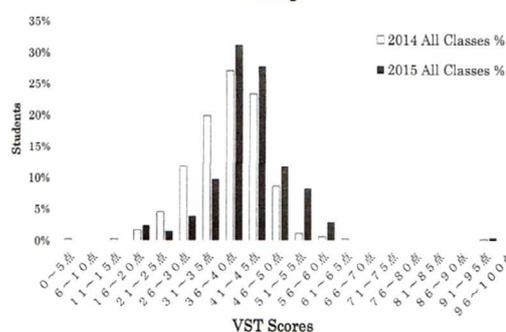


*Figure 3.* Comparison of VST scores in 5-point increments of all participating classes in 2014 and 2015. Adapted from "English" by Hauser and Shi, 2016, *Heisei 27-nendo Kiso Gakuryoku Kiso Tairyoku tou Chosa Hokokusho*, p. 101. Copyright 2016 by The University of Electro-Communications.

One can see in Figure 3 that the scores are distributed in slightly higher ranges in 2015 than in 2014, which is verified in Table 5.

Table 5
*Comparison of Score Distributions in Years 2014 and 2015*

| Year | 2014 | 2015 |
|---|---|---|
| Sample Size | 348 | 205 |
| Mean | 37 | 41 |
| SD | 7.5 | 7.9 |
| Max | 92 | 94 |
| Min | 0 | 16 |

Table 6 displays the estimated vocabulary sizes of the mean, maximum, and minimum scores in each year, based on I. S. P. Nation [3].

Table 6
*Estimated Vocabulary Sizes of VST Participants in 2014 and 2015*

| | | Mean | Max | Min | SD |
|---|---|---|---|---|---|
| 2014 | Sample Size | | | | |
| | 348 | 37 | 92 | 0 | 7.5 |
| | Estimated Vocabulary Size | 7,400 | 18,400 | 0 | |
| 2015 | Sample Size | Mean | Max | Min | SD |
| | 205 | 41 | 94 | 16 | 7.9 |
| | Estimated Vocabulary Size | 8,200 | 18,800 | 3,200 | |

It is suggested that the subjects in 2014 as a whole have still not attained the 8,000 vocabulary size level that is needed to handle non-simplified texts, while those in 2015 have. The reason that the scores were higher in 2015 than in 2014 must be attributed to the differences in skills in the test takers. It was quite coincidental that the students in 2015 had a higher proficiency in English than in 2014, because no explicit vocabulary training was being done as part of the curriculum. The instructors for the classes may have rigorously taught words and phrases relating to the construction of academic papers, but it is unlikely that it make an effect in one year only, and one must take note that the vocabulary in the test is from a non-academic source as well [3].

## Conclusion

In the study that measured the vocabulary size of sophomore students at a science and technology university in Tokyo, Japan, using the Vocabulary Size Test (VST) developed by Nation and Beglar [1] in years 2014 and 2015, it was found that the test takers at this university in 2014 were, as a whole, not quite capable of treating non-simplified texts in English, but those in 2015 were. This study was intended solely as a report of the status quo, and not to rate the success or failure of genre-based curriculum applied at this university. The increase of scores from 2014 to 2015 is entirely accidental; one can only surmise that there were higher-skill students in 2015, because vocabulary training is not the main purpose of the curriculum. It would be of interest to continue this VST study for multiple more years and to correlate the score results with other measures such as class grades and standardized proficiency tests.

It is to be noted that VST is only able to measure written receptive vocabulary size [10]. Future development of tests is recommended that are able to measure the vocabulary size in written productive English and oral receptive and/or productive English.

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