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Using Istation Reading Computer-Adaptive Curriculum to Improve GMAS Outcomes

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Istation

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DATE
April 2024

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 Georgia Milestones Assessment System (GMAS) English Language Arts (ELA) assessment.

Using data from a Georgia school district in the 2022–23 school year, hierarchical linear models were used to account for clustering and control for SES at the school level. Usage was divided into quartiles, with quartile 1 indicating the lowest amount of usage and quartile 4 indicating the highest amount of usage. Results indicated that Istation curriculum usage led to GMAS ELA growth in third grade students:

- Students in usage quartile 4 scored 12 points higher on the GMAS ELA assessment than those in usage quartile 1.
- Students from high-poverty schools in usage quartiles 2–4 scored 8–18 points higher on the GMAS ELA assessment than those in quartile 1.

These results demonstrate that using Istation helps student reading performance as measured by the GMAS ELA assessment. Furthermore, increased GMAS ELA performance was observed in students from high-poverty schools as Istation Reading usage increased, suggesting that the supplemental curriculum could help close the performance gap between high-poverty and low-poverty schools.

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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 ELA as measured by standardized tests such as the GMAS.

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 key 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:

- 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 GMAS ELA outcomes of third grade students in a large suburban Georgia school district. Specifically, the study aims to address the following question:

- Does Istation usage improve student scores on the GMAS ELA assessment?
- Does Istation usage vary between schools?
- Are GMAS scores different based on Istation usage and socioeconomic status (SES)?

Methodology

Analytical Sample

The data are from students in a large suburban school district in Georgia. This study focused on third grade students (n=5,293). Of those that had demographic data (n=5,215), the largest racial/ethnic group was Black/African American (52.0%), followed by Hispanic (23.3%), White (12.9%), Asian (8.0%), two or more races (3.4%), and American Indian/Alaska Native (< 1%).

Measures

GMAS ELA

The GMAS ELA is a comprehensive summative assessment program that aims to evaluate students' mastery of state-adopted content standards in English Language Arts. It is designed to provide information on students' achievement to determine their readiness for the next grade level of learning. As a summative assessment, it is a single measure taken at the conclusion of a grade. However, classroom formative assessments, such as Istation Reading, can provide important supplementary information that should be interpreted and utilized alongside summative measures. This study specifically examines the impact of Istation Reading with GMAS ELA assessment scores as the primary outcome to measure the effectiveness of the curriculum.

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.

Curriculum Usage

Istation recommends that students at or below the 40th percentile of the normative sample on Istation Reading use the curriculum for 40 minutes per week and that students who score above the 40th percentile use the curriculum for 30 minutes per week. For this study, usage quartiles were calculated by grade based on Istation Reading usage within the sample. Quartile 1 represents the lowest amount of usage, and quartile 4 represents the highest amount of usage.

Socioeconomic Status

Socioeconomic status at the school level was determined by the percentage of students eligible for the free or reduced-price school lunch (FRPL) program. Categorization was defined using the National Center for Education Statistics (NCES) criteria. NCES divides the percentages into quartiles:

- SES 1 consists of high-poverty schools with **≥75%** of students eligible for FRPL.
- SES 2 consists of mid-high poverty schools with **50–74.9%** of students eligible for FRPL.
- SES 3 consists of mid- to low-poverty schools with **25–49.9%** of students eligible for FRPL.
- SES 4 consists of low-poverty schools with **< 25%** of students eligible for FRPL.

Analytical Approach

Due to the sample having students nested in schools, a hierarchical linear model (HLM) was used to examine the efficacy of Istation curriculum usage on GMAS ELA assessment scores from the 2022-23 school year, controlling for school-level SES.

Two-level HLM models control for the effects at the student level (Level 1) and the school level (Level 2). Four nested models were tested. Model 1 is the baseline model that consists of only the random effect for the intercept. Model 2 is an extension of model 1 that includes fixed effects at Level 1, which includes usage quartiles. Model 3 is an extension of model 2 that includes random slopes for Level 1 (weekly usage). Model 4 extends model 3 and includes the Level 2 fixed effects (SES).

Results

Table 1 shows the correlations between the Istation Reading formative assessment and GMAS ELA to determine if there was a significant relationship. Correlation coefficients were 0.81 and 0.80 for MOY and EOY, respectively, indicating a strong relationship between the Istation Reading formative assessment scores and GMAS ELA spring scores.

Table 1. *Correlations between Istation Reading MOY and EOY scores and GMAS ELA Spring Scores*

Istation Reading MOY & GMAS ELA	Istation Reading EOY & GMAS ELA
0.81***	0.80***

*** *p* < 0.001

Table 2 shows the total minutes by usage quartiles. Generally, Istation usage recommendations were met in quartile 4, needing approximately 1,080–1,440 minutes total for the school year.
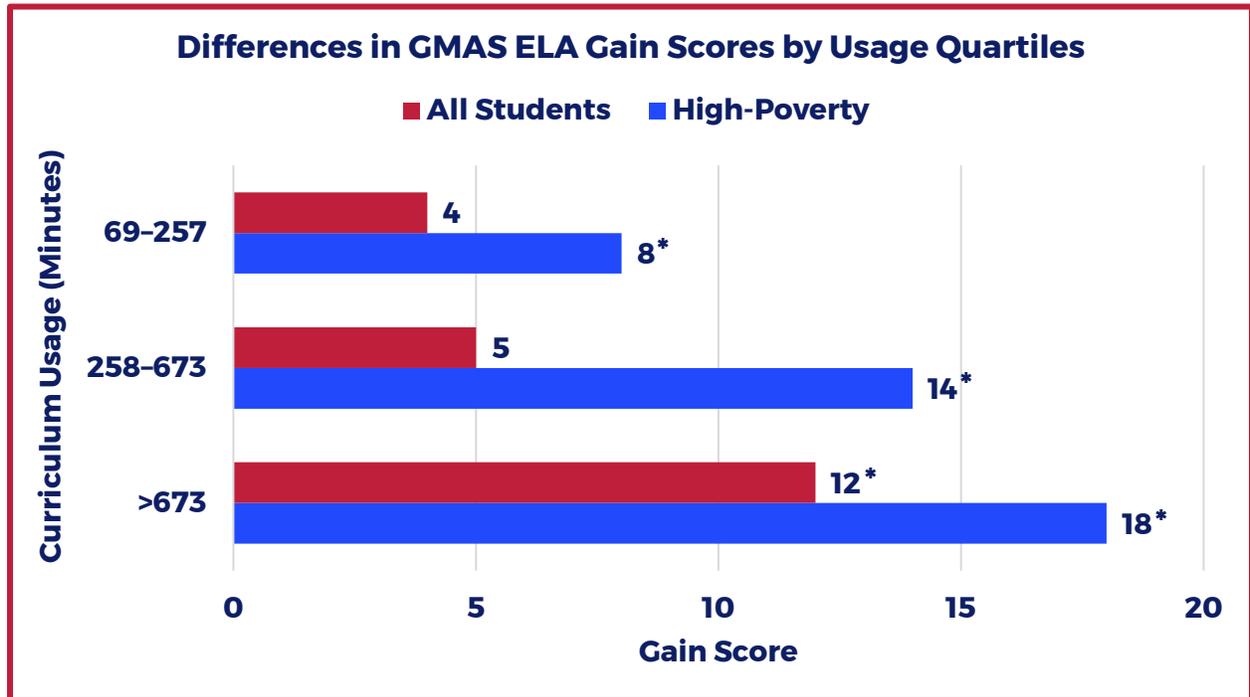
Table 2. *Usage Quartiles and Total Minutes for the School Year*

Usage Quartile	Usage Percentile Rank	Total Minutes
1	≤25	≤68
2	26–50	69–257
3	51–75	258–673
4	>75	>673

Istation Usage on GMAS ELA Outcomes

Figure 1 shows the graphical representation of increases in GMAS ELA gain scores by total minutes of usage per school year for all third grade students and only those in high-poverty schools.

Figure 1. *Differences in GMAS ELA Gain Scores for Third Grade Students by Istation Total Usage*

Differences in GMAS ELA Gain Scores by Usage Quartiles

■ **All Students**   ■ **High-Poverty**

Curriculum Usage (Minutes)

- **69–257**: All Students 4, High-Poverty 8*
- **258–673**: All Students 5, High-Poverty 14*
- **>673**: All Students 12*, High-Poverty 18*

Gain Score (0, 5, 10, 15, 20)

* $p < 0.05$

Usage Results in Third Grade Students

Table 3 shows the results of the HLM models for third grade students. Third grade students in the fourth Istation Reading usage quartile (>673 total minutes/school year) had an increase of 12 points in GMAS ELA scores compared to students in the lowest usage quartile, the referent group. Twenty-eight percent (28%) of the score variability was due to schools, leaving 72% due to students. Looking at the school-level SES variable in model 4, GMAS ELA scores increase 52–95 points as school SES increases, relative to the referent group (high-poverty schools). The significance of the error variance suggests that schools influence the variability in students' scores after accounting for usage and SES. There was also variability in Istation curriculum usage across schools, though relatively small.

Table 3. *Two-Level HLM for Third Grade, Coefficients and Standard Errors (SE)*

Fixed Effects	Model 1	Model 2	Model 3	Model 4
Intercept	490.59* (4.64)	491.70* (5.02)	488.57* (5.60)	465.97* (4.40)
Usage 2 (26-50)		-0.80 (2.76)	3.77 (2.82)	3.57 (2.78)
Usage 3 (51-75)		-3.64 (3.10)	4.99 (3.52)	4.66 (3.42)
Usage 4 (>75)		-0.17 (3.45)	12.72* (4.98)	12.13* (4.87)
SES 2				51.78* (9.33)
SES 3				67.21* (14.53)
SES 4				95.08* (9.79)
Error Variance				
Level-1	3838.28* (75.14)	3838.83* (75.17)	3712.10* (73.99)	3717.94* (74.19)
Level-2 Intercept	1522.94* (263.40)	1518.67* (263.10)	1934.08* (347.16)	637.69* (136.63)
Weekly Usage			2.18* (0.80)	2.03* (0.76)
Model Fit				
AIC	58944.3	58936.7	58881.5	58797.7
BIC	58964.0	58976.1	58927.5	58863.4

* $p < 0.05$; ICC = .28
Values based on Stata 18.0 Mixed. Entries show parameter estimates with standard errors in parentheses. Estimation Method = REML; Satterthwaite degrees of freedom.

Usage Results in Third Grade Students from High-Poverty Schools

Table 4 shows the results for the HLM model for third grade students from high-poverty schools. Students in the second Istation Reading usage quartile or above (>69 total minutes/school year) had an increase of 8–18 points in GMAS ELA scores compared to students in the lowest quartile of usage. Sixteen percent (16%) of the variability in scores was due to schools (ICC = .16), leaving 84% of the variability due to students.

Table 4. . *Two-Level HLM for Third Grade Students in High-Poverty Schools, Coefficients and Standard Errors (SE)*

Fixed Effects	Model 1	Model 2	Model 3
Intercept	471.05* (3.70)	461.72* (4.65)	461.10* (4.85)
Usage 2 (26-50)		7.41* (3.46)	7.82* (3.47)
Usage 3 (51-75)		12.36* (3.82)	13.55* (3.94)
Usage 4 (>75)		16.18* (4.08)	18.21* (4.70)
Error Variance			
Level-1	3570.64* (86.13)	3553.17* (85.75)	3513.06* (85.53)
Level-2 Intercept	616.98* (143.42)	673.31* (156.62)	756.00* (180.56)
Weekly Usage			0.28* (0.16)
Model Fit			
AIC	38588.7	38566.6	38558.5
BIC	38607.2	38603.5	38601.6

* $p < 0.05$; ICC = .16
Values based on Stata 18.0 Mixed. Entries show parameter estimates with standard errors in parentheses. Estimation Method = REML; Satterthwaite degrees of freedom.

Conclusion

The findings of this study reaffirm the role that Istation Reading plays in enhancing reading outcomes for third grade students. The data analyzed demonstrate that higher levels of engagement with Istation Reading improve scores on the GMAS ELA assessment. This effect is more pronounced among students attending high-poverty schools, suggesting that the adaptive nature of the curriculum is particularly effective in supporting those who might otherwise be at a disadvantage.

The findings underscore educational technology's potential to close the literacy performance gap between students of varying SES. By providing personalized learning paths based on individual student performance, Istation Reading addresses

specific educational needs, thereby fostering academic growth and equity in educational outcomes.

Moreover, the study highlights the importance of consistent engagement with the curriculum to maximize its benefits. Students in the highest usage quartile showed the most significant gains in GMAS ELA scores, indicating that both quantity and quality of interaction with the curriculum are pertinent for achieving substantial academic improvements.

These results contribute valuable insights into integrating adaptive learning technologies in schools, particularly in under-resourced areas. They advocate for the broader implementation of such technologies as a viable strategy to enhance educational equity and improve literacy outcomes across diverse educational landscapes.

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