The Impact of Classworks® Individualized Learning Math Instruction as an Academic Intervention for Second Grade

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*Original study completed June 2022, this analysis has been revised to include updated reliability information. See the Methodology section for details.

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Study Summary

This study, analyzing data from the 2021-2022 school year, demonstrates the positive effects of Classworks® Individualized Learning math instruction for second grade students initially performing below the 25th percentile in math. The analysis involved a sample of 1,367 students from 45 schools across seven districts, with 941 students participating in Classworks instruction and 426 serving as a comparison group.

Employing a quasi-experimental design, the study revealed that Classworks users consistently outperformed non-users in math achievement. Students in the Classworks group engaged with the program for an average of 11 minutes per week over 30 instructional weeks, showcasing the program's ability to deliver meaningful results with modest time investment.

The researchers employed rigorous statistical methods, including adjustments for clustering, baseline achievement, and fixed effects of districts, to estimate the impact of Classworks Individualized Learning math instruction. We appreciate the guidance and technical assistance provided by Bruce Randel at Century Analytics.

The results are significant and promising. Classworks users scored, on average, six points higher on the spring math assessment compared to non-users, with an effect size of 0.13. This improvement indicates that Classworks positively impacts math performance, particularly for students who struggle with mathematics.

Introduction

Since 2003, millions of students have used Classworks® to close learning gaps, keep pace, and grow. Classworks is an online, tiered intervention solution that combines assessment, instruction, progress monitoring, and powerful reporting in one platform.

Classworks includes:

- Reading and math academic screeners validated by The National Center on Intensive Intervention (NCII)
- Reading and math progress monitoring validated by NCII
- Individualized Learning for language arts, reading, and mathematics, grades K-8
- Social-emotional and behavioral resources
- Supplemental reading and math lessons for grades K-8
- Data and Reporting

Individualized Learning

Classworks Individualized Learning is an integral component of Classworks tiered intervention support. It is composed of online units of instruction in reading and math for K-HS. An Individualized Learning Path (ILP) is generated from student assessment data, such as the Classworks Universal Screener. ILPs consist of multiple units of Classworks instruction and are organized along an evidence-based learning progression.

A Classworks instructional unit includes direct instruction, activities to apply learning, and a short formative test focused on strengthening a specific skill. The direct instruction introduces the subject matter with two-to-three-minute segments that teachers can also use in classrooms. Extended learning and practice on the unit skills are introduced in the form of interactive games and activities that differentiate by instructional strategies. Next, a formative assessment confirms skill mastery with ten questions. This structure ensures that when students master a Classworks unit, they master the concept. This translates into increased student achievement not only on state high-stakes tests but in cross-curricular experiences and real-life applications. Skill practice focuses on concepts in direct response to students' demonstrated needs.

Classworks lessons reflect different pedagogies, keeping students motivated and engaged because of the variety encountered throughout the lesson. Students are presented with different instructional approaches, types of interactivities, and varying

degrees of games and concrete instruction as they learn each skill. Activities use diverse media-rich technology including voice, text, video, graphics, photographs, and animation.

To ensure the optimal impact of Classworks Individualized Learning, it is essential for teachers to actively monitor student progress and reassign assignments as needed to support student mastery (*Best Practices for Individualized Learning*, 2022). As a responsive system, Classworks Individualized Learning supports teachers' instructional planning by generating student assignments at the level the student is ready to learn as indicated by performance on assessments such as the Classworks Universal Screener. When monitoring student progress, teachers can make modifications to student learning progressions by turning a skill on or off in a student's ILP. Classworks monitoring features allow teachers to prepare relevant and timely instructional support during individual or small group instruction.

The instructional variety of Classworks Individualized Learning along with intentional classroom implementation practices ensure students encounter multiple ways to learn and practice every skill. It's important to note that the interventions the students receive in tiers two and three should be different in instruction and experience from what they receive in tier one.

Classworks Tiered Instructional Model

Classworks Response to Intervention (RTI/MTSS) Instructional Model includes universal screening for students in all tiers and supplemental instruction in reading, language arts, and math and progress monitoring for students receiving tiers two and three supports. The Individualized Learning Path sets the progression of targeted instruction for each student.

Placement into an Individualized Learning Path is determined by a student's assessment results which may be the Classworks Universal Screener assessments or one of Classworks nationally-recognized partners such as Renaissance and NWEA.

The recommendation for all students is to spend a minimum of 30 minutes each week on individualized learning in each content area. Students receiving tier two and three supports are recommended to complete 60 to 90 minutes per subject per week (*How Much Time Should My Students Be Using Classworks Each Day?*, 2022, Classworks, 2019).

In addition, Classworks recommends that students complete an average of six to eight individualized units mastered at 80% or higher each month, in each content area. On average, this is equivalent to 18 hours of individualized instruction over the school year, per student. When these recommendations of time and mastery are followed, studies show that students show significant increase in growth when compared with students not using Classworks (*Best Practices for Individualized Learning*, 2022, Classworks, 2019, Classworks, 2020).

It is important to note that these recommendations assume that all students attend school consistently. Regular classroom attendance wavered across the nation during the 2021-2022 school year, and evidence suggests that absenteeism rates differed across socio-economic groups with attendance rates for low-income students worsening as rates begin to level for high-income students (Dorn et al., 2021).

Classworks follows NCII guidelines with regards to tier placement recommendations and therefore recommends using the following percentiles for tier placement: Tier one students perform above the 25th percentile, tier two students perform between the 10th and 25th percentiles, and tier three students perform below the 10th percentile (Classworks, 2022).

At tier one, for students performing at and above the 25th percentile, based on assessment results, Classworks ensures readiness, tracks learning gains, monitors rate of learning among peers, and identifies students requiring additional intervention. Lessons are differentiated, presenting grade level standards at varying levels of difficulty. Teachers are equipped with resources to support lesson planning, real-time responsive instruction, and reporting for professional learning communities, student action plan meetings, and parent-teacher communication, with a focus on student identification of need for intervention.

At tier two, for students performing between the 10th and 24th percentile, extra instruction time is an important factor in achieving learning goals and providing real-time measures of student performance towards mastery of skills. In addition to the placement in the Individualized Learning Path by assessment, ongoing progress monitoring also further informs and adapts individualized instruction for each student. Formative assessments are embedded throughout the learning path assignments to monitor mastery of skills. The focus of Classworks data and reporting at tier two is on monitoring student performance and mastery through a battery of Curriculum-Based Measurement (CBM) Probes.

Domain-based CBM Probes continue to be essential at tier three, for students performing below the 10th percentile. Weekly progress monitoring allows teachers to determine if students are making progress and make the necessary adjustments to the Individualized Learning Path. As previously mentioned, the intensity of intervention is increased at tier three, which may include lengthening instructional time, increasing the frequency of instructional sessions, adjusting the level of instruction, and/or targeting the skills the student is working on within the intervention. As with all tiers, teachers are also able to customize Classworks assignments to further address student deficits. The focus of Classworks data and reporting for tier three students is on skills and progress monitoring of student achievement and growth through intensified intervention (Classworks, 2022).

Students participating in the study were found to be academically-at-risk based on their identification as performing at or below the 25th percentile on their fall baseline Classworks Math Universal Screener. In this analysis, we examined students' score performance from fall to spring on the Classworks Math Universal Screener. The analysis compares the fall to spring scores for students who participated in Classworks Individualized Learning math instruction compared to their peers that did not participate in Classworks Individualized Learning math instruction.

Classworks Universal Screeners

Classworks Reading and Math Universal Screeners are included in the NCII Academic Screeners Tools Chart (*Academic Screening Tools Chart*, n.d.) and are valid and reliable assessments used to measure readiness for grade level instruction, help identify baseline learning levels, and measure growth (SEG Measurement, 2019; Classworks, 2022).

As mentioned, Classworks Universal Screeners were specifically designed for the purpose of screening students who may need additional intervention and can be used as part of the MTSS (Multi-Tiered System of Supports) and Response to Intervention (RtI) process. In addition to reporting an overall scaled score based on the total test, Classworks Universal Screener results provide nationally normed percentile ranks and student strengths and weaknesses for key strands. In Math, these strands include algebra, geometry, mathematical processes, measurement, numeration, operations, patterns, and statistics and probability. Classworks provides an online, interactive dashboard to explore the alignment of the Classworks Mathematics Universal Screener to state standards for kindergarten - tenth grade (*Classworks Universal Screener State Standards Alignment*, 2022).

Testing windows for the Classworks Universal Screeners are set at the district level, but districts typically follow the Classworks recommended dates of Fall: 07/01 - 11/24, Winter: 11/25 - 03/16, and Spring: 03/17 - 05/30. The test has 20-35 items depending on grade level and takes students of all grade levels an average of 30 minutes to complete. In administering the Classworks Universal Screener, best practices recommended to teachers and proctors include consistently monitoring students to ensure they are actively working and making progress through the assessment, and that all questions are answered in one sitting. If a student has accommodations for end-of-year assessments, the same accommodations apply to the Classworks Universal Screener. If the assessment is administered remotely, teachers and proctors should monitor the amount of time students spend on the assessment to determine if students properly attended to the assessment. The Classworks Universal Screeners should be treated as a formal test administration and students should be provided a day between subjects (*Best Practices for Classworks Universal Screener*, 2022). Classworks provides school and district-level training to effectively administer the Classworks Universal Screeners and to ensure fidelity of program implementation.

Research Questions

Classworks provides online, tiered intervention solutions to school districts in 24 states across the nation. The current study explores the impact of Classworks Individualized Learning math instruction for second grade students performing at and below the 25th percentile during the 2021-2022 school year.

The following question is addressed in this study:

- What is the impact of participation in Classworks Individualized Learning math instruction on the math achievement of 2nd grade students who perform below the 25th percentile, as compared to similar students who do not participate in Classworks Individualized Learning math instruction?

Methodology

Sample

Participants in this study included 1367 second grade students, gathered from a convenience sample of traditional, public school second-grade students from Classworks Individualized Learning math instruction and Classworks Math Universal Screener usage files for the 2021-2022 school year.

Data from the Math Universal Screener usage file were first filtered to identify students that completed both fall and spring Universal Screeners. As such, the impact analyses were conducted on students with non-missing data, and no data imputation was used. An additional filter identified students that performed at or below the 25th percentile on the baseline fall Math Universal Screener. Individualized Learning usage, which detail student Individualized Learning Path (ILP) usage metrics such as the sum of Individualized Learning (IL) time on task, IL unit score average, and count of IL units completed, was then used to assign the filtered students to treatment and comparison groups based on if students did or did not participate in Individualized Learning math instruction. Students with any measured amount of ILP usage were assigned to the treatment group, and those who did not have any measured amount of ILP usage were assigned to the comparison group. Treatment group participants are referred to in this study as Individualized Learning Path Users, or ILP Users, while their control group counterparts are referred to as Non-ILP Users.

All participants completed Math Universal Screeners following the standard administration procedures previously described. In all, the 1367 identified participants represented 45 schools across seven districts.

Despite documented national trends of instability in school attendance (Dorn et al., 2021), these ILP Users spent an average of 11 minutes per week in Individualized Learning for math instruction over 30 instructional weeks. ILP Users spent an average of 5 hours in Individualized Learning math instruction over the course of the school year, with an average of 1 unit completed per month.

ILP users and non-ILP users showed similar scores on the fall Math Universal Screener (Table 1), with a model-based difference of 1.49 ($p > .05$). In other words, the treatment and comparison groups for second grade students were comparable to one another at pre-treatment, based on Hedge's *g* calculation of effect size (Hedge's $g = 0.05$) and are thus considered to meet the What Works Clearinghouse standard for baseline equivalence (WWC, 2022).

Table 1

Second Grade Math Baseline Equivalence Statistics for ILP and Non-ILP Users

Grade	Student Count	ILP Count	ILP Mean (SD)	Non-ILP Count	Non-ILP Mean (SD)	Effect Size
Second Grade	1367	941	243 (28)	426	242 (28)	0.05

Note: SD= Standard deviation; Effect Size= Hedge's *g*

The 1367 second grade participants in the study represent 45 schools across six districts implementing Classworks to monitor student learning during the 2021-2022 academic school year. These districts range in size from some of the smallest to largest districts nationwide, with districts comprising as few as 10 schools with less than 1,000 students to districts comprising over 125 schools and over 100,000 total students. Additionally, districts represented in this study have student populations with 70 to over 95% qualified for free and reduced lunch.

Instrument

This study utilized Classworks Universal Screener assessments to identify participants' percentile ranking below the 25th percentile as students academically-at-risk and in need of an academic intervention in math instruction. Additionally, the Classworks Universal Screener Scores were used as an outcome measure to estimate student match achievement at the fall screening window and the spring screening window.

The Classworks Universal Screeners have been found to be both psychometrically reliable and valid as instruments to measure grade level readiness, help identify baselines for instruction, identify students who may need additional intervention as part of the RTI/MTSS process, and measure student growth (SEG Measurement, 2019; Classworks, 2022).

In an evaluation of Classworks Universal Screeners conducted by SEG Measurement in 2017, (Classworks, 2022) the Second Grade Classworks Math Universal Screener was found to be highly reliable (33 items; α=0.83).

Additionally, evidence of validity was demonstrated from both the concurrent and predictive relationships between Classworks Universal Screener assessment scores to NWEA MAP Growth test scores. NWEA is known, both nationally and internationally, as a leader in educational assessment, and the Measures of Academic Progress (MAP) Growth is accepted as a highly valid and reliable measure of academic performance for K-HS students (*Precisely Measure Student Growth and Performance with MAP Growth*, 2022).

Concurrent validity estimated as the Pearson correlation coefficient between students' scores on both the Fall 2017 Classworks Universal Screener and MAP Growth Assessment indicated a strong relationship, r = 0.63 (Classworks, 2022). Predictive validity estimated as the Pearson correlation coefficient between students' Universal Screener scores from Fall 2017 and the same students' total scale score on the Winter

2017 MAP Growth Assessment also indicated a strong relationship, $r = 0.66$ (Classworks, 2022).

The reliability of the Classworks Math Universal Screener was assessed using more recent data than the original study. In the 2023-2024 school year, a large district with 39 schools and over 21,000 students administered the spring math screener to second-grade students. This administration resulted in a Cronbach's Alpha of 0.859, indicating very strong internal consistency. While this data was collected after the original study, it's important to note that the screener's content has remained unchanged since its last revision in 2019. Therefore, the reliability data is applicable to the version of the assessment used in the original study.

In this study, the fall Math Universal Screener was typically completed during the first three months of the 2021-2022 school year, between mid-August to the end of October. Most participants, including both ILP and Non-ILP Users, completed the fall screener from mid-August to mid-September.

Design

This study compared student math achievement on the Classworks Math Universal Screener between ILP Users and Non-ILP Users, all of whom performed below the 25th percentile on the fall baseline screener. Participants included in the study completed both the fall and spring screener during the 2021-2022 school year.

We used a linear model to estimate the impact of ILP usage on student achievement in mathematics. The model for estimating the difference between the ILP Users and Non-ILP Users on their spring scores, adjusted for baseline scores, is as follows:

$$Y_i = \beta_0 + \beta_1(\text{TREAT})_i + \beta_2(\text{PRE})_i + \beta_3(\text{District 1})_i + \beta_4(\text{District 2})_i + \beta_5(\text{District 3})_i + \beta_6(\text{District 4})_i + \beta_7(\text{District 5})_i + \beta_8(\text{District 6})_i + e_i$$

Where:
Y_i is the spring score on the Math Universal Screener for student *i*.
TREAT is an indicator variable coded as 1 = ILP Users and 0 = Non-ILP Users.
PRE is the fall score on the Match Universal Screener for student *i*.
District 1 – District 6 are dummy variables for district, coded as 1 for students in the district and 0 for students not in the district.
β_0 is the intercept (i.e., the adjusted mean outcome for students in the non-ILP group).
β_1 is the treatment effect (i.e., the adjusted mean difference between ILPs users and non-ILP users).

β_2 the effect of fall score on the Math Universal Screener.

β_3 through β_8 are the fixed effects for each district (i.e., the adjusted mean difference between students in the district and students in the reference district).

e_i is a random error associated with student *i.*

Results

Second grade ILP Users had significantly higher scores in the spring, adjusted for fall achievement, than did Non-ILP Users (Table 2). Model-based mean difference between ILP and Non-ILP Users was 5.17.

Table 2

Baseline Fall and Model-Based Spring Means with an Impact on Growth on the Mathematics Universal Screener for Second Grade ILP and Non-ILP Users

Comparison Group			Treatment Group						
Sample Size	Mean	Standard Deviation	Sample Size	Model - Adjusted Mean	Standard Deviation	Treatment – Control Difference	Standard Error	Effect Size	p-value
426	287.63	42.31	941	293.17	40.63	5.17	2.18	0.13	0.018

Note: Effect Size= Hedge's *g*

Conclusion

The purpose of this study was to gather insight related to the impact of Classworks Individualized Learning math instruction on student math achievement for second grade students performing below the 25th percentile in math.

The study included 1367 second grade students, gathered from a convenience sample of districts implementing Classworks as an MTSS solution for student achievement during the 2021-2022 academic school year. All participants were identified as academically-at-risk and in need of an academic intervention in math based on identification of performing below the 25th percentile at the fall baseline Classworks Math Universal Screener.

Based on the results of this analysis, second grade students performing below the 25th percentile who participated in Classworks Individualized Learning mathematics instruction obtained statistically significantly higher scores in the spring compared to

their peers who did not participate in Classworks Individualized Learning mathematics instruction.

Overall, this study offers compelling evidence that Classworks can be an effective tool for boosting math achievement among struggling second grade students.

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