

---

SECTION VI

A Study of the Correlation between  
Course Performance in Algebra I and  
Algebra I End-of-Course Test Performance

---

# **A Study of the Correlation between Course Performance in Algebra I and Algebra I End-of-Course Test Performance**

## **OVERVIEW**

Texas Education Code Section 39.182(a)(4) mandates an evaluation of the correlation between student grades and student performance on state-mandated assessment instruments. To comply with this statute, the Student Assessment Division at the Texas Education Agency has conducted periodic studies to determine the relationship between students' classroom performance and their scores on statewide criterion-referenced assessments.

This section describes the most recent study, which compares (1) the pass/fail rates of students in their Algebra I course with their pass/fail rates on the Algebra I end-of-course (EOC) test, and (2) the numeric grades that students received in their Algebra I course with their scale scores on the Algebra I end-of-course test. Passing the Algebra I end-of-course test is defined as attaining a scale score of at least 1500, and passing the Algebra I course is defined as receiving a numeric grade of at least 70. A simple random sample of 20,000 students was selected from the population of all middle school and high school students who took the Algebra I end-of-course test in spring 1999. Requests for data were sent to 932 school districts. A total of 815 school districts responded to this request, supplying pass/fail information and numeric grades for Algebra I for 16,401 students (82% of the original sample). Because courses in Algebra I range from one semester to four semesters, numeric grades for each student were requested from districts for the spring 1999 semester (the terminal semester of the course for the students in the study) only; however, pass/fail information was based on the entire Algebra I course.

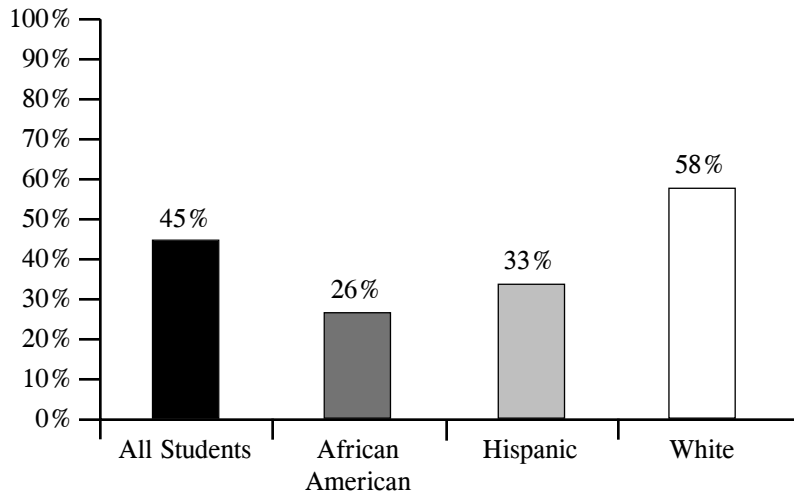
The results of the report are presented in two sections. Part I presents results based on pass/fail information for both the Algebra I course and Algebra I end-of-course test. Part II presents results based on numeric grades received in the Algebra I course and scale scores received on the Algebra I end-of-course test.

## PART I: RESULTS BASED ON PASS/FAIL DATA

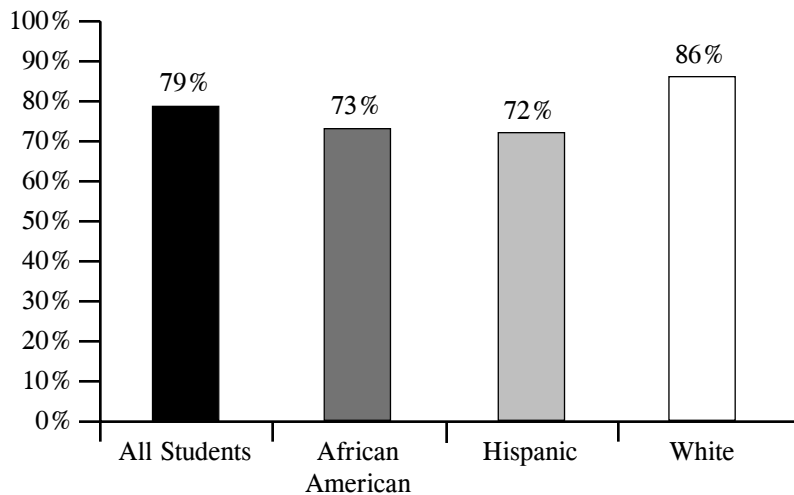
### ALL STUDENTS AND BY ETHNIC GROUP

Overall, 45 percent of students in the study passed the Algebra I EOC test, while 79 percent passed their Algebra I course. The passing rates on the Algebra I EOC test and in the Algebra I course for all students and broken down by ethnicity are shown in the following charts.

**Percent Passing Algebra I EOC Test**



**Percent Passing Algebra I Course**



The tables below give the joint Algebra I EOC test and Algebra I course pass/fail performance for all students and for the three major ethnic groups. All percents are estimated within a bound of 0.02 or smaller with 95 percent confidence.

**Performance on Algebra I EOC Test Compared to  
Performance in Algebra I Course**

ALL STUDENTS

|                 | Passed Course | Failed Course |
|-----------------|---------------|---------------|
| Passed EOC Test | 43%           | 2%            |
| Failed EOC Test | 36%           | 19%           |

AFRICAN AMERICAN

|                 | Passed Course | Failed Course |
|-----------------|---------------|---------------|
| Passed EOC Test | 24%           | 2%            |
| Failed EOC Test | 48%           | 26%           |

HISPANIC

|                 | Passed Course | Failed Course |
|-----------------|---------------|---------------|
| Passed EOC Test | 31%           | 2%            |
| Failed EOC Test | 41%           | 26%           |

WHITE

|                 | Passed Course | Failed Course |
|-----------------|---------------|---------------|
| Passed EOC Test | 56%           | 2%            |
| Failed EOC Test | 30%           | 13%           |

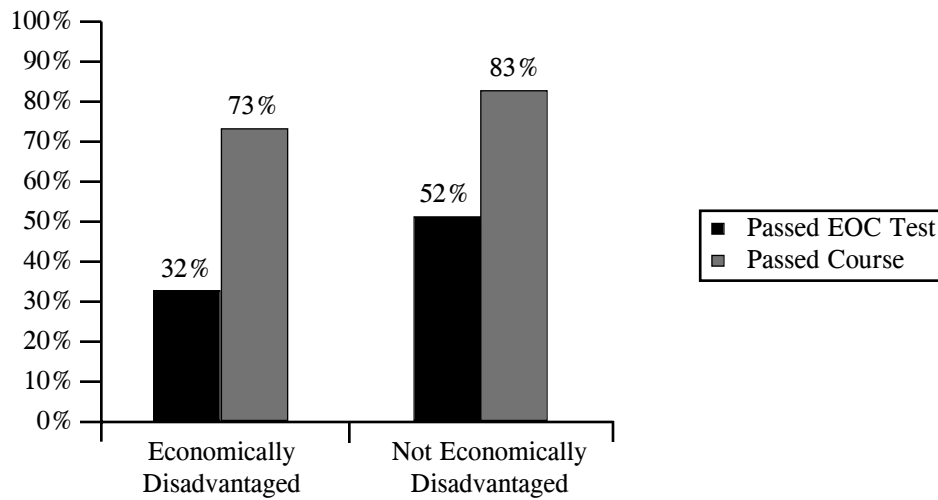
As can be seen in the “All Students” table, 62 percent of the students in the sample either passed both the Algebra I EOC test and their Algebra I course or failed both the Algebra I EOC test and their Algebra I course. A very small percentage (2 percent) passed the Algebra I EOC test but failed their Algebra I course; however, quite a large percentage (36 percent) passed the Algebra I course but failed the Algebra I EOC test.

For each of the ethnic groups analyzed, more students passed the Algebra I course but failed the Algebra I EOC test than passed the Algebra I EOC test but failed the Algebra I course. For example, 48 percent of African American students passed the Algebra I course but failed the Algebra I EOC test while only 2 percent passed the Algebra I EOC test but failed the Algebra I course. This same pattern held true for Hispanic and white students also.

### **ECONOMICALLY DISADVANTAGED**

The chart below presents the percent of students passing the Algebra I EOC test and the percent passing the Algebra I course by economically disadvantaged status.

**Percent Passing Algebra I EOC Test and Algebra I Course**



For both groups of students, those classified as economically disadvantaged and those classified as not economically disadvantaged, a higher percentage of students passed their Algebra I course than passed the Algebra I EOC test. Seventy-three percent of students classified as economically disadvantaged passed their Algebra I course, while only 32 percent passed the Algebra I EOC test. Likewise, 83 percent of students classified as not economically disadvantaged passed their Algebra I course, but only 52 percent passed the Algebra I EOC test.

The tables below give the joint Algebra I EOC test and Algebra I course pass/fail performance by economically disadvantaged status. All percents are estimated within a bound of 0.02 or smaller with 95 percent confidence.

**Performance on Algebra I EOC Test Compared to Performance in Algebra I Course**

ECONOMICALLY DISADVANTAGED

|                 | Passed Course | Failed Course |
|-----------------|---------------|---------------|
| Passed EOC Test | 30%           | 2%            |
| Failed EOC Test | 42%           | 26%           |

NOT ECONOMICALLY DISADVANTAGED

|                 | Passed Course | Failed Course |
|-----------------|---------------|---------------|
| Passed EOC Test | 51%           | 2%            |
| Failed EOC Test | 32%           | 15%           |

For both groups (economically disadvantaged and not economically disadvantaged) a higher percentage of students passed the Algebra I course and failed the Algebra I EOC test than passed the Algebra I EOC test and failed the Algebra I course. As can be seen in the above table, 42 percent of economically disadvantaged students passed the Algebra I course but failed the Algebra I EOC test whereas only 2 percent passed the Algebra I EOC test but failed the Algebra I course. A similar pattern can be seen for the not economically disadvantaged group.

## PART II: RESULTS BASED ON COURSE GRADES AND SCALE SCORES

In addition to providing the pass/fail rates for students in Algebra I courses, the districts in our sample also provided the specific numeric grade that each student received for the spring 1999 semester. The following analyses provide statistical information on the degree of association between the numeric grades that students received in their Algebra I course and the scale scores that they received on their Algebra I end-of-course test.

### LINEAR CORRELATION ANALYSES

Because the Algebra I course grades were not normally distributed and were highly positively skewed, Spearman correlation coefficients are presented for this discussion of the linear correlation between Algebra I course grades and EOC test scores. The Spearman correlation between the Algebra I EOC scale scores and the Algebra I course grades for all students was 0.64 ( $p < .0001$ ). A correlation of this magnitude indicates that there is a significant relationship between students' scores on the EOC test and the scores they received in their Algebra I course. In other words, there was a general trend for students who did well in their Algebra I course also to perform well on the Algebra I EOC test and for students who did not do as well in their Algebra I course to receive lower scores on the Algebra I EOC test. As can be seen in the table below, the same trend was apparent for all ethnic groups and for students classified as economically disadvantaged and not economically disadvantaged.

### **Spearman Correlations between EOC Test Scores and Course Grades**

| GROUP                          | SPEARMAN CORRELATION COEFFICIENT* |
|--------------------------------|-----------------------------------|
| All Students                   | 0.64                              |
| African American               | 0.53                              |
| Hispanic                       | 0.58                              |
| White                          | 0.64                              |
| Economically Disadvantaged     | 0.58                              |
| Not Economically Disadvantaged | 0.66                              |

\* All correlation coefficients are estimated within a bound of 0.05 with 95% confidence.

## **REGRESSION ANALYSIS**

A stepwise regression analysis was performed in order to analyze further the relationship between Algebra I EOC test scale scores and spring 1999 Algebra I course grades. The analysis was performed with scale score on the Algebra I EOC test as the criterion variable and the following variables as predictors: Algebra I course grade, ethnic group membership, economically disadvantaged status, and the interactions among these variables. The selection criterion used was the maximum  $R^2$  criterion which first includes in the regression model the predictor variable that accounts for the most variance in the criterion variable (produces the highest  $R^2$  value for the regression model), followed by the variable that produces the largest increment in  $R^2$ , and so on until all variables have been added to the model.

Algebra I course grade was found to be the predictor variable which singly accounted for the most variation in Algebra I EOC test scale score. With this predictor variable alone, an  $R^2$  value of 0.35 was obtained for the model. With all predictor variables included in the model, the  $R^2$  value increased only to 0.41. The interaction between Algebra I course grade and ethnicity accounted for nearly all of the  $R^2$  difference between the model containing only Algebra I course grade and the full model, which means that the regression line slopes were different for each ethnic group. Ethnicity alone and all variables involving economic disadvantaged status contributed negligibly to the model.

## **MEAN SCALE SCORES BY COURSE GRADE**

Algebra I EOC test scale score means were computed for each Algebra I course grade value for all students and for each of the three major ethnic groups. From these results the following was observed: (1) the mean scale score for students who earned a course grade of 70 was below 1500 (the passing Algebra I EOC test scale score) for all three major ethnic groups; (2) course grade had a positive relationship with Algebra I EOC test score for all ethnic groups, but the relationship was different for each group; and (3) pass/fail performance in the Algebra I course was most predictive of pass/fail performance on the Algebra I EOC test for white students. The table below shows mean Algebra I EOC test scale scores for students who earned Algebra I course grades of exactly 60, 70, 80, 90 and 100, respectively, for all students and for each of the three major ethnic groups.



**Mean Algebra I EOC Test Scores For Given Algebra I Course Grades**

| GROUP            | COURSE GRADE |             |           |           |            |
|------------------|--------------|-------------|-----------|-----------|------------|
|                  | <i>60</i>    | <i>70</i>   | <i>80</i> | <i>90</i> | <i>100</i> |
| All Students     | 1365         | <b>1396</b> | 1483      | 1594      | 1728       |
| African American | 1348         | <b>1379</b> | 1438      | 1569      | 1659       |
| Hispanic         | 1368         | <b>1385</b> | 1447      | 1536      | 1645       |
| White            | 1372         | <b>1416</b> | 1515      | 1616      | 1751       |