

**Relationships Between a Statewide  
Language Proficiency Test and Academic  
Achievement Assessments**



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## LEP Projects Report 4

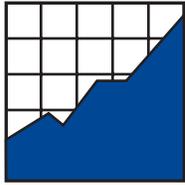
# Relationships Between a Statewide Language Proficiency Test and Academic Achievement Assessments

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**August 2004**

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Kato, K., Albus, D., Liu, K., Guven, K., & Thurlow, M., (2004). *Relationships between a statewide language proficiency test and academic achievement assessments* (LEP Projects Report 4). Minneapolis, MN: University of Minnesota, National Center on Educational Outcomes.



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The project “Connecting English Language Proficiency, Statewide Assessments, and Classroom Performance” is a subcontract (#41159) with the Minnesota Department of Education supported by a grant (#T 292B010002) from the Office of English Language Acquisition. Opinions expressed herein do not necessarily reflect those of the Minnesota Department of Education or the U.S. Department of Education or Offices within it.

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## Executive Summary

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Minnesota is one of many states that began development of an English proficiency test before federal requirements were in place to do so. It had decided to put into place a test that would provide the state with a better and more uniform gauge of how its population of English language learners (ELLs) was doing in their acquisition of academic English language skills. Minnesota chose to adapt its test, the Test of Emerging Academic English (TEAE), from the Illinois Measure of Academic Growth in English (IMAGE). The TEAE is designed to gauge the growth of emerging academic English language skills across all grades, including three forms spanning grades 3-4, 5-6, and 7-8. The 7-8 form is also designed for use with students above grades 7-8.

This report focused on state ELL performance on the TEAE, in comparison to ELL and fluent English student performance on Minnesota's Comprehensive Assessment (MCA) in reading in 3rd and 5th grade, and Minnesota's Basic Skills Test (BST) in reading in 8th grade. The TEAE is designed to measure the basic English proficiency required for pursuing higher-level academic achievement, while the MCA is designed to measure academic achievement toward the state standards. The Basic Skills Test in reading measures the basic skills needed to be able to graduate. Across these comparisons, our guiding research questions were to find out what levels of the TEAE best predicts success on the MCA and BST, and whether the state decision to count as proficient those ELLs who achieve at level 4 on the TEAE has a sound base of support from an assessment perspective. Study 1 addresses the questions related to the TEAE and the MCAs. Study 2 addresses the same questions for the TEAE and the BST.

### Key Findings:

#### Study 1: TEAE and the MCA

- ELLs in TEAE level 4 are likely to do as well as native English speakers on the MCA, recognizing that there is a range of performance among native speakers.
- Although the specific predictive relationship (i.e., what TEAE score corresponds to what MCA score) can differ, the positive relationship between students' performance on the two tests is stable across years and grades.
- For students with TEAE scores below about 110, there is less ability to predict MCA scores.
- Most students in TEAE level 3 fall into MCA levels 2A, 2B, or 3 and therefore although it is likely that many within this group score as proficient (i.e., 2B or 3) others may not (2A).

## Study 2: TEAE and the BST

- TEAE scale scores had moderate predictive power for BST performance. However, the predictability is not as good as for the MCA.
- To predict that a student would be likely to pass the BST, he or she must score at least 260 (i.e., achieve level 3) on the TEAE.

In conclusion, there might be stronger relationships between the MCA and 3rd and 5th grade reading skills on the TEAE because the academic language skills measured on the TEAE fit those elementary grades better. Other factors besides potential discrepancies between secondary grade level skills and basic academic language skills may also account for differences in performance between the tests. These include differences in a learner's age upon entering Minnesota schools, differences based on student familiarity or lack of familiarity with topical content and vocabulary for individual passages encountered on the tests, and teachers' own anecdotal evidence which suggests that some students who take the TEAE do not take the test seriously. Any combination of these and other individual student factors could contribute to the TEAE not predicting success on the BST as well as on the MCA.

## Overview

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Minnesota is one of many states that began development of an English proficiency test before federal requirements were in place to do so. It had decided to put into place a test that would provide the state with a better and more uniform gauge of how its population of English language learners (ELLs) was doing in their acquisition of academic English language skills. Minnesota chose to adapt its test, the Test of Emerging Academic English (TEAE), from the Illinois Measure of Academic Growth in English (IMAGE). The TEAE, begun before Title III legislation required an annual growth measure for English proficiency under the No Child Left Behind Act of 2001, is now used to serve accountability purposes at federal and state levels, and is the official measure to provide on-going identification of English language learners in Minnesota for the purpose of state funding. This said, a student's proficient scores on the TEAE reading and writing tests do not prohibit him or her from receiving on-going ESL/bilingual support as deemed feasible by local districts.

The TEAE is designed to gauge the growth of emerging academic English language skills across all grades, including three forms spanning grades 3-4, 5-6, and 7-8. The 7-8 form is also designed for use with students above grades 7-8. Gauging growth in academic English, and even defining it, is a challenge for language acquisition specialists and assessment specialists alike. The different viewpoints on what constitutes academic English (Bailey, Butler, LaFramenta, & Ong, 2004; Chamot & O'Malley, 1994; Cummins, 1979; Scarcella, 2003; Solomon & Rhodes, 1995; Stevens, Butler, & Castellon-Wellington, 2000), makes the design, implementation, and interpretation of such a proficiency test complex at best, especially when translating back the results into what academic language skills a student truly needs for success across content classrooms such as reading and mathematics.

This report focuses on state ELL performance on the TEAE, in comparison to ELL and fluent English student performance on Minnesota's Comprehensive Assessment (MCA) in reading in 3rd and 5th grade, and Minnesota's Basic Skills Test in reading in 8th grade (BST). The TEAE is designed to measure the basic English proficiency required for pursuing higher-level academic achievement, while the MCA is designed to measure academic achievement toward the state standards. The Basic Skills Test in reading measures the basic reading skills needed to be able to graduate. Across these comparisons, our guiding research questions are to find out what levels of the TEAE best predicts success on the MCA and BST, and whether the state decision to count as proficient those ELLs who achieve at level 4 on the TEAE has a sound base of support from an assessment perspective. Study 1 addresses the questions related to the TEAE and the MCAs, Study 2 addresses the same questions for the TEAE and the BST.

## Study 1: TEAE and MCA

### Method

In Study 1, we use the Minnesota state test data of third and fifth graders in school year (SY) 2001-02 and 2002-03. Although the TEAE consists of reading and writing tests, we focus only on the reading test and its relationship with the MCA reading test. Hereafter, they are simply denoted by TEAE and MCA, respectively. The MCA data include test scores of all students who participated in the state assessment. The TEAE data consist of test scores of ELLs. The TEAE data originally contained 5,161 third graders and 4,688 fifth graders in SY 2001-02, and 5,123 third graders and 4,683 fifth graders in SY 2002-03. The MCA data originally contained 61,922 third graders and 64,408 fifth graders in SY 2001-02, and 60,018 third graders and 63,350 fifth graders in SY 2002-03. The data files for the same school year were merged using the student ID as the key variable. At this step, students with invalid or no student ID number were flagged so that they would not be used in the subsequent analyses. The merged data were then screened to exclude students who had any missing value on variables related to test scores (i.e., raw scores, subscale scores, and scaled scores; if any of these is missing, then other scores are not reliable even if they are recorded). Students who are recorded as “not tested” on MCA were also excluded. The resulting sample sizes are shown in the third column in Table 1.

**Table 1. Descriptive Statistics for TEAE and MCA Data**

Year	Grade	N	TEAE Reading Scale Score				MCA Reading Scale Score				r
			Mean	SD	Min	Max	Mean	SD	Min	Max	
01-02	3	4361	186.22	35.26	14	383	1309.11	178.22	870	2050	.72
02-03	3	4541	181.94	39.31	5	408	1348.70	163.21	390	2060	.71
01-02	5	3983	227.94	44.05	25	377	1334.35	197.35	710	2060	.73
02-03	5	4238	216.60	39.85	9	425	1378.74	179.44	540	2220	.73

Note. *N* is sample size, *SD* is standard deviation, and *r* is sample correlation between TEAE and MCA.

Next, we examined the relationship between the two tests. English proficiency as measured by the TEAE is considered to be prerequisite to minimal performance on the MCA. Thus, we expect that performance on the two tests is positively related, but detailed analysis will reveal more specifically the degree to which they are related. We analyzed the data in three ways based on how the results of these tests may impact practice.

The first analysis examines the relationship between the two tests at the scale score level. The scale scores of the TEAE and the MCA represent English proficiency and academic achievement toward the state standards, respectively. Every year performance on both tests is converted from raw scores so that they have similar distributions across years irrespective of changes in

test items. Based on our research questions, we inspected scatter plots of the MCA and TEAE, and then applied regression analysis to examine the extent to which the MCA scale score is predicted by the TEAE scale score.

The second analysis focused on the relationship between the two tests by the proficiency or achievement level. The MCA has five achievement levels, I, IIa, IIb, III, and IV, based on cutoff points set on the scaled score. Students who are in level IIb or above are counted as “achieved” for accountability purposes in Minnesota. The TEAE has four levels to represent English language proficiency based on the scale score. On both the MCA and the TEAE, each level is associated with a specific description of progress toward the state standards (MCA) or English proficiency (TEAE), and thus gives a brief and clearer interpretation of a test result. Also, using such levels makes the results less sensitive to measurement errors on scale scores. Examining the relationship between the two tests by the proficiency or achievement level leads to relating a specific level of English proficiency to a specific achievement level.

The third analysis is motivated by the regulation that ELLs who have achieved the highest proficiency level (level 4 on reading and level 5 writing) on the TEAE are no longer eligible for funding for LEP programs because they are regarded as having English proficiency sufficient to access the academic content in the mainstream without further language support. If results of the TEAE reflect this reasoning, then the distribution of MCA scores of ELLs who are in the highest English proficiency level are comparable to those of students who are not ELLs. In other words, the means of the MCA score distributions of both groups of students should be almost the same and the ranges of the distributions should substantially overlap. Accordingly, the distribution of MCA scale scores for each of the TEAE proficiency levels will be compared with the distribution of native English speakers. Test scores of native English speakers were taken from the Minnesota state test data as well, and those data were screened in the same manner as for the TEAE.

## Results

### *Descriptive Statistics for the Entire Sample*

Descriptive statistics by grade and year were shown in Table 1. Within each school year, fifth graders had higher mean scores on both the TEAE and MCA as expected. Fifth graders had larger variability on the MCA than third graders in both school years. Fifth graders had larger variability than third graders also on the TEAE in 2001-02, while there is little difference in 2002-03. Correlations between the TEAE and MCA are larger than .70 for all grades and years. This indicates an overall stable, positive relationship between the TEAE and MCA. Still, it is worthy of more detailed examination.

### *Analysis of Scale Scores*

**Scatter plots.** Scatter plots of MCA scale scores and TEAE scale scores by grade and year are shown in Figures 1 through 4. These plots consistently indicate that the majority of points are positively correlated. However, there is a group of points that do not follow that major pattern in the region where TEAE scale scores are less than a given point. For third graders in 2001-02, for example, data points with TEAE scores less than about 100 seem to have almost no correlation while the majority of data points are positively correlated. For these "irregular" points, MCA scores looked highly unpredictable based on TEAE scores. Thus, it is better to separate these points in order to investigate the relationship that applies to the majority of students in the data set. The question is, however, at what point we should separate regular and irregular cases; there is no indicator variable that separates these two types of points in the data files.

**Figure 1. Scatter plot of MCA and TEAE scale scores (2001-02, Grade 3)**

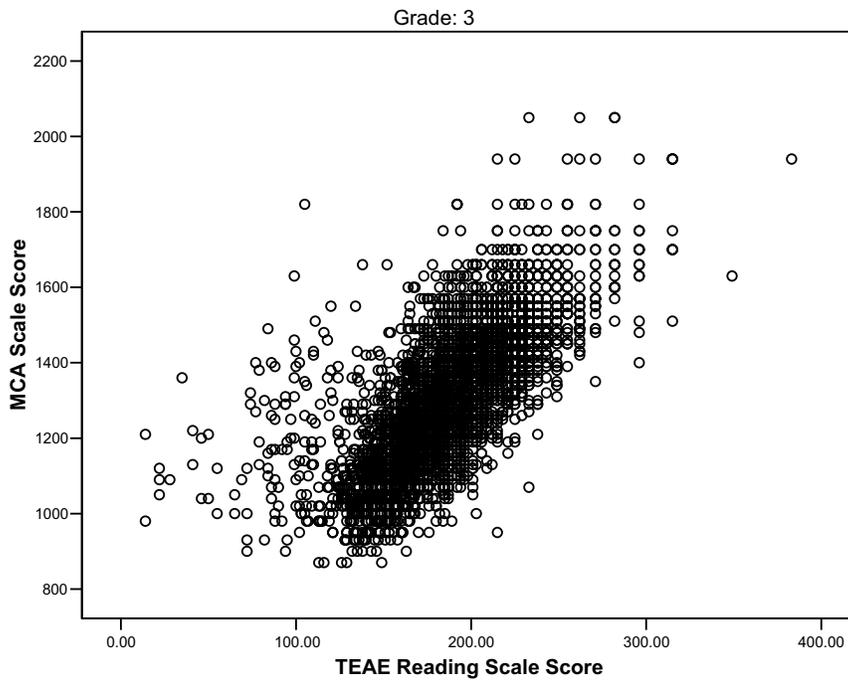


Figure 2. Scatter plot of MCA and TEAE scale scores (2002-03, Grade 3)

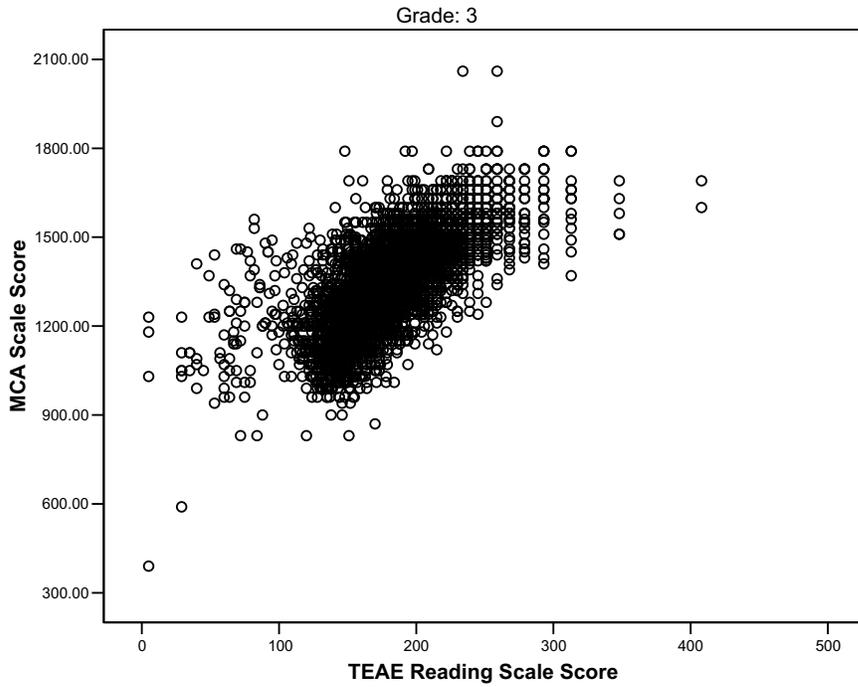
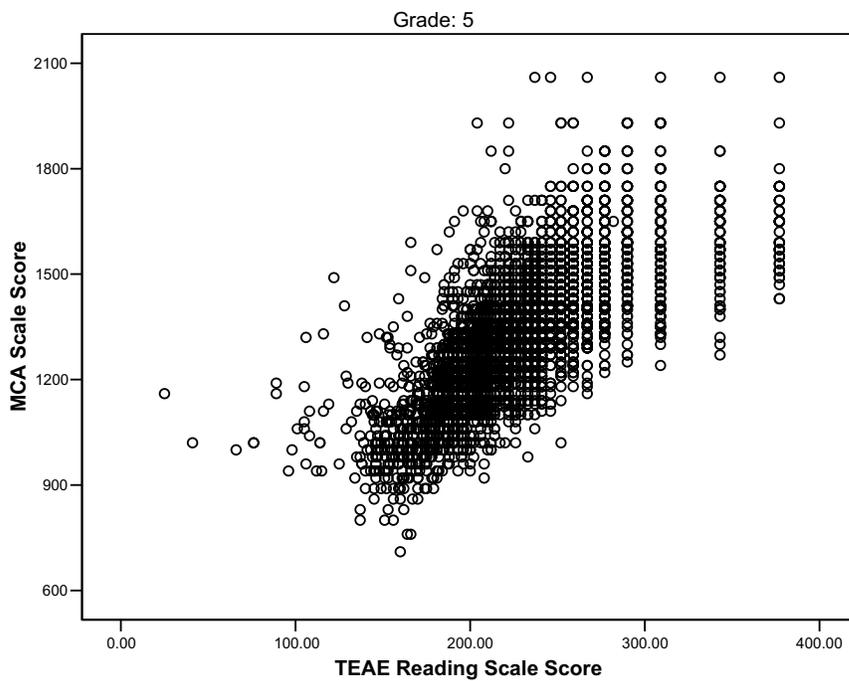
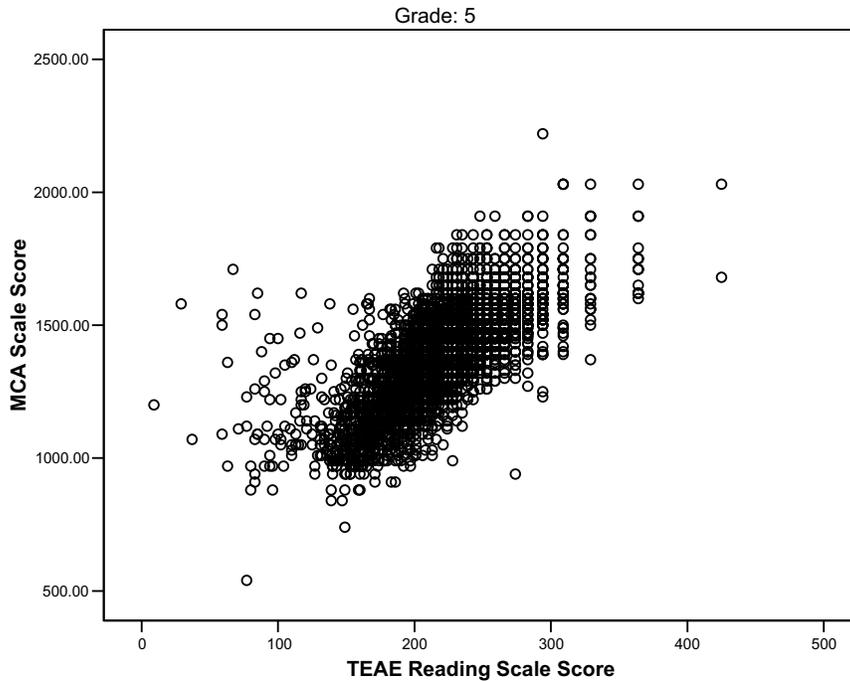


Figure 3. Scatter plot of MCA and TEAE scale scores (2001-02, Grade 5)



**Figure 4. Scatter plot of MCA and TEAE scale scores (2002-03, Grade 5)**



To estimate a cut off point for the scale scores for each grade and year, the following simple linear regression model is applied to the regular group of students (i.e., students with TEAE scores greater than the cutoff point) to assess the predictability of the TEAE on the MCA:

$$\text{MCA} = (\text{Intercept}) + b_1 (\text{TEAE}) + e$$

Although there probably are multiple ways to estimate the cutoff point, a change point analysis is used for this purpose. It searches for the best cutoff point by fitting two different linear regression models for regular and irregular groups, respectively.

It should be noted that the TEAE scale scores show some discreteness in the score range above 300 (i.e., there are big jumps between two adjacent possible scale scores) in the score range above 300. This is more apparent for fifth graders, because more students marked scores close to the maximum possible scale score. This discreteness results from the scaling, which depends on the distribution of raw scores in each grade and year.

***Estimation of Cutoff Scores***

Estimated cutoff scores are shown in the third column in Table 2. The mean squared errors of MCA scores in the irregular group estimated by the change point analysis were 167.97 and 163.53 for grade 3 (2001-02 and 2002-03, respectively), and 132.15 and 201.24 for grade 5

(2001-02 and 2002-03, respectively). These are almost the same as the unconditional standard deviations listed in Table 1 except for fifth graders in 2001-02. Thus, we can conclude that MCA scores of students with TEAE scores less than the cutoff points are not well predicted by the TEAE. Although these cutoff points vary across years and grades, the unpredictability is likely to occur when the TEAE score is less than about 110.

**Table 2. Estimates of cutoff scores and regression coefficients**

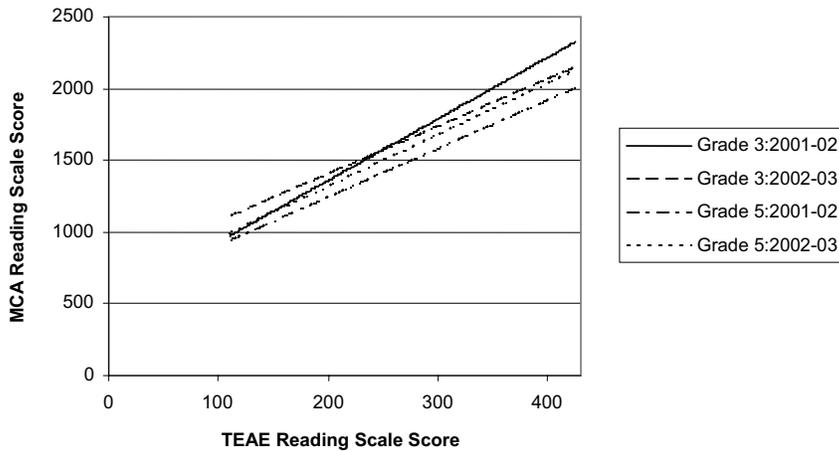
Year	Grade	Cutoff	N	Intercept ( $b_0$ )	Slope ( $b_1$ )	$R^2$
01-02	3	124.87	4217	501.46	4.29	.58
02-03	3	114.39	4417	739.63	3.31	.54
01-02	5	131.93	3953	561.85	3.38	.54
02-03	5	130.71	4161	593.82	3.60	.56

Note. Intercepts and slopes are for the “regular” group of students with TEAE scores greater than the cutoff point.  $N$  is the number of students included in the regular group, and  $R^2$  is the squared multiple correlation.

### ***Regression Analysis for the Regular Group***

In the fourth through seventh columns in Table 2 are shown the number of students in the regular group, estimated intercept, slope, and R squared for the regular group of students (i.e., students with TEAE scores greater than the cutoff point). The slopes range from 3.31 to 4.29, and the corresponding  $R^2$ s range from .54 to .58. These results indicate that more than 54% of variation of the MCA scale score can be accounted for by the TEAE scale score for the regular group of students. This is a strong positive relationship. The results also indicate, however, that slopes vary to some extent across years and grades. The estimated regression lines are plotted in Figure 5. As the slope estimates indicate, the lines are almost parallel except for grade 3 in 2001-02, where the regression line is slightly steeper than the others. Also, vertical locations of the lines vary in the 200 range for the MCA score scale. The lines for grade 3 are higher than those for grade 5 in Figure 5, but more longitudinal data would be required to infer systematic effects of grade levels on regression lines. Overall, although the specific predictive relationship (i.e., what TEAE score corresponds to what MCA score) can differ, the positive relationship between the two tests is stable across years and grades. Thus, we expect that increased English proficiency is associated with progress toward the state academic standards.

**Figure 5. Comparison of Estimated Regression Lines**



### Relationship by Proficiency or Achievement Level

#### *Grade 3 TEAE Level and MCA Level Correspondence*

Tables 3 and 4 show the number of third graders cross-classified by TEAE proficiency levels and MCA achievement levels in 2001-02 and 2002-03. Level 1 of the TEAE includes the “irregular” group of students found in the analysis of scale scores.

Both 2001-02 and 2002-03 results consistently indicated the following. First, students in TEAE level 1 are likely (about 80%) to be in level 1 on the MCA, and thus to be counted as "not proficient" for accountability purposes. This is a clear indication that basic English proficiency is a prerequisite to achieving higher-level academic reading skills. Second, students in TEAE level 4 are likely to achieve level 3 or 4 on MCA, and thus to be counted as proficient for accountability purposes (the result for 2001-02 may not be reliable due to the small sample size of 24 in TEAE level 4). Thus, proficient English learners can do well on the MCA. Finally, TEAE levels 2 and 3 seem to have no single corresponding level on the MCA. Most students in TEAE level 2 fall in MCA level 1, 2A, or possibly 2B, although they are unlikely to be proficient (2B) on the MCA. Also, most students in TEAE level 3 fall into MCA levels 2A, 2B, or 3. They are likely to be proficient on the MCA but there is still some possibility that they would not be proficient.

Although there is no clear one-to-one correspondence between the TEAE proficiency levels and the MCA achievement levels, ELLs who are in TEAE level 3 or 4 are likely to be proficient (i.e., scoring in level 2B or above) on the MCA.

**Table 3. Correspondence between TEAE Proficiency Levels and MCA Achievement Levels (2001-02, Grade 3)**

		MCA Reading Achievement Level					Total	
		1	2A	2B	3	4		
TEAE Reading Proficiency Level	1	Count	1406	274	51	23	1	1755
		Row%	<b>80.1</b>	<b>15.6</b>	<b>2.9</b>	<b>1.3</b>	<b>0.1</b>	100.0
		Column%	73.1	23.2	7.7	4.5	1.1	40.2
		Total%	32.2	6.3	1.2	0.5	0.0	40.2
	2	Count	515	864	519	311	25	2234
		Row%	<b>23.1</b>	<b>38.7</b>	<b>23.2</b>	<b>13.9</b>	<b>1.1</b>	100.0
		Column%	26.8	73.1	78.6	61.2	28.7	51.2
		Total%	11.8	19.8	11.9	7.1	0.6	51.2
	3	Count	3	43	89	167	46	348
		Row%	<b>0.9</b>	<b>12.4</b>	<b>25.6</b>	<b>48.0</b>	<b>13.2</b>	100.0
		Column%	0.2	3.6	13.5	32.9	52.9	8.0
		Total%	0.1	1.0	2.0	3.8	1.1	8.0
	4	Count	0	1	1	7	15	24
		Row%	<b>0.0</b>	<b>4.2</b>	<b>4.2</b>	<b>29.2</b>	<b>62.5</b>	100.0
		Column%	0.0	0.1	0.2	1.4	17.2	0.6
		Total%	0.0	0.0	0.0	0.2	0.3	0.6
Total	Count	1924	1182	660	508	87	4361	
	Row%	44.1	27.1	15.1	11.6	2.0	100.0	
	Column%	100.0	100.0	100.0	100.0	100.0	100.0	
	Total%	44.1	27.1	15.1	11.6	2.0	100.0	

Note. Dark gray cells indicate that the row proportion is larger than 50% (i.e., more than 50% of MCA scores were at this level or these levels when the TEAE score was the one in the row), and light gray cells indicate that the row proportion is larger than 20% (i.e., more than 20% of MCA scores were at this level or these levels when the TEAE score was the one in the row).

### ***Grade 5 TEAE Level and MCA Level Correspondence***

Results are shown in Tables 5 (for the 2001-02 data) and 6 (for the 2002-03 data). Fifth graders showed results similar to those of third graders for both academic years. There is a clearer indication than for third graders that TEAE level 4 corresponds to MCA level 3. Also, TEAE level 2 corresponds to MCA levels 1 or 2A, and TEAE level 3 to MCA levels 2A, 2B, or 3. These observations are consistent in both school years. Again, we can conclude that increased English proficiency of English learners is associated with higher performance on accountability measures.

**Table 4: Correspondence between the TEAE Proficiency Levels and the MCA Achievement Levels (2002-03, Grade 3)**

		MCA Reading Achievement Level					Total	
		1	2A	2B	3	4		
TEAE Reading Proficiency Level	1	Count	323	58	21	4	0	406
		Row%	<b>79.6</b>	<b>14.3</b>	<b>5.2</b>	<b>1.0</b>	<b>0.0</b>	100.0
		Column%	21.7	4.4	2.4	0.5	0.0	8.9
		Total%	7.1	1.3	0.5	0.1	0.0	8.9
	2	Count	1081	747	255	82	4	2169
		Row%	<b>49.8</b>	<b>34.4</b>	<b>11.8</b>	<b>3.8</b>	<b>0.2</b>	100.0
		Column%	72.6	57.0	28.7	10.5	5.2	47.8
		Total%	23.8	16.5	5.6	1.8	0.1	47.8
	3	Count	84	495	561	523	29	1692
		Row%	<b>5.0</b>	<b>29.3</b>	<b>33.2</b>	<b>30.9</b>	<b>1.7</b>	100.0
		Column%	5.6	37.8	63.2	67.2	37.7	37.3
		Total%	1.8	10.9	12.4	11.5	0.6	37.3
	4	Count	1	10	50	169	44	274
		Row%	<b>0.4</b>	<b>3.6</b>	<b>18.2</b>	<b>61.7</b>	<b>16.1</b>	100.0
		Column%	0.1	0.8	5.6	21.7	57.1	6.0
		Total%	0.0	0.2	1.1	3.7	1.0	6.0
Total	Count	1489	1310	887	778	77	4541	
	Row%	32.8	28.8	19.5	17.1	1.7	100.0	
	Column%	100.0	100.0	100.0	100.0	100.0	100.0	
	Total%	32.8	28.8	19.5	17.1	1.7	100.0	

Note. Dark gray cells indicate that the row proportion is larger than 50% (i.e., more than 50% of MCA scores were at this level or these levels when the TEAE score was the one in the row), and light gray cells indicate that the row proportion is larger than 20% (i.e., more than 20% of MCA scores were at this level or these levels when the TEAE score was the one in the row).

**Table 5: Correspondence between TEAE Proficiency Levels and MCA Achievement Levels (2001-02, Grade 5)**

		MCA Reading Achievement Level					Total	
		1	2A	2B	3	4		
TEAE Reading Proficiency Level	1	Count	362	24	3	2	0	391
		Row%	<b>92.6</b>	<b>6.1</b>	<b>0.8</b>	<b>0.5</b>	<b>0.0</b>	100.0
		Column%	24.5	2.0	0.6	0.3	0.0	9.8
		Total%	9.1	0.6	0.1	0.1	0.0	9.8
	2	Count	1002	672	126	99	6	1905
		Row%	<b>52.6</b>	<b>35.3</b>	<b>6.6</b>	<b>5.2</b>	<b>0.3</b>	100.0
		Column%	67.8	56.2	27.1	14.2	4.1	47.8
		Total%	25.2	16.9	3.2	2.5	0.2	47.8
	3	Count	111	451	280	393	61	1296
		Row%	<b>8.6</b>	<b>34.8</b>	<b>21.6</b>	<b>30.3</b>	<b>4.7</b>	100.0
		Column%	7.5	37.7	60.2	56.2	41.8	32.5
		Total%	2.8	11.3	7.0	9.9	1.5	32.5
	4	Count	2	49	56	205	79	391
		Row%	<b>0.5</b>	<b>12.5</b>	<b>14.3</b>	<b>52.4</b>	<b>20.2</b>	100.0
		Column%	0.1	4.1	12.0	29.3	54.1	9.8
		Total%	0.1	1.2	1.4	5.1	2.0	9.8
Total	Count	1477	1196	465	699	146	3983	
	Row%	37.1	30.0	11.7	17.5	3.7	100.0	
	Column%	100.0	100.0	100.0	100.0	100.0	100.0	
	Total%	37.1	30.0	11.7	17.5	3.7	100.0	

Note. Dark gray cells indicate that the row proportion is larger than 50% (i.e., more than 50% of MCA scores were at this level or these levels when the TEAE score was the one in the row), and light gray cells indicate that the row proportion is larger than 20% (i.e., more than 20% of MCA scores were at this level or these levels when the TEAE score was the one in the row).

**Table 6. Correspondence between TEAE Proficiency Levels and MCA Achievement Levels (2002-03, Grade 5)**

		MCA Reading Achievement Level					Total	
		1	2A	2B	3	4		
TEAE Reading Proficiency Level	1	Count	411	63	10	14	1	499
		Row%	<b>82.4</b>	<b>12.6</b>	<b>2.0</b>	<b>2.8</b>	<b>0.2</b>	100.0
		Column%	41.2	4.7	1.2	1.5	0.7	11.8
		Total%	9.7	1.5	0.2	0.3	0.0	11.8
	2	Count	458	531	108	55	0	1152
		Row%	<b>39.8</b>	<b>46.1</b>	<b>9.4</b>	<b>4.8</b>	<b>0.0</b>	100.0
		Column%	45.9	39.4	13.2	5.9	0.0	27.2
		Total%	10.8	12.5	2.5	1.3	0.0	27.2
	3	Count	125	723	643	577	58	2126
		Row%	<b>5.9</b>	<b>34.0</b>	<b>30.2</b>	<b>27.1</b>	<b>2.7</b>	100.0
		Column%	12.5	53.7	78.6	62.0	40.0	50.2
		Total%	2.9	17.1	15.2	13.6	1.4	50.2
	4	Count	3	30	57	285	86	461
		Row%	<b>0.7</b>	<b>6.5</b>	<b>12.4</b>	<b>61.8</b>	<b>18.7</b>	100.0
		Column%	0.3	2.2	7.0	30.6	59.3	10.9
		Total%	0.1	0.7	1.3	6.7	2.0	10.9
Total	Count	997	1347	818	931	145	4238	
	Row%	23.5	31.8	19.3	22.0	3.4	100.0	
	Column%	100.0	100.0	100.0	100.0	100.0	100.0	
	Total%	23.5	31.8	19.3	22.0	3.4	100.0	

Note. Dark gray cells indicate that the row proportion is larger than 50% (i.e., more than 50% of MCA scores were at this level or these levels when the TEAE score was the one in the row), and light gray cells indicate that the row proportion is larger than 20% (i.e., more than 20% of MCA scores were at this level or these levels when the TEAE score was the one in the row).

## Comparability of MCA Scores

### *Grade 3 TEAE Level by MCA Scale Scores*

Mean MCA scale scores by TEAE proficiency level were compared with the mean MCA scale score of native English speakers, and similar comparisons were made for dispersion of test scores (see Table 7). Also, boxplots were drawn (see Figures 6 and 7). In these, the box represents the middle 50% of the data, the top line represents the 75<sup>th</sup> percentile and the bottom line represents the 25<sup>th</sup> percentile. A line segment in the box indicates the median. The length of whiskers outside the box is usually taken 1.5 times as large as the interquartile range, which is the height of the box. All values outside the range of the whiskers are marked as outliers and represented as dots in the plot. As in the comparison by the proficiency or achievement levels, the irregular group of students was included in the data. In the subsequent tables and figures, the group of native English speakers is designated as "No TEAE."

**Table 7. Mean MCA Scale Score by TEAE Proficiency Level (Grade 3)**

	2001-02			2002-03		
	Mean	SD	N	Mean	SD	N
TEAE Level 1	1176.83	134.23	1803	1169.46	140.41	429
TEAE Level 2	1374.23	129.56	2246	1275.52	129.68	2174
TEAE Level 3	1544.89	132.37	352	1448.44	103.66	1694
TEAE Level 4	1711.67	152.53	24	1575.96	106.47	275
No TEAE	1500.56	201.61	54263	1531.90	180.25	53556

Note. The group of native English speakers is designated as "No TEAE."

In the 2001-02 school year, ELLs in TEAE levels 3 and 4 had higher mean scores than native English speakers. The result for TEAE level 4, however, is not reliable due to the small sample size; the mean and standard deviation for that group are both too high. Dispersion of scores is almost the same for all TEAE proficiency levels except for TEAE level 4, and they are much smaller than the dispersion for No TEAE. This is a natural result because TEAE levels are correlated to the MCA scale scores.

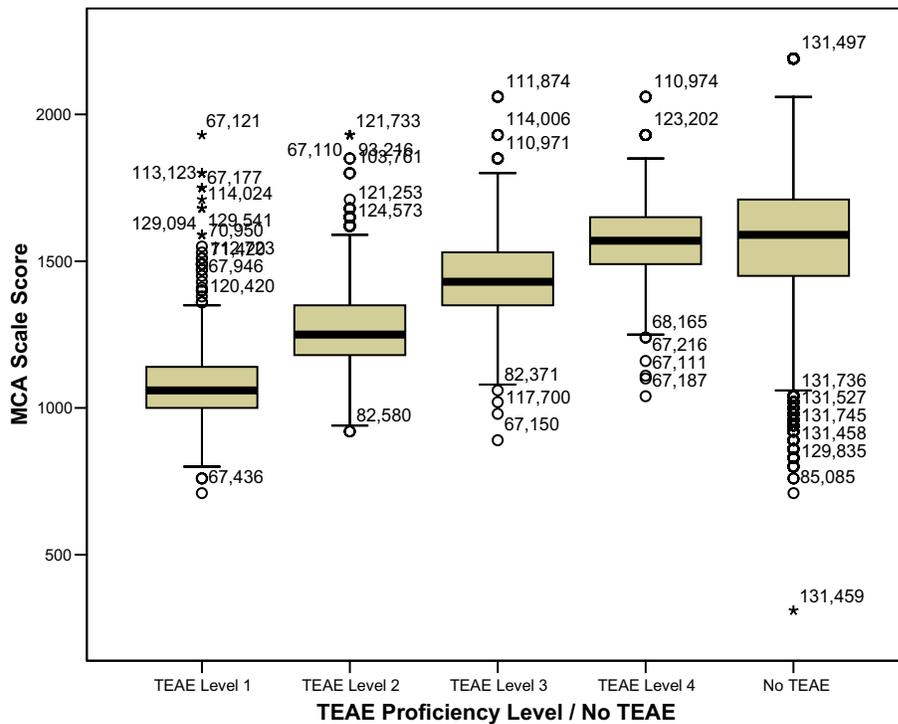
Figure 6 shows that the ranges indicated by whiskers (i.e., the lines extending from the box) for TEAE levels 2, 3, and 4 are completely within the whisker range of No TEAE (and the interquartile ranges of these levels indicated by boxes also substantially overlap that of No TEAE). Yet, the location of the distribution of TEAE level 2 is substantially lower compared with No TEAE. These results indicate that ELLs in TEAE levels 3 or 4 can perform as well on the MCA as native English speakers.

In SY 2002-03, the pattern of score distributions is somewhat different from that of SY 2001-02. The mean score in 2002-03 is lower than in 2001-02 at each TEAE proficiency level, whereas

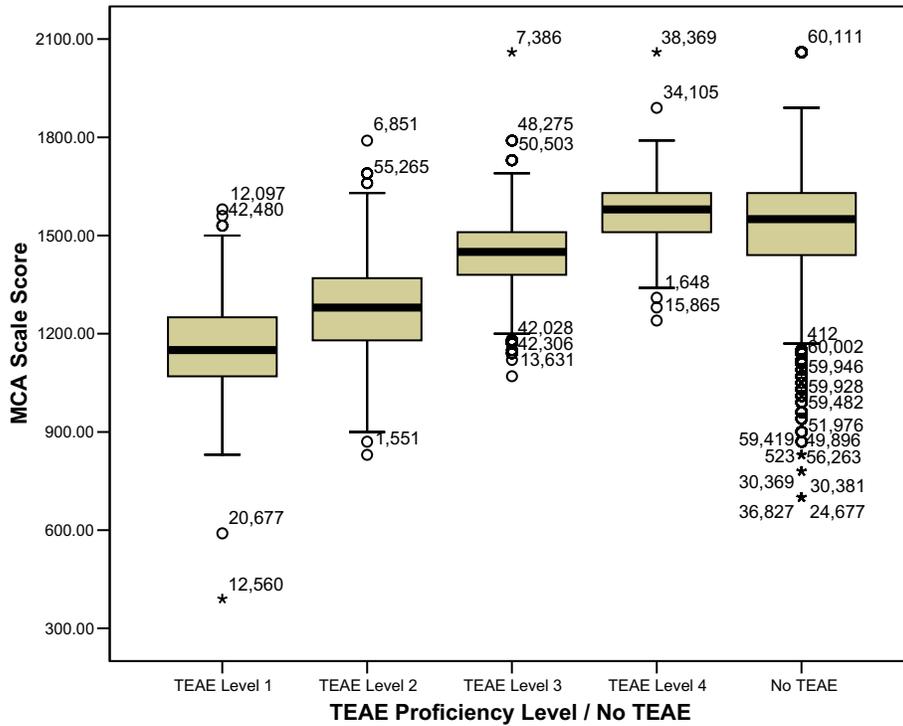
the mean score of No TEAE in 2002-03 is higher than in 2001-02 (see Table 7). Also, the score dispersion tends to be smaller as the TEAE level goes up, unlike in 2001-02. TEAE level 4 has a higher mean score than No TEAE as well as in 2001-02, but TEAE level 3 does not.

Figure 7 shows that the score distributions of TEAE levels 3 and 4 are completely within the range of No TEAE, but the distribution of TEAE level 3 is located relatively low to that of No TEAE with little overlap of the interquartile range. Thus, the 2002-03 data indicate that while ELLs in TEAE level 4 can perform as well on the MCA as native English speakers, this may not be the case for those in TEAE level 3.

**Figure 6. Boxplots of Mean MCA Scale Scores by TEAE Proficiency Level (2001-02, Grade 3)**



**Figure 7. Boxplots of Mean MCA Scale Scores by TEAE Proficiency Level (2002-03, Grade 3)**



**Grade 5 TEAE Level by MCA Scale Scores**

A summary of the MCA scale scores by TEAE proficiency level is shown in Table 8, and boxplots are shown in Figures 8 and 9. Fifth graders in both 2001-02 and 2002-03 school years consistently show a distributional pattern similar to third graders in 2001-02. In each school year, the distribution of MCA scale scores of TEAE level 4 has almost the same mean as the No TEAE group, and the range of the distribution is completely within that of the No TEAE group. The range of TEAE level 3 is also within that of No TEAE, but its mean is substantially lower than that of No TEAE in both school years. Thus, for fifth graders, students in TEAE level 4 are comparable to native English speakers.

**Table 8. Mean MCA Scale Score by TEAE Proficiency Level (Grade 5)**

	2001-02			2002-03		
	Mean	SD	N	Mean	SD	N
TEAE Level 1	1092.51	170.12	438	1145.44	156.01	515
TEAE Level 2	1265.09	139.54	1934	1284.62	118.88	1157
TEAE Level 3	1445.88	144.26	1315	1440.35	125.87	2137
TEAE Level 4	1575.86	150.46	399	1593.39	134.78	463
No TEAE	1567.84	211.23	57147	1580.66	196.60	57104

Figure 8. Boxplots of Mean MCA Scale Scores by TEAE Proficiency Level (2001-02, Grade 5)

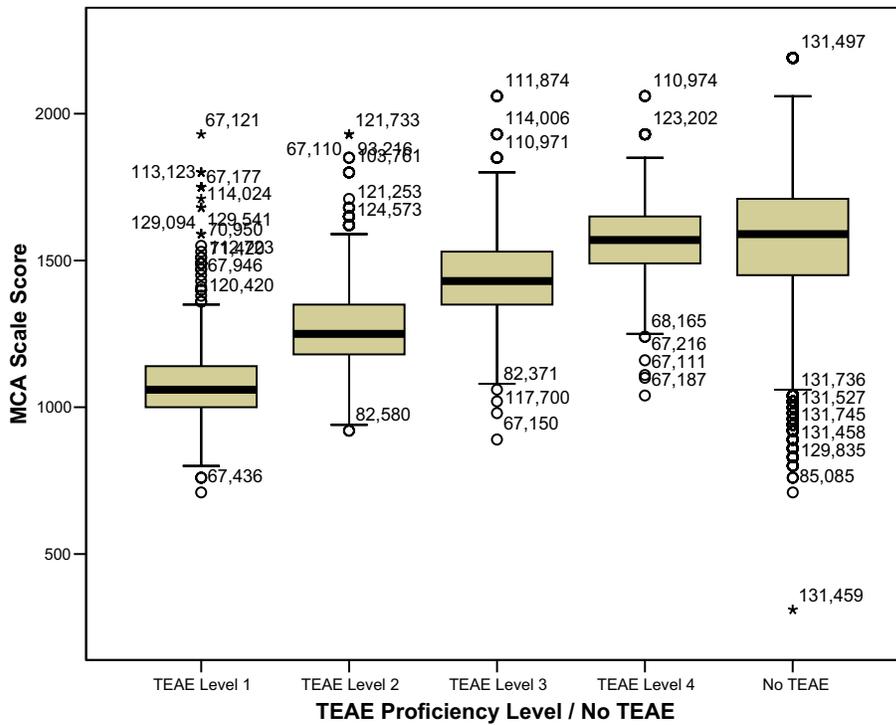
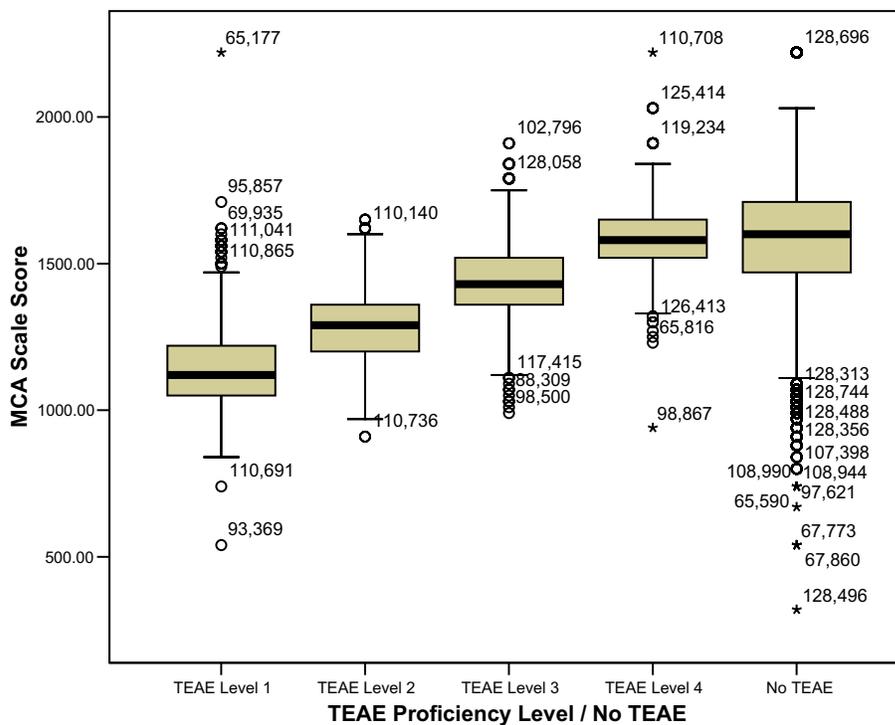


Figure 9. Boxplots of Mean MCA Scale Scores by TEAE Proficiency Level (2002-03, Grade 5)



## Study 2: TEAE and BST

### Method

The data used in these analyses, like those used for the MCA analyses, are from 2001-02 and 2002-03. With state eighth grade performance, we again focus on the TEAE reading test in comparison to the BST reading test (hereafter, referred to as TEAE and BST). The TEAE data originally contained 4,019 eighth graders in SY 2001-02, and 3,865 in SY 2002-03. The BST data originally contained 61,922 eighth graders, 66,769 in SY 2001-02, and 66,975 in SY 2002-03. The data were screened in the same manner as for the TEAE-MCA analysis: excluding students who (a) had any missing value on variables related to test scores, (b) were recorded as “not tested” on the BST, and (c) had the minimum possible score on the TEAE. The resulting sample sizes are shown in Table 9.

**Table 9. Descriptive Statistics for TEAE-BST Data**

Year	Grade	N	TEAE Reading Scale Score				BST Reading Scale Score				r
			Mean	SD	Min	Max	Mean	SD	Min	Max	
01-02	8	3315	247.77	42.19	59	417	589.89	42.62	434	750	.71
02-03	8	3331	243.87	39.00	28	437	585.50	44.04	456	750	.66

Note. *N* is the sample size, SD is the standard deviation, and *r* is the sample correlation between TEAE and BST.

The purpose of this analysis was to examine how basic English proficiency measured by the TEAE relates to (a) acquisition of basic academic reading skills, and (b) the reading skills needed to pass the BST as needed for graduation. We therefore analyzed the data in two ways.

The first analysis examined how English proficiency affects acquiring basic academic skills. This was done by examining the relationship of the TEAE and BST at the scale score level. We used scatterplots and regression analysis to examine the extent to which the BST scale score is predicted by the TEAE scale score.

The second analysis focused on how English proficiency affects passing rates. The criterion for graduation is a BST scale score greater than 600. In this analysis, the TEAE scale score is used as a predictor of the passing rate. Since the criterion variable for each student is binary (i.e., passed or failed), the logistic regression analysis is employed to predict passing rates. Passing rates are also compared across proficiency levels of the TEAE.

### Results

#### *Descriptive Statistics for the Entire Sample*

Means and standard deviations of test scores are very similar in both academic years. The correlations between the TEAE and BST were .71 and .66 in SY 2001-02 and SY 2002-03,

respectively. They are slightly smaller than the correlations between the MCA and TEAE. Also, the correlation in 2002-03 is smaller than that in 2001-02.

### *Analysis of Scale Scores*

**Scatter plots.** BST scale scores were plotted against TEAE scale scores for each school year. These plots, however, showed that the BST scale score increases exponentially rather than linearly as the TEAE scale score increases. This seemed to be a result of scaling of the BST scale score. The distribution of the BST raw scores peaked close to the maximum possible score. Then, on the resulting scale, raw score points close to the maximum were stretched out, that is, intervals between these scale scores were much longer than those between scale scores from lower raw scores. In order to apply linear regression models, the BST scale score was log-transformed so that the relationship between the BST and TEAE was more linear. The resulting scatter plots for 2001-02 and 2002-03 school years are shown in Figures 10 and 11.

Figures 10 and 11 show that the TEAE scale score and the log-transformed BST scale score is positively related, and the relationship is almost linear. However, we do observe a small number of data points that lie outside the central region in which most of the data points concentrate. These observations will negatively affect the predictability of the BST scale score. Unlike the MCA, these points are distributed across almost the entire range of the TEAE scale score. Also, higher TEAE or BST scores show discreteness due to the scaling, although the discreteness of the BST has been weakened by the log-transformation. With the information currently at hand, we have no basis for removing these data points. Thus, all of these data points were used for the regression analysis.

### *Regression Analysis*

The following linear regression model, was applied by school years in order to assess the predictability of the BST:

$$\log(\text{BST}) = (\text{Intercept}) + b_1(\text{TEAE}) + e$$

The results are shown in Table 10. The estimated regression lines are almost the same, but  $R^2$  for 2002-03 is smaller than for 2001-02. Also, these  $R^2$ s are smaller than those for the MCA. Thus, the BST scale score can be predicted by the TEAE scale score to a moderate degree, because English proficiency affects acquiring basic academic skills in reading. However, the predictability is not as good as for the MCA.

The relationship between the BST and TEAE seems to be stable across years, as shown in Figure 12 in which the estimated regression curves from both school years are plotted (the log-BST scale score is transformed back to the original scale score). TEAE scores that give the predicted value of the BST score of 600 (i.e., 600 corresponds to 6.4 on log scale in Figures 10 and 11)

Figure 10. Scatter plot of BST scale scores (log-transformed) and TEAE scale scores (2001-02, Grade 8)

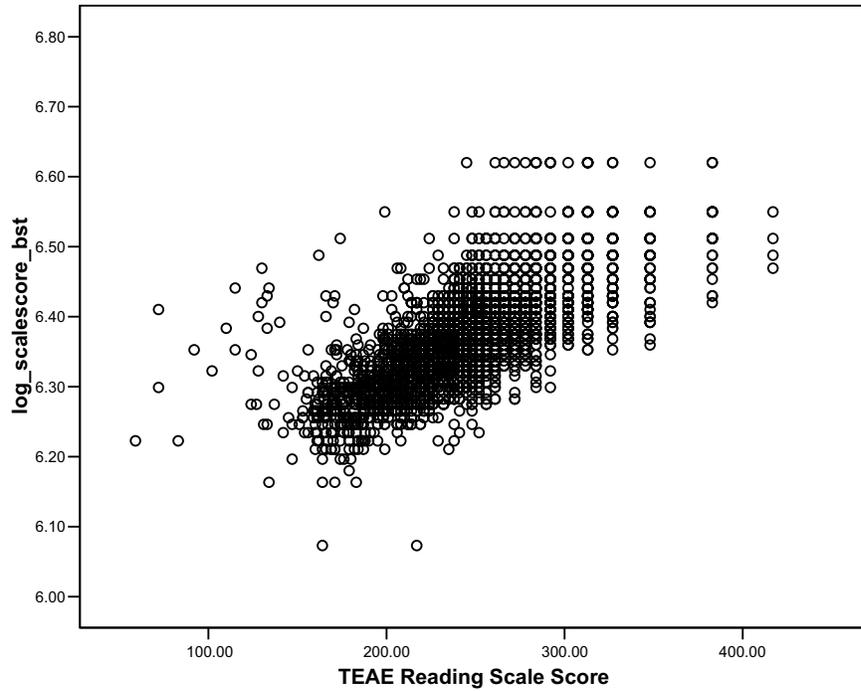
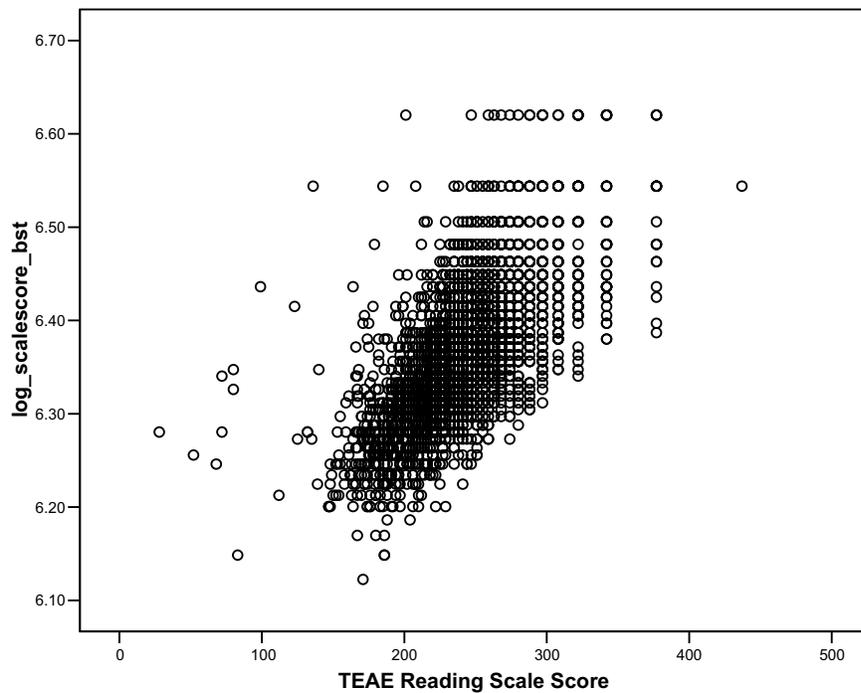


Figure 11. Scatterplot of BST Scale Scores (log-transformed) and TEAE Scale Scores (2002-03, Grade 8)



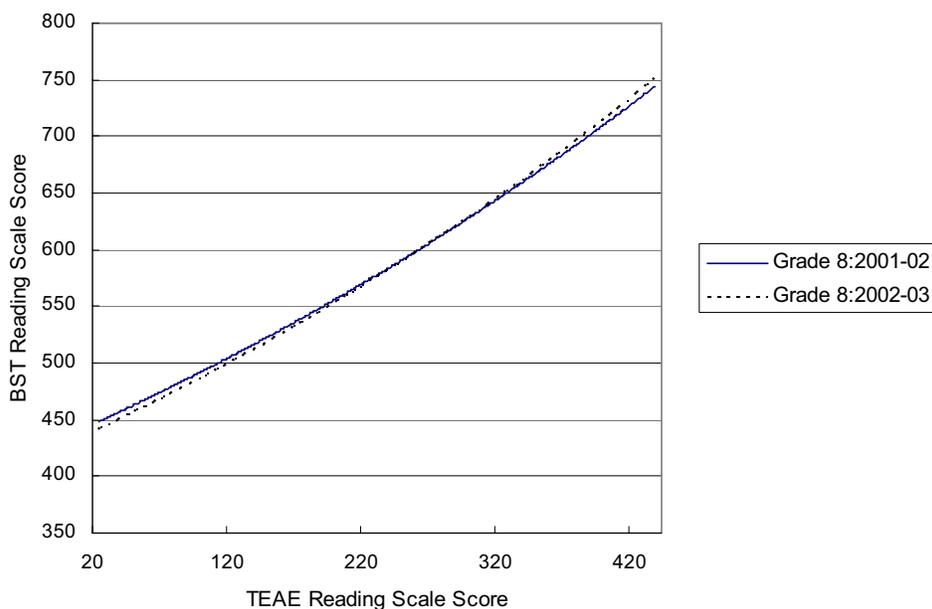
are 263.81 and 265.18 for 2001-02 and 2002-03 school years, respectively. Thus, students with TEAE scores greater than these values are expected to have BST scores greater than 600.

**Table 10. Estimates of Regression Coefficients**

Year	Grade	Intercept ( $b_0$ )	Slope ( $b_1$ )	$R^2$
01-02	8	6.07	.0012	.52
02-03	8	6.06	.0013	.45

Note.  $R^2$  is the squared multiple correlation.

**Figure 12. Comparison of Estimated Regression Curves**



## Predicting Passing Rates

### *Logistic Regression Analysis*

The following logistic regression model was applied by school years in order to assess the predictability of the BST passing rate:

$$\text{logit}[\text{Pr}(\text{Passing on BST})] = (\text{Intercept}) + b_1(\text{TEAE}) + e$$

The term  $\text{logit}(p)$  denotes the logarithm of odds in terms of probability  $p$ , that is,  $\text{logit}(p) = \log[p / (1 - p)]$ . The logistic regression model assumes that the logit of the target proportion (i.e., the passing rate in this context) is linearly related to the predictor (i.e., TEAE scale score). The results are shown in Table 11. Because the slopes are positive, the passing rate increases as the TEAE scale score increases. However, Cox-Snell  $R^2$ s are small (.33 and .29, respectively), so

the predictability is low. In fact, correct classification rates are not very high (78.0% and 75.1%, respectively). These rates were computed as follows. First, a predicted passing rate is computed using the estimated regression curve and the TEAE score for each student. Next, each student was classified as "passed" if the predicted passing rate is greater than .5 and as "failed" otherwise. The correct classification rate is then computed as the proportion of students whose predicted and actual pass/fail values are the same. Thus, predicting passing or failing on the BST using the TEAE is more difficult than simply predicting BST scores.

The median effective levels, which give the TEAE scores the predicted passing rate of .50, are 263.43 and 260.71. Thus, in order to predict that a student would likely pass the BST, they must score at least 260 on the TEAE.

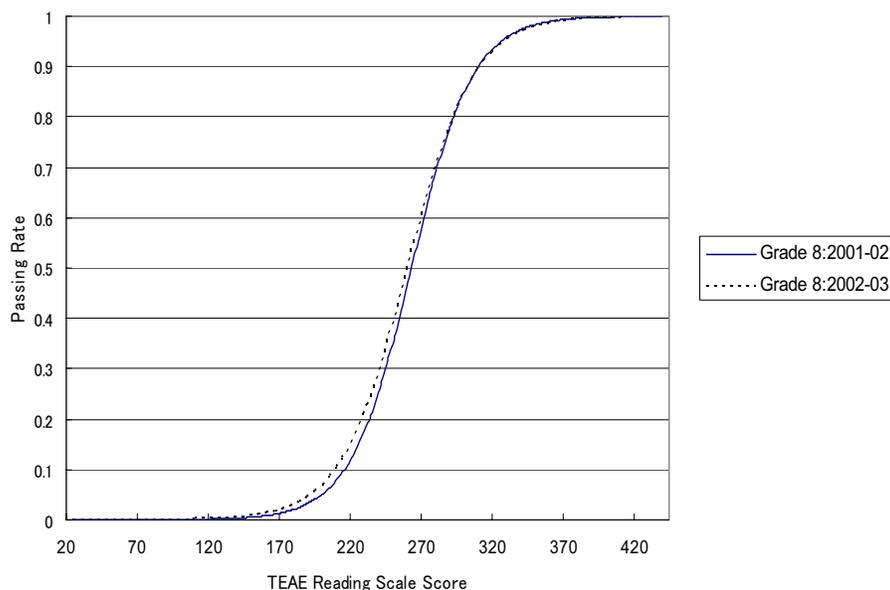
**Table 11. Estimates of Regression Coefficients**

Year	Grade	Intercept ( $b_0$ )	Slope ( $b_1$ )	$R^2$
01-02	8	-12.25	.047	.33
02-03	8	-11.26	.043	.29

Note.  $R^2$  is Cox-Snell squared multiple correlation, which is an analogue of ordinary  $R^2$  in linear regression.

Although the relationship in terms of the passing rate is relatively weak, it is considered to be stable across years. In Figure 13, the estimated regression curves are plotted. They are almost identical.

**Figure 13. Comparison of Estimated Regression Curves**



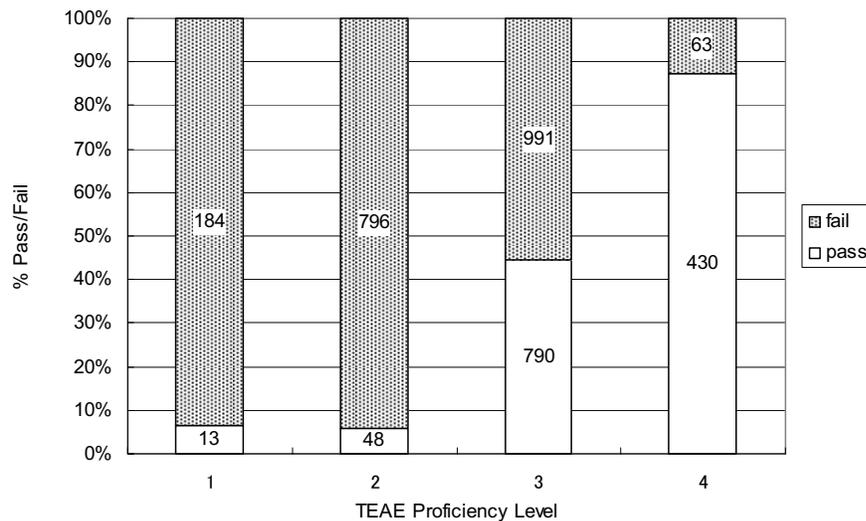
## Passing Rates by Proficiency Level

Passing rates were also compared by TEAE proficiency level. The passing rates are shown in Table 12, and corresponding graphs displayed in Figures 14 and 15 for each school year. Table 12 indicates that in both school years, (a) passing rates in levels 1 and 2 are very low (less than 10%), and (b) only level 4 had reasonably high passing rates. Level 1 has slightly higher passing rates than level 2, but the reason is not clear. Although the results are similar across years, passing rates in 2002-03 were slightly lower than in 2001-02 for all levels as well as overall. These results indicate that in order to pass on the BST, students must be at least in level 3 on the TEAE. But we reiterate that only students in level 4 had reasonably high passing grades.

**Table 12. Estimates of Regression Coefficients**

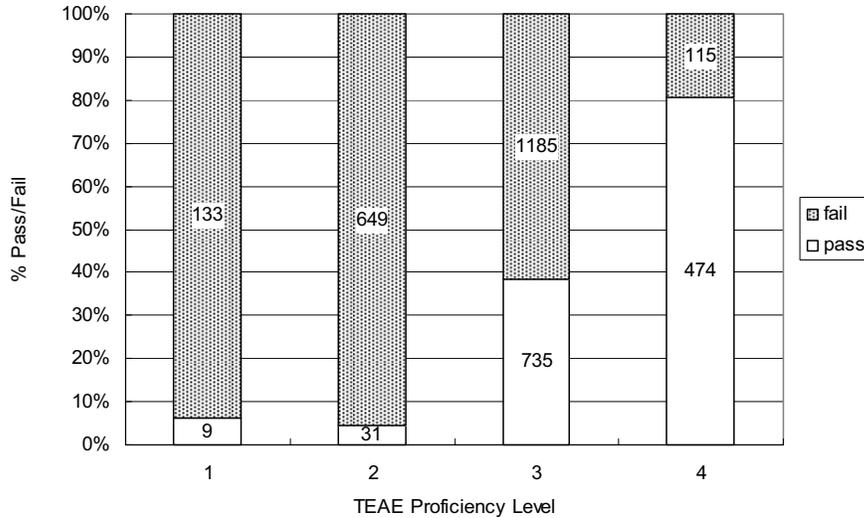
Year	Grade	TEAE Reading Proficiency Level				Overall
		1	2	3	4	
2001-02	8	.066	.057	0.44	0.87	0.39
2002-03	8	.063	.046	0.38	0.80	0.37

**Figure 14. Passing rates by TEAE Proficiency Level (2001-02)**



Note. The numbers indicated in the graphs are the number of students.

**Figure 15. Passing Rates by TEAE Proficiency Level (2002-03)**



Note. The numbers indicated in the graphs are the number of students.

## Discussion

The Study 1 results show that although the specific predictive relationship (i.e., what TEAE score corresponds to what MCA score) can differ, the positive relationship between the two tests is stable across years and grades. Also, the results suggest that ELLs in TEAE level 4 would do as well as native English speakers on the MCA. This finding indicates that those students in level 4 are more able to excel in academic achievement assessments in reading toward the state standards, and thus supports the state’s decision to count English learners who have achieved the highest proficiency level on the TEAE as fluent English proficient. However, the different distributional pattern for third graders in 2001-02 implies that there may be some fluctuations across year and grade.

For students with scores below the cut point (110), there is less ability to predict MCA scores. Most students in TEAE level 3 fall into MCA levels 2A, 2B, or 3 and therefore although it is likely that many within this group score as proficient (i.e., 2B or 3) others may not (2A). Although there is no clear one-to-one correspondence between the TEAE proficiency levels and the MCA achievement levels, ELLs who are in TEAE level 3 or 4 are likely to be proficient (i.e., scoring in level 2B or above) on the MCA.

Results of Study 2 showed that TEAE scale scores had moderate predictive power for BST performance. However, the predictability is not as good as for the MCA. In order to predict that a student would likely pass the BST, he or she must score at least 260 (i.e., achieve level

3) on the TEAE. Thus, we see the effect of acquiring basic English proficiency on acquiring basic academic skills in reading.

In conclusion, there might be stronger relationships between the MCA and 3rd and 5th grade reading skills on the TEAE because the academic language skills measured on the TEAE addressed the skills taught in those elementary grades. Yet, students in the middle and high school grades face increasing demands in terms of academic language. This suggests that the TEAE, although providing a basic picture of academic language skills, may not detect as well the academic skills of students at the higher grades. However, this requires further research.

Other factors besides potential discrepancies between secondary grade level skills and basic academic language skills may also account for differences in performance between the tests. These include differences in a learner's age upon entering Minnesota schools. It is possible that the relationship of the tests may differ for learners who started schooling in America in 10<sup>th</sup> grade as opposed to learners who had been in the educational system from 4<sup>th</sup> grade. Also, the relationship between tests may be affected by individual student performance based on familiarity or lack of familiarity with topical content and vocabulary for individual passages encountered on the tests. Although the match varies between content tested and background knowledge for every reading test, it still has the potential to affect student results. For example, a student may be familiar with the language and content on the TEAE reading test, but may lack familiarity with language or content needed to successfully apply similar skills to a BST reading passage, or vice versa. Finally, Minnesota teachers' own anecdotal evidence suggests that some students who take the TEAE do not really try, or do not take the test seriously. Any combination of these and other individual student factors could contribute to the TEAE not predicting success on the BST as well as on the MCA.

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