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Using Istation Reading Computer-Adaptive Curriculum to Improve STAAR Reading Outcomes

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Executive Summary

Istation is an integrated learning system that provides assessments, supplemental curriculum, and detailed reports that can be used for progress monitoring or benchmarking. It provides a computer adaptive test for universal screening, and students are routed into the curriculum based on assessment performance.

Istation recommends that students use the supplemental curriculum 30–40 minutes per week to increase their reading performance. Previous research with the Istation Reading curriculum demonstrated that Istation usage increased reading performance. This research evaluates if the Istation Reading curriculum improves academic growth on the State of Texas Assessments of Academic Readiness (STAAR) Reading assessment.

Using data from a large urban Texas school district in the 2022–23 school year, hierarchical linear models were used to account for clustering at the school level. Propensity score matching was used to match students within schools on demographic data and baseline Istation Reading performance to create a retrospective control group. Those in the treated group had greater than 0 minutes of curriculum usage.

Results indicated that fifth through seventh grade students using the Istation curriculum led to STAAR Reading growth:

- Students using the Istation Reading computer-adaptive curriculum scored 16 points higher on the STAAR Reading assessment than the comparison group.

These results demonstrate that using Istation helps students' reading performance, as measured by the STAAR Reading assessment.

Table of Contents

Introduction

Computer adaptive testing (CAT) has proven to be a transformative approach to pursuing educational equity, particularly in addressing literacy challenges in high-poverty schools. This study focuses on the Istation Reading curriculum, a comprehensive computer-adaptive system designed to enhance reading outcomes. Istation Reading tailors instruction to individual student needs, potentially narrowing the performance gap in reading as measured by standardized tests such as the STAAR assessment.

Recent research highlights the efficacy of educational technologies in improving literacy, especially in underserved communities. For example, studies have demonstrated that personalized, technology-supported learning can significantly uplift student performance in low-income settings by adapting educational content to each student's unique learning profile (Naik et al., 2020; Major et al., 2021). Istation Reading leverages this principle by assessing students' abilities in phonemic awareness, alphabetic knowledge, and other essential literacy skills to provide targeted instructional content.

Istation Reading is a comprehensive, computer-adaptive testing system focusing on continuous progress monitoring in reading (Mathes et al., 2022). The assessment measures the skills based on the science of reading that lead to literacy: phonemic awareness, alphabetic knowledge and skills, vocabulary, fluency, and comprehension. The first time the student takes the assessment in the school year, their results are used to place them in the curriculum. The reading curriculum in English provides students with authentic and engaging intervention lessons to increase student success in the classroom. The curriculum is cyclical; as one cycle is completed, the student proceeds to the next. The first cycle starts instruction with foundational skills for the alphabet, alphabetic principle, print awareness, and other essential skills supported by the science of reading.

This user-friendly platform offers engaging, age-appropriate interfaces and real-time data for teachers, aiding in identifying students struggling with reading concepts and tailoring instruction accordingly. By providing detailed web-based reports, automatic alerts for students needing additional instruction, and access to a wide range of intervention materials, Istation Reading effectively supports personalized learning and instructional decision-making, ensuring students' progress toward achieving grade-level standards in reading.

Evidence for the efficacy of the Istation Reading curriculum comes from research that demonstrates Istation usage led to increased achievement across several assessments:

- Georgia Milestones Assessment System (GMAS) (Jeans, 2024)
- State of Texas Assessments of Academic Readiness (STAAR) (Wolf & Locke, 2023)
- New Mexico Measures of Student Success and Achievement (Wolf & Locke, 2023)
- Idaho Standards Achievement Test (Cook & Ross, 2022)
- Northwest Evaluation Association Measures of Academic Progress (NWEA MAP®) (Cook & Ross, 2021)
- Partnership for Assessment of Readiness for College and Careers (PARCC) (Cook & Ross, 2020)
- Renaissance Star Assessment® (Luo et al., 2017)
- Developmental Reading Assessment (2nd edition) (DRA2) (Putman, 2017)

Therefore, this study aims to evaluate the impact of Istation usage on STAAR Reading outcomes of fifth through seventh grade students in a large urban Texas school district. Specifically, the study aims to address the following question:

- Does the Istation Reading computer-adaptive curriculum affect STAAR Reading outcomes relative to those not using the curriculum?
- Does Istation usage vary between schools?
- Are STAAR scores different based on Istation usage and socioeconomic status?

Methodology

Analytical Sample

The data are from students in 11 schools from a large urban school district in Texas from the 2022–2023 academic year. This study focused on fifth through seventh grade students (n=884). Student demographics for the sample of this evaluation are in Table 1. The majority of students are Hispanic (56%), followed by Black students (26%). On average, 87% of students are eligible for the free- and reduced-price lunch program (FRL). Approximately 12% of students are disabled/special education (SPED) students, and nearly 60% are emergent bilingual students.

Table 1. *Student Characteristics for Analytical Sample*

Group	Treated	Control	Total
% Hispanic	54.96	57.18	56.07
% Black	27.68	24.93	26.31
% Asian	12.40	13.58	12.99
% White	4.31	3.13	3.72
% Other Race	0.65	1.17	0.91
% Female	41.18	45.48	43.33
% FRL, Mean (SD)	87.16 (2.67)	87.21 (2.70)	87.19 (2.68)
% Students with Disabilities/SPED	11.54	12.67	12.10
% Emergent Bilingual	57.69	60.63	59.16
N	442	442	884

Measures

STAAR Reading

STAAR Reading is the state testing program for Texas students in grades 3 through 8. The Texas Education Agency (TEA), in collaboration with the Texas Higher Education Coordinating Board (THECB) and Texas educators, developed the STAAR program in response to requirements set forth by the 80th and 81st Texas legislatures. STAAR is an assessment program designed to measure how students have learned and can apply the knowledge and skills defined in the state-mandated curriculum standards (http://tea.texas.gov).

After students take the STAAR, results are reported in two primary ways: scaled scores and achievement levels. This study focuses on STAAR Reading scaled scores. The observed ranges of scores for STAAR Reading are shown in Table 2.

Istation Reading

Istation Reading is a computer-adaptive testing system designed to monitor students' continuous progress in reading from prekindergarten through 8th grade. It offers a user-friendly experience for teachers and students, with minimal administrative effort required from educators and engaging, developmentally appropriate interfaces for learners.

Based on the science of reading, the Istation Reading formative assessment comprehensively covers essential domains, including phonemic awareness, reading comprehension, listening comprehension, letter knowledge, alphabetic decoding, fluency, spelling, and vocabulary. The assessment's computer-adaptive nature, powered by Item Response Theory (IRT), tailors the difficulty of questions based on each student's performance, ensuring a highly personalized assessment experience. This approach enhances the accuracy of measuring student abilities and provides real-time, easily interpretable web-based reports. These reports detail students'

strengths and weaknesses, enabling teachers to make informed decisions for targeted instruction and intervention.

Additionally, Istation Reading includes reporting features that automatically alert teachers to students requiring additional instructional support and offers access to a comprehensive library of instructional materials and lessons. This feature aids in customizing teaching strategies to meet individual student needs, which allows for a more accurate profile of each student's abilities while facilitating enhanced teacher planning and student learning outcomes.

Analytical Approach

This quasi-experimental study examined two cohorts to compare the growth in 2023 STAAR Reading scores among students using the Istation computer-adaptive curriculum versus similar students not using Istation within the district. Since all schools in the study used Istation, the comparison group was comprised of students who had no recorded usage time (in minutes) for the curriculum, while those with more than zero minutes of usage were classified as the treatment group.

To address baseline differences and ensure comparability between the treatment and control groups, propensity score matching (PSM) was employed. Students were matched on their 2022 beginning-of-year (BOY) Istation Reading scores to establish baseline equivalence. Istation Reading scores have previously been shown to be highly correlated ($r=0.70–0.72$) with STAAR Reading scores (Wolfe & Locke, 2023), making this a reliable measurement of performance equivalence. Exact matching was performed at the grade level to ensure comparisons were made within the same academic context. Additionally, students were matched within schools on gender, race, and the percentage of students receiving free or reduced lunch (FRL) to control for socio-demographic and economic variables. Matching without replacement was chosen to avoid reusing control observations and to ensure a more stringent comparison. Table 3 shows the average baseline Istation Reading scores for Istation students and comparison students. Baseline equivalence is met if the standardized mean difference

between treatment (Istation) and comparison students is less than 0.25. Standardized mean differences between Istation and comparison students were less than 0.01, indicating that baseline equivalence was satisfied. The small size of baseline differences was expected as this variable was included to match students.

Table 2. *Baseline Equivalence on Fall 2023 Istation Reading Scores*

Istation Mean (SD)	Control Mean (SD)	Adjusted T v C Difference	Pooled Unadjusted SD	Standardized Mean Difference
532.53 (91.67)	532.74 (81.61)	0.21	86.79	–0.002

Post-matching balance was assessed using the *pstest* command in Stata/MP 18.1 to check for any remaining bias in the matched samples. The standardized mean differences (SMD) for all covariates were examined, and the results indicated satisfactory balance, with SMD values close to zero, suggesting that the matching process effectively balanced the covariates between the treatment and control groups.

Given the hierarchical nature of the data, with students nested within schools, hierarchical linear modeling (HLM) was conducted to account for clustering at the school level. The analysis proceeded through several stages. The null model was specified to partition the variance in STAAR Reading scores into within-school and between-school components. This model served as a baseline to understand the extent of clustering in the data. The subsequent model included fixed effects for treatment status (Istation usage), race/ethnicity, gender, BOY Istation Reading score, percent of students in FRL, and grade level. An additional model included random slopes for usage to allow the effect of Istation usage to vary across schools. However, this model did not significantly improve the model fit, as indicated by model fit statistics. Therefore, the random slopes for usage were not retained in the final model. Lastly, the school-level percent of students in FRL was explored as a predictor, but it did not significantly improve the model fit. The results from this model (Model 3) were included in the table for comparative purposes.

Results

Istation Usage on STAAR Reading Outcomes

Table 3 shows the adjusted mean differences in STAAR Reading scaled scores between the Istation and the comparison group (1620.51 vs. 1604.20, respectively), resulting in an effect size of +0.10. This indicates a small effect, and the treatment has a modest impact on STAAR Reading scores. The results of the HLM models for fifth through seventh grade students are shown in Table 4. Since model fit did not significantly improve when school-level fixed effects were included (Model 3), Model 2 will be interpreted. Students using the Istation Reading computer-adaptive curriculum increased by 16 points in STAAR Reading scores compared to students not using the curriculum ($p=0.01$). Twenty-two percent (22%) of the score variability was due to schools, leaving 78% due to students.

Table 3. *STAAR Reading Scaled Score Comparison by Group*

Outcome	Istation			Control			
	Mean (SD)	95% CI		Mean (SD)	95% CI		p
		Lower	Upper		Lower	Upper	
STAAR Scaled Score	1620.51 (172.15)	1604.47	1636.56	1604.20 (170.73)	1588.28	1620.12	< 0.001

* $p < 0.05$

Table 4. *Two-Level HLM of Treated on STAAR Reading Scaled Scores, Coefficients and Standard Errors (SE)*

Fixed Effects	Model 1	Model 2	Model 3
Intercept	1571.85* (24.02)	879.63* (23.03)	907.42* (271.52)
Usage (Treated)		16.31* (6.44)	16.27* (6.45)
Gender (Male)		-22.45* (6.58)	-22.47* (6.58)
Race and Ethnicity (Hispanic as referent)			
Black		-11.27 (7.81)	-11.41 (7.82)
Asian		24.30 (17.34)	24.16 (17.34)
White		40.91* (10.96)	40.96* (10.97)
Other		15.17 (30.60)	15.03 (30.60)
Grade (5 as referent)			
6		45.44* (17.99)	45.30* (18.20)
7		43.53* (18.98)	43.86* (20.45)
Baseline Istation Score		1.30* (0.04)	1.30* (0.04)
% FRL			-0.32 (3.03)
Error Variance			
Level-1	20058.29* (960.42)	9020.86* (433.15)	9021.91* (433.27)
Level-2 Intercept	5503.77* (2945.81)	350.56* (226.63)	413.86* (277.91)
Model Fit			
AIC	11292.5	10531.0	10529.01
BIC	11306.9	10588.4	10591.21

* $p < 0.05$; ICC = .22

Values based on Stata 18.0 Mixed. Entries show parameter estimates with standard errors in parentheses. Estimation Method = REML; Satterthwaite degrees of freedom.

Discussion

The purpose of the analyses in this report was to examine the effect of the Istation Reading computer-adaptive curriculum on STAAR Reading gains in the 2022–2023 school year. As Istation was used in all district schools included in the study, a propensity score matching approach was used to match students using and not using the curriculum within schools on several demographic variables, with exact matching on grade level. This created a retrospective comparison group of students who did not use Istation but were very similar to students who did use Istation.

There are limitations to this study that should be noted. First, this study was conducted in an entire district that had implemented the Istation curriculum and the assessment packages. However, even though no comparison schools were available within the district to evaluate program efficacy, the use of propensity score matching allowed for a comparison of STAAR Reading gains between Istation and non-Istation students. As a result of only including one district, the generalization of results is restricted relative to a study involving multiple districts.

This study showed that Istation students using the computer-adaptive curriculum significantly outgained comparison students. Istation students averaged a statistically significant 16-point advantage in STAAR Reading score gain over comparison students. Since comparison students were similar to Istation students in demographics, prior reading achievement, and school, and the sample size was sufficiently large, these analyses support the conclusion that Istation usage is related to more considerable reading performance gains than non-Istation users.

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