Predictability Study of Istation ISIP (Math and Reading) and Ohio AIR (Math and English Language Arts) Tests for 3rd – 8th Grade Students in the Youngstown City School District

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Executive Summary

The enclosed analysis will show that the Istation ISIP assessment, both reading and math, can predict performance on the Ohio State AIR assessments in the Youngstown City School District. This analysis used the April 2018 ISIP scores and the Spring 2018 Ohio AIR test results for students in grades 3 through 8. All data was from students in the Youngstown City School District. Only students who had both the ISIP and AIR assessments were included in the study. A linear regression was used to fit a model which predicted the scaled AIR test score from the April ISIP score. This regression was conducted separately for each grade level and each discipline (i.e. reading and math). Predictability bands were then computed using a 95% confidence interval, and identified the ISIP scores which predicted each of the 5 Ohio achievement levels.

Introduction

Istation's Indicators of Progress, also known as ISIP, is a computer-adaptive testing (CAT) system that provides continuous progress monitoring (CPM) assessments in reading and math. The purpose of ISIP Reading and Math is to measure reading and math ability and identify deficits in critical areas to provide continuous differentiated instruction. ISIP accomplishes this by delivering short tests, at least monthly, that target critical areas to inform instruction. Student results are immediately available online for teachers and administrators and illustrate each student's past and present performance and skill growth.

The Ohio State Tests indicate how well students are growing in the knowledge and skills outlined in Ohio's Learning Standards. The tests help guide and strengthen future teaching so schools can be sure that they are preparing students for long-term success in school, college, careers and life. Test results also allow citizens to know how their local schools are performing compared to others around the state. The Ohio Department of Education (ODE) worked with Ohio educators and the American Institutes for Research (AIR) to develop the state tests. Content advisory committees, as well as fairness and sensitivity committees discussed whether test items were accurate and fair, were suitable for the course and measured an aspect of Ohio's Learning Standards.

Student performance is graded on a scale based on the assessment and grade level. There are 5 achievement levels which are defined by various cut scores, depending on the assessment. The achievement levels are, in order of proficiency, Limited, Basic, Proficient, Accelerated, and Advanced. Generally, 700 indicates a proficient score, with the other bands identified by a variety of cut scores. For more information, please refer to the document on ODE's site:

http://oh.portal.airast.org/core/fileparse.php/3094/urlt/Understanding_State_Tests_Reports_2017-2018.pdf

This study provides evidence that ISIP Overall Reading and Math Ability scores can predict AIR Test ELA and Math performance levels 3rd through 8th grade students in the Youngstown City School District. To provide as much useful information as possible for teachers, parents, and administrators to prepare students for AIR Tests, the scores to predict AIR performance levels are provided.

Data

Data from the April ISIP benchmark assessment in both reading and math was selected for students in grades 3 through 8, in addition to the scaled scores from the Spring 2018 AIR assessment in Math and English Language Arts (ELA). April was chosen as it was the closest ISIP assessment to the Spring 2018 AIR testing window. Each student analyzed had both an ISIP and AIR assessment in either reading or math. Table 1 below shows the descriptive statistics of the students and measures used. The ISIP Reading assessment was a required assessment for students in grades K-8, but the ISIP Math assessment was an optional assessment, so therefore the sample size is smaller.

All analysis was done in the R programming language, and all graphs were done using the ggplot2 package.

Table 1 – Descriptive Statistics

		ISIP-Reading		AIR-ELA			ISIP-Math		AIR-Math	
Grade	n	Mean	SD	Mean	SD	n	Mean	SD	Mean	SD
3	474	230.0	21.92	678.6	41.66	315	1820.0	210.26	675.1	38.17
4	358	1796.7	203.23	684.9	38.63	299	1868.0	196.38	685.0	37.36
5	340	1855.0	217.30	685.3	38.68	225	1853.0	185.91	680.1	30.53
6	320	1917.5	277.05	673.8	34.37	193	1940.0	205.72	683.9	28.05
7	294	1978.6	275.81	679.0	33.69	147	1941.0	155.76	675.3	34.18
8	303	2082.0	307.46	681.8	26.09	183	1961.0	159.26	689.5	25.28

Correlation

Table 2 shows high correlation coefficients between the ISIP scores and the AIR scaled scores, indicating a strong relationship between the measures.

Table 2 – Correlation Coefficients

Grade	Reading	Math
3	0.636	0.652
4	0.588	0.717
5	0.676	0.597
6	0.658	0.712
7	0.718	0.778
8	0.708	0.741

Regression

A simple linear regression was performed to predict the AIR scaled score from the ISIP score. The model statistics are shown in Table 3 for the Reading/ELA tests and Table 4 for the Math tests.

Table 3
Linear Regression Model Statistics –AIR ELA Scaled Score as a function of Istation Reading ISIP

Grade	Coefficient	Estimate	StdError	T value	P value	Signif	R-squared
3	(Intercept)	400.6538	15.5976	25.69	<2e-16	0.000	0.4044
	ISIP	1.2084	0.0675	17.90	<2e-16	0.000	
4	(Intercept)	484.00	14.73	32.86	<2e-16	0.000	0.3459
	ISIP	0.1118	0.008	13.72	<2e-16	0.000	
5	(Intercept)	461.9	13.32	34.67	<2e-16	0.000	0.4576
	ISIP	0.1204	0.007	16.89	<2e-16	0.000	
6	(Intercept)	517.3	10.15	50.96	<2e-16	0.000	0.4328
	ISIP	0.008	0.005	15.58	<2e-16	0.000	
7	(Intercept)	505.5	9.947	50.82	<2e-16	0.000	0.5149
	ISIP	0.009	0.005	17.6	<2e-16	0.000	
8	(Intercept)	556.6	7.267	76.59	<2e-16	0.000	0.5019
	ISIP	0.06	0.0035	17.42	<2e-16	0.000	

Table 4
Linear Regression Model Statistics –AIR Math Scaled Score as a function of Istation Math ISIP

Grade	Coefficient	Estimate	StdError	T value	P value	Signif	R-squared
3	(Intercept)	459.6	14.25	32.25	<2e-16	0.000	0.4255
	ISIP	0.1184	0.0078	15.23	<2e-16	0.000	
4	(Intercept)	430.1	14.45	29.76	<2e-16	0.000	0.5144
	ISIP	0.1365	0.0077	17.74	<2e-16	0.000	
5	(Intercept)	498.33	16.42	30.34	<2e-16	0.000	0.3568
	ISIP	0.0981	0.009	11.12	<2e-16	0.000	
6	(Intercept)	495.7	13.52	36.67	<2e-16	0.000	0.5063
	ISIP	0.097	0.0069	14.00	<2e-16	0.000	
7	(Intercept)	343.78	22.27	15.44	<2e-16	0.000	0.606
	ISIP	0.17	0.011	14.93	<2e-16	0.000	
8	(Intercept)	458.9	15.59	29.43	<2e-16	0.000	0.5489
	ISIP	0.1177	0.0079	14.84	<2e-16	0.000	

Prediction Bands

To determine prediction bands, all the possible ISIP scores were entered into the regression models to determine predicted AIR scaled scores, including the upper and lower bounds as estimated by the 95% confidence interval. These estimated AIR scores were then compared to the AIR performance levels. Because of the relatively small sample size across grade levels and disciplines, the bands are not evenly spaced throughout the grade levels. It is anticipated that these grade levels will even out as the district gains more experience and fidelity with the Istation program.

Table 5 – Prediction Bands – Reading/ELA
ISIP Scores Required to Predict Ohio Tests Performance Levels

Grade	Limited	Basic	Proficient	Accelerated	Advanced
3	<=221	222-244	245-263	264-284	>=285
4	<=1664	1665-1899	1900-2103	2104-2325	>=2326
5	<=1687	1688-1949	1950-2142	2143-2368	>=2369
6	<=1808	1809-2189	2190-2467	2468-2752	>=2753
7	<=1842	1843-2180	2181-2443	2444-2692	>=2693
8	<=2051	2052-2340	2341-2721	2722-3007	>=3008

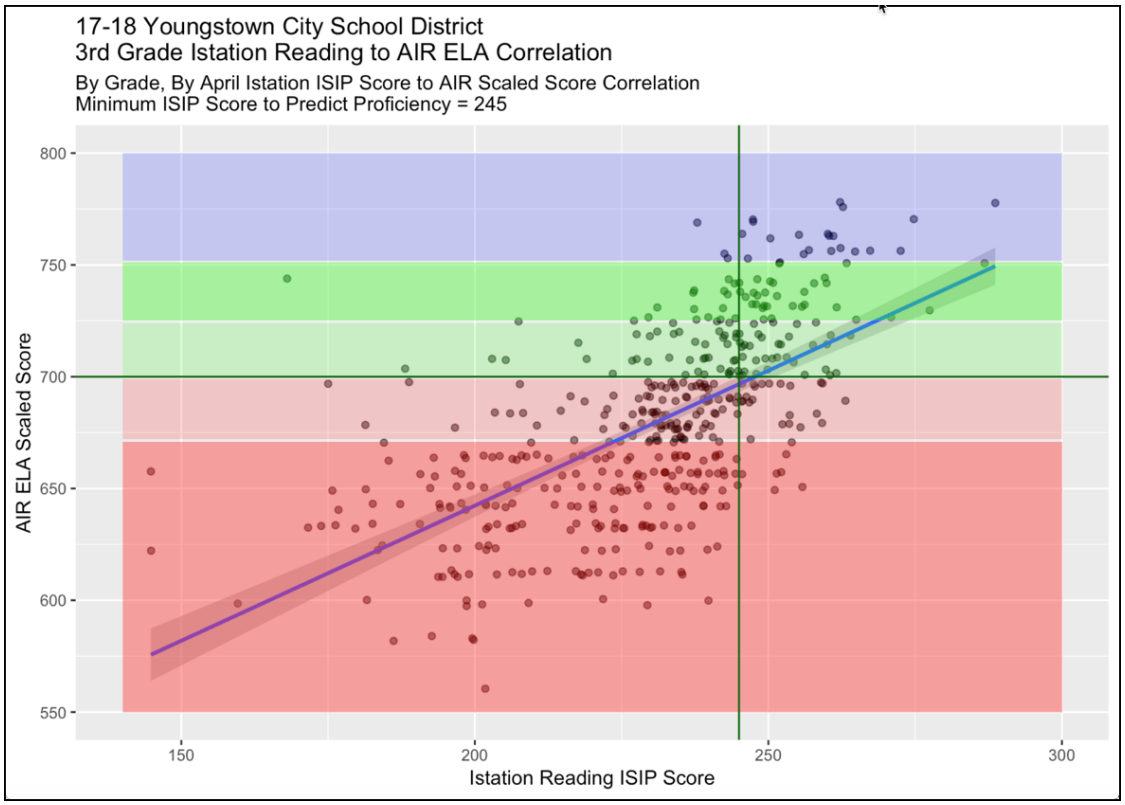
Table 6 – Prediction Bands – Math
ISIP Scores Required to Predict Ohio Tests Performance Levels

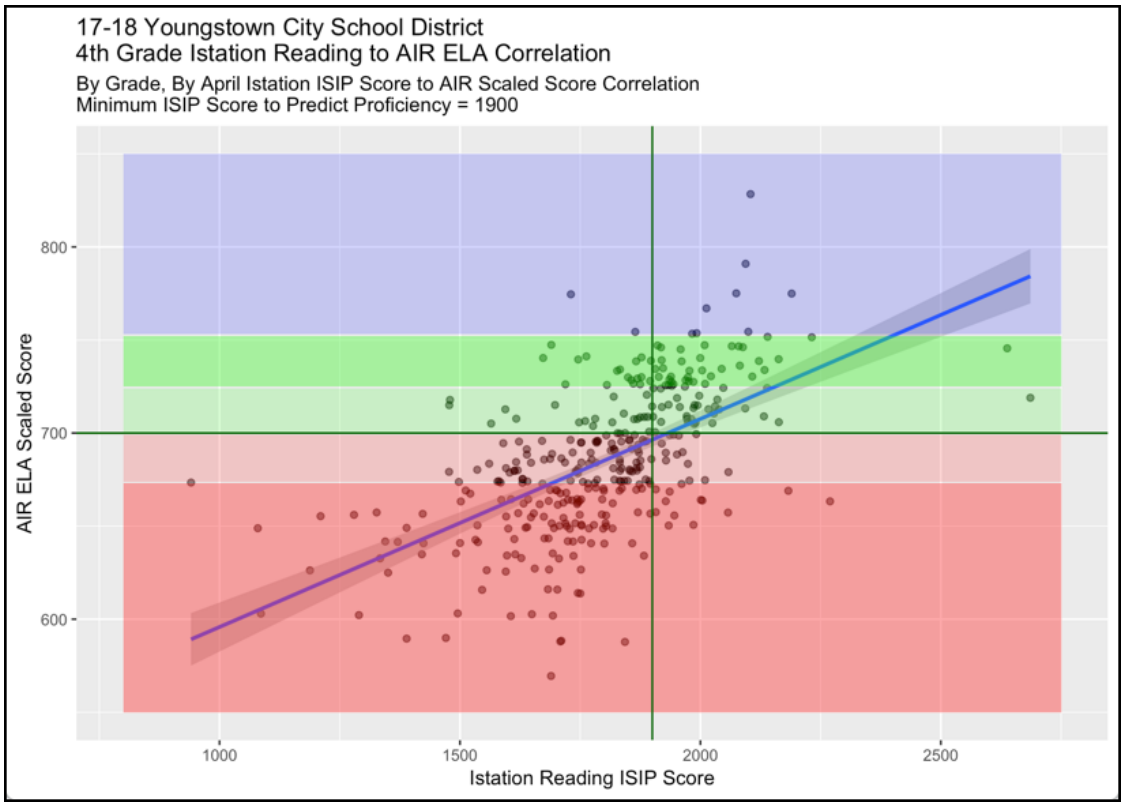
Grade	Limited	Basic	Proficient	Accelerated	Advanced
3	<=1859	1860-1994	1995-2186	2187-2398	>=2399
4	<=1853	1854-1954	1955-2125	2126-2352	>=2353
5	<=1849	1850-2012	2013-2235	2236-2480	>=2481
6	<=1890	1891-2071	2072-2304	2305-2478	>=2479
7	<=1970	1971-2059	2060-2192	2193-2349	>=2350
8	<=1943	1944-2027	2028-2221	2222-2366	>=2367

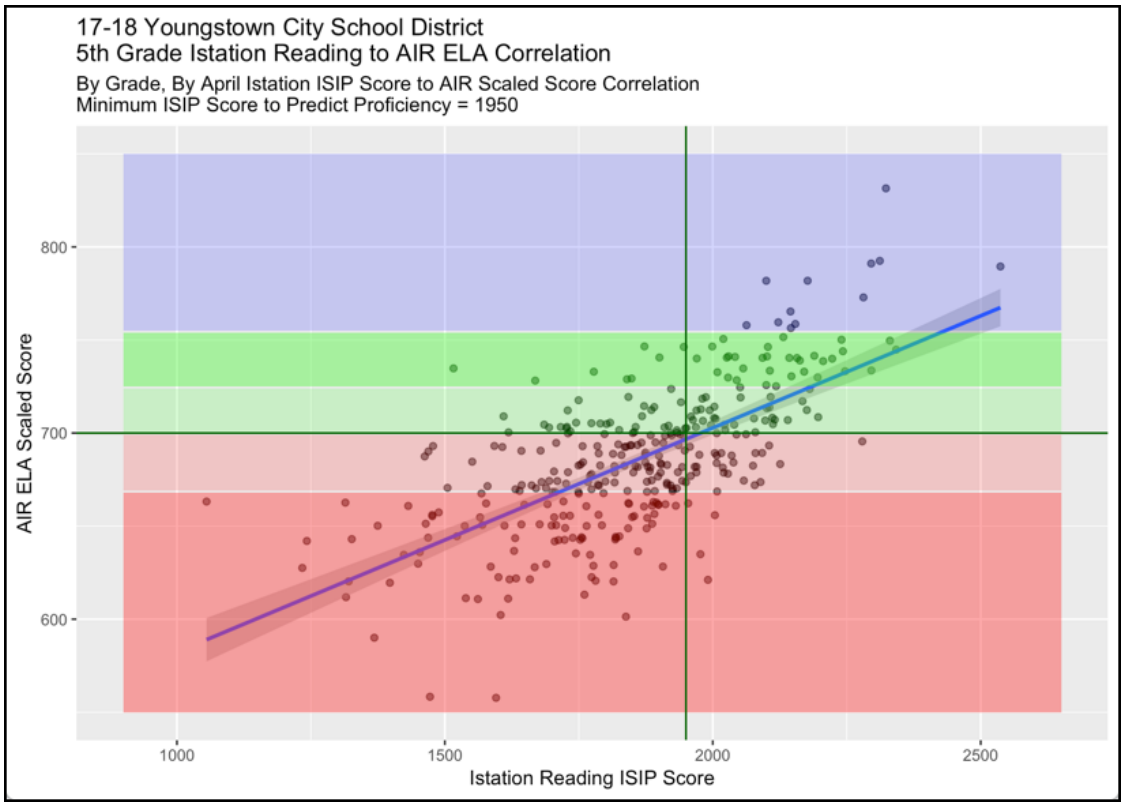
Conclusion

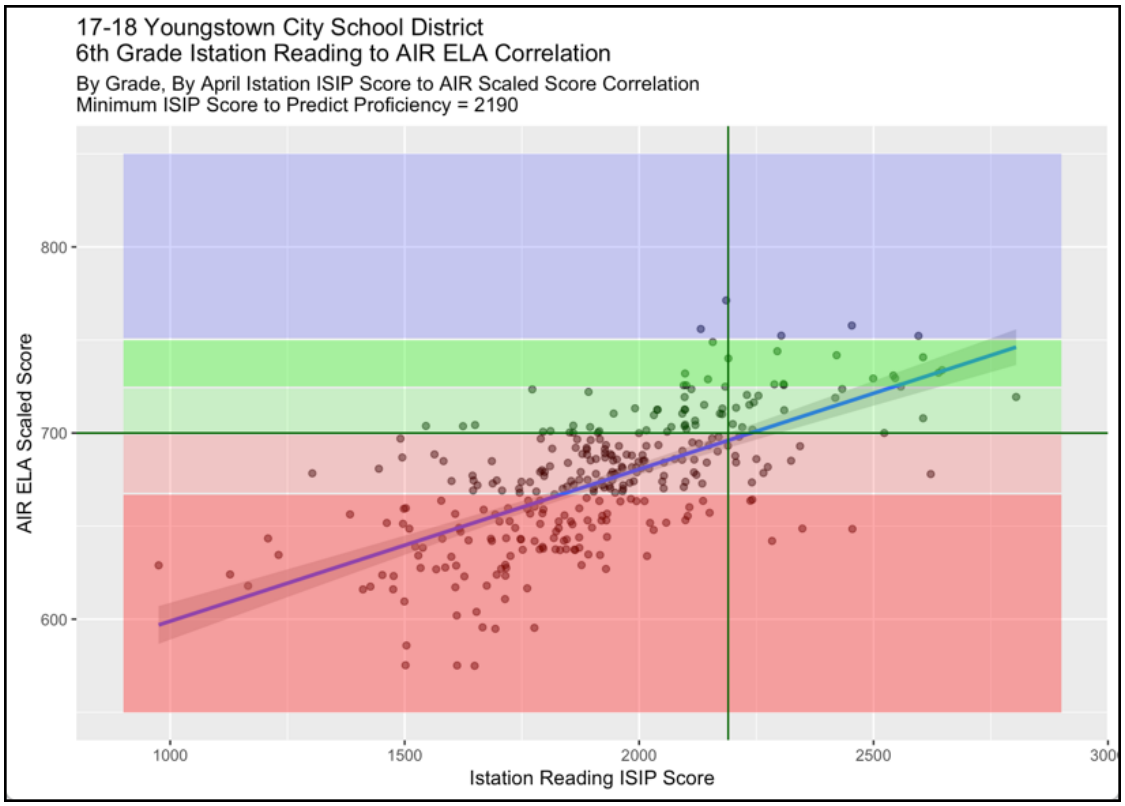
In conclusion, results of this analysis show that, for Youngstown City School District in the 2017-2018 school year, that ISIP scores in reading and math are predictive of results on the Ohio State AIR tests. The prediction bands (Tables 5 and 6) should be used to the maximum extent possible, starting in August 2018, to identify students who may be at risk for not passing the AIR tests.

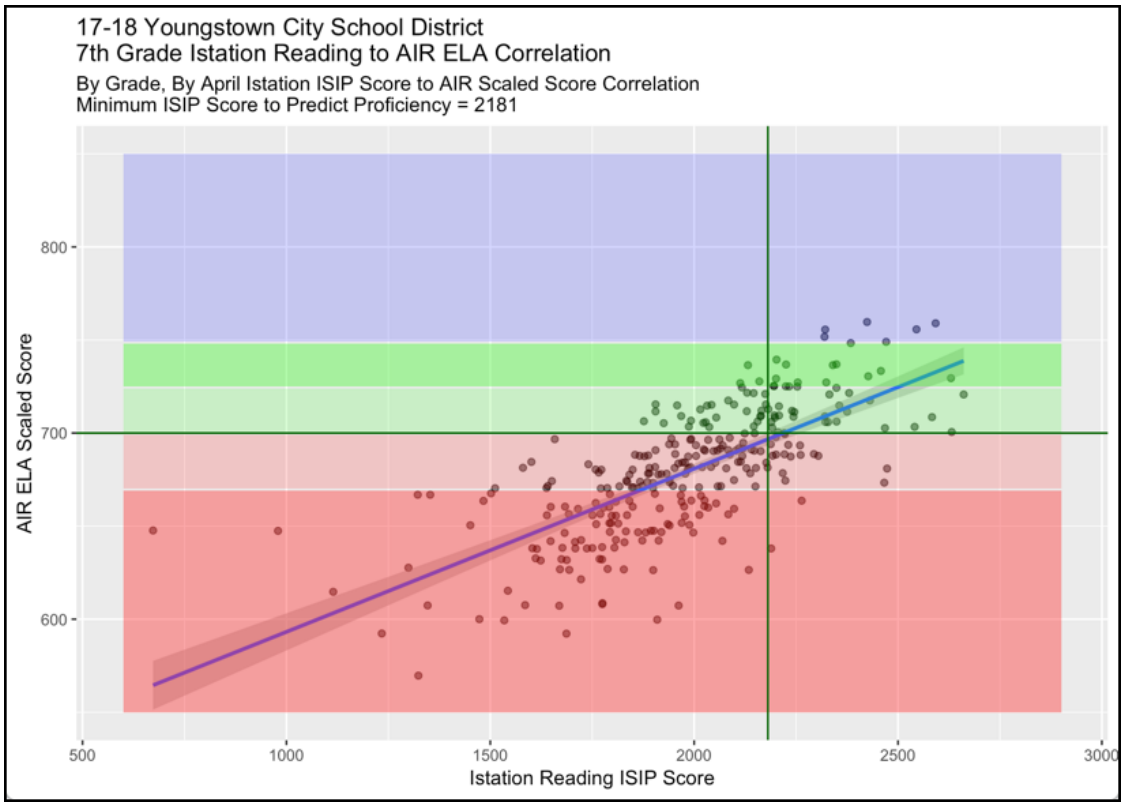
Graphs – English Language Arts

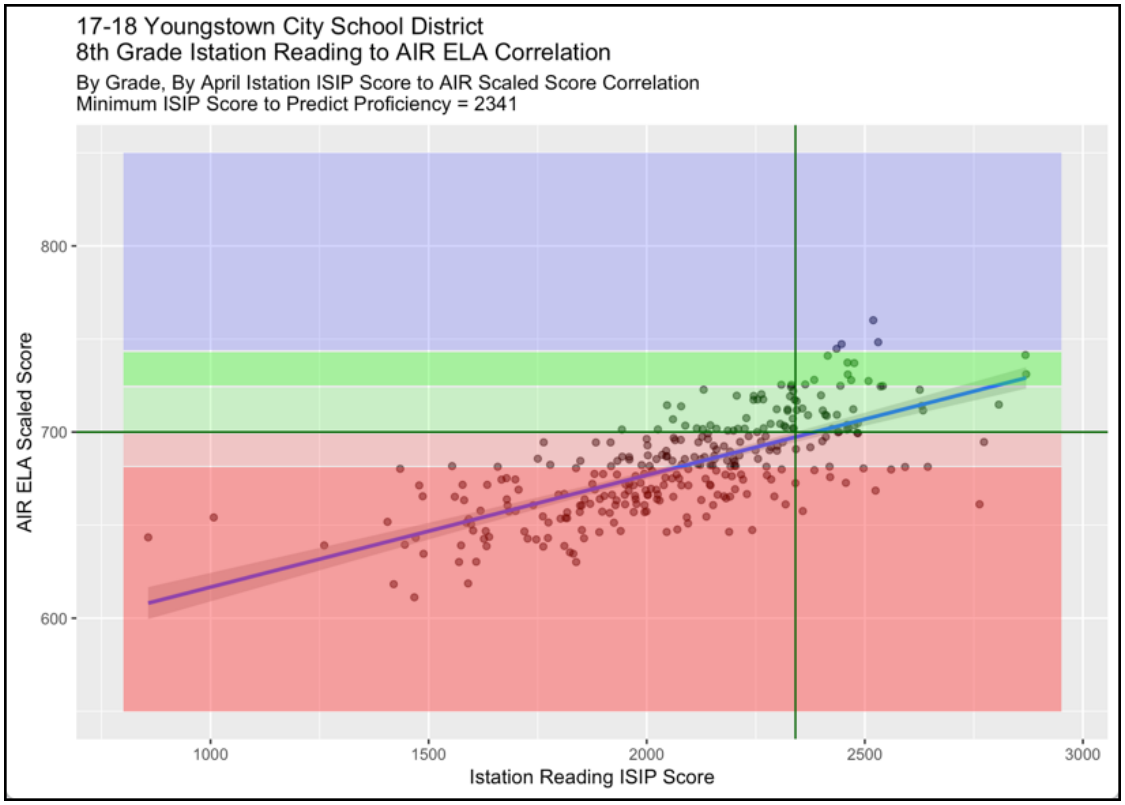




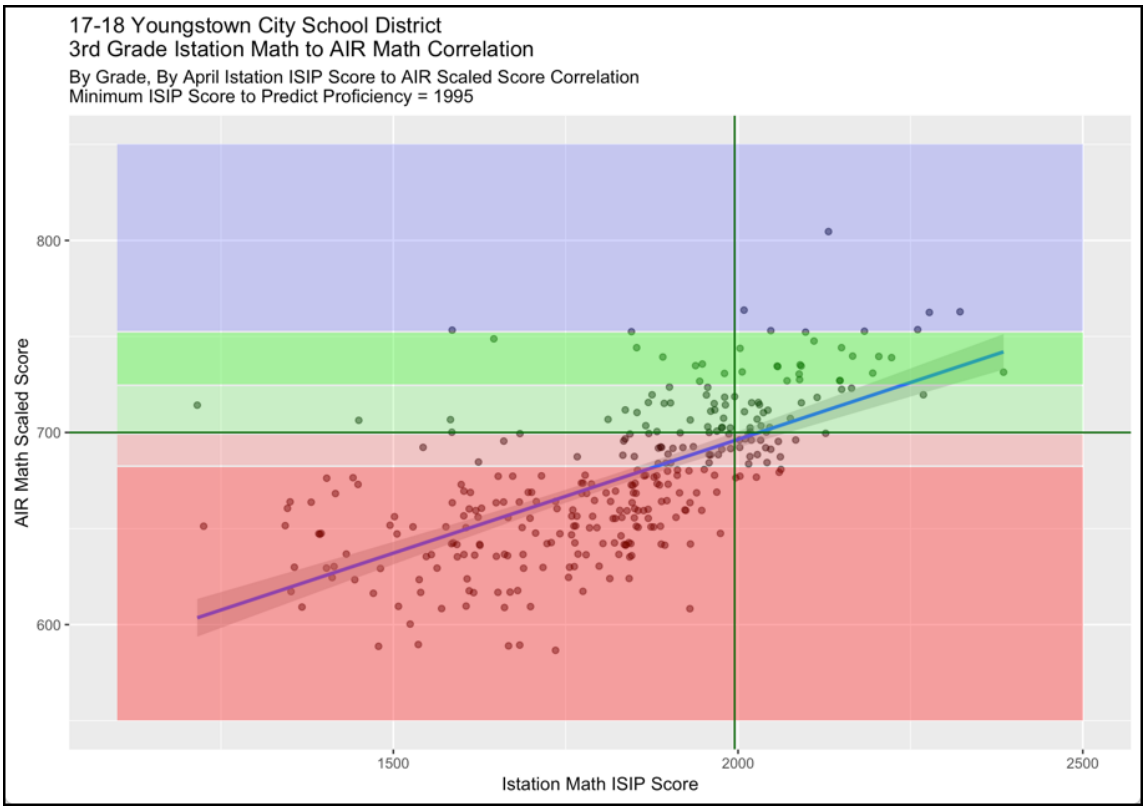

17-18 Youngstown City School District
5th Grade Istation Reading to AIR ELA Correlation
By Grade, By April Istation ISIP Score to AIR Scaled Score Correlation
Minimum ISIP Score to Predict Proficiency = 1950
AIR ELA Scaled Score
800
700
600
1000
1500
2000
2500
Istation Reading ISIP Score

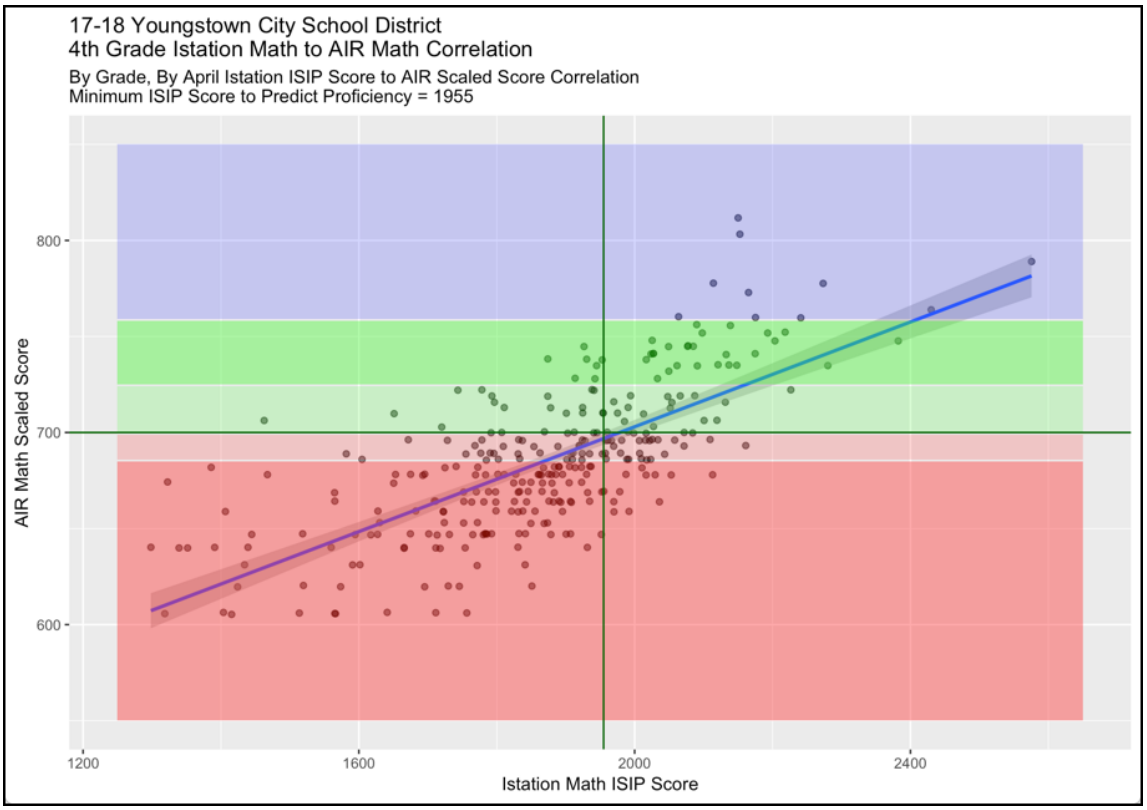

17-18 Youngstown City School District
6th Grade Istation Reading to AIR ELA Correlation
By Grade, By April Istation ISIP Score to AIR Scaled Score Correlation
Minimum ISIP Score to Predict Proficiency = 2190
AIR ELA Scaled Score
800
700
600
1000
1500
2000
2500
Istation Reading ISIP Score

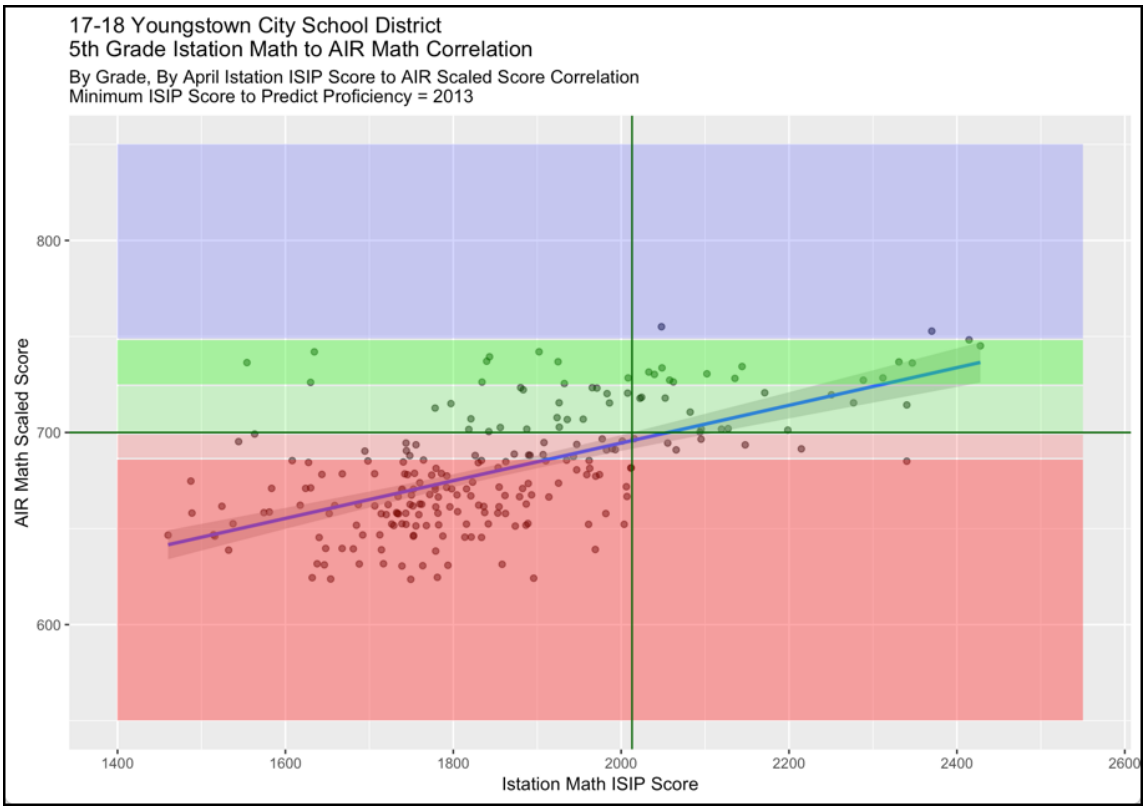

17-18 Youngstown City School District
7th Grade Istation Reading to AIR ELA Correlation
By Grade, By April Istation ISIP Score to AIR Scaled Score Correlation
Minimum ISIP Score to Predict Proficiency = 2181
AIR ELA Scaled Score
800
700
600
500
1000
1500
2000
2500
3000
Istation Reading ISIP Score

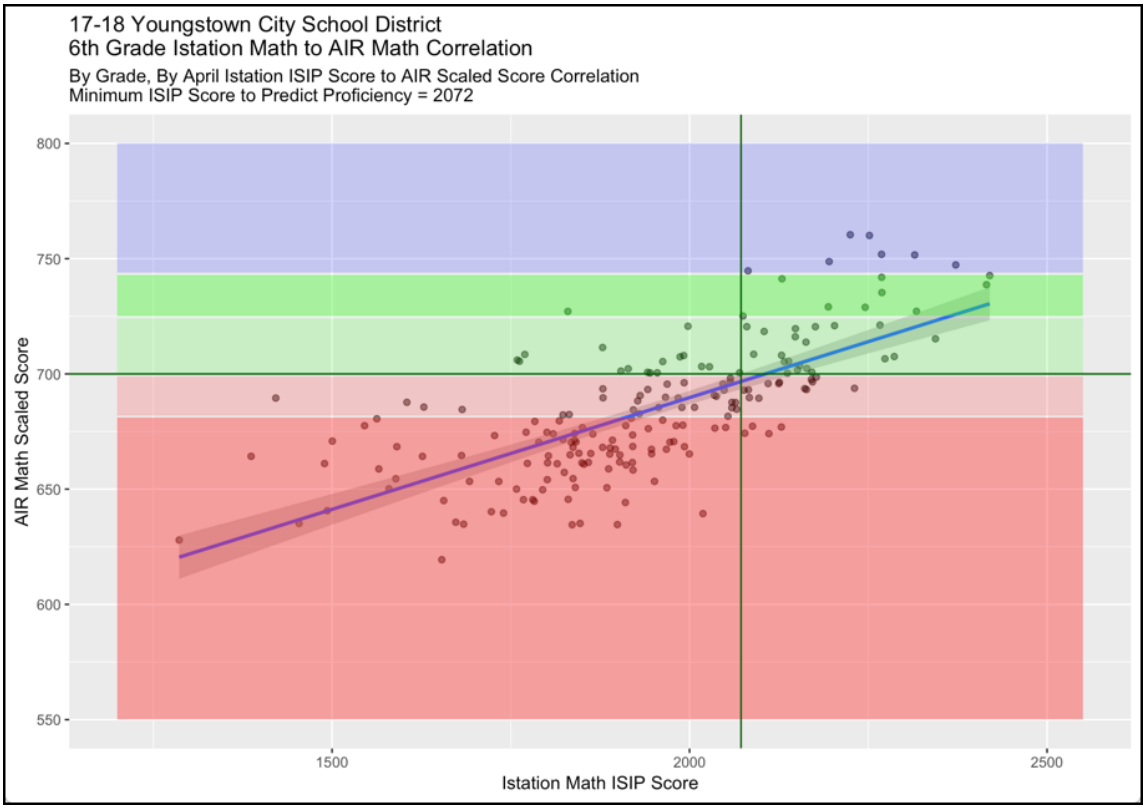

17-18 Youngstown City School District
8th Grade Istation Reading to AIR ELA Correlation
By Grade, By April Istation ISIP Score to AIR Scaled Score Correlation
Minimum ISIP Score to Predict Proficiency = 2341
AIR ELA Scaled Score
800
700
600
1000
1500
2000
2500
3000
Istation Reading ISIP Score

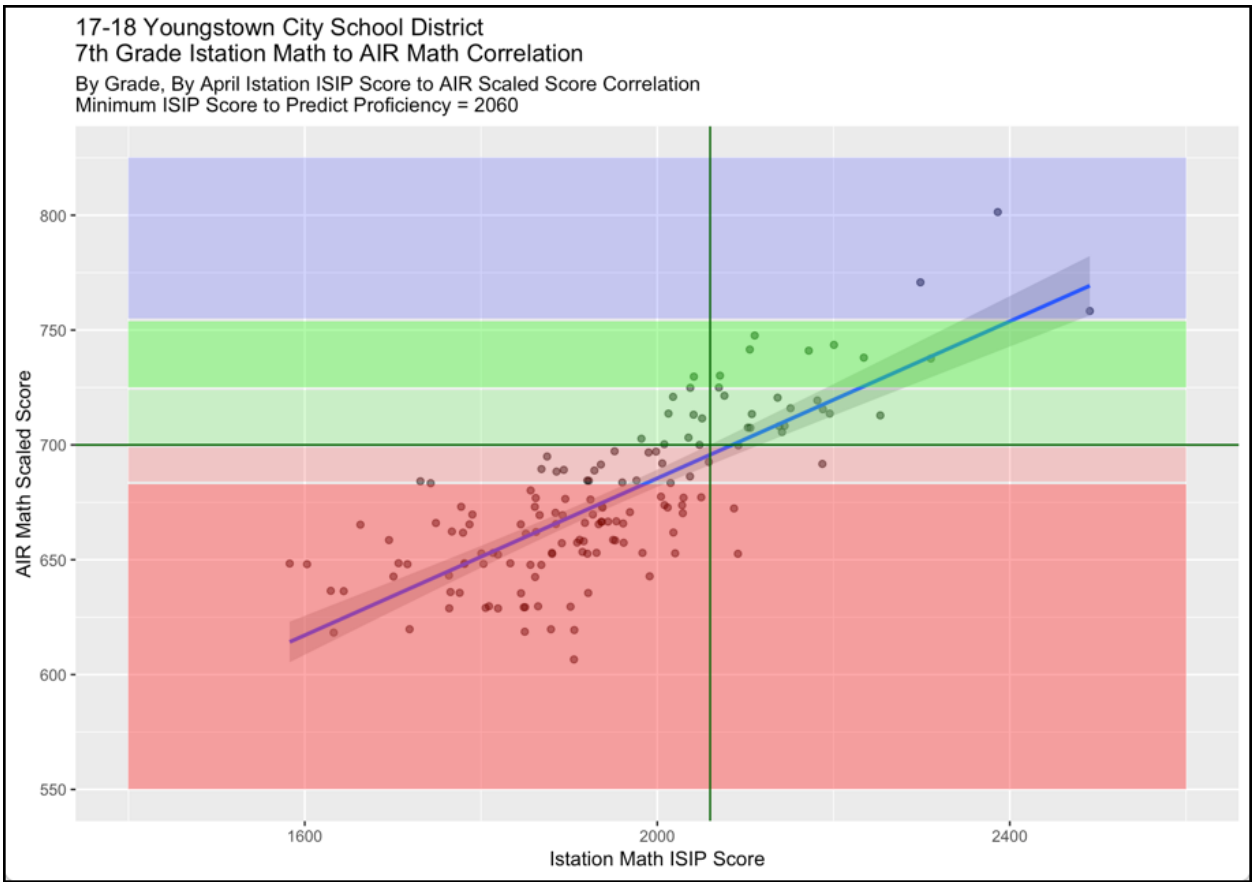
Graphs – Mathematics

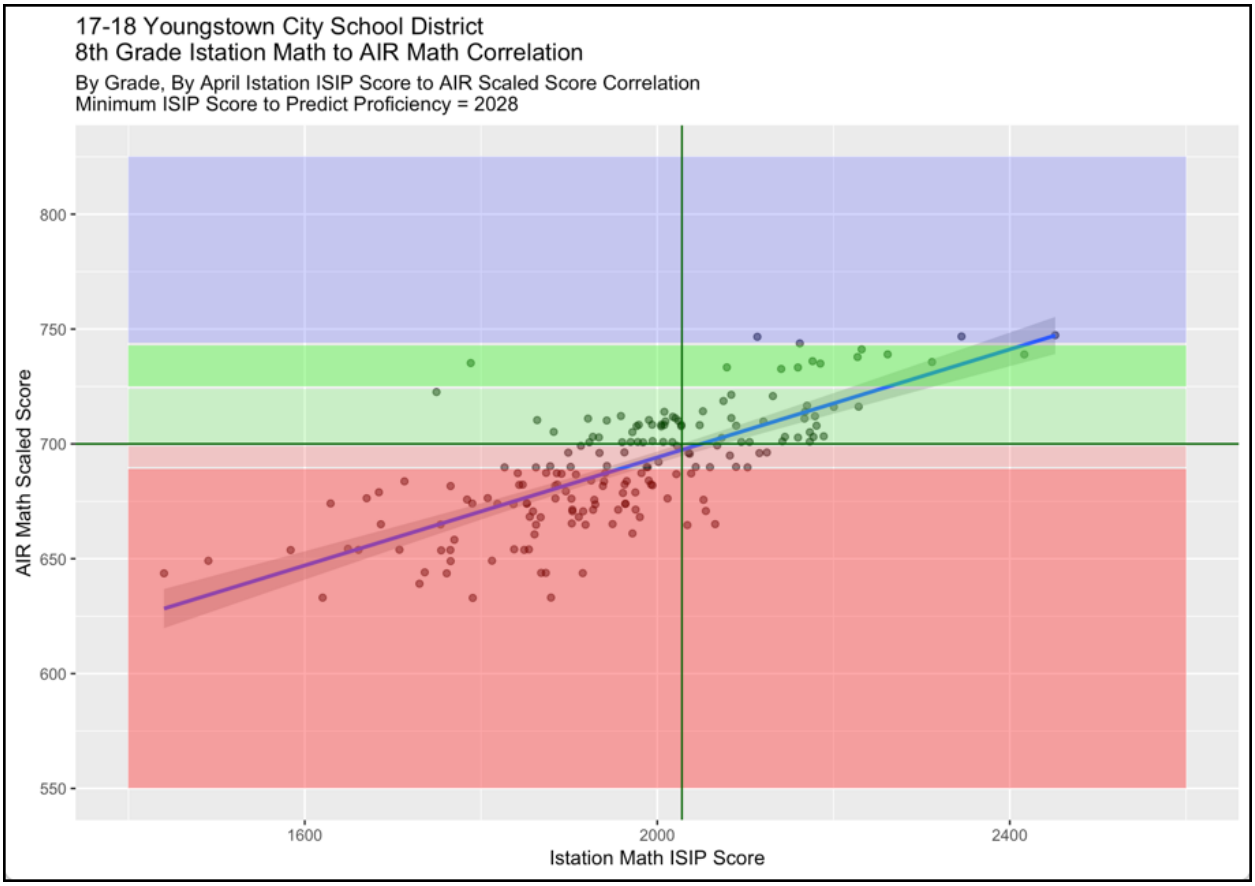





17-18 Youngstown City School District
5th Grade Istation Math to AIR Math Correlation
By Grade, By April Istation ISIP Score to AIR Scaled Score Correlation
Minimum ISIP Score to Predict Proficiency = 2013
AIR Math Scaled Score
800
700
600
1400
1600
1800
2000
2200
2400
2600
Istation Math ISIP Score


17-18 Youngstown City School District
6th Grade Istation Math to AIR Math Correlation
By Grade, By April Istation ISIP Score to AIR Scaled Score Correlation
Minimum ISIP Score to Predict Proficiency = 2072
AIR Math Scaled Score
800
750
700
650
600
550
1500
2000
2500
Istation Math ISIP Score


17-18 Youngstown City School District
7th Grade Istation Math to AIR Math Correlation
By Grade, By April Istation ISIP Score to AIR Scaled Score Correlation
Minimum ISIP Score to Predict Proficiency = 2060
AIR Math Scaled Score
800
750
700
650
600
550
1600
2000
2400
Istation Math ISIP Score


17-18 Youngstown City School District
8th Grade Istation Math to AIR Math Correlation
By Grade, By April Istation ISIP Score to AIR Scaled Score Correlation
Minimum ISIP Score to Predict Proficiency = 2028
AIR Math Scaled Score
800
750
700
650
600
550
1600
2000
2400
Istation Math ISIP Score