

## Relating Star Reading® and Star Math® to the State of Texas Assessments of Academic Readiness (STAAR)



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# Introduction

At Renaissance we know that as an educator, chief among your responsibilities is making decisions about how to allocate limited resources to best serve diverse student needs. A good assessment system supports your efforts, by providing timely, relevant information to help address key questions about which students are on track to meet important standards and who may need additional assistance.

Assessments that identify early any students at risk of missing academic standards are especially useful, as they inform instructional decisions to improve student performance and reduce gaps in achievement. Assessments that do this while taking little time away from instruction are particularly valuable. *Interim assessments*, one of three broad categories of educational assessment,<sup>1</sup> indicate which students are on track to meet later expectations (Perie, Marion, Gong, & Wurtzel, 2007).

This linking study applied results from two interim assessments, Renaissance Star Reading® and Renaissance Star Math®, to help you predict whether individual students are on track or need more assistance to succeed on the year-end summative State of Texas Assessments of Academic Readiness (STAAR) in English in grade 3 through 8 and mathematics in grades 3 through 7.<sup>2</sup>

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## Main Findings

Results from the linking analysis revealed that Star Reading and Star Math are accurate predictors of the State of Texas Assessments of Academic Readiness (STAAR), meaning as a Texas educator you can use Star scores to:

1. Identify early in the year students likely to miss reading and math yearly progress goals in time to make meaningful adjustments to instruction well before the year-end test.
2. Forecast the percent of students at each STAAR performance level to serve as an early warning system for building and district administrators and allow redirection of resources as needed.

## Study

To determine if Star Reading and Star Math can predict student achievement on the end-of-year STAAR test in English and mathematics, we began by linking the score scales for each assessment.

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<sup>1</sup> **Formative assessments** are short and frequent processes, embedded in instruction, that support learning and provide specific feedback on what students know and can do versus where gaps in knowledge exist. **Summative assessments** evaluate whether students have met a set of standards, and serve most commonly as year-end state-mandated tests. **Interim assessments** represent the middle ground, in terms of duration and frequency and can serve purposes including informing instruction, evaluating curriculum and student responsiveness to intervention, and forecasting performance on high-stakes summative year-end tests.

<sup>2</sup> Sample sizes were inadequate for mathematics grade 8; possible linking for this grade will be re-visited in the future as more data becomes available.

Technical manuals are available for Star Reading and Star Math by request to [research@renaissance.com](mailto:research@renaissance.com).

## Data collection

Using a secure data-matching procedure compliant with the federal Family Educational Rights and Privacy Act (FERPA) and Texas Department of Education policies, staff from eight Texas districts provided Renaissance with state summative test scores for students who had taken Star Reading during the 2011–2012 and/or the 2012–2013 school year or Star Math during the 2014–2015 school year. Each record included a student’s STAAR scores and was matched with all Star scores for that year.

## Sample characteristics

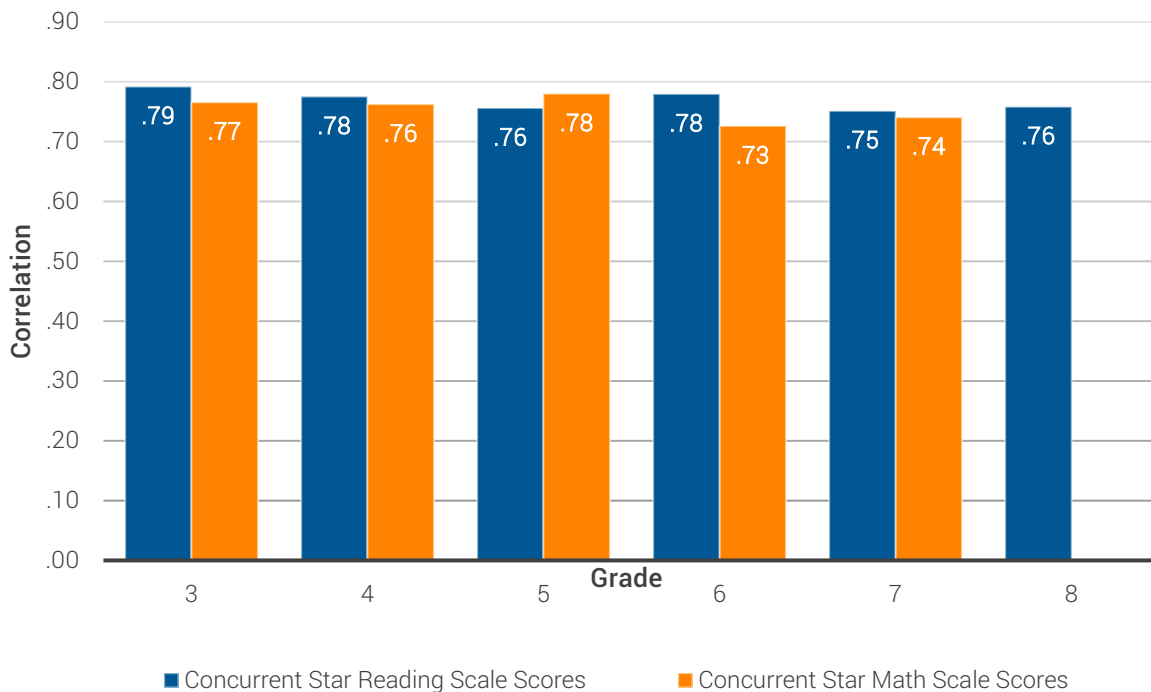
The sample selected included students’ scores for all Star tests taken within 30 days before or after the mid-date of the STAAR administration window. This sample numbered 39,152 students in grades 3–8 with matched STAAR and Star Reading scores and 24,584 students in grades 3–7 with matched STAAR and Star Math scores. In each grade, we then set aside scores from a subset of these students—10%—as a holdout sample to use to evaluate the scale linkage.

The linking analysis revealed that Star Reading and Star Math are accurate predictors of STAAR performance.

## Correlations

Before linking Star tests with STAAR, we ensured there was a strong relationship between the test scales. As seen in figure 1, the correlations were strong, averaging .77 and .76 between STAAR and Star Reading and Star Math, respectively.

Figure 1. Star Reading® and Star Math® scores highly correlate with the State of Texas Assessments of Academic Readiness (STAAR)



## Scale linkage

Renaissance linked the Star test scale to the STAAR scale by applying equipercentile linking analysis (Kolen & Brennan, 2004). The concurrent sample (sans the holdout sample) was used in the linking, and the result was a table of STAAR scores for each possible Star score.

## Texas cut scores and corresponding Star score equivalents

STAAR results are reported in scaled scores that describe each student's location on an achievement continuum ranging from approximately 1345 to 1860 and using four achievement levels: *Did Not Meet Grade Level*, *Approaches Grade Level*, *Meets Grade Level*, and *Masters Grade Level*. A main purpose in linking Star Reading and Star Math to the STAAR was to identify Star scores approximately equivalent to the cut-off scores that separate the Texas achievement levels. Table 1 displays these equivalent Star scores for grades 3–8 for Star Reading and grades 3–7 for Star Math. The corresponding STAAR cut scores can be found in Appendix B.

Table 1. Star Reading® and Star Math® score equivalents for each STAAR achievement level range

Star Reading® cut-score equivalents				
Grade	Did Not Meet Grade Level	Approaches Grade Level	Meets Grade Level	Masters Grade Level
3	< 345	345 – 461	462 – 547	≥ 548
4	< 446	446 – 563	564 – 674	≥ 675
5	< 468	468 – 631	632 – 794	≥ 795
6	< 526	526 – 697	698 – 890	≥ 891
7	< 555	555 – 812	813 – 1035	≥ 1036
8	< 590	590 – 856	857 – 1096	≥ 1097
Star Math® cut-score equivalents				
Grade	Did Not Meet Grade Level	Approaches Grade Level	Meets Grade Level	Masters Grade Level
3	< 585	585 – 652	653 – 700	≥ 701
4	< 668	668 – 743	744 – 783	≥ 784
5	< 669	669 – 763	764 – 813	≥ 814
6	< 720	720 – 804	805 – 861	≥ 862
7	< 757	757 – 831	832 – 880	≥ 881

## Results

### Accuracy of scale linkage confirmed

In evaluating the accuracy of the scale linkage, we applied the linking results (i.e., our table of STAAR scores for each possible Star score) to the holdout sample. For each student, we compared actual STAAR proficiency status to estimated proficiency status. Table 2 displays classification diagnostics about whether students were correctly or incorrectly classified as proficient or not on the STAAR using Star scores. On average, students were correctly classified (i.e., overall classification accuracy) 83% of the time for reading and 84% of the time for math.

For Area Under the ROC Curve (AUC), a summary measure of diagnostic accuracy, Star Reading averaged .90 and Star Math averaged .91 (also displayed in table 2). The AUCs far exceed the .85 standard set by the National Center on Response to Intervention to indicate convincing evidence that an assessment can accurately predict another assessment result or outcome.

Table 2. Proficiency estimating using Star Reading® and Star Math® scores yields accurate results

Star Reading®						
Measure	Grade					
	3	4	5	6	7	8
Overall classification accuracy (percentage of correct classifications)	85%	85%	83%	85%	83%	77%
Area Under the ROC Curve	0.92	0.92	0.90	0.90	0.89	0.86
Star Math®						
Measure	Grade					
	3	4	5	6	7	8
Overall classification accuracy (percentage of correct classifications)	86%	85%	83%	83%	82%	
Area Under the ROC Curve	0.93	0.92	0.92	0.90	0.88	

Other diagnostic accuracy measures studied:

- ✓ **Sensitivity** represents the percentage of proficient students that were correctly forecasted, which for Star Reading averaged 71% and for Star Math averaged 80%.
- ✓ **Specificity** represents the percentage of not-proficient students that were correctly forecasted, which for Star Reading averaged 88% and for Star Math averaged 85%.
- ✓ **Positive predictive values** indicate that when Star scores forecasted students to be proficient, they actually were proficient 71% of the time for Star Reading and 76% of the time for Star Math.
- ✓ **Negative predictive values** indicate that when Star scores forecasted students to miss proficiency, they actually weren't proficient 88% of the time for reading and 89% of the time for math.
- ✓ **Proficiency status projection error**, the difference between actual and projected proficiency rates, indicates how well scores accurately predict proficiency within each grade. Star Reading averaged 0% and Star Math averaged 2% (negative scores indicate under-prediction while positive scores show over-prediction).

## Appendix A: About Star Reading® and Star Math®

The computer-adaptive Star Reading and Star Math assessments serve multiple purposes including screening, progress monitoring, instructional planning, forecasting proficiency, standards mastery, and measuring growth. These highly reliable, valid, and efficient standards-based measures of student performance in reading and math provide valuable information regarding the acquisition of skills along a continuum of learning expectations. The assessments can be completed in about 20 minutes, and we recommend administering them two to five times a year for most purposes and more frequently when used for progress monitoring.

RENAISSANCE  
**Star Reading®**

RENAISSANCE  
**Star Math®**

Star Reading and Star Math are highly rated for academic screening and academic progress monitoring by the National Center on Intensive Intervention.

National Center on  
**INTENSIVE INTERVENTION**

at American Institutes for Research ■

## Appendix B: State of Texas Assessments of Academic Readiness (STAAR) achievement levels

Table B1. STAAR achievement level score ranges

STAAR achievement level score ranges: Reading				
Grade	Did Not Meet Grade Level	Approaches Grade Level	Meets Grade Level	Masters Grade Level
3	< 1345	1345 – 1467	1468 – 1554	≥ 1555
4	< 1434	1434 – 1549	1550 – 1632	≥ 1633
5	< 1470	1470 – 1581	1582 – 1666	≥ 1667
6	< 1517	1517 – 1628	1629 – 1717	≥ 1718
7	< 1567	1567 – 1673	1674 – 1752	≥ 1753
8	< 1587	1587 – 1699	1700 – 1782	≥ 1783
STAAR achievement level score ranges: Mathematics				
Grade	Did Not Meet Grade Level	Approaches Grade Level	Meets Grade Level	Masters Grade Level
3	< 1360	1360 – 1485	1486 – 1595	≥ 1596
4	< 1467	1467 – 1588	1589 – 1669	≥ 1670
5	< 1500	1500 – 1624	1625 – 1723	≥ 1724
6	< 1536	1536 – 1652	1653 – 1771	≥ 1772
7	< 1575	1575 – 1687	1688 – 1797	≥ 1798
8	< 1595	1595 – 1699	1700 – 1853	≥ 1854

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