

# RENAISSANCE

TECHNICAL PAPER | 2020–2021 School Year

## Relating Star Reading and Star Math to the Indiana Learning Evaluation Assessment Readiness Network (ILEARN) Tests



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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 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 Indiana Learning Evaluation Assessment Readiness Network (ILEARN) tests in English/Language Arts (ELA) and mathematics in grades 3 through 8.<sup>2</sup>

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 ILEARN 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.
2. Forecast the percent of students at each ILEARN 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 ILEARN tests in ELA and mathematics, we began by linking the score scales for each assessment.

### Data collection

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

Using a secure data-matching procedure compliant with the federal Family Educational Rights and Privacy Act (FERPA), the Indiana Department of Education provided Renaissance with ILEARN test scores for Indiana students from the 2018–2019 school year. Each record included a student’s ILEARN scores and was matched with all Star scores for that year.

## Sample characteristics

Renaissance divided the data into two samples. The **concurrent sample** included students’ scores for all Star tests taken within an interval of 30 days before or after the mid-date of the ILEARN administration. This sample numbered 76,222 records in grades 3–8 with matched ILEARN and Star Reading scores and 50,741 records in those grades with matched ILEARN 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 only to evaluate the scale linkage. By-grade sample sizes and performance, both for the sample and statewide, are presented in Table 1. Extended sample and state characteristics, including ethnicity, gender, SES, Special Education, ELL and 504 status, are presented in Appendix B. Comparison of sample characteristics to statewide characteristics indicated that the sample closely represented statewide characteristics on performance and the range of demographic characteristics studied.

**Table 1. Sample sizes and performance characteristics of reading and math concurrent samples**

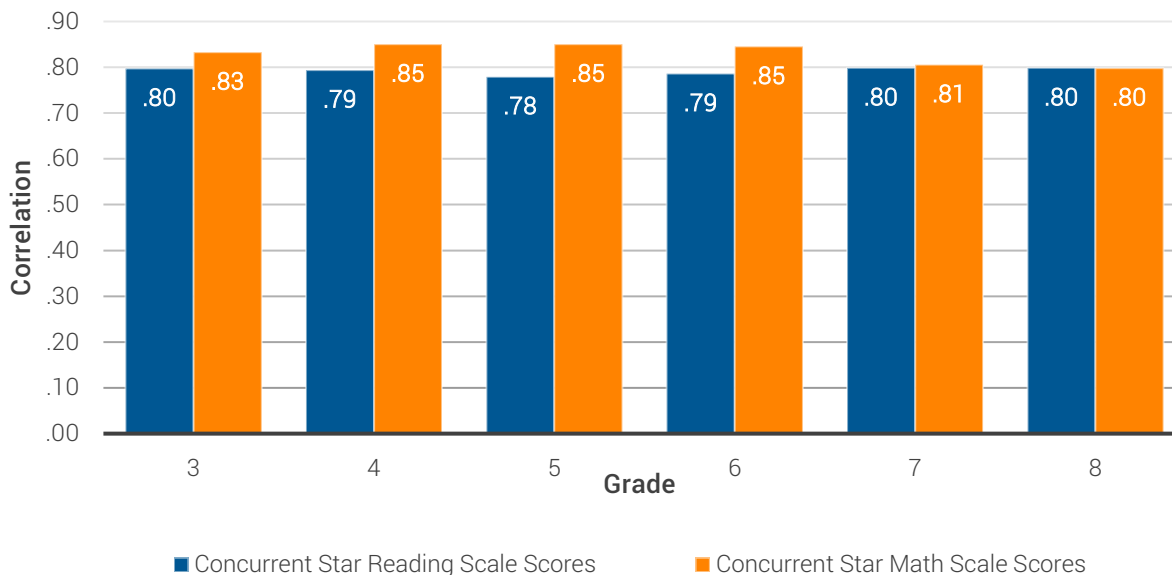
Star Reading® sample performance									
Grade	Sample size	Below Proficiency		Approaching Proficiency		At Proficiency		Above Proficiency	
		Sample	State	Sample	State	Sample	State	Sample	State
3	17,705	31%	31%	24%	23%	28%	28%	17%	18%
4	17,477	31%	31%	25%	24%	26%	26%	19%	20%
5	15,583	29%	29%	25%	24%	32%	32%	15%	15%
6	11,135	27%	27%	26%	26%	29%	30%	17%	18%
7	8,028	25%	25%	25%	26%	30%	29%	20%	20%
8	6,294	22%	21%	27%	29%	28%	29%	23%	21%
Star Math® sample performance									
Grade	Sample size	Below Proficiency		Approaching Proficiency		At Proficiency		Above Proficiency	
		Sample	State	Sample	State	Sample	State	Sample	State
3	10,891	23%	23%	20%	19%	33%	33%	24%	25%
4	10,684	27%	26%	22%	21%	33%	33%	18%	21%
5	10,479	27%	27%	26%	25%	26%	25%	21%	22%
6	7,887	32%	30%	24%	24%	25%	26%	19%	20%
7	5,928	32%	32%	26%	27%	24%	23%	18%	18%
8	4,872	35%	35%	30%	28%	18%	19%	17%	18%

The **Fall predictive sample** included 87,777 students for reading and 51,536 students for math in the Fall testing window interval (between August 1 and November 30). The **Winter predictive sample** included 81,317 students for reading and 49,677 students for math in the Winter testing window interval (between December 1 and March 31). Sample sizes by grade in each window ranged from 8,820 to 17,390 for reading and 5,965 to 10,400 for math. All scores in the predictive sample were more than 30 days before the mid-date in the ILEARN testing window. National growth norms (Renaissance Learning, 2019a, 2019b) were used to project students' Star scores in the predictive sample to what their Star scores would be at the beginning of the ILEARN administration window. We used the projected Star scores (or the average of the projected scores in each testing window for students with multiple Star scores prior to the ILEARN administration) to examine the accuracy of the linkage to the ILEARN scale.

## Correlations

Before linking Star tests with the ILEARN, we ensured there was a strong relationship between the test scales. As seen in figure 1, the concurrent correlations were strong, averaging .79 and .83 between ILEARN and Star Reading and Star Math, respectively.

**Figure 1. Star Reading® and Star Math® scores highly correlate with ILEARN tests**



## Scale linkage

Renaissance then linked the score scales for Star Reading/Star Math and the ILEARN in ELA and mathematics by applying equipercentile linking analysis (Kolen & Brennan, 2004) in grades 3–8. The concurrent sample (sans the holdout sample) was used in the linking (scores from all Star tests taken within 30 days before or after the ILEARN administration mid-date), and the result was a table of ILEARN scores for each possible Star score.

## ILEARN cut scores and corresponding Star score equivalents

ILEARN results are reported in scaled scores that describe each student’s location on an achievement continuum ranging from approximately 5060 to 5920 for ELA and 6080 to 6950 for math and using four achievement levels: *Below Proficiency*, *Approaching Proficiency*, *At Proficiency*, and *Above Proficiency*. A main purpose in linking Star Reading and Star Math to the ILEARN was to identify Star scores at the time of the state test that are approximately equivalent to the cut-off scores that separate the ILEARN achievement levels. Table 2 displays these equivalent Star scores at the time of the state test for grades 3–8.<sup>3</sup> The corresponding ILEARN cut scores can be found in Appendix C.

**Table 2. Star Reading® and Star Math® score equivalents at time of state test for each ILEARN achievement level range**

Star Reading® cut – score equivalents				
Grade	Below Proficiency	Approaching Proficiency	At Proficiency	Above Proficiency
3	< 366	366 – 471	472 – 608	≥ 609
4	< 451	451 – 557	558 – 723	≥ 724
5	< 500	500 – 631	632 – 904	≥ 905
6	< 538	538 – 715	716 – 978	≥ 979
7	< 589	589 – 812	813 – 1108	≥ 1109
8	< 622	622 – 899	900 – 1204	≥ 1205
Star Math® cut – score equivalents				
Grade	Below Proficiency	Approaching Proficiency	At Proficiency	Above Proficiency
3	< 554	554 – 611	612 – 683	≥ 684
4	< 636	636 – 693	694 – 778	≥ 779
5	< 685	685 – 765	766 – 828	≥ 829
6	< 735	735 – 807	808 – 867	≥ 868
7	< 771	771 – 840	841 – 893	≥ 894
8	< 801	801 – 875	876 – 913	≥ 914

## Estimated probabilities of ILEARN achievement levels

Renaissance additionally applied multinomial logistic regression analyses to obtain estimated probabilities of ILEARN achievement levels based on Star Reading/Star Math scores. Table D1 in Appendix D displays the estimated probabilities of ILEARN ELA achievement levels and associated Star Reading scale score ranges. This analysis was then replicated to obtain estimated probabilities of ILEARN mathematics achievement levels based on Star Math scores. Table D2 in Appendix D displays the estimated probabilities of ILEARN mathematics achievement levels and associated Star Math scale score ranges.

<sup>3</sup> 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

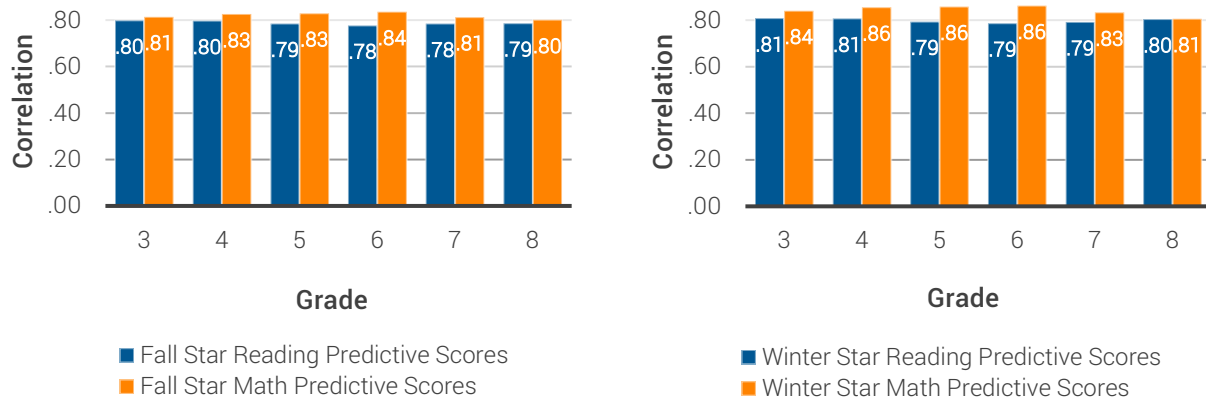
In evaluating the accuracy of the scale linkage, we used two methods to examine the differences between students' observed (actual) ILEARN scores and our Star equivalents: (1) computing the RMSEL (the root mean squared errors of linking) using the scores from the linking study, and (2) applying the holdout sample, consisting of the subset of concurrent scores not used in the linking, to the linking results. Results showed that our linking computation performed as intended.

## Predictive Star scores correlate highly with actual ILEARN scores

To summarize the predictive power of Star Reading and Star Math, we calculated raw correlations between observed (actual) ILEARN scores and projected Star scores. As figure 2 shows, the predictive correlation showed a strong relationship between the assessments (similar to the correlations from the concurrent sample, see figure 1, p. 5), indicating that earlier Star scores have a strong relationship with end-of-year ILEARN. For reading, the correlations averaged .79 for Fall and .80 for Winter. For math, the associations were also high, averaging .82 for Fall and .84 for Winter.

Predictive Star scores have a strong relationship with end-of-year ILEARN scores.

Figure 2. Fall and Winter Star Reading® and Star Math® predictive scores highly correlate with ILEARN tests



## Star scores discriminate well between students who score proficient or not

Using the predictive sample, we compared how projected Star scores aligned with the observed ILEARN scores. Tables 3 and 4 display classification diagnostics about whether students were correctly or incorrectly classified as proficient or not on the ILEARN using fall or winter scores projected to the ILEARN testing date. On average, for reading students were correctly classified (i.e., overall classification accuracy) 81% of the time using Fall projected scores and 82% of the time using Winter projected scores. For math, students were correctly classified 83% and 85% of the time using Fall and Winter projected scores respectively.

For Area Under the ROC Curve (AUC), a summary measure of diagnostic accuracy, Star Reading averaged .90 and .90 in the Fall and Winter testing windows respectively. For Star Math, the AUC averaged .91 and .93 in the Fall and Winter testing windows respectively. By-grade AUC values are displayed in table 3. AUC values closer to 1 indicate an assessment perfectly distinguishes between students who are proficient versus those who are not, whereas values of .50 indicate prediction no better than chance. In general, an AUC of .70 to .80 is considered acceptable, .80 to .90 is excellent, and greater than .90 is outstanding (Hosmer et al., 2013).

**Table 3. Proficiency forecasting using Star Reading® and Star Math® fall scores yields accurate results**

Fall Testing Window						
Star Reading®						
Measure	Grade					
	3	4	5	6	7	8
Overall classification accuracy (percentage of correct classifications)	81%	81%	81%	81%	81%	81%
Area Under the ROC Curve	0.90	0.90	0.89	0.89	0.90	0.89
Star Math®						
Measure	Grade					
	3	4	5	6	7	8
Overall classification accuracy (percentage of correct classifications)	83%	82%	83%	82%	84%	84%
Area Under the ROC Curve	0.91	0.91	0.91	0.91	0.92	0.92

**Table 4. Proficiency forecasting using Star Reading® and Star Math® winter scores yields accurate results**

Winter Testing Window						
Star Reading®						
Measure	Grade					
	3	4	5	6	7	8
Overall classification accuracy (percentage of correct classifications)	82%	82%	81%	82%	82%	82%
Area Under the ROC Curve	0.91	0.91	0.90	0.90	0.90	0.90
Star Math®						
Measure	Grade					
	3	4	5	6	7	8
Overall classification accuracy (percentage of correct classifications)	85%	85%	85%	84%	85%	85%
Area Under the ROC Curve	0.93	0.93	0.93	0.93	0.93	0.92



Other diagnostic accuracy measures studied:

- ✓ **Sensitivity** represents the percentage of proficient students that were correctly forecasted, which for Star Reading averaged 82% for Fall and 83% for Winter. Sensitivity for Star Math averaged 83% for Fall and 85% for Winter.
- ✓ **Specificity** represents the percentage of not-proficient students that were correctly forecasted, which for Star Reading averaged 80% for Fall and 81% for Winter. Specificity for Star Math averaged 82% for Fall and 83% for Winter.
- ✓ **Positive predictive values** indicate that when Star scores forecasted students to be proficient, they actually were proficient. Star Reading positive predictive values averaged 81% for Fall and Winter, and Star Math positive predictive values averaged 82% for Fall and 83% for Winter.
- ✓ **Negative predictive values** indicate that when Star scores forecasted students to miss proficiency, they actually weren't proficient. Star Reading negative predictive values averaged 81% for Fall and 83% for Winter. Star Math negative predictive values averaged 83% for Fall and 86% for Winter.
- ✓ **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 1% for Fall and 1% for Winter. Star Math averaged 0% for Fall and 1% for Winter. These results indicate that the predicted proficiency rates were closely in line with actual proficiency rates.

## 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.

National Center on  
**INTENSIVE INTERVENTION**

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## Appendix B: Sample characteristics

**Table B1. Star Reading sample characteristics**

Star Reading® sample characteristics												
	Grade 3		Grade 4		Grade 5		Grade 6		Grade 7		Grade 8	
Ethnicity	Sample	State	Sample	State	Sample	State	Sample	State	Sample	State	Sample	State
American Indian	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%
Asian	2%	3%	2%	3%	1%	2%	1%	2%	1%	2%	1%	2%
Black	12%	13%	12%	12%	13%	13%	14%	12%	12%	12%	12%	12%
Hispanic	11%	13%	11%	13%	12%	13%	14%	13%	12%	13%	12%	12%
Multiracial	5%	5%	5%	5%	5%	5%	5%	5%	4%	5%	5%	5%
Native Hawaiian or Other Pacific Islander	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%
White	70%	66%	70%	66%	68%	66%	64%	67%	71%	68%	69%	69%
Gender												
Female	49%	49%	49%	49%	49%	49%	49%	49%	48%	49%	48%	49%
Male	51%	51%	51%	51%	51%	51%	51%	51%	52%	51%	52%	51%
SES												
Free/Reduced Price Meals	51%	50%	50%	50%	50%	50%	48%	48%	43%	47%	43%	45%
Paid Meals	48%	48%	49%	49%	49%	49%	51%	50%	56%	52%	57%	53%
Unknown	1%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Special Education												
General Education	82%	82%	83%	83%	84%	83%	84%	84%	83%	84%	83%	85%
Special Education	17%	16%	16%	16%	15%	16%	15%	15%	16%	14%	16%	14%
Unknown	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%

Star Reading® sample characteristics												
	Grade 3		Grade 4		Grade 5		Grade 6		Grade 7		Grade 8	
ELL	Sample	State	Sample	State	Sample	State	Sample	State	Sample	State	Sample	State
English Language Learner	8%	9%	7%	9%	6%	6%	5%	4%	4%	3%	4%	3%
Non-English Language Learner	91%	90%	92%	90%	93%	92%	94%	95%	96%	96%	95%	96%
Unknown	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
504 Status												
Not Section 504	98%	98%	97%	97%	97%	97%	97%	97%	98%	97%	97%	97%
Section 504	2%	2%	3%	3%	3%	3%	3%	3%	2%	3%	3%	3%

**Table B2. Star Math sample characteristics**

Star Math® sample characteristics												
	Grade 3		Grade 4		Grade 5		Grade 6		Grade 7		Grade 8	
Racial Demographics	Sample	State	Sample	State	Sample	State	Sample	State	Sample	State	Sample	State
American Indian	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%
Asian	1%	3%	1%	3%	2%	2%	1%	2%	1%	2%	1%	2%
Black	15%	13%	13%	12%	16%	13%	18%	12%	14%	12%	13%	12%
Hispanic	12%	13%	12%	13%	12%	13%	16%	13%	13%	13%	13%	12%
Multiracial	6%	5%	6%	5%	5%	5%	6%	5%	5%	5%	5%	5%
Native Hawaiian or Other Pacific Islander	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%
White	66%	66%	68%	66%	65%	66%	59%	67%	66%	68%	68%	69%
<b>Gender</b>												
Female	48%	49%	49%	49%	49%	49%	49%	49%	49%	49%	48%	49%
Male	52%	51%	51%	51%	51%	51%	51%	51%	51%	51%	52%	51%
<b>SES</b>												
Free/Reduced Price Meals	49%	50%	49%	50%	49%	50%	48%	48%	43%	47%	41%	45%
Paid Meals	49%	48%	50%	49%	50%	49%	51%	50%	56%	52%	58%	53%
Unknown	1%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
<b>Special Education</b>												
General Education	84%	82%	84%	83%	85%	83%	85%	84%	84%	84%	85%	85%
Special Education	15%	16%	15%	16%	14%	16%	14%	15%	15%	14%	14%	14%
Unknown	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%

Star Math® sample characteristics												
	Grade 3		Grade 4		Grade 5		Grade 6		Grade 7		Grade 8	
ELL	Sample	State	Sample	State	Sample	State	Sample	State	Sample	State	Sample	State
English Language Learner	8%	9%	7%	9%	6%	6%	6%	4%	4%	3%	3%	3%
Non-English Language Learner	91%	90%	92%	90%	93%	92%	93%	95%	96%	96%	96%	96%
Unknown	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
504 Status												
Not Section 504	98%	98%	97%	97%	97%	97%	97%	97%	98%	97%	97%	97%
Section 504	2%	2%	3%	3%	3%	3%	3%	3%	2%	3%	3%	3%

## Appendix C: ILEARN achievement levels

**Table C1. ILEARN achievement level score ranges**

ILEARN achievement level score ranges: English Language Arts				
Grade	Below Proficiency	Approaching Proficiency	At Proficiency	Above Proficiency
3	5060–5415	5416–5459	5460–5514	5515–5760
4	5090–5443	5444–5492	5493–5546	5547–5810
5	5110–5471	5472–5523	5524–5594	5595–5850
6	5130–5491	5492–5543	5544–5603	5604–5870
7	5130–5506	5507–5567	5568–5628	5629–5890
8	5150–5510	5511–5576	5577–5637	5638–5920
ILEARN achievement level score ranges: Mathematics				
Grade	Below Proficiency	Approaching Proficiency	At Proficiency	Above Proficiency
3	6080–6381	6382–6424	6425–6487	6488–6730
4	6100–6428	6429–6473	6474–6540	6541–6800
5	6110–6452	6453–6509	6510–6565	6566–6850
6	6110–6487	6488–6544	6545–6604	6605–6870
7	6120–6492	6493–6561	6562–6624	6625–6920
8	6120–6508	6509–6589	6590–6650	6651–6950

## Appendix D: Estimated ILEARN achievement level probabilities and associated Star Reading<sup>®</sup> and Star Math<sup>®</sup> scale score ranges

**Table D1. Estimated ILEARN ELA achievement level probabilities and associated Star Reading scale score ranges**

Grade	Minimum Star Score	Maximum Star Score	Probability Below Proficiency	Probability Approaching Proficiency	Probability At Proficiency	Probability Above Proficiency
3	0	108	> 90%	< 10%	< 10%	< 10%
	109	111	90%	< 10%	< 10%	< 10%
	112	214	90%	10%	< 10%	< 10%
	215	223	80%	10%	< 10%	< 10%
	224	267	80%	20%	< 10%	< 10%
	268	286	70%	20%	< 10%	< 10%
	287	295	70%	30%	< 10%	< 10%
	296	306	70%	30%	10%	< 10%
	307	338	60%	30%	10%	< 10%
	339	341	50%	30%	10%	< 10%
	342	366	50%	40%	10%	< 10%
	367	367	50%	40%	20%	< 10%
	368	396	40%	40%	20%	< 10%
	397	409	30%	40%	20%	< 10%
	410	427	30%	40%	30%	< 10%
	428	438	20%	40%	30%	< 10%
	439	447	20%	40%	30%	10%
	448	465	20%	40%	40%	10%
	466	481	10%	40%	40%	10%
	482	488	10%	30%	40%	10%
	489	514	10%	30%	50%	10%
	515	529	10%	30%	50%	20%
	530	531	< 10%	30%	50%	20%
	532	562	< 10%	20%	50%	20%
	563	584	< 10%	20%	50%	30%
	585	603	< 10%	10%	50%	30%
604	641	< 10%	10%	50%	40%	
642	655	< 10%	10%	50%	50%	
656	670	< 10%	10%	40%	50%	



Grade	Minimum Star Score	Maximum Star Score	Probability Below Proficiency	Probability Approaching Proficiency	Probability At Proficiency	Probability Above Proficiency
	671	680	< 10%	< 10%	40%	50%
	681	710	< 10%	< 10%	40%	60%
	711	723	< 10%	< 10%	30%	60%
	724	767	< 10%	< 10%	30%	70%
	768	773	< 10%	< 10%	20%	70%
	774	838	< 10%	< 10%	20%	80%
	839	841	< 10%	< 10%	10%	80%
	842	973	< 10%	< 10%	10%	90%
	974	1400	< 10%	< 10%	< 10%	> 90%
4	0	179	> 90%	< 10%	< 10%	< 10%
	180	184	90%	< 10%	< 10%	< 10%
	185	287	90%	10%	< 10%	< 10%
	288	299	80%	10%	< 10%	< 10%
	300	341	80%	20%	< 10%	< 10%
	342	361	70%	20%	< 10%	< 10%
	362	363	70%	20%	10%	< 10%
	364	380	70%	30%	10%	< 10%
	381	413	60%	30%	10%	< 10%
	414	421	50%	30%	10%	< 10%
	422	443	50%	40%	10%	< 10%
	444	444	50%	40%	20%	< 10%
	445	474	40%	40%	20%	< 10%
	475	495	30%	40%	20%	< 10%
	496	508	30%	40%	30%	< 10%
	509	510	20%	40%	30%	< 10%
	511	541	20%	40%	30%	10%
	542	550	20%	40%	40%	10%
	551	585	10%	40%	40%	10%
	586	599	10%	30%	40%	10%
	600	600	10%	30%	50%	10%
	601	622	10%	30%	50%	20%
	623	644	< 10%	30%	50%	20%
645	659	< 10%	20%	50%	20%	
660	707	< 10%	20%	50%	30%	
708	709	< 10%	10%	50%	30%	
710	757	< 10%	10%	50%	40%	

Grade	Minimum Star Score	Maximum Star Score	Probability Below Proficiency	Probability Approaching Proficiency	Probability At Proficiency	Probability Above Proficiency
	758	760	< 10%	10%	50%	50%
	761	805	< 10%	10%	40%	50%
	806	812	< 10%	10%	40%	60%
	813	838	< 10%	< 10%	40%	60%
	839	859	< 10%	< 10%	30%	60%
	860	912	< 10%	< 10%	30%	70%
	913	922	< 10%	< 10%	20%	70%
	923	1005	< 10%	< 10%	20%	80%
	1006	1010	< 10%	< 10%	10%	80%
	1011	1179	< 10%	< 10%	10%	90%
	1180	1180	< 10%	< 10%	< 10%	90%
	1181	1400	< 10%	< 10%	< 10%	> 90%
5	0	194	> 90%	< 10%	< 10%	< 10%
	195	201	90%	< 10%	< 10%	< 10%
	202	317	90%	10%	< 10%	< 10%
	318	334	80%	10%	< 10%	< 10%
	335	379	80%	20%	< 10%	< 10%
	380	391	70%	20%	< 10%	< 10%
	392	409	70%	20%	10%	< 10%
	410	424	70%	30%	10%	< 10%
	425	462	60%	30%	10%	< 10%
	463	479	50%	30%	10%	< 10%
	480	486	50%	40%	10%	< 10%
	487	497	50%	40%	20%	< 10%
	498	533	40%	40%	20%	< 10%
	534	544	30%	40%	20%	< 10%
	545	572	30%	40%	30%	< 10%
	573	595	20%	40%	30%	< 10%
	596	615	20%	40%	40%	< 10%
	616	622	20%	40%	40%	10%
	623	649	10%	40%	40%	10%
	650	668	10%	40%	50%	10%
669	710	10%	30%	50%	10%	
711	723	< 10%	30%	50%	10%	
724	744	< 10%	30%	60%	10%	
745	745	< 10%	30%	60%	20%	

Grade	Minimum Star Score	Maximum Star Score	Probability Below Proficiency	Probability Approaching Proficiency	Probability At Proficiency	Probability Above Proficiency
	746	828	< 10%	20%	60%	20%
	829	829	< 10%	20%	60%	30%
	830	899	< 10%	10%	60%	30%
	900	910	< 10%	10%	60%	40%
	911	965	< 10%	10%	50%	40%
	966	969	< 10%	10%	50%	50%
	970	1007	< 10%	< 10%	50%	50%
	1008	1031	< 10%	< 10%	40%	50%
	1032	1089	< 10%	< 10%	40%	60%
	1090	1101	< 10%	< 10%	30%	60%
	1102	1178	< 10%	< 10%	30%	70%
	1179	1184	< 10%	< 10%	20%	70%
	1185	1294	< 10%	< 10%	20%	80%
	1295	1296	< 10%	< 10%	10%	80%
	1297	1400	< 10%	< 10%	10%	90%
6	0	158	> 90%	< 10%	< 10%	< 10%
	159	161	90%	< 10%	< 10%	< 10%
	162	310	90%	10%	< 10%	< 10%
	311	324	80%	10%	< 10%	< 10%
	325	389	80%	20%	< 10%	< 10%
	390	413	70%	20%	< 10%	< 10%
	414	435	70%	30%	< 10%	< 10%
	436	446	70%	30%	10%	< 10%
	447	490	60%	30%	10%	< 10%
	491	494	60%	40%	10%	< 10%
	495	538	50%	40%	10%	< 10%
	539	550	40%	40%	10%	< 10%
	551	583	40%	40%	20%	< 10%
	584	604	30%	40%	20%	< 10%
	605	621	30%	50%	20%	< 10%
	622	631	30%	50%	30%	< 10%
	632	655	20%	50%	30%	< 10%
	656	683	20%	40%	30%	< 10%
	684	692	20%	40%	40%	10%
693	750	10%	40%	40%	10%	
751	770	10%	40%	50%	10%	

Grade	Minimum Star Score	Maximum Star Score	Probability Below Proficiency	Probability Approaching Proficiency	Probability At Proficiency	Probability Above Proficiency
	771	797	10%	30%	50%	10%
	798	817	< 10%	30%	50%	10%
	818	847	< 10%	30%	50%	20%
	848	870	< 10%	20%	50%	20%
	871	903	< 10%	20%	60%	20%
	904	934	< 10%	20%	60%	30%
	935	976	< 10%	10%	50%	30%
	977	1043	< 10%	10%	50%	40%
	1044	1075	< 10%	10%	50%	50%
	1076	1081	< 10%	10%	40%	50%
	1082	1112	< 10%	< 10%	40%	50%
	1113	1168	< 10%	< 10%	40%	60%
	1169	1186	< 10%	< 10%	30%	60%
	1187	1264	< 10%	< 10%	30%	70%
	1265	1273	< 10%	< 10%	20%	70%
	1274	1400	< 10%	< 10%	20%	80%
7	0	172	> 90%	< 10%	< 10%	< 10%
	173	176	90%	< 10%	< 10%	< 10%
	177	338	90%	10%	< 10%	< 10%
	339	354	80%	10%	< 10%	< 10%
	355	424	80%	20%	< 10%	< 10%
	425	452	70%	20%	< 10%	< 10%
	453	470	70%	30%	< 10%	< 10%
	471	486	70%	30%	10%	< 10%
	487	536	60%	30%	10%	< 10%
	537	539	60%	40%	10%	< 10%
	540	588	50%	40%	10%	< 10%
	589	599	40%	40%	10%	< 10%
	600	637	40%	40%	20%	< 10%
	638	653	30%	40%	20%	< 10%
	654	678	30%	50%	20%	< 10%
	679	691	30%	50%	30%	< 10%
	692	735	20%	50%	30%	< 10%
	736	749	20%	40%	30%	< 10%
750	758	20%	40%	40%	< 10%	
759	762	10%	40%	40%	< 10%	

Grade	Minimum Star Score	Maximum Star Score	Probability Below Proficiency	Probability Approaching Proficiency	Probability At Proficiency	Probability Above Proficiency
	763	826	10%	40%	40%	10%
	827	854	10%	40%	50%	10%
	855	875	10%	30%	50%	10%
	876	896	< 10%	30%	50%	10%
	897	938	< 10%	30%	50%	20%
	939	979	< 10%	20%	50%	20%
	980	1031	< 10%	20%	50%	30%
	1032	1046	< 10%	10%	50%	30%
	1047	1107	< 10%	10%	50%	40%
	1108	1115	< 10%	10%	50%	50%
	1116	1169	< 10%	10%	40%	50%
	1170	1182	< 10%	10%	40%	60%
	1183	1207	< 10%	< 10%	40%	60%
	1208	1235	< 10%	< 10%	30%	60%
	1236	1298	< 10%	< 10%	30%	70%
	1299	1313	< 10%	< 10%	20%	70%
1314	1400	< 10%	< 10%	20%	80%	
8	0	130	> 90%	< 10%	< 10%	< 10%
	131	322	90%	10%	< 10%	< 10%
	323	336	80%	10%	< 10%	< 10%
	337	422	80%	20%	< 10%	< 10%
	423	448	70%	20%	< 10%	< 10%
	449	495	70%	30%	< 10%	< 10%
	496	499	60%	30%	< 10%	< 10%
	500	541	60%	30%	10%	< 10%
	542	558	60%	40%	10%	< 10%
	559	616	50%	40%	10%	< 10%
	617	647	40%	40%	10%	< 10%
	648	651	40%	50%	10%	< 10%
	652	674	40%	50%	20%	< 10%
	675	738	30%	50%	20%	< 10%
	739	745	20%	50%	20%	< 10%
	746	818	20%	50%	30%	< 10%
819	830	10%	50%	30%	< 10%	
831	831	10%	50%	40%	< 10%	
832	849	10%	50%	40%	10%	

Grade	Minimum Star Score	Maximum Star Score	Probability Below Proficiency	Probability Approaching Proficiency	Probability At Proficiency	Probability Above Proficiency
	850	930	10%	40%	40%	10%
	931	952	10%	40%	50%	10%
	953	953	10%	30%	50%	10%
	954	968	< 10%	30%	50%	10%
	969	1038	< 10%	30%	50%	20%
	1039	1048	< 10%	20%	50%	20%
	1049	1113	< 10%	20%	50%	30%
	1114	1133	< 10%	20%	50%	40%
	1134	1147	< 10%	10%	50%	40%
	1148	1173	< 10%	10%	40%	40%
	1174	1232	< 10%	10%	40%	50%
	1233	1251	< 10%	10%	40%	60%
	1252	1287	< 10%	10%	30%	60%
	1288	1295	< 10%	< 10%	30%	60%
	1296	1345	< 10%	< 10%	30%	70%
	1346	1385	< 10%	< 10%	20%	70%
1386	1400	< 10%	< 10%	20%	80%	

Note: Percentages may not sum to 100 due to rounding.

**Table D2. Estimated ILEARN Mathematics achievement level probabilities and associated Star Math scale score ranges**

Grade	Minimum Star Score	Maximum Star Score	Probability Below Proficiency	Probability Approaching Proficiency	Probability At Proficiency	Probability Above Proficiency
3	0	405	> 90%	< 10%	< 10%	< 10%
	406	406	90%	< 10%	< 10%	< 10%
	407	464	90%	10%	< 10%	< 10%
	465	468	80%	10%	< 10%	< 10%
	469	494	80%	20%	< 10%	< 10%
	495	502	70%	20%	< 10%	< 10%
	503	513	70%	30%	< 10%	< 10%
	514	515	70%	30%	10%	< 10%
	516	532	60%	30%	10%	< 10%
	533	533	60%	40%	10%	< 10%
	534	548	50%	40%	10%	< 10%
	549	549	50%	40%	20%	< 10%
	550	564	40%	40%	20%	< 10%
	565	569	30%	40%	20%	< 10%
	570	581	30%	40%	30%	< 10%
	582	586	20%	40%	30%	< 10%
	587	601	20%	40%	40%	< 10%
	602	602	10%	40%	40%	< 10%
	603	607	10%	40%	50%	< 10%
	608	608	10%	30%	50%	< 10%
	609	622	10%	30%	50%	10%
	623	631	10%	30%	60%	10%
	632	634	10%	20%	60%	10%
	635	639	< 10%	20%	60%	10%
	640	655	< 10%	20%	60%	20%
	656	657	< 10%	10%	60%	20%
	658	669	< 10%	10%	60%	30%
	670	671	< 10%	10%	50%	30%
672	684	< 10%	10%	50%	40%	
685	689	< 10%	10%	50%	50%	

Grade	Minimum Star Score	Maximum Star Score	Probability Below Proficiency	Probability Approaching Proficiency	Probability At Proficiency	Probability Above Proficiency
	690	692	< 10%	10%	40%	50%
	693	696	< 10%	< 10%	40%	50%
	697	705	< 10%	< 10%	40%	60%
	706	710	< 10%	< 10%	30%	60%
	711	723	< 10%	< 10%	30%	70%
	724	725	< 10%	< 10%	20%	70%
	726	745	< 10%	< 10%	20%	80%
	746	747	< 10%	< 10%	10%	80%
	748	787	< 10%	< 10%	10%	90%
	788	1400	< 10%	< 10%	< 10%	> 90%
4	0	485	> 90%	< 10%	< 10%	< 10%
	486	545	90%	10%	< 10%	< 10%
	546	548	80%	10%	< 10%	< 10%
	549	576	80%	20%	< 10%	< 10%
	577	582	70%	20%	< 10%	< 10%
	583	598	70%	30%	< 10%	< 10%
	599	603	60%	30%	< 10%	< 10%
	604	610	60%	30%	10%	< 10%
	611	616	60%	40%	10%	< 10%
	617	633	50%	40%	10%	< 10%
	634	638	40%	40%	10%	< 10%
	639	649	40%	40%	20%	< 10%
	650	657	30%	40%	20%	< 10%
	658	666	30%	40%	30%	< 10%
	667	673	20%	40%	30%	< 10%
	674	686	20%	40%	40%	< 10%
	687	688	10%	40%	40%	< 10%
	689	698	10%	40%	50%	< 10%
	699	704	10%	30%	50%	< 10%
	705	709	10%	30%	60%	< 10%
710	720	10%	30%	60%	10%	
721	732	< 10%	20%	60%	10%	
733	739	< 10%	20%	70%	10%	



Grade	Minimum Star Score	Maximum Star Score	Probability Below Proficiency	Probability Approaching Proficiency	Probability At Proficiency	Probability Above Proficiency
	740	744	< 10%	20%	70%	20%
	745	746	< 10%	10%	70%	20%
	747	755	< 10%	10%	60%	20%
	756	768	< 10%	10%	60%	30%
	769	772	< 10%	10%	60%	40%
	773	780	< 10%	10%	50%	40%
	781	787	< 10%	< 10%	50%	50%
	788	792	< 10%	< 10%	40%	50%
	793	801	< 10%	< 10%	40%	60%
	802	804	< 10%	< 10%	30%	60%
	805	816	< 10%	< 10%	30%	70%
	817	818	< 10%	< 10%	20%	70%
	819	836	< 10%	< 10%	20%	80%
	837	837	< 10%	< 10%	10%	80%
	838	873	< 10%	< 10%	10%	90%
	874	1400	< 10%	< 10%	< 10%	> 90%
5	0	535	> 90%	< 10%	< 10%	< 10%
	536	536	90%	< 10%	< 10%	< 10%
	537	595	90%	10%	< 10%	< 10%
	596	625	80%	20%	< 10%	< 10%
	626	627	70%	20%	< 10%	< 10%
	628	648	70%	30%	< 10%	< 10%
	649	652	60%	30%	< 10%	< 10%
	653	667	60%	40%	< 10%	< 10%
	668	675	50%	40%	< 10%	< 10%
	676	676	50%	40%	10%	< 10%
	677	684	50%	50%	10%	< 10%
	685	701	40%	50%	10%	< 10%
	702	710	30%	50%	10%	< 10%
	711	714	30%	50%	20%	< 10%
	715	720	30%	60%	20%	< 10%
	721	724	20%	60%	20%	< 10%
725	731	20%	50%	20%	< 10%	

Grade	Minimum Star Score	Maximum Star Score	Probability Below Proficiency	Probability Approaching Proficiency	Probability At Proficiency	Probability Above Proficiency
	732	742	20%	50%	30%	< 10%
	743	747	10%	50%	30%	< 10%
	748	758	10%	50%	40%	< 10%
	759	762	10%	40%	40%	< 10%
	763	764	10%	40%	40%	10%
	765	776	10%	40%	50%	10%
	777	789	< 10%	30%	50%	10%
	790	792	< 10%	30%	60%	20%
	793	804	< 10%	20%	60%	20%
	805	805	< 10%	20%	60%	30%
	806	811	< 10%	20%	50%	30%
	812	816	< 10%	10%	50%	30%
	817	827	< 10%	10%	50%	40%
	828	829	< 10%	10%	50%	50%
	830	838	< 10%	10%	40%	50%
	839	841	< 10%	10%	40%	60%
	842	845	< 10%	< 10%	40%	60%
	846	850	< 10%	< 10%	30%	60%
	851	861	< 10%	< 10%	30%	70%
	862	864	< 10%	< 10%	20%	70%
	865	880	< 10%	< 10%	20%	80%
	881	882	< 10%	< 10%	10%	80%
	883	917	< 10%	< 10%	10%	90%
918	918	< 10%	< 10%	< 10%	90%	
919	1400	< 10%	< 10%	< 10%	> 90%	
6	0	577	> 90%	< 10%	< 10%	< 10%
	578	578	90%	< 10%	< 10%	< 10%
	579	641	90%	10%	< 10%	< 10%
	642	643	80%	10%	< 10%	< 10%
	644	674	80%	20%	< 10%	< 10%
	675	678	70%	20%	< 10%	< 10%
	679	697	70%	30%	< 10%	< 10%
	698	707	60%	30%	< 10%	< 10%

Grade	Minimum Star Score	Maximum Star Score	Probability Below Proficiency	Probability Approaching Proficiency	Probability At Proficiency	Probability Above Proficiency
	708	709	60%	40%	< 10%	< 10%
	710	717	60%	40%	10%	< 10%
	718	735	50%	40%	10%	< 10%
	736	739	40%	40%	10%	< 10%
	740	747	40%	50%	10%	< 10%
	748	753	40%	50%	20%	< 10%
	754	769	30%	50%	20%	< 10%
	770	771	30%	50%	30%	< 10%
	772	787	20%	50%	30%	< 10%
	788	788	20%	40%	30%	< 10%
	789	793	20%	40%	40%	< 10%
	794	799	10%	40%	40%	< 10%
	800	807	10%	40%	40%	10%
	808	813	10%	40%	50%	10%
	814	828	10%	30%	50%	10%
	829	833	< 10%	30%	50%	20%
	834	844	< 10%	20%	50%	20%
	845	855	< 10%	20%	50%	30%
	856	857	< 10%	10%	50%	30%
	858	869	< 10%	10%	50%	40%
	870	881	< 10%	10%	40%	50%
	882	887	< 10%	10%	40%	60%
	888	894	< 10%	< 10%	30%	60%
	895	904	< 10%	< 10%	30%	70%
	905	908	< 10%	< 10%	20%	70%
	909	926	< 10%	< 10%	20%	80%
	927	929	< 10%	< 10%	10%	80%
	930	967	< 10%	< 10%	10%	90%
968	968	< 10%	< 10%	< 10%	90%	
969	1400	< 10%	< 10%	< 10%	> 90%	
7	0	603	> 90%	< 10%	< 10%	< 10%
	604	604	90%	< 10%	< 10%	< 10%
	605	670	90%	10%	< 10%	< 10%

Grade	Minimum Star Score	Maximum Star Score	Probability Below Proficiency	Probability Approaching Proficiency	Probability At Proficiency	Probability Above Proficiency
	671	671	80%	10%	< 10%	< 10%
	672	704	80%	20%	< 10%	< 10%
	705	708	70%	20%	< 10%	< 10%
	709	729	70%	30%	< 10%	< 10%
	730	736	60%	30%	< 10%	< 10%
	737	749	60%	40%	< 10%	< 10%
	750	750	60%	40%	10%	< 10%
	751	767	50%	40%	10%	< 10%
	768	769	50%	50%	10%	< 10%
	770	786	40%	50%	10%	< 10%
	787	787	40%	50%	20%	< 10%
	788	806	30%	50%	20%	< 10%
	807	808	20%	50%	20%	< 10%
	809	824	20%	50%	30%	< 10%
	825	826	20%	40%	30%	< 10%
	827	828	20%	40%	40%	10%
	829	847	10%	40%	40%	10%
	848	855	10%	30%	50%	10%
	856	862	10%	30%	50%	20%
	863	865	< 10%	30%	50%	20%
	866	871	< 10%	20%	50%	20%
	872	885	< 10%	20%	50%	30%
	886	894	< 10%	10%	50%	40%
	895	897	< 10%	10%	40%	40%
	898	910	< 10%	10%	40%	50%
	911	915	< 10%	10%	40%	60%
	916	917	< 10%	10%	30%	60%
	918	923	< 10%	< 10%	30%	60%
	924	934	< 10%	< 10%	30%	70%
	935	939	< 10%	< 10%	20%	70%
	940	958	< 10%	< 10%	20%	80%
	959	961	< 10%	< 10%	10%	80%
	962	1002	< 10%	< 10%	10%	90%

Grade	Minimum Star Score	Maximum Star Score	Probability Below Proficiency	Probability Approaching Proficiency	Probability At Proficiency	Probability Above Proficiency
	1003	1003	< 10%	< 10%	< 10%	90%
	1004	1400	< 10%	< 10%	< 10%	> 90%
8	0	640	> 90%	< 10%	< 10%	< 10%
	641	703	90%	10%	< 10%	< 10%
	704	704	80%	10%	< 10%	< 10%
	705	736	80%	20%	< 10%	< 10%
	737	738	70%	20%	< 10%	< 10%
	739	760	70%	30%	< 10%	< 10%
	761	764	60%	30%	< 10%	< 10%
	765	780	60%	40%	< 10%	< 10%
	781	790	50%	40%	< 10%	< 10%
	791	799	50%	50%	10%	< 10%
	800	817	40%	50%	10%	< 10%
	818	829	30%	50%	10%	< 10%
	830	836	30%	50%	20%	< 10%
	837	851	20%	50%	20%	< 10%
	852	852	20%	50%	20%	10%
	853	859	20%	50%	30%	10%
	860	870	10%	50%	30%	10%
	871	874	10%	40%	30%	10%
	875	879	10%	40%	40%	10%
	880	887	10%	40%	40%	20%
	888	893	10%	30%	40%	20%
	894	895	< 10%	30%	40%	20%
	896	903	< 10%	30%	40%	30%
	904	908	< 10%	20%	40%	30%
	909	921	< 10%	20%	40%	40%
	922	931	< 10%	10%	40%	50%
932	933	< 10%	10%	30%	50%	
934	947	< 10%	10%	30%	60%	
948	952	< 10%	10%	30%	70%	
953	955	< 10%	< 10%	30%	70%	
956	963	< 10%	< 10%	20%	70%	

Grade	Minimum Star Score	Maximum Star Score	Probability Below Proficiency	Probability Approaching Proficiency	Probability At Proficiency	Probability Above Proficiency
	964	982	< 10%	< 10%	20%	80%
	983	986	< 10%	< 10%	10%	80%
	987	1031	< 10%	< 10%	10%	90%
	1032	1032	< 10%	< 10%	< 10%	90%
	1033	1400	< 10%	< 10%	< 10%	> 90%

Note: Percentages may not sum to 100 due to rounding.

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# Independent Review and Evaluation of “Relating Star Reading and Star Math to the Indiana Learning Evaluation Assessment Readiness Network (ILEARN) Tests”

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Prepared for Renaissance Learning

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I have read and reviewed the report, “Relating Star Reading and Star Math to the Indiana Learning Evaluation Assessment Readiness Network (ILEARN) Tests” produced by Renaissance Learning. I have reviewed the methodology that was used in the study and the results and conclusions of the study. Below is my assessment of the quality of the work performed.

## Summary of the Study

This is a linking study from two interim assessments used to help predict success on ILEARN ELA and math grade 3 assessments. The study concludes that the interim assessments of Star Reading and Star Math are accurate predictors of the ILEARN tests and that the results from these tests will enable teachers to accurately identify students at risk of not meeting progress goals in time to make changes to instruction, and forecast the ILEARN performance level of all students.

The linking study included sample sizes that ranged from approximately 6,000 to 18,000 for reading (varying across grades 3–8), and 5,000 to 11,000 for math. The correlations between the Star assessments and ILEARN assessments were essentially the same for reading and math, and were strong, at 0.80.

The equipercentile equating was conducted to link the scores from the Star assessments to the ILEARN assessments. Additionally, a multinomial logistic regression was performed to estimate probabilities of ILEARN performance categories based on Star assessment scores. To evaluate the linking, the error in the linking was estimated and the results of the linking were applied to a holdout sample not used in obtaining the linking relationship. The results of these analyses indicate that the linking was successful.

Once the linking was confirmed, the predictive accuracy of the scores was evaluated. The actual ILEARN scores were compared to projected Star scores and the correlation between the projected scores and the actual scores were strong (approximately 0.80), in all grades and both subjects. The projected Star scores were also used to classify students as above/below proficient. Using both Fall and Winter projected scores, 80%-85% of students were correctly classified, with the math projections being slightly more accurate (83%-85%) than reading (81%-82%) with the higher percentages obtained with Winter scores as compared to Fall scores, as expected. Overall diagnostic accuracy was evaluated with ROC curves, and these results indicate high degree of accuracy.



Other measures of predictive accuracy were also included, including sensitivity, specificity, positive predictive value, and negative predictive value. All of these indices indicate strong predictive power of identifying the students that are at risk of not meeting proficiency.

## **My Findings**

In this section I will provide my opinion regarding the appropriateness of the methods used, the quality of the results presented, and the reasonableness of the conclusions and claims that were made.

## **Methodology**

The study utilized an equipercentile equating method to perform the linking between the Star assessments and the ILEARN assessments. This methodology uses the score distributions of the two different tests to link scores on the two tests. Given that the test scores were highly correlated (0.80) it is appropriate to link the scores, and equipercentile would be a useful methodology, as the rank ordering of the students is maintained very well between the assessments. Furthermore, the sample sizes, and sample representation used should provide meaningful and accurate results.

It was noted that a holdout sample was chosen to evaluate the quality of the linking as well. This step is not always taken, unfortunately, and it provides strong evidence of the quality of the linking. The choice to use a holdout sample for evaluation was strong.

In addition to the equipercentile equating the use of multinomial logistic regression was notable, as it was used to look at the probability of being in each category of the ILEARN assessment based on the Star scores. This analysis provided further indication of the ability to predict ILEARN status from Star scores. The choice of analysis was appropriate and commendable.

ROC analysis was conducted to evaluate the diagnostic accuracy and this is a strong methodology to address this concern. Additional statistics such as specificity, sensitive, positive/negative predictive value, and predictive error are all standard statistics for evaluating the diagnostic accuracy.

Overall, I find the choice of methods to be appropriate, the application of the methods to be accurate, and do not have additional analyses to recommend.

## **Results**

The results of the linking study were strong. The linking appears to have been successful based on the resulting correlations, ROC analysis, and other computed statistics. The predictive power of Star assessments to the ILEARN assessments was also shown to be strong, using either Fall or Winter Star scores. These results seem to be based on sound methodology and suggest a strong link, for both reading and math.

## Conclusions and Claims

The report claims that the results of study indicate:

Results from the linking analysis revealed that Star Reading and Star Math are accurate predictors of the ILEARN 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.
2. Forecast the percent of students at each ILEARN performance level to serve as an early warning system for building and district administrators and allow redirection of resources as needed.

In my review of the report, I agree that the Star assessments allow teachers to identify students likely to miss reading and math progress goals. Given that the Fall scores provide good prediction, there certainly is time to make meaningful adjustment to instruction.

With respect to forecasting the percent of students at each level, I agree with the conclusion that the Star assessments will allow for a reasonable estimate of the percent of students at each level, given the accuracy of classification.

In summary, I agree with the conclusions of the report, and support that the Star Assessments provide a good prediction for the ILEARN assessments.

## About the Independent Reviewer

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Lisa A. Keller is an Associate Professor in the Research, Educational Measurement, and Psychometrics (REMP) concentration in the College of Education at the University of Massachusetts Amherst. She earned her Ed. D. in psychometrics and her M.S. in mathematics from the University of Massachusetts Amherst in 2002, and her B.S. in mathematics (magna cum laude) from St. Michael's College in 1993. She is an active member of several professional organizations, such as the Psychometric Society, the American Statistical Association, and the National Council on Measurement in Education.

Dr. Keller has expertise in multivariate statistics, Bayesian analysis, and psychometrics. She teaches courses in introductory and intermediate statistics, as well as advises graduate students on research projects. She also directs the Statistical Consulting Center, which provides statistical support for the students and faculty in the College of Education.

Dr. Keller has worked as a statistical consultant for the University of Massachusetts Medical School in Worcester, providing data analysis and technical reports, as well as designing and implementing research studies. She worked as the primary evaluation expert for a grant through the Noyce Foundation to evaluate the effectiveness of the Massachusetts Education Reform Act. Her duties included designing the evaluation plan, coordinating the data collection and writing the evaluation report. This work was then used for a grant proposal to extend the project through the National Science Foundation. Currently, she is directing a project to compare the content equivalence of two testing programs for the Massachusetts Board of Higher Education. She has also completed research projects for the American Institute of Certified Public Accountants, Educational Testing Service, the National Board of Medical Examiners, the Massachusetts Department of Education and Harcourt Educational Measurement.

Dr. Keller's primary research interests focus on equating methodology and parameter estimation in Item Response Theory. She has presented her work at national and international conferences, including the annual meetings of the American Educational Research Association, the National Council on Measurement in Education, the International Testing Commission, and the Association of American Medical College's Research in Medical Education conference. She has been invited to present her research at the joint meetings of The American Statistical Association, the International Biometric Society, The Institute of Mathematical Statistics, and The Statistical Society of Canada in 2003. She served as the Chair to the National Council on Measurement in Education's Graduate Student Issues Committee (2001–2002). Her work has been published in *Academic Medicine*, *Applied Measurement in Education*, *The CLEAR Exam Review*, *Contemporary Psychology*, *Journal of Experimental Education*, and *School Psychology Review*. She is an occasional reviewer for professional journals including *Journal of Educational and Behavioral Statistics*. In addition, she is the author or coauthor to numerous technical reports and software programs.