

RENAISSANCE

TECHNICAL PAPER | 2021–2022 School Year

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



Contents

3	Introduction
3	Main Findings
4	Study
6	Results
8	Appendix A: About Star Reading and Star Math
8	Appendix B: State of Texas Assessments of Academic Readiness (STAAR) achievement levels
9	Appendix C: Star Reading and Star Math Enterprise score equivalents
10	References

Figures

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

Tables

6	Table 1. Star Reading and Star Math Unified score equivalents for each STAAR achievement level range
7	Table 2. Proficiency forecasting using Star Reading and Star Math scores yields accurate results
8	Table B1. STAAR achievement level score ranges
9	Table C1. Star Reading and Star Math Enterprise score equivalents for each STAAR achievement level range

Initial publication July 1, 2017

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,¹ indicate which students are on track to meet later expectations (Perie et al., 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 7.²

Assessments that identify early any students at risk of missing academic standards are especially useful.

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.

¹ **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.

² 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.

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.

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

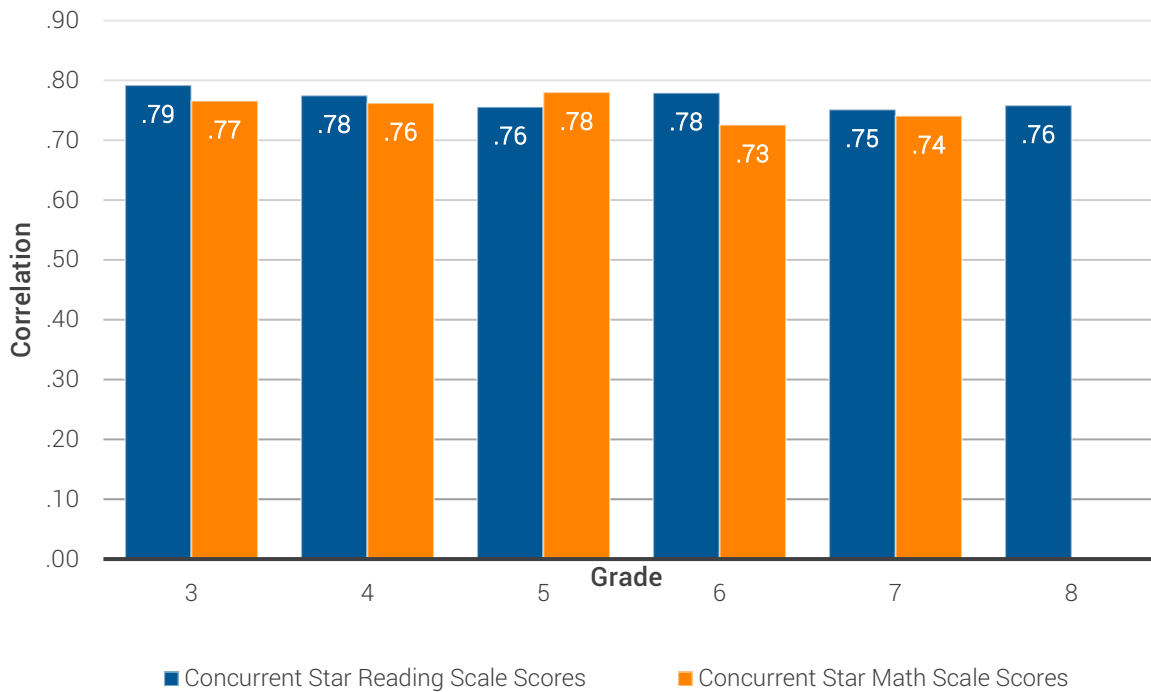
The sample selected included students’ scores for all Star tests taken within 30 days before or after the mid-date of the STAAR administration window. This sample numbered 39,152 students in grades 3–8 with matched STAAR and Star Reading scores and 24,584 students in grades 3–7 with matched STAAR and 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 Unified 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 Unified score equivalents for each STAAR achievement level range

Star Reading Unified cut-score equivalents				
Grade	Did Not Meet Grade Level	Approaches Grade Level	Meets Grade Level	Masters Grade Level
3	< 948	948 – 996	997 – 1026	≥ 1027
4	< 989	989 – 1032	1033 – 1063	≥ 1064
5	< 1000	1000 – 1052	1053 – 1085	≥ 1086
6	< 1021	1021 – 1068	1069 – 1103	≥ 1104
7	< 1029	1029 – 1089	1090 – 1130	≥ 1131
8	< 1041	1041 – 1097	1098 – 1138	≥ 1139
Star Math Unified cut-score equivalents				
Grade	Did Not Meet Grade Level	Approaches Grade Level	Meets Grade Level	Masters Grade Level
3	< 966	966 – 1007	1008 – 1037	≥ 1038
4	< 1017	1017 – 1063	1064 – 1088	≥ 1089
5	< 1018	1018 – 1075	1076 – 1106	≥ 1107
6	< 1049	1049 – 1101	1102 – 1136	≥ 1137
7	< 1072	1072 – 1117	1118 – 1147	≥ 1148

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

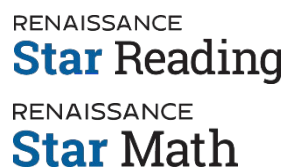
Star Reading						
Measure	Grade					
	3	4	5	6	7	8
Overall classification accuracy (percentage of correct classifications)	85%	85%	83%	85%	83%	77%
Area Under the ROC Curve	0.92	0.92	0.90	0.90	0.89	0.86
Star Math						
Measure	Grade					
	3	4	5	6	7	8
Overall classification accuracy (percentage of correct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



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



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

Appendix C: Star Reading and Star Math Enterprise score equivalents

Since the 2017–2018 school year, Renaissance has offered educators the additional option of reporting student Star scores on an alternative scale referred to as the Unified scale. Table C1 below includes the Enterprise scaled scores for Star Reading and Star Math that correspond to achievement levels on the STAAR assessments for English language arts and Mathematics. Table 1 contains the Unified scaled scores for Star Reading and Star Math that correspond to achievement levels on the STAAR assessments for English language arts and Mathematics.

Table C1. Star Reading and Star Math Enterprise score equivalents at time of state test for each STAAR achievement level range

Star Reading Enterprise 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 Enterprise 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

References

Kolen, M. J., & Brennan, R. R. (2004). *Test equating scaling and linking: Methods and practices*. Springer Science+Business Media.

Perie, M., Marion, S., Gong, B., & Wurtzel, J. (2007). *The role of interim assessments in a comprehensive assessment system*. Aspen Institute.

Renaissance Learning. (2016a). *Star Math technical manual*. Available by request to research@renaissance.com

Renaissance Learning. (2016b). *Star Reading technical manual*. Available by request to research@renaissance.com

Independent technical reviews of Star Reading and Star Math

U.S. Department of Education: National Center on Intensive Intervention. (2018a). *Review of academic progress monitoring tools* [Review of Star Math]. <https://charts.intensiveintervention.org/aprogressmonitoring>

U.S. Department of Education: National Center on Intensive Intervention. (2018b). *Review of academic progress monitoring tools* [Review of Star Reading]. <https://charts.intensiveintervention.org/aprogressmonitoring>

U.S. Department of Education: National Center on Intensive Intervention. (2019a). *Review of academic screening tools* [Review of Star Math]. <https://charts.intensiveintervention.org/ascreening>

U.S. Department of Education: National Center on Intensive Intervention. (2019b). *Review of academic screening tools* [Review of Star Reading]. <https://charts.intensiveintervention.org/ascreening>

U.S. Department of Education: National Center on Response to Intervention. (2010a). *Review of progress monitoring tools* [Review of STAR Math]. <https://web.archive.org/web/20120813035500/http://www.rti4success.org/pdf/progressMonitoringGOM.pdf>

U.S. Department of Education: National Center on Response to Intervention. (2010b). *Review of progress monitoring tools* [Review of STAR Reading]. <https://web.archive.org/web/20120813035500/http://www.rti4success.org/pdf/progressMonitoringGOM.pdf>

U.S. Department of Education: National Center on Response to Intervention. (2011a). *Review of screening tools* [Review of STAR Math]. <https://web.archive.org/web/20171027185735/http://www.rti4success.org:80/resources/tools-charts/screening-tools-chart>

U.S. Department of Education: National Center on Response to Intervention. (2011b). *Review of screening tools* [Review of STAR Reading]. <https://web.archive.org/web/20171027185735/http://www.rti4success.org:80/resources/tools-charts/screening-tools-chart>