

Pathway to Proficiency: Linking Star Reading® and Star Math® to the Louisiana Educational Assessment Program (LEAP 2025)



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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,¹ 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 Louisiana Educational Assessment Program (LEAP 2025) tests in English Language Arts (ELA) and Mathematics in grades 3 through 8.²

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

Louisiana Findings

Results from the linking analysis revealed that Star Reading and Star Math are accurate predictors of the LEAP 2025 tests, meaning as an 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 LEAP 2025 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 LEAP 2025 tests in ELA and mathematics, we began by linking the score scales for each assessment.

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 Technical manuals are available for Star Reading and Star Math by request to research@renaissance.com.

School-Level Data collection

To find a sample of students who were assessed by both the LEAP 2025 and Star Assessments, we began by gathering all Star Reading and Star Math test records from 2015–2016 for Louisiana. Then, each school's Star Reading and Star Math data were aggregated by grade and subject area. The next step was to match Star data with the LEAP 2025 data from the same school year by district and school name. To do this, performance level distribution data from the LEAP 2025 was obtained from the Louisiana Department of Education website. The file included the number of students tested in each grade and the percentage of students who were *Unsatisfactory*, *Approaching*, *Basic*, *Mastery*, or *Advanced*.

Sample characteristics

Once we determined how many students in each grade at a school were tested on the LEAP 2025 ELA and took a Star Reading assessment, we calculated the percentage of students assessed on both tests. Then we repeated this exercise for the math assessments. In each grade at each school, if between 95% and 105% of the students who tested on the LEAP 2025 had taken a Star assessment, that grade was included in the sample. This method of sample selection ensured that our sample consisted of cases in which all or nearly all the enrolled students who took the LEAP 2025 also took a Star test within the specified window of time. If a total of approximately 1,000 or more students per grade met the sample criteria, that grade's sample was considered sufficiently large for analysis.

The reading sample included 33,815 Star Reading students from 208 schools. The math sample included 12,672 Star Math students from 69 schools. Table 1 displays by-grade test summaries for the reading and math samples. It also includes percentages of students in the *Unsatisfactory*, *Approaching*, *Basic*, *Mastery*, and *Advanced* performance levels, both for the sample and statewide.

Table 1. Performance characteristics of reading and math samples

Star Reading® sample performance												
Grade	Star Reading® students	LEAP ELA students	Unsatisfactory		Approaching		Basic		Mastery		Advanced	
			sample	state	sample	state	sample	state	sample	state	sample	state
3	7,228	7,080	13%	13%	16%	18%	24%	25%	41%	39%	6%	5%
4	7,142	7,040	7%	8%	15%	23%	28%	30%	41%	35%	9%	4%
5	4,547	4,440	6%	9%	15%	19%	30%	31%	44%	38%	5%	3%
6	5,531	5,460	9%	10%	19%	25%	27%	30%	36%	29%	9%	6%
7	4,518	4,430	13%	13%	18%	19%	27%	27%	31%	30%	11%	11%
8	4,849	4,750	10%	11%	17%	17%	26%	27%	36%	36%	11%	9%
Star Math® sample performance												
Grade	Star Math® students	LEAP math students	Unsatisfactory		Approaching		Basic		Mastery		Advanced	
			sample	state	sample	state	sample	state	sample	state	sample	state
3	2,541	2,490	11%	11%	17%	18%	27%	27%	36%	36%	9%	8%
4	2,111	2,090	6%	9%	19%	18%	30%	29%	40%	37%	5%	7%
5	1,779	1,730	6%	11%	19%	25%	35%	32%	35%	28%	5%	4%
6	2,120	2,080	11%	13%	24%	30%	32%	29%	28%	24%	5%	4%
7	1,816	1,800	9%	11%	25%	29%	37%	35%	27%	23%	2%	2%
8	2,305	2,280	17%	20%	24%	28%	28%	25%	29%	25%	2%	2%

Scale linkage

Renaissance linked the Star test scale to the LEAP 2025 by applying equipercentile linking analysis (Kolen & Brennan, 2004). First, we aggregated the sample of schools to calculate the percentage of students performing *Unsatisfactory*, *Approaching*, *Basic*, *Mastery*, and *Advanced* for each subject and grade. Then we analyzed the distribution of Star scores to determine the scaled score corresponding to the same percentile as specific LEAP 2025 level. For example, as shown in Table 1, 13% of students in the third-grade reading sample were classified as *Unsatisfactory*, 16% were classified as *Approaching*, 24% were classified as *Basic*, 41% were classified as *Mastery*, and 6% were classified as *Advanced*. Therefore, the cut score was at the 13th percentile for *Approaching*, 29th percentile for *Basic*, 53rd percentile for *Mastery*, and 94th percentile for *Advanced*.

LEAP 2025 cut scores and corresponding Star score equivalents

LEAP 2025 results are reported in scaled scores that are split into five achievement levels: *Unsatisfactory*, *Approaching*, *Basic*, *Mastery*, and *Advanced*. The main purpose in linking Star Reading and Star Math to the LEAP 2025 was to identify Star scores at the time of the state test that are approximately equivalent to the cut-off scores that separate the LEAP 2025 levels. Table 2 displays these equivalent Star scores at the time of the state test for grades 3–8³. The corresponding LEAP 2025 cut scores can be found in Appendix B.

Table 2. Star Reading[®] and Star Math[®] score equivalents at time of state test for each LEAP 2025 achievement level range

Star Reading [®] cut-score equivalents					
Grade	Unsatisfactory	Approaching	Basic	Mastery	Advanced
3	< 227	227 – 323	324 – 414	415 – 638	≥ 639
4	< 245	245 – 364	365 – 497	498 – 758	≥ 759
5	< 282	282 – 427	428 – 592	593 – 985	≥ 986
6	< 369	369 – 524	525 – 684	685 – 1062	≥ 1063
7	< 417	417 – 555	556 – 733	734 – 1122	≥ 1123
8	< 425	425 – 576	577 – 778	779 – 1182	≥ 1183
Star Math [®] cut-score equivalents					
Grade	Unsatisfactory	Approaching	Basic	Mastery	Advanced
3	< 492	492 – 554	555 – 612	613 – 684	≥ 685
4	< 519	519 – 609	610 – 677	678 – 779	≥ 780
5	< 545	545 – 655	656 – 755	756 – 849	≥ 850
6	< 612	612 – 721	722 – 791	792 – 868	≥ 869
7	< 658	658 – 725	726 – 826	827 – 909	≥ 910
8	< 704	704 – 785	786 – 853	854 – 935	≥ 936

³ The Star Reading and Star Math cut-score equivalents presented in Table 2 apply only to the time of the state test. Some Renaissance reports adjust the Star Reading and Star Math cut-score equivalents based on date.

Results

Accuracy of scale linkage confirmed

Two Louisiana districts shared student level LEAP 2025 scores to explore the accuracy of using Star Reading and Star Math for forecasting LEAP 2025 performance. The Star Reading sample consisted of 20,452 students and the Star Math sample consisted of 7,713 students. We took students' Star scores and used national growth norms (Renaissance Learning, 2016a, 2016b) to project what their Star scores would be at the date of the LEAP 2025 administration. We used the projected Star scores (or the average of the projected scores for students with multiple Star scores prior to the mid-date of the LEAP 2025 administration) to examine the accuracy of the linkage to the LEAP 2025 scale.

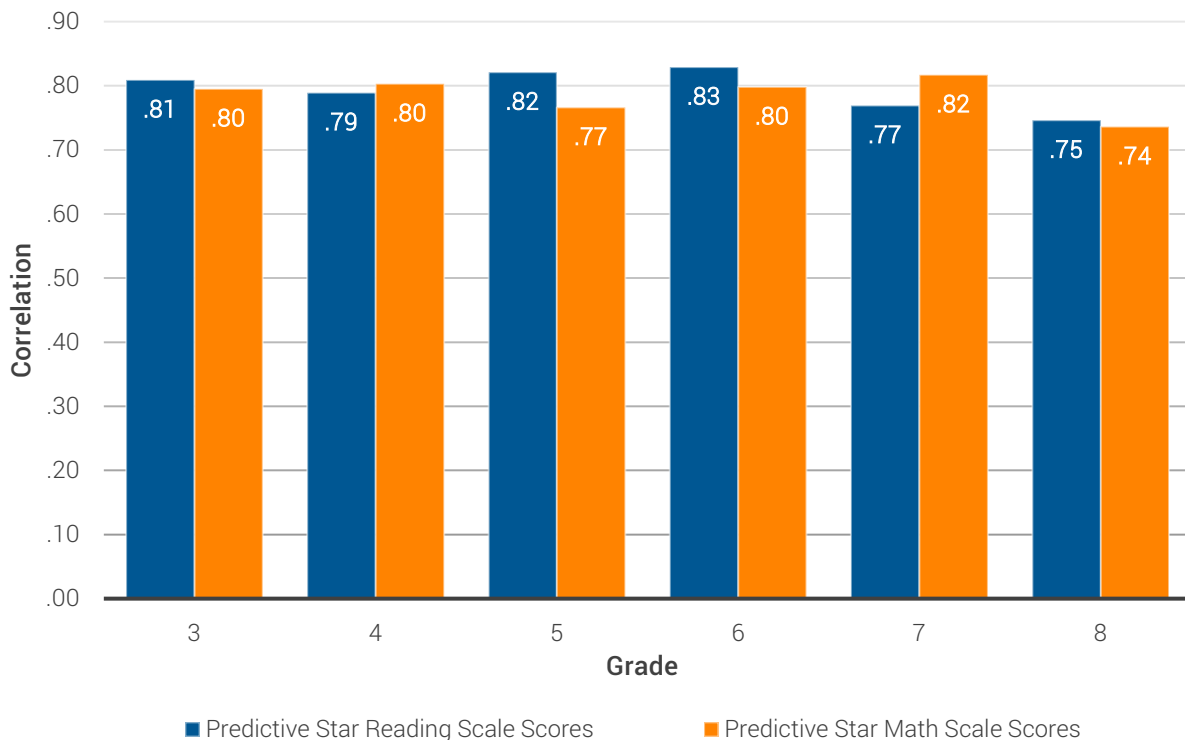
Classification diagnostics were derived from counts of correct and incorrect classifications when using Star scores to predict whether a student would achieve proficiency on the LEAP 2025. The results indicate that Star Assessments provide an effective means of estimating end-of-year achievement on the LEAP 2025.

Predictive Star scores correlate highly with actual LEAP 2025 scores

To summarize the predictive power of Star Reading and Star Math, we calculated correlations between observed LEAP 2025 scores and projected Star scores. As seen in Figure 1, the correlations were strong, averaging .79 between LEAP 2025 and Star for both reading and math.

Star scores have a strong relationship with end-of-year LEAP 2025 scores.

Figure 1. Star Reading® and Star Math® scores highly correlate with LEAP 2025 scores



Star scores discriminate well between students who score proficient or not

We compared actual LEAP 2025 performance to students' estimated LEAP 2025 performance based on projected Star scores and the estimated Star cut score equivalents. Table 3 displays classification diagnostics about whether students were correctly or incorrectly classified as proficient or not on the LEAP 2025 using projected Star scores. On average, students were correctly classified (i.e., overall classification accuracy) 82% of the time by Star Reading and 84% of the time by Star 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 3). The AUCs met or exceeded 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 3. Proficiency forecasting using Star Reading® and Star Math® scores yields accurate results

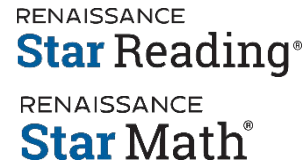
Star Reading®						
Measure	Grade					
	3	4	5	6	7	8
Overall classification accuracy (percentage of correct classifications)	83%	82%	83%	84%	80%	78%
Area Under the ROC Curve	.92	.90	.92	.92	.89	.87
Star Math®						
Measure	Grade					
	3	4	5	6	7	8
Overall classification accuracy (percentage of correct classifications)	84%	83%	83%	85%	86%	82%
Area Under the ROC Curve	.91	.93	.90	.91	.92	.89

Other diagnostic accuracy measures studied:

- ✓ **Sensitivity** represents the percentage of proficient students that were correctly forecasted, which for Star Reading averaged 82% and for Star Math averaged 73%.
- ✓ **Specificity** represents the percentage of not-proficient students that were correctly forecasted, which for Star Reading averaged 82% and for Star Math averaged 87%.
- ✓ **Positive predictive values**, which indicate that when Star scores forecasted students to be proficient, they actually were proficient, were 78% for Star Reading and 83% for Star Math.
- ✓ **Negative predictive values**, which indicate that when Star scores forecasted students to miss proficiency, they actually weren't proficient, were 85% for reading and 85% 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 3% 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.



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Appendix B: LEAP 2025 achievement levels

Table B1. LEAP 2025 achievement level score ranges

LEAP 2025 achievement level score ranges: ELA					
Grade	Unsatisfactory	Approaching	Basic	Mastery	Advanced
3	650 – 699	700 – 724	725 – 749	750 – 809	810 – 850
4	650 – 699	700 – 724	725 – 749	750 – 789	790 – 850
5	650 – 699	700 – 724	725 – 749	750 – 798	799 – 850
6	650 – 699	700 – 724	725 – 749	750 – 789	790 – 850
7	650 – 699	700 – 724	725 – 749	750 – 784	785 – 850
8	650 – 699	700 – 724	725 – 749	750 – 793	794 – 850
LEAP 2025 achievement level score ranges: Mathematics					
Grade	Unsatisfactory	Approaching	Basic	Mastery	Advanced
3	650 – 699	700 – 724	725 – 749	750 – 789	790 – 850
4	650 – 699	700 – 724	725 – 749	750 – 795	796 – 850
5	650 – 699	700 – 724	725 – 749	750 – 789	790 – 850
6	650 – 699	700 – 724	725 – 749	750 – 787	788 – 850
7	650 – 699	700 – 724	725 – 749	750 – 785	786 – 850
8	650 – 699	700 – 724	725 – 749	750 – 800	801 – 850

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