LEVERED LEARNING

Usability, Implementation, and Correlational Findings

Research Report

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About LEANLAB Education

LEANLAB Education is a nonprofit research organization that helps schools understand and solve their biggest problems. We listen to parents, educators, and students to help them pinpoint specific problems that hinder student achievement. Then, we match those schools with education entrepreneurs. Together, they develop the next generation classroom tools through research and direct, community feedback.

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CONTENTS

OVERVIEW

The purpose of this study was to identify and verify conditions of Levered Learning implementation that would yield sustained engagement from teachers and students by gathering qualitative data from teachers and students at Lee A. Tolbert Community Academy in Kansas City, Missouri. The study also set out to assess the correlation between Levered Learning and change in student outcomes related to math performance, confidence, and engagement by gathering quantitative data. LEANLAB Education facilitated a co-design research process that included the voices of teachers, administrators, and parents from the school alongside the voices of the founders of Levered Learning to develop the above research goals and processes of this study. The intent of co-design research is to elevate the voices of those most impacted by education tools being used in the classroom in order to help create a tool that is responsive to the needs of school communities and provide evidence-backed data to those responsible for adoption decisions. This report first describes in more detail the two research partners in this endeavor: Lee A. Tolbert Community Academy and Levered Learning. It then summarizes the research methodology and outlines the key findings from the implementation and correlational design. Schools looking to know how to implement Levered Learning in the classroom with greatest success will find the implementation findings starting on page 26 the most helpful, which includes evidence-based recommendations for implementation as well as perceived value from teachers and students.

Lee A. Tolbert Community Academy

At Lee A. Tolbert Community Academy, we understand that all children have the potential to be successful. We also believe that children learn in different ways. We consider our community responsible for providing our students with the skills to be successful leaders and entrepreneurs in the 21st century. Our methodology reflects our pride in our children.

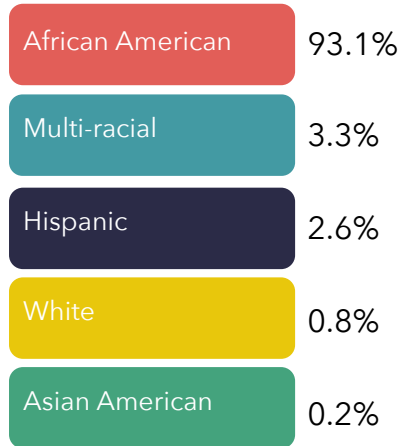**School Type**
Public Charter

Location
Kansas City, MO

Grades
K-8

Total Students
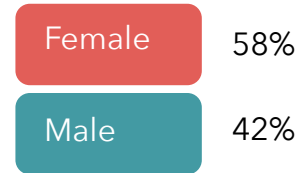492

Student : Teacher Ratio
12:1

Race/Ethnicity

African American	93.1%
Multi-racial	3.3%
Hispanic	2.6%
White	0.8%
Asian American	0.2%

Gender

Female	58%
Male	42%

Free & Reduced Lunch

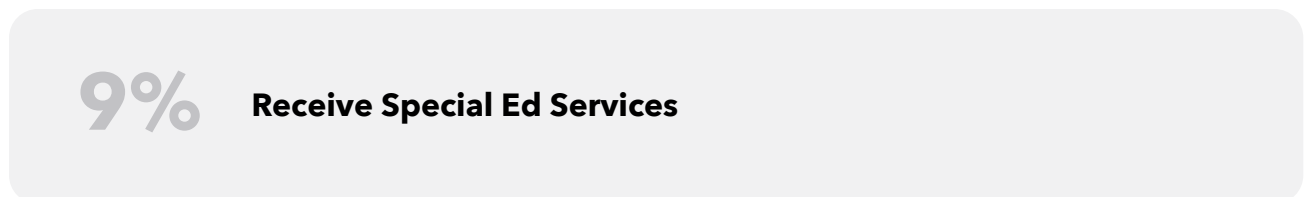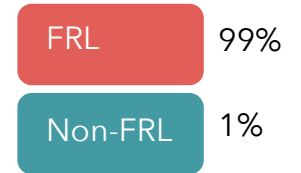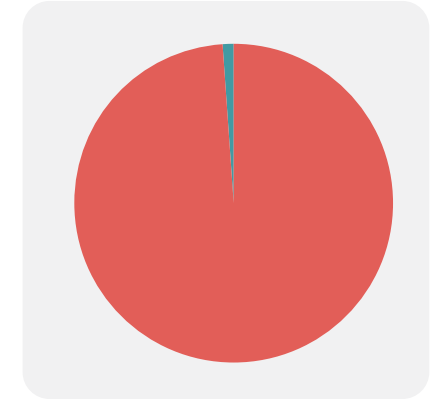|	
FRL	99%
Non-FRL	1%

0% English Language Learners

9% Receive Special Ed Services
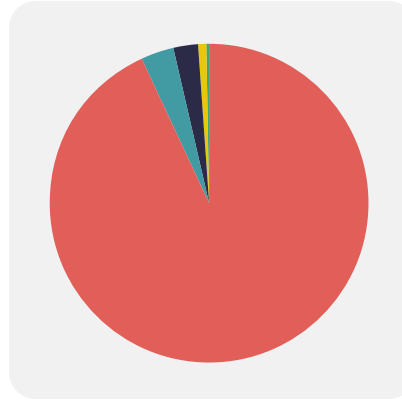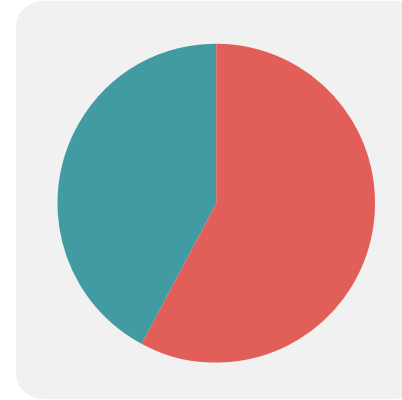
Math Competency

Listening Tour

LEANLAB Education conducted a Listening Tour—a series of focus groups—with various Lee A. Tolbert school-system stakeholders to better understand how each stakeholder experienced the problem related to math teaching and learning.

The administrator focus group consisted of 4 people, including the superintendent and principal. The teacher focus group consisted of 3 math teachers. The parent focus group consisted of 3 parents. Lee A. Tolbert Community Academy was matched with Levered Learning because the school community had identified math competency and teaching as a primary challenge.

Key Findings

- The school culture is supportive and has a familial dynamic. Participants in every focus group spoke to the strong community culture of the school.

- Students' scores on standardized assessments are significantly below average and teachers and parents are struggling to find ways to improve scores.

- There was uncertainty on how to improve math education:
  - Teachers wondered where the root of the problem started and were unsure if students learned the foundational concepts in prior grades
  - Teachers also shared that they were looking for new strategies to teach math and that, at times, they didn't know the best way to teach standards.
  - Parents also shared that they didn't know how to support their children at home and longed for a common curricular language or platform on which to collaborate with teachers.
  - Parents and teachers see students "shutting down" when math gets hard
  - All stakeholders wanted to see a math curriculum that integrates real-world learning.

In a final "stakeholder panel" focus group, one or two representatives from each stakeholder group came together to draft a problem statement that would be used to co-design the research study.

The insights from this exercise informed research questions that focused on understanding student engagement with math and successful implementation conditions of Levered Learning.

Problem Statement

Students are not engaged in their math classes because they have many traumas and distractions at home. This means students have a hard time focusing and lose confidence in math. If this continues students will fall behind in math and not be prepared for middle/secondary level math.
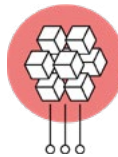
Levered Learning

Overview

Levered Learning is an elementary interactive curriculum that "is adaptive and competency-based," with every student working at their own pace. Individual work is bolstered by integrated, whole class activities and pencil-and-paper group challenges. Teachers use real-time data about student progress to inform intervention and enrichment, giving each student the support and runway they need."

History

Levered Learning was founded by Mitch Slater, a veteran teacher who taught for 20 years in public schools. It was challenging for him to give all his students at various levels the support they needed to succeed. So, he decided to create his own personalized learning math curriculum - an extension of an adaptive pencil and paper curriculum - that he has refined for over 12 years.

Theory of Change

The theory of change behind Levered Learning focuses on adaptive learning and promoting quality teacher-student relationships. The curriculum allows teachers to identify the unique needs of each of their students and provides teachers the instructional content needed to support all students. The curriculum gives students the right amount of challenge and the support to meet that challenge. Throughout, the teacher has an essential role in that support piece. "We are not trying to replace teacher-student interactions -- we are trying to keep it, increase it, and nurture it."

Levered is a teacher-designed, classroom-tested instructional system for 3rd-5th grade mathematics.

Solution Type
Curriculum

Grade Level
3 - 5

Subject
Math

Founder
Mitch Slate

Location
Soquel, CA

Research Questions

The following research questions emerged from the first collaborative research design meeting that included school administrators, teachers, and parents, the founder and product developer from Levered Learning, and the research team from LEANLAB Education.

Implementation Questions

- What are the barriers to classroom implementation?

- What conditions of use and ways of product implementation yield greater teacher and student engagement with the solution?

- Do teachers feel Levered Learning provides added value to the classroom and meets the unique needs of their school setting?

Correlational Questions

- What is the relationship between use of Levered Learning and the following outcomes:
  - Student Outcomes:
    - Math Scores
    - Confidence in Math
    - Engagement with Math
  - Teacher Outcomes:
    - Confidence to Teach Math
    - Planning Time

METHODOLOGY

Sample

All six teachers across grades 3rd through 5th agreed to take part in this study. One fifth grade teacher did not participate because she was not responsible for teaching math. Across the three grades, there were 162 students that piloted Levered Learning. Tables A and B summarize teacher and student participant demographic data, respectively.

Table A: Teacher Participant Demographic Data

Participant	Grade Level	Gender	Race	Years Teaching	# of Students
Teacher A	3rd	Female	Black	3	18
Teacher B	3rd	Female	White	11	20
Teacher C	3rd	Female	Black	7	18
Teacher D	4th	Female	Black		29
Teacher E	4th	Female	White	2	28
Teacher F	5th	Female	Black	5	49

Table B: Student Participant Demographic Data

Classroom	Grade Level	# of Students	Gender %	# of Students
Teacher A	3rd	18	67% female	94% Black 6% Other
Teacher B	3rd	20	80% female	95% Black 5% Latino
Teacher C	3rd	18	44% female	100% Black
Teacher D	4th	29	59% female	90% Black 10% Latino
Teacher E	4th	28	64% female	93% Black 4% Latino 3% White
Teacher F	5th	49	63% female	96% Black 4% White
Total		**162**	**63% female**	**94% Black 3% Latino 2% White 1% Other**

Learning Environment

All teachers were virtual from January to mid-March and then all teachers were hybrid from mid-March to May. In the hybrid environment, students were placed into Groups A and B; Group A students came in-person on Monday and Tuesday and Group B students came in-person on Thursday and Friday. All students were virtual on Wednesday.

Data Collection & Measurement

Implementation Design

The goal of the implementation study was to assess barriers to full teacher and student engagement and to identify ways of use that increased engagement. To that end, teachers were asked to use Levered Learning with all their students for the full spring semester. Teachers took a 60-minute training session with the Levered Learning team in early December and then a 45-minute follow-up training in early January. Both training sessions focused on the technical aspects of using Levered Learning and its various features. The recommended use of Levered Learning was 30 minutes every day, which included a teacher-led class opener followed by independent and small group practice. This protocol was consistent in a virtual and in-person classroom setting.
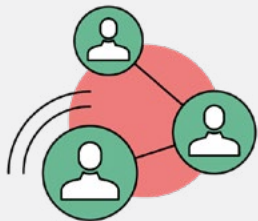
# Data Collection & Measurement *continued*

Implementation Survey

Implementation Survey: One survey was sent to teachers in the middle of February to solicit feedback on the training and onboarding process as well as to identify the features of Levered Learning that teachers were using and with what frequency.

Focus Groups with Teachers

Focus Groups with Teachers (6 total): 60-minute, virtual focus groups were conducted with teachers by grade level in March and May. The purpose of the focus groups was to gain deeper insight into the ways teachers were using Levered Learning with students virtually (in March) and in-person (in May) and to identify the barriers and successes teachers were having with implementation. The time was also used to learn more about the perceived value-add of Levered Learning and to solicit their feedback on product modifications. After the March focus group, the barriers were communicated to the Levered Learning team who then made small iterations that were evaluated for effectiveness in the May focus groups.
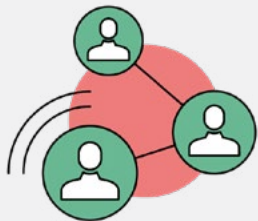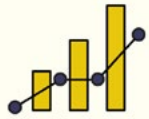
Focus Groups with Students

Focus Groups with Students (5 total): In the middle of May, 15-minute focus groups were conducted with students by grade level. Size of focus groups varied from three students to eight students. There were two third-grade focus groups, two fifth-grade focus groups, and one fourth grade focus group. The purpose of the student focus groups was to learn more about what students liked and disliked, to identify barriers to their engagement as well as things that increased their engagement, and to solicit their feedback on product modifications.

Implementation Design

The goal of the correlational study was to assess the relationship between usage of Levered Learning and student/teacher outcomes.

Pre- and Post Survey

Student Math Confidence and Engagement
Pre- and Post-Survey: The exact same survey was sent to students at the beginning of January and at the end of May that asked them to rate their attitudes towards math.

Pre- and Post Assessment

Student Math Comprehension and Performance (Math Scores)
Pre- and Post-NWEA Assessment: The NWEA MAP assessment was used to assess change in math comprehension and performance. The LEANLAB research team participated in two 60-minute training sessions on how to set-up and implement the NWEA assessment. The pre-assessment was administered virtually at the end of January. Each teacher administered the assessment with her class of students with the support of the LEANLAB research team over the course of a week in order to get as many students as possible to complete it. The post-assessment was completed in-person at the school at the end of May. The LEANLAB research team administered the exam on two separate days, by grade level, and only to those students that completed the first assessment since the purpose is to assess change.
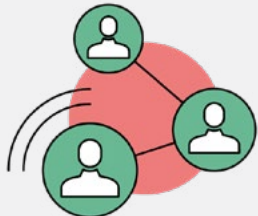
Pre- and Post Survey

Teacher Confidence to Teach Math
Pre- and Post-Survey: The exact same survey was sent to teachers at the beginning of January and at the end of May that asked them to rate their attitudes towards teaching math.

Focus Groups

Focus Groups: In the focus groups detailed above, teachers were also asked to describe their attitudes towards teaching math and to reflect on how Levered Learning has impacted those attitudes.

Pre- and Post Survey

Teacher Planning Time
Pre- and Post-Survey: In the pre-and post-survey sent to teachers at the beginning of January and at the end of May, they were asked to estimate how much time they spent preparing for various aspects of instruction and evaluation thinking back to the previous semester (fall semester for January survey and spring semester for May survey).

FINDINGS

Implementation Findings

Implementation Successes and Challenges

Teachers used Levered Learning in a virtual format in January to mid-March and then used Levered Learning in the physical classroom from mid-March to the end of May. It is noteworthy that the successes and challenges below are largely similar across virtual and in-classroom learning environments, which speaks to the applicability and adaptability of Levered Learning across contexts. The infomation below summarizes the key implementation successes and challenges and provides educators a guide to what would be needed for successful onboarding, classroom implementation, and teacher support.

Onboarding

Setting up Levered Learning in the classroom

SUCCESSES

- **83%** of teachers were "extremely" or "very satisfied" with the set-up process.
- The average time a teacher spent setting up Levered Learning was 10 minutes.
- Levered Learning is integrated with Google Sign-in, which all teachers said was a critical reason set-up was so easy.

CHALLENGES

- Success is dependent on attending the initial training led by the Levered Learning team. Without the training, set-up and learning how to use it was more difficult.

Training teachers to use Levered Learning

SUCCESSES

- Training was clear and the Levered Learning team was very responsive to teacher's questions and requests for help.

CHALLENGES

- There is a desire for the training to include more instructional support on classroom management during independent and small group time, particularly when teachers have "kids all over the place"

  "I need ideas on how to get around to all kids."

Classroom Implementation

Teacher Classroom Use & Instruction

SUCCESSES

- All teachers found the greatest success in using Levered Learning in the classroom in the following structure:
    - *5-10 minutes of teacher instruction on new concepts or reinforce old concepts*
    - *5-10 minutes using the Class Opener for whole-group instruction*
    - *15-20 minutes of independent and small group work with teacher going around to students needing assistance*
    - *With this format, students were able to engage with Levered Learning more independently and make better progress.*

CHALLENGES

- Teachers struggled to get around to all the students that needed help and couldn't advance past a question.

    "Whole group instruction was especially hard in a virtual environment when class was all over the place… despite using breakout rooms."

- It is particularly challenging if a classroom has many different level learners to "catch up to all of them."

- Teachers felt some loss of agency and control in teaching math.

    "It is hard to intervene when I don't see where along the thinking process students are struggling."

SUCCESSES

- The **Class-Opener feature was the most helpful feature** for all teachers in providing whole-class instruction because it helped them identify and customize content and instruction to areas students were struggling.

CHALLENGES

- All teachers wanted more rigorous and more variety in Class-Openers as a way to present material differently and align to different level needs.
    - ° *Note: already resolved by Levered Learning team*
- Teachers in 4th and 5th grade felt openers weren't enough to teach the concepts, so they supplemented with their own instruction.

Teacher Classroom Use & Instruction (continued)

SUCCESSES

- All teachers said using Levered Learning for about **30 minutes total** was about the right time before students started to disengage.

CHALLENGES

"Anything over 30 minutes virtually was too long."

SUCCESSES

- All teachers and staff agreed that starting with Levered Learning at the beginning of the academic year would make integration and implementation fidelity easier.

CHALLENGES

- Teachers noted that there was some time required for adjustment and transition from other products, so about a month is needed to really feel comfortable with the product.

Student Use and Engagement

SUCCESSES

- All teachers agreed that the most helpful feature of Levered Learning was the self-pacing function. It allowed students to independently work at their own pace, so **"higher kids were challenged"** and "we could spend more time with the struggling students."

CHALLENGES

Student Use and Engagement (continued)

SUCCESSES

- Teachers noticed that their students who are more "academically inclined" do very well with the self-pacing program.

  "My higher kids are proud of themselves...for them it is a competition. They compare themselves on the ladder and want to improve."

SUCCESSES

"Another plus is that the students have to get a certain score before they can move on, so it keeps them from going too fast just to be done."

SUCCESSES

- 5 out of the 6 teachers found connecting Levered Learning (for the curriculum and practice) with a separate "gamelike program" (for fun and competition) was a good balance.

SUCCESSES

- In-person instruction was easier because teachers can demonstrate how to solve problems on paper beside the students.

CHALLENGES

- There was, however, extreme variation in the progress among different stages of learners:

  "With the lower kids, they are not improving as much."

  "Levered is way too advanced for my SPED kids."

CHALLENGES

"Kids were frustrated because they didn't receive direct feedback about WHY they were getting problems wrong."

- Word problems caused the most challenge for students getting stuck.

  "Students need more specific feedback when students get questions wrong."

CHALLENGES

- Keeping students motivated to use it was a challenge for all teachers.

  "Without a game or incentive, kids are less motivated."

CHALLENGES

- All teachers would like to have a workbook.
  "They need a workbook to go back and make connections between past concepts, like multiplication and division. They need hard paper to reference back."

Student Feedback

LIKES AND VALUE-ADDS

- The Teacher Conference button allowed them to request immediate assistance, even virtually.

- They all liked the animation.
  "The sandwich cutting was satisfying."

- Students liked building the avatar.

- They liked practicing math, especially those that already enjoy math.
  "I always cheer when I get an answer correct."

- All students agreed that they like that they can draw on the platform

- A few students said they liked working independently.

- A few students in each class reported learning fractions better on Levered Learning.
  "It actually helps us with math and fractions. Like a lot. It's telling me to cut lasagna... and that helps."

WISHES AND BARRIERS

- The Teacher Conference button needs to have a **"sound to alert my teacher when I press it."**

- All grades mentioned they didn't like the porcupine voice, especially 4th and 5th graders.
  "Please, make Penelope more girlish."

- Majority of students said they wanted more games.
  "Could add mini games for when you're done with the lesson. it would make kids want to play it more."

- Eight of Eight 5th graders said they wanted a workbook.
  "I like to use paper and pencil for solving math."

- The most common frustration was that students didn't understand when they got a question wrong.
  "It didn't tell me what I did wrong."

 **"I didn't know how to fix my wrong answers."**

  "[My teacher] comes around and helps us but sometimes I'm just waiting."

Implementation Thresholds

Based on the above implementation findings from teacher and student use, the following implementation thresholds are evidence-based recommendations—and that validate many of Levered Learning's existing protocols—to optimize teacher usage and instruction as well as student engagement.

Set-Up & Integration
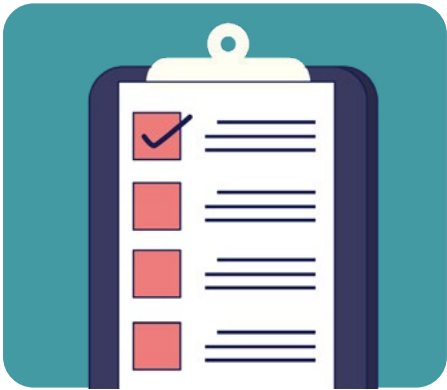
- Integrate Levered Learning and Google Sign-in for fast and easy student rostering
- Allow 20 minutes for teachers to roster students and set-up Levered Learning
- Begin using Levered Learning at the beginning of the academic year for ease of integration with teachers and students
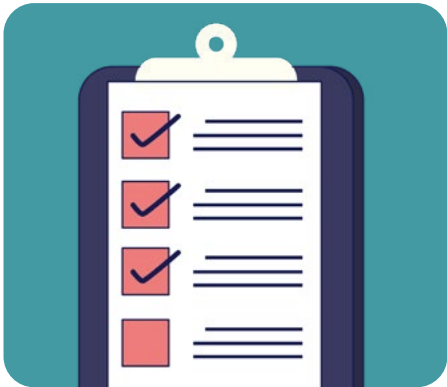
Training
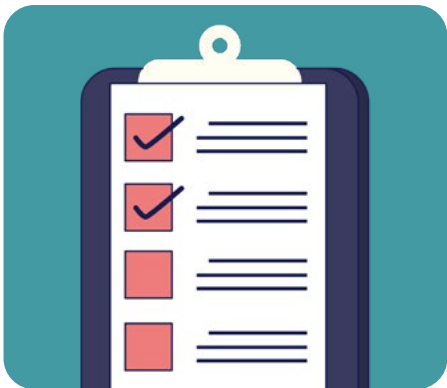
- Integrate Levered Learning and Google Sign-in for fast and easy student rostering
- Allow 20 minutes for teachers to roster students and set-up Levered Learning
- Begin using Levered Learning at the beginning of the academic year for ease of integration with teachers and students

Implementation Thresholds

Teacher Classroom Use

- Levered Learning should be used at least 30 minutes every day as the primary curriculum

- Teachers begin with whole-group instruction using Levered Learning's Class Openers

- Teachers can supplement whole-group instruction as needed with additional teacher-led instruction to reinforce difficult content

- After whole-group instruction, allow students to use it independently while the teacher pulls small groups for Tier II intervention.

Student Use
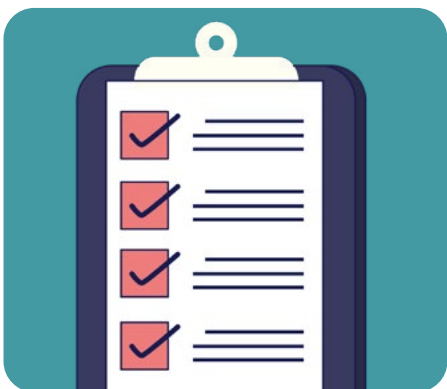
- Teachers should encourage peer conferencing on Levered Learning as a way for students to learn from each other as well as keep them engaged while the teacher supports individual students or groups in need of extra support.

- Create incentives or rewards among similar stage learners to make progress within Levered Learning more gamelike and to motivate students when engagement begins to slip.

Value Add for Teachers

- "I like that students can work at their own pace."

- "The challenging problems help the higher functioning students think deeper."

- "I spend way less time planning."

- "For students that lack social skills, the virtual environment was better - they could work at their own pace."

- "Levered was broken up by standards which was nice."

Self-Pacing

With Levered Learning, students can explore and master math concepts at their own pace. All teachers identified this feature as the best quality of Levered Learning.

Less Prep Time

From preparing for tests and grading to getting ready for lecture-style presentations, Levered Learning saved teachers time in every possible way.

Better for Virtual Learning

- Less copying paper from workbooks

- less time creating digital resources

- All of the digital components are in one place

Parent Engagement Tool

Levered provides parents and home teachers with tools and assessment data to support direct instruction.

Value Add for Teachers

Whole Curriculum
Levered Learning provides teachers a whole curriculum that is split up by standards.

New strategies for instruction
Levered provides teachers with an array of options to teach math concepts in different ways.

Real-time data Tracking
Teachers are able to make instructional decisions based on real-time student data.

- "I can see their multiple ways of learning and I need to be more creative in how I teach it."

- "I'm learning new ways of teaching, which is good, especially with word problems."

- "It helped me figure out how to explain fractions to them and teach it in a different way."

- "I like the real-time of seeing where they need help and I don't have to figure out where they are struggling."

- "It gives me an opportunity to present things in a different way.

Usability Findings

Recommendations for Enhancements

Suggestions for product enhancements in order of urgency and frequency of suggestion:

1 — There needs to be a way for students to get feedback on what they are doing wrong. They need additional help or tips on how to solve a problem they are repeatedly getting wrong. There needs to be an explanation as to WHY it was wrong.

2 — Change the porcupine voice to something more mature.

| **3**	The conference button should have a sound that alerts the teacher when a student has pressed it and needs support.
4	Create games that students could play together (rather than engaging through peer conference) as it would excite the students and keep them more interested and engaged.
5	Include some characters that are less "kid-like" for the 5th graders.
6	Allow students who may be behind in math to access content from different grade levels.

Correlational Findings
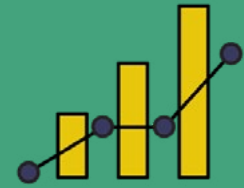
In this section, the results of the correlational analysis are presented.

There are three main **student outcomes** to be correlated with active minutes of use of Levered Learning:
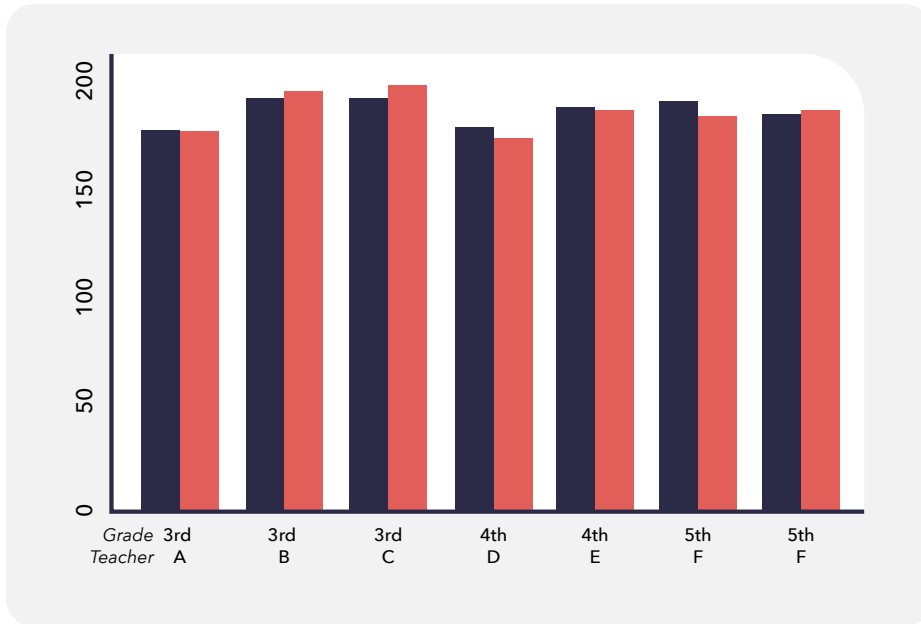
1. Student math scores,
2. Student confidence, and
3. Student engagement.

The two **teacher outcomes** are:

1. Teacher confidence to teach math and
2. Planning time

Student Math Scores

Figure 1: Change in NWEA Score (January to May)

	Pre-Test	Post-Test

In Figure 1, the change in NWEA overall scores are presented by grade level and teacher. The pre-test was taken at the end of January and the post-test was taken at the end of May. There was some growth in Teacher B and C's classrooms - both 3rd grade classrooms - but there was no growth in the other classrooms. Neither the increases or decreases are statistically significant.

Figure 2: Change in NWEA Score, by Level of Proficiency
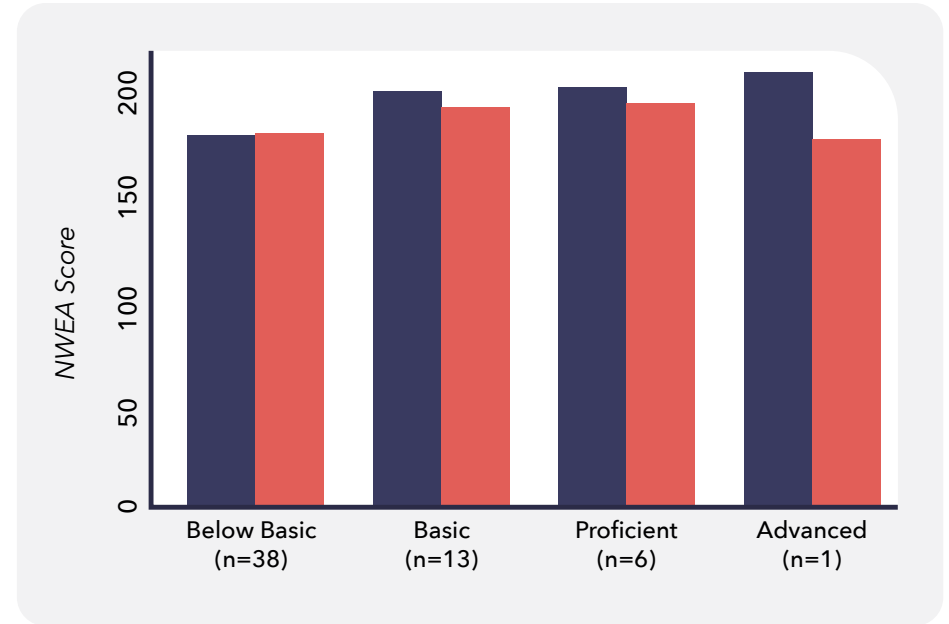
	Pre-Test	Post-Test

In figure 2, the change in overall NWEA scores are presented by level of proficiency. Proficiency for each student was determined based on how the student scored in the pre-test. The majority of students (N=59) fell in the Below Basic category after the pre-test and saw no growth on the post-test. Students in all other categories of proficiency actually had lower scores on the post-test. Again, none of these changes are statistically significant.

Figure 3: Scatterplot of Active Minutes and
Change of NWEA Score
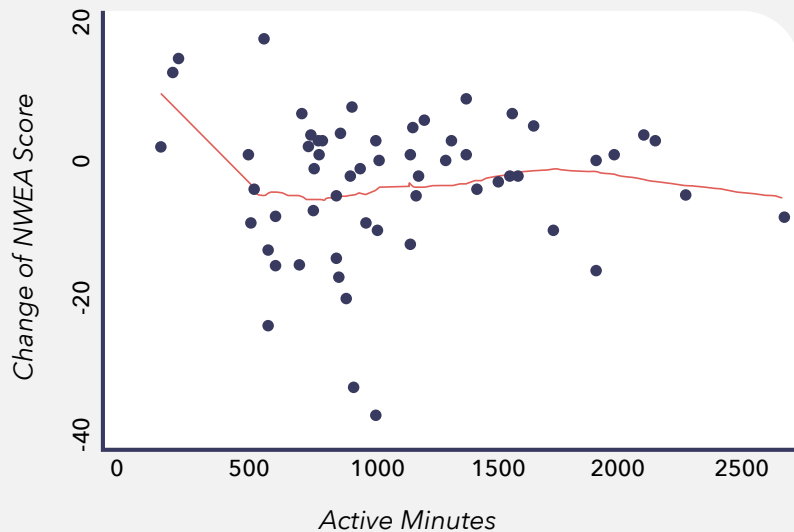
Figure 3 illustrates the correlation between active minutes on Levered Learning and the change in overall NWEA scores. The lowess curve is U-shaped, suggesting that students who spent relatively little or a lot of minutes on Levered Learning experienced small increases in their NWEA scores, while those students who spent closer to the average number of minutes (average = 703 minutes) on Levered Learning saw small decreases in their NWEA scores. This relationship is, however, not statistically significant.

Student Social-Emotional Learning Results

Figure 4: Change in Math Confidence Indicators

Pre-Survey

Post-Survey

Figure 5: Change in Math Engagement Indicators

Pre-Survey
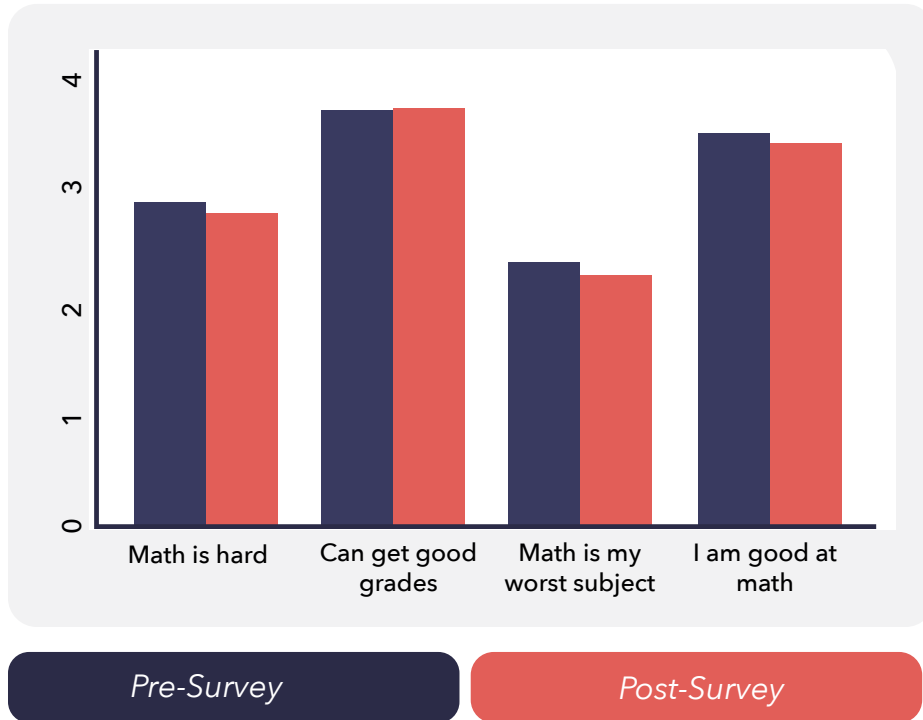
Post-Survey

Figure 4 illustrates the change in math confidence indicators as measured by pre- and post-surveys. There are no statistically significant increases or decreases nor is there any correlation between Levered Learning usage and change in confidence indicators.
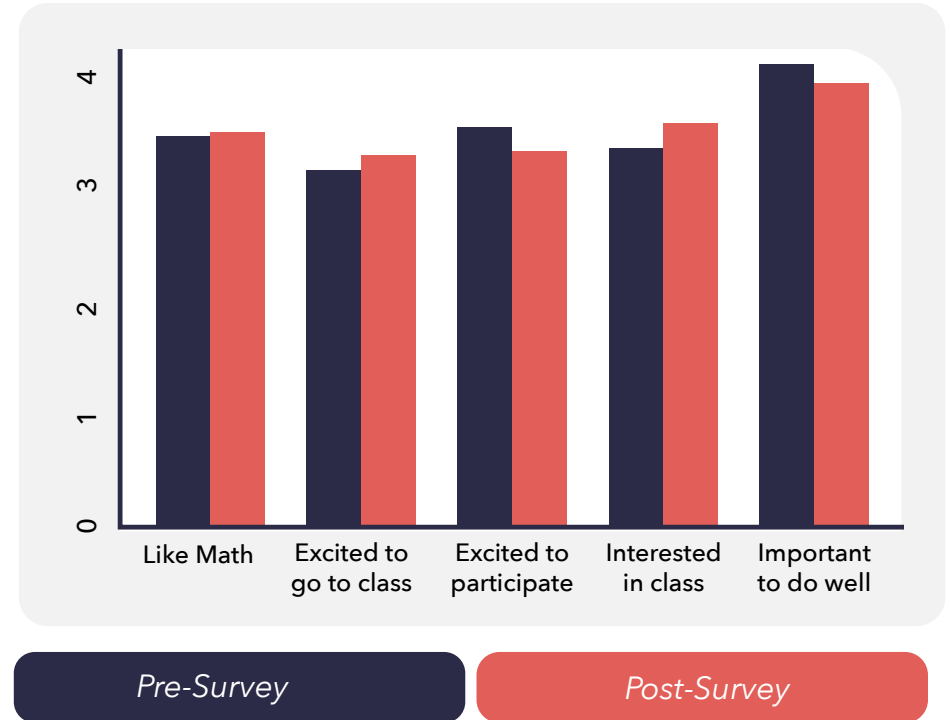
Figure 5 illustrates change in math engagement indicators as measured on a pre- and post- survey. None of the increases or decreases are statistically significant nor is there any correlation between Levered Learning usage and change in confidence indicators.

Teacher-reported Perceptions of Student Confidence and Engagement

The table below shows the average survey scores of all six teachers on survey items related to their own perceptions of student confidence and engagement. Overall, teachers perceived student confidence and engagement in math to be lower at the end of the semester than at the beginning.

Question	Pre-Survey Average	Post-Survey Average
My students are excited about learning math.	4	2.7
My students are confident in their ability to do math.	3.2	2.7
My students are motivated to learn math.	3.2	2.2
My students are actively engaged regularly in math class.	3.6	2.7
My students use math vocabulary effectively.	2.2	2.2

1 Strongly Disagree   **5** Strongly Agree

Teacher Results

Confidence to Teach Math

The table below shows the average scores for all six teachers for each survey item related to teacher confidence from the pre- and post-surveys. The scale is from 1-5 with higher values representing higher agreement with the statement.

Overall, teachers actually had lower levels of agreement in the post-survey than in the pre-survey, suggesting that teacher confidence on a whole decreased over the course of the semester.

Statement	Pre-Survey Average	Post-Survey Average
I am confident in my ability to teach math at the grade level I teach.	4.6	4
I feel prepared to teach math at the grade level I teach.	4.6	4
I am aware of the unique math needs of each of my classroom students.	4.2	4
I know how to differentiate learning for each of my students.	4.6	3.8
I feel competent in understanding the math that I need to teach my students successfully.	5	4.2
I am confident that I can provide effective intervention for struggling students.	4.2	3.3

1 Strongly Disagree   **5** Strongly Agree

Teacher Results

Teacher Prep Time

Lastly, teachers were asked to report on the pre- and post-survey how much time, on a scale of 1-5 (higher values representing more time), they spent preparing for math class. Overall, teachers spent less time preparing for math class in every possible way. The areas where teachers saw the biggest decrease in preparation time was in preparing for tests, grading tests, reviewing tests, and preparing lecture-style presentations. Thus, Levered Learning saved teachers significant time in preparation for math class.

Thinking back to last semester (fall 2020), how much time did you spend on each of the following tasks:	Pre-Survey Average	Post-Survey Average
Preparing tests and/or quizzes	4.4	3
Grading tests and/or quizzes	4.2	2.8
Reviewing tests and/or quizzes to identify which students understand and which students still find the content difficult	4.2	3.3
Identifying/preparing problems to use during class & anticipating students' strategies to solve them	3.8	3.2
Identifying/preparing homework and activities for student practice at home	3.4	3.3
Preparing lecture-style presentations for use during class	4.2	3.2
Working one-on-one with individual students to check-in on their learning	3.6	3.5
Facilitating student practice during class sessions by answering quick questions	3.8	3.3
Creating extra content or supporting students who are advancing and need a greater challenge	3.4	3.2

1 Strongly Disagree   **5** Strongly Agree

Discussion of Correlational Results

The implementation conditions of this research study were not favorable for properly assessing correlation between Levered Learning and the student and teacher outcomes of interest. Unfortunately, the consequences of the global COVID pandemic and inconsistent learning environments created aberrations in ideal implementation and engagement of Levered Learning across the school system.

Limitations

Virtual Learning

The first major limitation to successful implementation was the virtual context in which learning occurred for the first two months of the semester. Teachers did not have the accountability mechanism they needed to keep students consistently engaged at home.

QUOTES

- "Kids were not getting on Levered at home for 30 minutes a day."

- "Kids don't have the accountability at home."

Limitations

Hybrid Environment

Once students returned to the classroom halfway through the semester, the change itself and the inconsistencies in a hybrid environment posed even more challenges. Teachers were not able to establish a consistent routine essential for using Levered Learning daily as a curriculum.

QUOTES

- "We are not getting a chance to use the full spectrum of Levered since we only have the kids 2 days a week."

- "The change of learning formats has been very difficult. We were actually getting into a routine virtually and then had to change it all."

Burnout

Students themselves were burnt out and struggled with motivation.

QUOTES

- "Kids are not giving us effort."

- "Students are sick of being on the computer so they are not as motivated."

- "Being on a computer makes me tired!" ~ 4th grade student quote

- "Kids are easily frustrated right now and the context didn't help."

Discussion of Correlational Results

Recommendations

Despite these significant limitations, teachers and students were optimistic about the possibility of Levered Learning contributing to a more positive learning environment and to math performance gains. A more consistent learning environment and integrating Levered Learning into the daily routine from the onset of the semester is a critical condition needed for assessing correlation and the promise of impact of Levered Learning on student and teacher outcomes. It is, therefore, recommended that the research study extend into the fall 2021 semester to properly assess correlation

CONCLUSION

This study set out to identify and verify implementation thresholds of Levered Learning that would yield sustained engagement from teachers and students. The findings can be categorized into three main areas: onboarding, teacher use and engagement, and student use and engagement.

The existing **onboarding protocol** offered by Levered Learning is a sufficient and necessary component for teacher success with the tool. Two professional development sessions are required in order for teachers to feel comfortable with the various features of Levered Learning. It is recommended that Levered Learning incorporate additional teacher instructional support to advise more clearly how teachers can use the data from the platform to create and manage small groups in the classroom, particularly when a classroom has many students at different learning levels.

The **key to successful teacher engagement** is a combination of whole-group instruction, small group targeted instruction, and independent practice. Teachers find most success with whole group instruction and are personally most fulfilled when they supplement the Class Opener feature of Levered Learning with their own unique styles of lecture-style presentation to reinforce material that is difficult. Small group instruction and independent practice allows teachers to work more closely with students that need extra support while simultaneously allowing advanced students to be challenged independently. Classroom management is, however, difficult for teachers, as they are unable to get around to help all the students when multiple students or groups are struggling to advance in Levered Learning and "getting stuck." It is, therefore, critically important that teachers attend the second professional development session offered

by Levered Learning where they offer more support on using student data from within the platform to create and support small groups aligned to similar target area needs.

Likewise, **the key to successful student engagement** was being able to keep progressing through the lessons without getting stuck on a question. For students that are significantly behind in grade-level math, they did not understand why they were getting questions wrong despite the instructional prompts from within Levered Learning, so a key recommendation is that Levered Learning provide more explanation or a different way for struggling students to better understand what they did wrong so they can more effectively try again and advance. This will simultaneously give teachers more opportunity to spend quality time with students who are struggling to understand even after the additional support from within Levered Learning.

From a **product usability** perspective, the key recommendation enhancement revolves around making the characters and animation of Levered Learning slightly more mature as the vast majority of students felt the voices and characters were a little bit immature.

Overall, the results of this research study provide evidence that Levered Learning can be easily used and implemented in 3rd through 5th grade classrooms and that engagement can be sustained with only slight product enhancements. Teachers and students alike believed the self-pacing feature to be an invaluable addition to the classroom and all teachers saved significant time in preparation for math class. Levered Learning was also particularly valuable for Lee A. Tolbert Community Academy in that it gave new ideas and strategies to teachers on how to teach math, which was a key feature teachers and administrators were looking for in a new math curriculum for their school. Since implementation conditions were not favorable to properly assess correlation of Levered Learning usage with student and/or teacher outcomes, it is recommended that the correlational research be repeated in the fall with Lee A. Tolbert Community Academy and/or another similar school to gather evidence of promise of impact of Levered Learning.