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Investigating the Nature of Corpus-based Variables and their Contributions to Item Difficulty*

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This study examines whether the two tests, the English Test for Certified Public Tax Accountants (ETCPTA) and the Test of English for International Communication (TOEIC) represent the target language use domain presented in a specific field of tax and accounting as ESP-based tests. This study compares the two tests by measuring corpus-based variables and their influence on item difficulty. The study intends to: 1) examine input language through corpus analysis and study whether the corpus-based variables have correlations with item difficulty of the tests; and 2) investigate statistically significant variables and the extent to which they affect item difficulty compared to other variables. The two tests presented completely different characteristics in their input language. ETCPTA represented academically specific discourse, while TOEIC was characterized as general business-related discourse. Multiple Regression Analysis and ANOVA also confirmed that the ETCPTA item difficulty was influenced by content specific or academic vocabulary, while the TOEIC data were affected by frequently used vocabulary. In terms of authenticity of the ESP-based tests, neither ETCPTA nor TOEIC represent the target language use domain of tax and accounting. Thus, it is suggested that even more content-specific ESP-based tests be designed reflecting particular language use contexts.

[authenticity/ESP-based tests/corpus analysis/predictor variables]

* This is the part of the author's Ph. D. dissertation.

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I. INTRODUCTION

1. Contexts of the Study

As one of the ESP-based tests, the English Test for Certified Public Tax Accountants (ETCPTA) was constructed to test English ability of the applicants for the Certified Public Tax Accountants (CPTA) exam, and then it was substituted by other standardized tests such as the Test of English as a Foreign Language (TOEFL), the Test of English Proficiency developed by Seoul National University (TEPS), and the Test of English for International Communication (TOEIC). A question has arisen as to whether these standardized tests have similarities in linguistic features with the previous ETCPTA, given that each test was constructed based on different purposes and methods in assessing English knowledge. It is well known that standardized tests are written for different purposes and include tasks that match those purposes.

This study examines the characteristics of input language for ETCPTA and TOEIC by comparing the nature of the corpus-based variables and their influence on item difficulty based on the observed test results. First, by analyzing input language as predictor variables, similarities or differences between the two tests will be found, and then the study examines whether these variables affect item difficulty of the two tests. Second, another purpose of this study is to specify statistically significant variables and the magnitude of their influence on item difficulty. Finally, in terms of "authenticity" of the tests (Bachman&Palmer,1996), the study validates that the two tests are useful enough to be adopted as ESP-based tests for the Certified Public Tax Accountants (CPTA) exam, representing the target language use domain of tax and accounting.

The research questions dealt with in this study are presented as follows.

1) What is the nature of the corpus-based variables in L2 reading comprehension tests for ETCPTA and TOEIC, and are they correlated to item difficulty?
2) To what extent do the statistically significant corpus-based variables affect item difficulty for ETCPTA and TOEIC?

II. LITERATURE REVIEW

1. Authenticity of the tests

Test usefulness is the most important term in testing and whether a test is useful enough can be judged in terms of reliability, construct validity, authenticity, interactiveness, impact, and practicality. As a main purpose of this study, it will be

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necessary to search the extent to which the two English tests are useful as reasonable high-stakes standardized English tests.

Bachman & Palmer (1996) defines test usefulness as the most significant quality of a test. The term includes six test qualities with a view to answering the question "How useful is the particular test for its intended purposes?" (p.17). According to Bachman & Palmer, usefulness includes the following:

1) Reliability refers to "consistency of measurement" (p.19); 2) construct validity is defined as "the extent to which we can interpret a given test score as an indicator of the ability, or constructs we intend to assess" (p.21); 3) authenticity is "the degree of correspondence of the characteristics of a given task to the features of target language use domain" (p.23); 4) "the level of interactiveness reflects the characteristics of the test takers such as personal characteristics, language ability, topical knowledge, and affective schemata and test tasks" (p.30); 5) impact refers to the direct effect of the given test in two levels, macro and micro levels; and 6) practicality is defined as "the extent to which the test specifications can be satisfied within the limits of existing resources such as human, material, and time" (p.36).

Test usefulness considers a specific purpose, a particular group of test takers, and a specific language use domain. Among those qualities, the impact of the implementation of a test has consequences for both the individuals and social systems involved (Lee & Shin, 2012). This study only concentrates on authenticity in order to measure test usefulness of the two tests.

2. English Tests for Specific Purposes (ESP)

ETCPTA aims at screening applicants for the CPTA exam, and it can be highly narrowly focused in contents compared with other English tests such as TOEIC, TOEFL, or TEPS. Due to this reason, it is suggested that ETCPTA cover specific target language use domain. A specific-purpose language test is characterized by its unique content and methods because the test is designed by analyzing a target language use situation. Consequently, test tasks would be representative of the specific language use domain (Douglas, 2000; Swales, 2000). For specific-purpose tests, the language use domain is relatively narrow or specific including the academic, professional or vocational fields (Klemsen & Seong, 2012). In addition, Douglas (2000) maintained that specific-purpose language tests typically employ the specific language use domain and successful specific-purpose tests precisely measure language ability representing each specific field domain.

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In reality, despite the fact that the need for the use of specific-purpose tests related to a particular language domain seems reasonable, empirical studies have not supported the argument with respect to ESP (Clapham, 1998; Douglas & Selinker, 1993; Smith, 1992). As an example, Smith (1992) conducted a study to confirm the effects of field-specific tests compared to field-general tests by examining differences in the oral proficiency.

The results of the study were unsatisfactory with regard to the question of the differences between the two tests. Only mathematics students presented notable discrepancy in the limited criteria such as fluency. Smith attributed the reason for only the mathematics group having different results on the two tests to their relatively high proficiency grade. It can be assumed that the specific language use domain of test items influence item difficulty are somewhat competent in the target language itself.

Reflecting the concept of the target language use domain, another high-stakes standardized test, the International English Language Testing System (IELTS), has two different versions: the Academic and General Training modules. The Academic Module is designed to test the ability of applicants who are attempting to "enter undergraduate or postgraduate education programs", while the General Training Module is generally taken for "vocational training courses, or for immigration purposes" (Kim, 2009, p.99).

III. RESEARCH METHODS

1. Participants

The participants of this study consisted of 451 college students, all of whom were required to submit their TOEIC scores as a prerequisite when applying for the Certified Public Tax Accountants (CPTA) exam. Their English proficiency, as estimated by the College Scholastic Ability Test (CSAT) levels, ranged from grade 2 to grade 5.

2. Instruments

1) Tests

The ETCPTA and TOEIC consist of structure, vocabulary, and reading comprehension items, and the number of items are 40 and 100, respectively. The two tests were conducted according to the following time limitations: 30 minutes for the ETCPTA and 75 minutes for the TOEIC. Test descriptions are included in Tables 1 and 2.

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TABLE 1

Test Description of ETCPTA

	Section	Components	No. of Items
Reading Comprehension (40 items/ 30 min.)	part 1	Vocabulary	9
	part 2	Structure	6
	part 3	Vocabulary & Structure	11
	part 4	Reading Comprehension	14

TABLE 2

Test Description of TOEIC

	Section	Components	N. of Items
Reading Comprehension (100 items/ 75 min.)	part 5	Structure & Vocabulary (in a sentential level)	40
	part 6	Structure & Vocabulary (in a discourse level)	12
	part 7	Reading Comprehension	48

2) Corpus Analysis

To investigate input language as predictor variables, corpora, including the GSL Range and the BNC, were used. In addition, WordSmith, CLAWS4POS Tagger, and Readability indices were employed in analysing test content and linguistic characteristics of the two tests.

(1) General Service List of English Words (GSL)

GSL Range was devised to examine comparative texts compared to the reference corpus. By using the corpus, the distributions of given words are identified across three independent baseword groups including Baseword list 1, Baseword list 2, and Baseword list 3. Baseword list 1 and 2 contain vocabulary used in the general daily life-related discourse. Words included in Baseword list 3, however, appear rather frequently in academic-based texts and stem from a variety of fields (Heatley, A., Nation, I. S. P., & Coxhead, A., 2002).

(2) The British National Corpus (BNC)

The BNC was used to measure the amount of Tokens, Types, and Families in each word list, ranging from Baseword list 1 to Baseword list 16. The BNC is a comparatively large corpus containing 100 million words, and it is used as a reference corpus when comparing data with the small target corpus.

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(3) WordSmith

As a corpus analysis tool, WordSmith measures the tokens, types, and TTR (Type/Token Ratio). TTR presents the extent to which vocabulary is used in a diverse manner. Furthermore, the number of sentences indicates whether the given text is relatively long or short to read and the mean sentence length determines whether the given text is syntactically complex (Scott, 2009).

(4) Readability Indices

This study examines Readability indices including the Flesch Reading Ease formula, Flesch Grade Level formula, and Fog formula. The Flesch Reading Ease formula and the Flesch Grade Level formula provided data on the amount of words, syllables and sentences. The formula's scores range from 0 to 100, and the higher the score, the more easy the texts were to read (Read, 2000). With regard to the Fog Index, when the score is getting higher, the texts would be considered difficult (DuBay, 2004).

(5) The Constituent Likelihood Automatic Word-tagging System 4

CLAWS4POS Tagger counts the number of content words and the ratio of content words to total words (C/T) by splitting up the given texts. Its fundamental purpose is to examine whether a given text is compact, encompassing a higher number of content words instead of function words (Garside, 1987 & 1996). Particularly for this study, the C5 tagset, was adopted. (Free CLAWS WWW trial service, 2003).

3) Data Analysis

PASW 18.0 for Windows was employed for computation of the following: 1) Pearson Product Moment Correlation Analysis, 2) Stepwise Regression Analysis, and 3) ANOVA. Pearson Product Moment Correlation Analysis was employed to see whether the item difficulty and the extent to which the two were related. Stepwise regression analysis studied the relationships between the dependent variable and independent variables. The process involved measuring the scores of the variables, and then the most predictable set was found by using multiple regression. Predictor variables that related to item difficulty were loaded as independent variables (plausibly affecting variables), and item difficulty was considered a dependent variable (affected variable). For the current study, item difficulty will be represented as the proportion of the test takers' incorrect responses to the questions (1-p). Then, ANOVA was used to see whether each model was statistically significant. The finally adopted model from multiple regression was investigated to determine whether it was acceptable when accounting for statistically

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significant predictor variables. In addition, the standardized coefficient indicated the extent to which each predictor variable affected item difficulty.

IV. RESULTS AND DISCUSSION

As preliminary analyses for the ETCPTA and TOEIC, descriptive statistics, proportion correct, discrimination, and reliability are presented in Tables 3 and 4.

TABLE 3

Descriptive Statistics for ETCPTA and TOEIC

Test	N of items	N of test-takers	Mean	Std. Dev	Skewness	Kurtosis	Min	Max
ETCPTA	40	289	15.509	4.594	0.033	-0.687	5	27
TOEIC	100	451	52.534	15.825	-0.129	-0.495	0	94

The mean scores of the two tests are 15.509 for ETCPTA and 52.534 for TOEIC. The values of Skewness and Kurtosis indicate the normality of the score distribution for the two tests. These values imply that the two tests achieved proper discriminability. With respect to the maximum scores, the ETCPTA seems to be relatively difficult compared to the TOEIC in that the maximum scores are 27 out of 40 for the ETCPTA and 94 out of 100 for the TOEIC.

TABLE 4

Proportion Correct, Discrimination, and Reliability of ETCPTA and TOEIC

Test	Mean P	Mean D	Alpha	SEM
ETCPTA	0.388	0.247	0.638	2.762
TOEIC	0.525	0.336	0.921	4.462

According to the mean proportion correct values, it can be concluded that the ETCPTA and TOEIC have appropriate difficulty levels (0.388 for ETCPTA and 0.525 for TOEIC). With regard to the mean discrimination, the ETCPTA presents relatively low discrimination while the TOEIC can be considered as having proper discrimination (0.247 and 0.336, each). For this study, it is suggested that the TOEIC would be even more reliable than the ETCPTA, taking into consideration the Alpha values (0.921for TOEIC and 0.638 for ETCPTA).

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1. Corpus Analysis and Correlations between Item Difficulty and Corpus-based Variables

1) GSL Range

Table 5 manifests the means of tokens, types, and families from each Baseword list in the two tests.

TABLE 5

Mean Tokens, Types and Families for GSL Range Output

	ETCPTA		TOEIC		Diff (ETCPTA-TOEIC)
	Mean score	STD	Mean score	STD	
Tokens total	70.95	82.486	146.49	144.209	-75.540***
Types total	46.40	42.903	78.37	55.419	-31.970***
Families total	35.65	32.986	60.61	41.623	-24.960***
Tokens Bw1	53.05	67.065	108.36	102.486	-55.310***
Types Bw1	31.88	31.541	55.92	39.647	-24.045***
Families Bw1	28.60	26.230	49.26	33.945	-20.660***
Tokens Bw2	4.30	4.921	8.82	9.855	-4.520***
Types Bw2	3.80	3.764	6.12	4.918	-2.320**
Families Bw2	3.65	3.438	5.77	4.797	-2.120**
Tokens Bw3	4.80	5.858	8.99	8.969	-4.190**
Types Bw3	3.63	4.307	5.96	4.822	-2.335**
Families Bw3	3.40	4.037	5.58	4.522	-2.180**
Tokens NITL	8.80	7.985	20.32	28.977	-11.520***
Types NITL	7.10	5.642	10.37	10.210	-3.270*

(*: $p<0.05$, **:$p<0.01$, ***:$p<0.001$)

There was a statistically meaningful mean difference in all of the Baseword lists. The mean values of TOEIC were proved to be higher than those of ETCPTA because the values of the mean difference were all negative. The tokens total especially showed the most remarkable mean difference (-75.540***), and then tokens Baseword 1 also had a huge difference in their mean difference (-55.310***). This result indicates that the ETCPTA and TOEIC are significantly different in the size of vocabulary, leading one to question whether the two tests are interchangeable.

Comparatively, the mean difference in Basewords 2 and 3 was smaller than that in the total and Baseword 1, indicating that there was no considerable mean difference in academic word lists compared to that of general word lists even though there was an

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enormous difference in the tokens total between TOEIC and ETCPTA (-75.540***). It could be speculated that the vocabulary used in the ETCPTA might be relatively academic rather than general. Table 6 presents the correlation between item difficulty (1-p) and GSL Range output in the two tests to examine how they were related to each other.

TABLE 6

Correlation between Item Difficulty (1-p) and the Mean of GSL Range Output

	1-*p*	
	ETCPTA	TOEIC
Tokens total	0.192	0.246*
Types total	0.196	0.229*
Families total	0.167	0.226*
Tokens Bw1	0.188	0.250*
Types Bw1	0.190	0.221*
Families Bw1	0.165	0.221*
Tokens Bw2	0.132	0.190
Types Bw2	0.120	0.149
Families Bw2	0.109	0.162
Tokens Bw3	0.064	0.260**
Types Bw3	0.166	0.259**
Families Bw3	0.201	0.267**
Tokens NITL	0.279	0.194
Types NITL	0.19	0.191

For ETCPTA, there was no correlations between GSL indices and item difficulty (1-p), indicating that the components of GSL Range were not predictors when explaining the item difficulty of ETCPTA. For TOEIC, however, the hypothesis that the total number of word representations such as tokens, types, and families could be predictors of item difficulty was validated in the correlation study between GSL Range results and item difficulty (1-p). Item difficulty (1-p) has positive correlations with Tokens total, Types total, Families total, Tokens Bw1, Types Bw1, Families Bw1, Tokens Bw3, Types Bw3, and Families Bw3. This fact indicated that item difficulty would increase when the amount of these variables was larger.

Baseword 3 particularly showed even higher correlations compared to other word lists. The highest correlation was shown between difficulty (1-p) and Families Baseword 3 (0.267**), and the second highest correlation was found between difficulty (1-p) and Tokens Baseword 3 (0.260**). Similarly, Types Baseword 3 was closely related to

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difficulty (1-p) with the statistic of 0.259**. This confirms the fact that item difficulty increases when the number of vocabulary included in the Baseword 3 group increases. This result also implies that academically-oriented vocabulary might be the most predictable factor in determining item difficulty (1-p) compared to the frequently used vocabulary included in Basewords 1 and 2.

No correlations were discovered between Baseword 2 and item difficulty while Baseword 1 is correlated with item difficulty. This result suggests that there would be reasons for the difference in correlations between Baseword 1 and 2 and item difficulty even though both of them represent frequently used vocabulary in general contexts.

In terms of the pattern of correlations among tokens, types, and families, Baseword 1 and 2 present relatively strong correlations in tokens and weak correlations in types and families, while Baseword 3 shows strong correlations in families and weak correlations in tokens and types. Considering the fact that Baseword 1 and 2 constitute frequently used vocabulary and Baseword 3 includes academically-based vocabulary, one of the reasons for the different correlation pattern of Baseword 3 could be explained by other factors such as the guessing strategy.

2) The BNC

Table 7 presents the mean difference between TOEIC and ETCPTA with the results obtained by using BNC Range. It was designed to estimate the amount of tokens, types, and families in each word list, ranging from BW1 to BW16. For example, vocabulary in BW1 would be more frequent or general than that in BW2, and therefore, vocabulary in BW16 might be considered the most infrequent or specialized. Again, a T-test was carried out in order to find out the statistically significant mean difference between the two tests.

TABLE 7

Mean Tokens, Types and Families for BNC Output

	ETCPTA		TOEIC		Diff (ETCPTA-TOEIC)
	Mean score	STD	Mean score	STD	
Tokens	70.95	82.486	146.49	144.209	-75.540***
Types	46.40	42.903	78.37	55.419	-31.970***
Families	41.48	36.631	67.66	46.955	-26.185***
Tokens BW1	52.23	67.544	113.71	107.756	-61.485***
Types BW1	31.20	31.926	59.44	42.205	-28.240***
Families BW1	27.73	26.223	52.45	36.393	-24.725***

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Tokens BW2	7.88	8.361	11.35	10.494	-3.475
Types BW2	6.33	6.220	7.86	5.723	-1.535
Families BW2	6.18	6.051	7.44	5.504	-1.265
Tokens BW3	2.78	3.752	3.95	5.720	-1.175
Types BW3	2.40	2.610	2.42	2.396	-.020
Families BW3	2.35	2.455	2.31	2.268	.040
Tokens BW4	1.80	3.123	3.33	5.435	-1.530*
Types BW4	1.40	1.985	1.88	1.991	-.480
Families BW4	1.30	1.829	1.78	1.915	-.480
Tokens BW5	.88	1.771	1.40	2.978	-.525
Types BW5	.65	1.001	.91	1.471	-.260
Families BW5	.60	.841	.90	1.467	-.300
Tokens BW6	1.13	1.488	.51	.882	.615*
Types BW6	.93	1.141	.44	.701	.485*
Families BW6	.88	1.067	.44	.701	.435*
Tokens BW7	.40	.672	.18	.500	.220*
Types BW7	.35	.580	.13	.338	.220*
Families BW7	.35	.580	.13	.338	.220*
Tokens BW8	.45	.639	1.15	2.983	-.700*
Types BW8	.38	.490	.46	.989	-.085
Families BW8	.38	.490	.36	.674	.015
Tokens BW9	.45	.714	.08	.273	.370**
Types BW9	.40	.632	.08	.273	.320**
Families BW9	.40	.632	.08	.273	.320**
Tokens BW10	.25	.588	.13	.544	.120
Types BW10	.23	.480	.07	.256	.155
Families BW10	.23	.480	.07	.256	.155
Tokens BW11	.53	1.908	.40	1.333	.125
Types BW11	.20	.516	.14	.349	.060
Families BW11	.20	.516	.14	.349	.060
Tokens BW12	.28	.599	.39	1.463	-.115
Types BW12	.28	.599	.16	.487	.115
Families BW12	.28	.599	.16	.487	.115
Tokens BW13	.20	.516	.01	.100	.190*
Types BW13	.18	.446	.01	.100	.165*
Families BW13	.18	.446	.01	.100	.165
Tokens BW14	.03	.158	.01	.100	.015
Types BW14	.03	.158	.01	.100	.015

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Families BW14	.03	.158	.01	.100	.015
Tokens BW15	.43	1.357	3.62	5.635	-3.195***
Types BW15	.43	1.357	1.38	1.791	-.955***
Families BW15	.43	1.357	1.38	1.791	-.955***
Tokens BW16	.00	.000	.00	.000	-
Types BW16	.00	.000	.00	.000	-
Families BW16	.00	.000	.00	.000	-
Tokens NILS	1.28	2.124	6.27	11.567	-4.995***
Types NILS	1.05	1.694	2.98	3.528	-1.930***

(*: p<0.05, **:p<0.01, ***:p<0.001)

There was a mean difference between the two tests in the word lists such as Tokens, Types, Families, Tokens BW1, Types BW1, Families BW1, Tokens BW4, Tokens BW6, Types BW6, Families BW6, Tokens BW7, Types BW7, Families BW7, Tokens BW8, Tokens BW9, Types BW9, Families BW9, Tokens BW13, Types BW13, Tokens BW15, Types BW15, Families BW15, Tokens NILS, and Types NILS. A negative mean difference was found, signifying that the means of TOEIC were higher than those of ETCPTA (i.e., Tokens, Types, Families, Tokens BW1, Types BW1, Families BW1, Tokens BW4, Tokens BW8, Tokens BW15, Types BW15, Families BW15, Tokens NILS, and Types NILS). In contrast, the means of ETCPTA were higher than those of TOEIC in the lists of Tokens BW6, Types BW6, Families BW6, Tokens BW7, Types BW7, Families BW7, Tokens BW9, Types BW9, Families BW9, Tokens BW13, and Types BW13, manifesting a positive mean difference.

The most statistically considerable mean difference was shown in Tokens Total (-75.540***), implying that TOEIC had many more tokens than those in ETCPTA. Along the same lines, the amount of tokens of Baseword 1 in TOEIC was larger than that in ETCPTA (-61.485***). Similar to the GSL results, there are significant differences in the size of vocabulary for the two tests. A major mean difference was discovered in the tokens total, types total, families total, tokens BW1, types BW1, and families BW1. Table 8 represents the relationships between item difficulty (1-p) and BNC indices.

TABLE 8

Correlation between Item Difficulty (1-p) and the Mean of the BNC Output

	1-p			1-p	
	ETCPTA	TOEIC		ETCPTA	TOEIC
Tokens	0.192	0.246*	Tokens BW9	0.106	0.119
Types	0.196	0.229*	Types BW9	0.057	0.119
Families	0.185	0.233*	Families BW9	0.057	0.119

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Tokens BW1	0.185	0.248*	Tokens BW10	0.456**	-0.003
Types BW1	0.186	0.223*	Types BW10	0.492**	0.000
Families BW1	0.165	0.225*	Families BW10	0.492**	0.000
Tokens BW2	0.107	0.234*	Tokens BW11	0.308	0.025
Types BW2	0.150	0.216*	Types BW11	0.337*	-0.018
Families BW2	0.147	0.209*	Families BW11	0.337*	-0.018
Tokens BW3	0.075	0.174	Tokens BW12	0.303	0.043
Types BW3	0.074	0.241*	Types BW12	0.303	0.028
Families BW3	0.068	0.228*	Families BW12	0.303	0.028
Tokens BW4	-0.010	0.253*	Tokens BW13	0.330*	-0.112
Types BW4	-0.007	0.212*	Types BW13	0.318*	-0.112
Families BW4	0.008	0.278**	Families BW13	0.318*	-0.112
Tokens BW5	0.290	0.082	Tokens BW14	0.211	0.192
Types BW5	0.256	0.089	Types BW14	0.211	0.192
Families BW5	0.255	0.088	Families BW14	0.211	0.192
Tokens BW6	0.199	0.116	Tokens BW15	-0.031	0.176
Types BW6	0.202	0.150	Types BW15	-0.031	0.108
Families BW6	0.241	0.150	Families BW15	-0.031	0.108
Tokens BW7	0.003	0.075	Tokens BW16	-	-
Types BW7	0.034	0.081	Types BW16	-	-
Families BW7	0.034	0.081	Families BW16	-	-
Tokens BW8	0.214	-0.061	Tokens NILS	-0.009	0.230*
Types BW8	0.243	-0.029	Types NILS	-0.027	0.159
Families BW8	0.243	0.029			

For TOEIC, there were correlations between item difficulty (1-p) and BNC indices, including Tokens, Types, Families, Tokens BW1, Types BW1, Families BW1, Tokens BW2, Types BW2, Families BW2, Types BW3, Families BW3, Tokens BW4, Types BW4, Families BW4, and Tokens NILS. As the amount of these Baseword lists was larger, item difficulty (1-p) might consistently increase, depending on positive correlation coefficients.

For ETCPTA, however, significant correlations were found between BNC indices and item difficulty (1-p) in Baseword 10 (0.456** for Tokens, 0.492** for Types, and 0.492** for Families). Moreover, types and families of Baseword 11 were associated with item difficulty (0.337* for both Types and Families), and Baseword 13 showed a close relationship with item difficulty (0.330*, 0.318*, and 0.318*, each). This fact implies that the amount of vocabulary in the Baseword 10, Baseword 11, and Baseword 13 word lists would affect the item difficulty in ETCPTA. To sum up, the item difficulty

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of TOEIC was far more related to the word lists ranging from Baseword 1 to Baseword 4, while that of ETCPTA was closely associated with those ranged from Baseword 10 to Baseword 13. Such results lead to speculation that the item difficulty of TOEIC would be influenced by daily-life oriented or frequently used vocabulary, while the item difficulty of ETCPTA could be predicted by relatively academically-oriented or infrequently used vocabulary.

3) WordSmith

Table 9 presents the means and mean difference of the two tests by operating the WordSmith program, which is designed to examine the lexical features of given texts. The result was that a significant mean difference existed between the two tests in the file size, tokens used for word lists, types (distinct words), type/token ratio (TTR), mean word length (in characters), sentences, mean sentences (in words), mean paragraphs (in words), mean sections (in words), and numbers removed.

TABLE 9

Means of WordSmith Output

	ETCPTA		TOEIC		Diff (ETCPTA-TOEIC)
	Mean score	STD	Mean score	STD	
file size	464.13	493.25	942.91	925.65	-478.79***
tokens used for word list	71.70	83.01	150.67	148.55	-78.97***
types(distinct words)	46.15	43.21	78.86	56.36	-32.71***
type/token ratio(TTR)	77.99	15.15	67.65	17.24	10.34***
mean word length (in characters)	5.36	0.72	5.02	0.69	0.34*
sentences	3.98	5.16	9.83	9.95	-5.86***
mean sentences(in words)	21.63	6.55	17.65	4.41	3.98**
paragraphs	1.00	0.00	1.00	0.00	-
mean paragraphs(in words)	71.70	83.01	150.67	148.55	-78.97***
sections	1.00	0.00	1.00	0.00	-
mean sections(in words)	71.70	83.01	150.67	148.55	-78.97***
numbers removed	0.38	0.84	4.03	5.92	-3.66***

(*: $p<0.05$, **:$p<0.01$, ***:$p<0.001$)

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The means of TOEIC were higher than those of ETCPTA in the file size, tokens used for word list, types (distinct words), sentences, mean paragraphs (in words), mean sections (in words), and numbers removed because they all had a negative mean difference. The most noticeable difference was found in file size (-478.79***), tokens (-78.97***), mean paragraphs (in words) (-78.97***), and mean sections (in words) (-78.97***).

However, the means of ETCPTA were higher than those of TOEIC in the type/token ratio (TTR)(10.34***), mean sentences (in words) (3.98**), and mean word length (in characters) (0.34*), showing positive mean difference statistics. This fact can be understood by observing that texts used in ETCPTA reflect vocabulary variation and syntactic complexity compared with those used in TOEIC. Table 10 presents correlation between Item Difficulty (1-p) and the mean of WordSmith Output.

TABLE 10

Correlation between Item Difficulty (1-p) and the Mean of WordSmith Output

	1-*p*	
	ETCPTA	TOEIC
file size	0.188	.242*
tokens used for word list	0.189	.246*
types(distinct words)	0.194	.234*
type/token ratio(TTR)	0.016	-.229*
mean word length(in characters)	0.075	-0.118
sentences	0.181	.247*
mean sentences(in words)	-0.098	-.244*
paragraphs	-	-
mean paragraphs(in words)	0.189	.246*
sections	-	-
mean sections(in words)	0.189	.246*
numbers removed	0.06	0.188

(*: p<0.05, **:p<0.01, ***:p<0.001)

For ETCPTA, there was no correlation between item difficulty (1-p) and the result of WordSmith. This fact suggested that all the indices of WordSmith were not accounted for as predictors in determining the item difficulty of ETCPTA. With regard to TOEIC, item difficulty (1-p) had a close relationship with indices of WordSmith such as file size, tokens used for word list, types (distinct words), type/token ratio (TTR), sentences, mean sentences (in words), mean paragraphs (in words), and mean sections (in words). Positive correlations indicated that the item difficulty of TOEIC would increase as the

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amount of the indices was larger (i.e., file size, tokens, types, sentences, mean paragraphs, and mean sections). The item difficulty of TOEIC, however, had the possibility of being lower when the amount of type/token ratio(TTR) and mean sentences (in words) was larger due to negative coefficients (-.229* and -.244*, each).

4) CLAWS4POS Tagger

Table 11 describes the mean difference in content words and the ratio of content words to total words (C/T) by using CLAWS4 program, which counts each word tagged as a part of speech.

TABLE 11

Means of CLAWS4POS Output

	ETCPTA		TOEIC		Diff (ETCPTA-TOEIC)
	Mean score	STD	Mean score	STD	
Content words	24.60	16.07	69.67	69.24	-45.07***
C/T	0.55	0.11	0.52	0.10	0.03

(*: p<0.05, **:p<0.01, ***:p<0.001)

There was a huge mean difference in content words, showing a mean difference of -45.07***. This fact implied that TOEIC had many more content words than ETCPTA. Although the ratio of content words to total words (C/T) did not present a statistically significant mean difference, the mean of C/T for ETCPTA was a little higher than that for TOEIC (ETCPTA = 0.55 and TOEIC = 0.52). From this result, it might be assumed that texts used in ETCPTA tend to be more compact, encompassing more content words instead of function words compared with the texts used in TOEIC. Table 12 represents the relationship between item difficulty and the indices of CLAWS4.

TABLE 12

Correlation between Item Difficulty (1-p) and the Mean of CLAWS4POS Output

	1-*p*	
	ETCPTA	TOEIC
Content words	.145	.225*
C/T	.161	-.166

(*: p<0.05, **:p<0.01, ***:p<0.001)

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With regard to ETCPTA, neither content words nor C/T were correlated with the item difficulty of the test. That is, vocabulary features such as content words and C/T produced by CLAWS4 were not predictors in determining item difficulty for ETCPTA. For TOEIC, however, the amount of content words was closely related to the item difficulty of the test. It showed a positive correlation (.225*) so that item difficulty would increase when the amount of content words was larger.

5) Readability

Table 13 shows the means of readability indices of ETCPTA and TOEIC and the mean difference between the two tests.

TABLE 13

Means of Readability Output

	ETCPTA		TOEIC		Diff (ETCPTA-TOEIC)
	Mean score	STD	Mean score	STD	
Flesch Reading Ease	40.53	24.90	48.33	21.66	-7.81
Flesch Grade Level	11.83	3.17	10.79	4.02	1.03
Fog	14.30	4.16	13.69	4.59	0.61
Syllable	120.08	126.70	235.85	235.13	-115.78***
Mono_Syll	37.50	43.24	94.83	93.90	-57.33***
Fog Difficult Word	13.33	14.34	22.67	23.67	-9.35*

(*: $p<0.05$, **:$p<0.01$, ***:$p<0.001$)

A significant mean difference was produced in the Syllable (-115.78***), Mono_Syll (-57.33***), and Fog Difficult Word (-9.35*). As shown in Table 13, this fact indicated that the means of TOEIC in those indices were higher than those of ETCPTA. One notable aspect was that the means of Flesch Grade Level and Fog for TOEIC were not higher than those for ETCPTA. ETCPTA items seemed to be difficult to read because of a lower mean score in the Flesch Reading Ease (ETCPTA= 40.53 < TOEIC= 48.33), and a higher mean score in the Flesch Grade Level (ETCPTA= 11.83 > TOEIC= 10.79) and the Fog (ETCPTA= 14.30 > TOEIC= 13.69).

Table 14 shows the correlation between item difficulty and readability output in the two tests. For ETCPTA, readability indices were not associated with item difficulty. However, for TOEIC, item difficulty (1-p) was affected by the amount of Syllable, Mono_Syll, and Fog Difficult Word, indicating that as the amount of Syllable, Mono_Syll, and Fog Difficult Word increased, item difficulty would also increase depending on positive correlations.

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TABLE 14

Correlation between Item Difficulty (1-p) and the Mean of Readability Output

	1-*p*	
	ETCPTA	TOEIC
Flesch Reading Ease	0.053	0.082
Flesch Grade Level	-0.098	-0.071
Fog	0.021	-0.058
Syllable	0.162	0.253*
Mono_Syll	0.183	0.237*
Fog Difficult Word	0.179	0.258**

(*: p<0.05, **:p<0.01, ***:p<0.001)

2. Multiple Regression Analysis and ANOVA

1) Affective Variables for ETCPTA

Stepwise regression analysis was employed especially for the purpose of identifying strong predictor variables that affect reading item difficulty. The most affective variables and the magnitude of their influence would be found. As shown in Table 15, the result was that the finally adopted model for ETCPTA was the fourth, and the variables significantly affecting item difficulty were Types BW10, mean sentences (in words), Tokens BW5, and Families BW14. Table 15 displays the set of predictors that account for a significant amount of variance.

TABLE 15

Model Summary (ETCPTA)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.432(a)	.187	.164	.17764
2	.537(b)	.288	.248	.16850
3	.635(c)	.404	.351	.15652
4	.717(d)	.514	.455	.14344

a. Predictors: (Constant), Types BW10
b. Predictors: (Constant), Types BW10, mean sentences (in words)
c. Predictors: (Constant), Types BW10, mean sentences (in words), Tokens BW5
d. Predictors: (Constant), Types BW10, mean sentences (in words), Tokens BW5, Families BW14
Dependent Variable: 1-P

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For Model 1, Types BW10 was found as an affecting variable, which accounted for 16.4% of the variance (Adjusted R Square = 0.164). Next, Model 2 included mean sentences (in words) as an additional variable, and this model explained 24.8% together (Adjusted R Square = 0.284). This implied that mean sentences (in words) increased 8.4% in explaining affecting variables compared to the result of Model 1. Then, for Model 3, Tokens BW5 was added as another affecting variable, producing 35.1% (Adjusted R Square = 0.351) in explaining the amount of variance all together, and Tokens BW5 increased 6.7% of the variance. Finally, Model 4, which included Families BW14, resulted in 45.5% (Adjusted R Square = 0.455) when explaining the entire variance, again increasing 10.4% of the variance compared with the result from Model 3. The amount of variance accounted for would increase when another predictor variable was added in the multiple stepwise regression model, ranging from 16.4% for Model 1 to 45.5% for Model 4.

Table 16 presents ANOVA results for the four models. It was examined to see whether each model was statistically significant, and it was proved that the finally adopted Model 4 met the satisfactory criterion ($p = .000 < .05$). This result implied that Model 4 would be considered appropriate when accounting for statistically significant predictor variables.

TABLE 16

ANOVA (ETCPTA)

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.261	1	.261	8.257	.007(a)
	Residual	1.136	36	.032		
	Total	1.397	37			
2	Regression	.403	2	.201	7.094	.003(b)
	Residual	.994	35	.028		
	Total	1.397	37			
3	Regression	.564	3	.188	7.668	.000(c)
	Residual	.833	34	.024		
	Total	1.397	37			
4	Regression	.718	4	.179	8.718	.000(d)
	Residual	.679	33	.021		
	Total	1.397	37			

a. Predictors: (Constant), Types BW10
b. Predictors: (Constant), Types BW10, mean sentences (in words)
c. Predictors: (Constant), Types BW10, mean sentences (in words), Tokens BW5
d. Predictors: (Constant), Types BW10, mean sentences (in words), Tokens BW5, Families BW14
Dependent Variable: 1-P

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Then, the significance of each independent variable was measured after confirming the appropriateness of Model 4 throughout the ANOVA test. Table 17 presents the significant predictor variables when explaining item difficulty for this study.

TABLE 17
Coefficients (ETCPTA)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.565	.031		18.150	.000
	Types BW10	.184	.064	.432	2.873	.007
2	(Constant)	.782	.101		7.715	.000
	Types BW10	.259	.069	.608	3.734	.001
	mean sentences (in words)	-.011	.005	-.364	-2.239	.032
3	(Constant)	.798	.094		8.458	.000
	Types BW10	.287	.065	.675	4.396	.000
	mean sentences (in words)	-.013	.004	-.445	-2.882	.007
	Tokens BW5	.039	.015	.348	2.562	.015
4	(Constant)	.811	.087		9.357	.000
	Types BW10	.307	.060	.723	5.098	.000
	mean sentences (in words)	-.014	.004	-.492	-3.449	.002
	Tokens BW5	.043	.014	.383	3.061	.004
	Families BW14	.403	.147	.336	2.735	.010

Dependent Variable: 1-P

Looking at the finally adopted Model 4, it included Types BW10, mean sentences (in words), Tokens BW5, and Families BW14, and they were proved as important predictor variables when explaining item difficulty.

In examining Standardized Coefficients, the extent to which each variable affects item difficulty was measured as well. For instance, the number of types in Baseword 10 was the most significant predictor variable (Beta = 0.723, p = .000). This result indicated that item difficulty (1-p) would increase by 0.723 on average as the amount of Types in BW10 increased. And the second most important predictor was mean sentences (in words) (Beta = -0.492, p = .002) followed by the number of tokens in Baseword 5 (Beta = 0.383, p = .004). One notable point was found in mean sentences, presenting a negative statistic of Standardized Coefficients (-0.492). Such a result confirmed that item difficulty (1-p) would be decreased by 0.492 on average when the amount of mean sentences (in words) increased. Similar to the result for Types BW10, for Tokens BW5,

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item difficulty would rise by 0.383 on average when the amount of Tokens BW5 increased (Beta = 0.383, p = .004). The last salient variable was the number of families in Baseword 14 (Beta = 0.336, p = .010). The statistic of the Standard Coefficient (0.336) means that ETCPTA item difficulty would rise by 0.336 on average as the amount of Families BW14 increased.

2) Affective Variables for TOEIC

Table 18 presents the results of regression analysis for TOEIC, carried out to identify predictor variables affecting the item difficulty (1-P) of TOEIC. The finally adopted model was Model 2, which included Families BW4 and Types BW4. Model 1, which only included Families BW4, accounted for 6.8% of the variance (Adjusted R Square = .068); however, Model 2, which included Types BW4 as an additional predictor, could explain 13.2% of the variance (Adjusted R Square = .132).

TABLE 18

Model Summary (TOEIC)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.278(a)	.077	.068	.16056
2	.386(b)	.149	.132	.15497

a. Predictors: (Constant), Families BW4
b. Predictors: (Constant), Families BW4, Types BW4

Table 19 exhibits the results of the ANOVA test that was used to measure the significance of each model. As a result, the finally adopted Model 2 was reasonable when explaining statistically significant predictor variables (p = .000 < .05).

TABLE 19

ANOVA (TOEIC)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.212	1	.212	8.213	.005(a)
	Residual	2.527	98	.026		
	Total	2.738	99			
2	Regression	.409	2	.204	8.508	.000(b)
	Residual	2.330	97	.024		
	Total	2.738	99			

a. Predictors: (Constant), Families BW4
b. Predictors: (Constant), Families BW4, Types BW4
Dependent Variable: 1-P

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The statistical significance of each independent variable was estimated followed by the confirmation of the appropriateness of regression model 2 throughout the ANOVA test.

TABLE 20

Coefficients (TOEIC)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.432	.022		19.640	.000
	Families BW4	.024	.008	.278	2.866	.005
2	(Constant)	.439	.021		20.547	.000
	Families BW4	.128	.037	1.470	3.446	.001
	Types BW4	-.102	.036	-1.221	-2.864	.005

Dependent Variable: 1-P

As presented in Table 20, the finally adopted variables were Families BW4 and Types BW4, which would affect the item difficulty of TOEIC ($p = .001 < .05$ and $p = .005 < .05$, respectively). For more details, the statistic of Standardized Coefficients was examined to see the extent to which each predictor variable affects item difficulty. For Families BW4, as the amount of Families BW4 increased, the item difficulty of TOEIC would be higher by 1.470 on average (Beta = 1.470, $p = .001 < .05$). In the case of Types BW4, as the number of types in Baseword 4 increased, the item difficulty of TOEIC tended to decrease by 1.221 on average (Beta = -1.221, $p = .005 < .05$).

V. CONCLUSION AND IMPLICATIONS

1. Conclusion

1) Corpus Analysis

The results of corpus analysis indicated that ETCPTA and TOEIC did not share task characteristics, showing the significant differences not only in the nature of the corpus-based variables but also in the correlations between the variables and item difficulty.

The results of GSL Range showed that there was no considerable mean difference in academic word lists although a significant mean difference was found in Tokens Total and Baseword list 1. In terms of correlation between GSL Range output and item

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difficulty, a correlation was found in TOEIC, while GSL Range output was not correlated with item difficulty for ETCPTA.

Similarly, for BNC results, a statistically significant mean difference was found in Tokens Total and Tokens Baseword 1. This implied that TOEIC possessed a lot more Tokens, Types, and Families in Baseword 1, encompassing relatively frequently used vocabulary compared to other Baseword lists. The correlation study also supported the conclusion that the inclusion of far more frequently used vocabulary influences TOEIC item difficulty, while academic-specific vocabulary might affect ETCPTA item difficulty. For instance, Basewords 1, 2, 3, and 4 showed correlations with TOEIC item difficulty, whereas Basewords 10, 11, and 13 were closely correlated with ETCPTA item difficulty.

For the WordSmith results, texts used in ETCPTA proved to be syntactically complicated because of the larger mean scores of ETCPTA in Type/ Token Ratio (TTR), mean sentences (in words), and mean word length (in characters). The WordSmith results and item difficulty were correlated with each other only for TOEIC. Moreover, it was confirmed that ETCPTA would be difficult due to syntactic complexity and relatively lengthy vocabulary.

Along the same lines, the CLAWS4POS results suggested that ETCPTA texts were compact, having even more content words instead of function words. From the result of the correlation study between CLAWS4POS output and item difficulty, ETCPTA did not show a relationship, but TOEIC item difficulty was associated with the number of content words.

Considering the Readability results, the means of Flesch Grade Level and Fog for TOEIC were not higher than those of ETCPTA, although TOEIC had a larger amount of syllable and monosyllable vocabulary than ETCPTA. Such a result implied that ETCPTA texts were difficult to read, judging from the lower mean score in Flesch Reading Ease and higher mean score in both Flesch Grade Level and Fog. Still, TOEIC item difficulty was correlated with syllable, monosyllable, and Fog difficult words, while ETCPTA item difficulty had no correlation with these variables.

2) Multiple Regression Analysis and ANOVA

The results from Multiple Regression Analysis and ANOVA for ETCPTA indicated that variables significantly affecting item difficulty were Types BW10, mean sentences (in words), Tokens BW5, and Families BW14. Referring to the standardized coefficients, Types BW10 was the most affective predictor variable for ETCPTA, followed by Tokens BW5 and Families BW14. In contrast, for TOEIC, the strongest predictor variables were Families BW4 and Types BW4. Consequently, Multiple Regression

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Analysis and ANOVA again confirmed that item difficulty of ETCPTA reading comprehension was affected by academically-specific vocabulary, while that of TOEIC was influenced by frequently used vocabulary based on the general language use domain

2. Implications

Judging from the results of this study, ETCPTA and TOEIC are perceived as having different characteristics in their input language. According to the correlation studies between corpus-based variables and item difficulty, the variables of the ETCPTA have no correlations with the item difficulty of the test only except for the BNC. This result suggests that, particularly for the ETCPTA, studies on affective variables on item difficulty should be conducted. In addition, the construct validity of the ETCPTA should be seriously examined to determine if it is, in fact, a reliable and useful means for achieving a high-stakes standardized English test.

With respect to "authenticity" of the tests, input language of the two tests failed to exhibit correspondence with the target language use domain, namely, the fields of tax and accounting. For ETCPTA, it presented linguistic features closely related to academic purposes, indicating that ETCPTA did not represent the target language use domain for the CPTA exam. Along the same lines, TOEIC might not be desirable enough to be used for the CPTA exam because the input language of TOEIC satisfied its ultimate purpose of testing English ability with respect to using the language to communicate in general contexts. Despite negative aspects for using ESP based tests, the purposes of a target English test should be thoroughly identified and designed reflecting TLU domain when considering the significance of authenticity in test usefulness. This study can provide implications with respect to the need for ETCPTA to represent properly its specific contents or contexts.

It has been suggested that a specific-purpose test for the CPTA exam be required so that relatively more competent applicants qualified with both English and background knowledge in tax and accounting would be benefited. In addition, test content for the ESP-based tests should be clearly defined, satisfying their ultimate goal of constituting the most reliable and useful test of the English skills requisite for the professional fields in question.

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Examples in: English
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