The Impact of Classworks® Individualized Learning Math Instruction as an Academic Intervention for 2nd Grade

Curriculum Advantage, Inc.
September 2022

Table of Contents

Research Overview

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, SEL, and powerful reporting in one platform. Classworks includes:

- NCII-validated reading and math academic screeners
- NCII-validated reading and math progress monitoring
- Individualized Learning for language arts, reading and mathematics, grades K-8
- Social-emotional and PBIS tools
- Rigorous tier-one reading and math lessons for grades K-8
- Data and reporting

After the closing of the 2022 spring testing window, an analysis was conducted to measure the impact of Classworks ® Individualized Learning on student growth for second grade students performing below the 25th percentile in math. The study analyzed the impact of Classworks Individualized Learning math instruction, from fall to spring, across six districts and 953 second grade students during the 2021-2022 school year. It was hypothesized that students that participated in Classworks Individualized Learning math instruction would show more growth from fall to spring on the Classworks Math Universal Screeners than their peers that did not participate in this instruction.

Results of the analysis concluded that Classworks Individualized Learning math instruction as an academic intervention has a significant impact on growth for 2nd grade students performing below the 25th percentile in math.

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, SEL, and powerful reporting in one platform. Classworks includes:

- NCII-validated reading and math academic screeners
- NCII-validated reading and math progress monitoring
- Individualized Learning for language arts, reading and mathematics, grades K-8
- Social-emotional and PBIS tools
- Rigorous tier-one reading and math lessons for grades K-8
- Data and reporting

After the closing of the 2022 spring testing window, an analysis was conducted to measure the impact of Classworks ® Individualized Learning on student growth for second grade students performing below the 25th percentile in math. The study analyzed the impact of Classworks Individualized Learning math instruction, from fall to spring, across six districts and 953 second grade students during the 2021-2022 school year. It was hypothesized that students that participated in Classworks Individualized Learning math instruction would show more growth from fall to spring on the Classworks Math Universal Screener than their peers that did not participate in this instruction.

Individualized Learning

Classworks Individualized Learning is an integral component in Classworks tiered intervention support and is composed of online units of instruction in reading and math for K-8th grades. 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 check 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 rich-media 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 that are sometimes below or above grade level based on a student's readiness as indicated based on 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 as needed when that skill is introduced to a student's ILP. Classworks monitoring features allow teachers to prepare relevant and timely instructional support during individual or small group instruction. Using assessment data to inform instructional decision-making equips teachers to make expert decisions to guide and support students as they close learning gaps and encounter new levels of learning.

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 are different in instruction and experience from what they receive in Tier One.

Classworks Tiered Instructional Model

Classworks RTI Instructional Model includes universal screening and K-8th grade supplemental instruction in reading, language arts, and math for Tier One and progress monitoring for Tiers Two and Three. 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 from one of Classworks nationally recognized partners such as Renaissance and

NWEA. ILP placement provides students with individualized instruction based on the skills they are ready to learn.

The recommendation for all students is to spend a minimum of 30 minutes each week on individualized learning in each content area. Tier Two and Three students 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' recommendation is that students will 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 at and below the 10th percentile (Classworks, 2022).

At Tier One, for students performing 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. Tier One instruction includes rigorous and engaging activities built to Common Core and College and Career Ready Standards. 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 25th 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.

Skill-based CBM Probes continue to be essential at Tier Three, for students performing below the 10th percentile. Weekly progress monitoring to identify and respond to specific skills students are struggling with 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 make customized 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 below the 25th percentile on their fall baseline Classworks Math Universal Screener. In this analysis, we examined the fall to spring growth based on student score performance on Classworks Math Universal Screener scores achieved by students that 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).

Administration of the Classworks Universal Screeners are set at the district level and typically occur three times a year during the fall, winter, and spring (*What are the Universal Screener Testing Windows?*, 2022). In administering the Classworks Universal Screener, best practices recommended to teachers and proctors include consistently monitoring students to ensure students are actively working and making progress through the assessment, and that all questions are answered within 60 minutes, unless accommodations are in place. It is intended that these accommodations would be the same accommodations students would receive for end of year assessments. In the event that 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. It is recommended that the administration of Classworks Universal Screeners is treated as a formal test administration, and that students are provided a day between subjects (*Best Practices for Classworks Universal Screener*, 2022). In addition to training support throughout the school year from Classworks Curriculum and Instruction Coaches, Classworks also provides school and district level training to prepare for the administration of Classworks Universal Screeners to further ensure fidelity of program implementation and administration of assessments.

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 2nd grade students performing below the 25th percentile during the 2021-2022 school year.

The following questions are addressed in this study:

- Do second grade students performing below the 25th percentile that participate in Classworks Individualized Learning math instruction experience more growth from fall to spring on the Classworks Universal Screener than their peers that do

not participate in Classworks Individualized Learning math instruction? And if so, to what extent?

Methodology

Sample

Participants in this study included 953 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 below the 25th percentile on the baseline fall Math Universal Screener. These filtered Student User IDs from the Universal Screener usage file was matched to the Student User IDs from the Individualized Learning usage files 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. This allowed for the assignment of students to treatment and comparison groups based on which students had taken both the fall and spring Math Universal Screeners, as well as if students did/did not participate in Individualized Learning math instruction. All participants completed Math Universal Screeners following the standard administration procedures previously described. In all, the 953 identified participants represented 44 schools across 6 districts.

Assignment of participants to the treatment and comparison groups was at the individual-level of students, based on participation in Classworks Individualized Learning math instruction during the 2021-2022 school year. To determine participation in Individualized Learning math instruction, students were assigned to either the treatment or comparison group based on whether they had measures indicating a sum IL time on task, IL unit score averages, and a count of IL units completed. Students with these measures indicating ILP usage were assigned to the treatment group, and those who did not have these measures were assigned to the comparison group.

Treatment group participants were second grade students performing below the 25th percentile that had completed both the fall and spring Universal Screeners and participated in Classworks Individualized Learning math instruction during the

2021-2022 school year. Treatment group participants are referred to in this study as Individualized Learning Path Users, or ILP Users.

Despite documented national trends of instability in school attendance (Dorn et al., 2021), these ILP Users spent between 10-40 minutes per week, or an average of 25 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. The average mastery of units in Individualized Learning math instruction of 80% or higher for ILP Users was 90%.

Comparison group participants were second grade students performing below the 25th percentile that had completed both the fall and spring Universal Screeners but did not participate in Classworks Individualized Learning math instruction during the 2021-2022 school year. Comparison group participants are referred to in this study as Non-ILP Users.

ILP users and non-ILP users differed by less than .25 standard deviation on the fall Math Universal Screener (Table 1). 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* = 0.003) and are thus considered to meet baseline equivalence (WWC, 2022).

Table 1

2nd 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	953	646	230.59 (22.20)	307	228.73 (21.37)	0.003

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

The 953 second grade participants in the study represent 44 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 determine the growth in student score performance, from the fall screening window to 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-12 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).

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.

The typical testing window for the Winter Math Universal Screener was between December through the end of February, with the majority of second grade students, including both ILP and Non-ILP Users, completing the winter screener during the months of December and January.

The typical Spring Math Universal Screener testing window was between March through May, with the majority of second grade students, including both ILP and Non-ILP Users, completing the spring screener during the months of March and April.

Design

This study compared student growth measured by score performance from fall to spring 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 at least both the fall and spring screener during the 2021-2022 school year. In instances in which participants also participated in the winter screener, this data was also included in analysis.

With repeated measures per participant over time, and data collected from participants at each grade level, we used a linear growth model to estimate the impact of ILP usage on student growth in mathematics. In addition to the model-based mean estimates from the linear model provided in the results below, pairwise comparisons were generated to estimate the differences in growth between ILP and Non-ILP Users by grade. These pairwise comparisons are available upon request.

The LMM for the impact of ILP usage on grade were estimated in R (R Core Team, 2017) with the R-package lme4 (Bates et al., 2015). For this model, the dependent variable was the Universal Screener score whereas time (1= fall, 2=winter, 3=spring) and treatment (0=comparison, 1=treatment) were treated as fixed effects. The interaction between treatment and time was included to determine if there was a difference in growth between the treatment and comparison groups over time.

The model for determining the impact of IP usage over time by grade level is as follows:

$$Mathscaledscore_{ij} = \beta_0 + \beta_1 time_{ij} + \beta_2 cntrltreat_j + \beta_3 (time * cntrltreat)ij + \mu_j + e_{ij}$$

for i = moment of time (fall, winter, spring) and j = student. β_0 is the mean outcome for Non-ILP Users at fall. $\beta_1 time_{ij}$ represent the mean change over time (i.e., growth) from fall and winter and from winter to spring for Non-ILP Users. $\beta_2 cntrltreat_j$ represents the mean difference between ILP Users and Non-ILP Users for fall scores. The treatment by

time interaction, $\beta_3(time * cntrltreat)ij$, represents the mean differences in growth between ILP Users and Non-ILP Users . μ_j represents the variance between students of their scores, and e_{ij} accounts for the error term for each student's three scores taken at fall, winter, and spring.

Results

Second Grade Impact

Second grade ILP Users experienced significantly more growth from fall to spring than Non-ILP Users (Table 2). Model-based mean differences in fall to spring growth between ILP and Non-ILP Users was 7.46. Model-based means and mean differences in growth from fall to winter and from winter to spring are provided in Appendix A.

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

	Fall Count	Baseline Fall Mean (SD)	Spring Count	Model-Based Spring Mean (SD)	Mean Difference In Fall to Spring Growth (SE)	Effect Size
ILP Users	646	230.59 (22.20)	646	286.87 (40.94)	7.46*** (2.88)	0.18
Non-ILP Users	307	228.73 (21.37)	307	279.41 (42.96)		

*Note: SD= Standard deviation; SE= Standard error; Effect size= Hedge's g; ***p<0.001*

Conclusion

The purpose of this study was to gather insight related to the impact of Classworks Individualized Learning math instruction on student growth on the Classworks Universal Screener Assessment from fall 2021 to spring 2022, for second grade students performing below the 25th percentile in math.

The study included 953 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 that participated in Classworks Individualized Learning mathematics instruction experienced significantly greater growth from fall to spring compared to their peers who did not participate in Classworks Individualized Learning mathematics instruction.

References

Academic Screening Tools Chart. (n.d.). Charts.intensiveintervention.org. Retrieved June 1, 2022, from https://charts.intensiveintervention.org/ascreening?_ga=2.185468329.1866389142.1654006126-845772245.1647890783

Bates, D., Maechler, M., Bolker, B. and Walker, S. (2015). Fitting Linear Mixed-Effects Models Using lme4. Journal of Statistical Software, 67(1), 1-48. doi:10.18637/jss.v067.i01.

Best Practices for Classworks Universal Screener. (2022). Help.classworks.com. Retrieved July 7, 2022, from http://help.classworks.com/en/articles/3296971-best-practices-for-classworks-universal-screener

Best Practices for Individualized Learning. (2022). Help.classworks.com. Retrieved June 3, 2022, from http://help.classworks.com/en/articles/3296916-best-practices-for-indiVidualized-learning

Classworks. (2019). *Classworks Achievement Study 2019: Integrated Assessments Report.* Classworks. https://www.curriculumadvantage.com/efficacy/classworks-achievement-study-2019-integrated-assessments-study

Classworks. (2020). *Classworks Shows Tremendous Impact in One Semester* [White paper]. Classworks. https://www.curriculumadvantage.com/efficacy/classworks-shows-tremendous-impact-in-one-semester

Classworks. (2022). *Research Basis for the Classworks Tiered Instructional Model* [White paper]. Classworks. https://www.curriculumadvantage.com/efficacy/research-basis-for-the-classworks-tiered-instructional-model

Classworks. (2022). *Validity and Reliability of Classworks Universal Screeners* [White paper]. Classworks. https://www.curriculumadvantage.com/efficacy/validity-reliability-of-classworks-universal-screeners

Classworks Universal Screener State Standards Alignment. (n.d.). Us-Standards.classworks.com. Retrieved August 24, 2022, from http://us-standards.classworks.com/

Dorn, E., Hancock, B., Sarakatsannis, J., & Viruleg, E. (2021, December 14). COVID-19 and education: An emerging K-shaped recovery. *McKinsey & Company*. https://www.mckinsey.com/industries/education/our-insights/covid-19-and-education-an-emerging-k-shaped-recovery

How much time should my students be using Classworks each day? (2022). Help.classworks.com. Retrieved June 3, 2022, from http://help.classworks.com/en/articles/2393552-how-much-time-should-my-students-be-using-classworks-each-day

Precisely measure student growth and performance with MAP Growth. (2022). NWEA. Retrieved July 7, 2022, from https://www.nwea.org/map-growth/?gclid=CjwKCAjwiJqWBhBdEiwAtESPaOPHRUITC560sinI2qZ93J3f_Dpk-8IeEGQ27S3X8ISINNzX9ci4PRoCOWYQAvD_BwE

R Core Team (2014). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL http://www.R-project.org/

SEG Measurement. (2019). *A Review of the Classworks Regional Efficacy Study* [White paper]. SEG Measurement. https://www.curriculumadvantage.com/efficacy/middle-nwea

What are the Universal Screener Testing Windows? (2022). Help.classworks.com. Retrieved July 7, 2022, from http://help.classworks.com/en/articles/5790369-what-are-the-universal-screener-testing-windows

What Works Clearinghouse, Institute of Education Sciences, U.S. Department of Education. (2022). *What Works Clearinghouse Standards Handbook, Version 4.1* Retrieved July 13, 2022 from https://ies.ed.gov/ncee/wwc/handbooks

Appendix A

Table A.1

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

	Fall Count	Baseline Fall Mean (SD)	Winter Count	Model-Based Winter Mean (SD)	Mean Difference In Fall to Winter Growth (SE)	Effect Size
ILP Users	646	230.59 (22.20)	641	274.54 (42.69)	3.18 (3.00)	0.07
Non-ILP Users	307	228.73 (21.37)	296	271.36 (42.51)		

Note: SD= Standard deviation; SE= Standard error; Effect size= Hedge's g

Table A.2

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

	Winter Count	Model-Based Winter Mean (SD)	Spring Count	Model-Based Spring Mean (SD)	Mean Difference In Winter to Spring Growth (SE)	Effect Size
ILP Users	641	274.54 (42.69)	646	286.87 (40.94)	7.46*** (2.88)	0.18
Non-ILP Users	296	271.36 (42.51)	307	279.41 (42.96)		

*Note: SD= Standard deviation; SE= Standard error; Effect size= Hedge's g; ***p<0.001*