2025

STEM Action Center's *K-12 Math Personalized Learning Software Grant Program*: 2024-2025 Evaluation Report

July 2025

Prepared for the
STEM Action Center

THE UNIVERSITY OF UTAH
UTAH EDUCATION POLICY CENTER

THE UNIVERSITY OF UTAH
UTAH EDUCATION POLICY CENTER

Bridging Research, Policy, and Practice

The Utah Education Policy Center (UEPC) is an independent, non-partisan, not-for-profit research-based center at the University of Utah founded in the Department of Educational Leadership and Policy in 1990 and administered through the College of Education since 2007. The UEPC mission is to bridge research, policy, and practice by conducting rigorous and comprehensive research and evaluations and providing expert and research-informed technical assistance and professional learning.

We empower educators, policymakers, and leaders to make research actionable and impactful to transform education across early childhood education, K-12 schools, and higher education. We are committed to supporting the understanding of whether educational policies, programs, and practices are being implemented as intended, whether they are effective and impactful, and how they may be improved, scaled-up, and become sustainable.

Please visit our website for more information about the UEPC.http://uepc.utah.edu

Andrea K. Rorrer, Ph.D., Director
Phone: 801-581-4207
andrea.rorrer@utah.edu

Cori Groth, Ph.D., Associate Director
Phone: 801-581-4207
cori.groth@utah.edu

Ellen Altermatt, Ph.D., Assistant Director for Research and Evaluation
ellen.altermatt@utah.edu

T. William Altermatt, Ph.D., Assistant Director and Lead Data Scientist
bill.altermatt@utah.edu

Acknowledgements

The Utah Education Policy Center (UEPC) extends its sincere thanks to Clarence Ames, Tami Goetz, and their colleagues at the Utah STEM Action Center for their leadership and dedication to supporting administrators, teachers, and students through the K–12 Math Personalized Learning Software Grant Program. We also appreciate the cooperation of school district and charter school administrators who facilitated teacher and student participation in the evaluation. Finally, we are grateful to the teachers and students who took the time to complete surveys, and to the math learning software providers for their collaboration throughout this work.

Citation: Altermatt, E. R., Yildiz, M., & Rorrer, A. K. (2025). *STEM Action Center's K-12 Math Personalized Learning Software Grant Program: 2024-2025 Evaluation Report.* Salt Lake City, UT: Utah Education Policy Center.

Table of Contents

List of Tables

List of Figures

1 | Executive Summary

1.1 Overview

This report provides findings from the Utah Education Policy Center's (UEPC's) 2024-2025 evaluation of STEM Action Center's *K-12 Math Personalized Learning Software Grant Program*. Using teacher surveys, student surveys, math learning software (MLS) usage data, and statewide administrative data, the evaluation examined five key evaluation questions related to the quality of MLS implementation, teacher and student perceptions of its value, and the relationship between MLS usage and student math attitudes and achievement.

1.2 Key Findings

EQ1. To what degree did teachers report using "promising practices" for MLS implementation?

- On average, teachers reported using three promising practices for MLS implementation – (1) setting mastery-based goals, (2) using data to reflect on instruction, and (3) using data to discuss learning with students – at low to moderate levels, with fewer than 30% of teachers reporting implementing them "to a large extent."
- Teachers who were more attentive to students as they used MLS were significantly more likely to implement these three promising practices.

EQ2. To what degree did teachers report that MLS was valuable for their teaching or for their students' learning?

- Most teachers agreed that MLS has value in helping their students build confidence and skills in math and in helping them meet the diverse learning needs of their students.
- Perceived value of MLS was significantly higher among teachers who reported implementing the three promising practices.

EQ3. To what degree did students report that MLS was valuable for their learning?

- Students held mixed views on the value of MLS. On average they found MLS more helpful for building skills and confidence than for making math interesting or enjoyable.
- Perceived value was significantly higher among students who used MLS more frequently (both at school and home), perceived greater support from adults, and saw stronger alignment between MLS content and classroom material.

EQ4. To what degree were changes in math attitudes related to students' self-reported levels of MLS usage?

- Students were *more* likely to report improvements in math attitudes (e.g., gains in self-confidence) when they used MLS more frequently at school, when they perceived stronger alignment between MLS content and classroom material, and when they perceived higher levels of support for MLS use at school and at home.
- Students were *less* likely to report improvements in math attitudes when they reported using MLS more frequently at home without sufficient adult support.

EQ5. What was the relationship between MLS usage and student outcomes on statewide math assessments in the 2023-2024 school year, and were these relationships moderated by characteristics of the school or characteristics of students?

- Positive associations were found between MLS usage and math achievement gains across all eight vendors – ALEKS, Derivita, DreamBox, i-Ready, Imagine Learning, IXL, Mathspace, and ST Math – for which MLS usage and achievement data were available. Students in the highest usage quartile (Q4) had predicted Student Growth Percentiles (SGPs) that were 3 to 13 points higher, on average, than those in the lowest quartile (Q1).
- For several MLS programs, the relationship between software usage and student growth was stronger for students from low-income backgrounds and for those attending schools with higher concentrations of low-income students.
- Across most vendors, students from low-income backgrounds used MLS less frequently than their more affluent peers.

1.3 Conclusions and Recommendations

Overall, the evaluation revealed **low to moderate implementation of promising practices**, generally **positive perceptions of MLS value** (especially with high-quality implementation and adult support), and **positive links between MLS usage and growth in math**. However, persistent **gaps in use** remain, with students from low-income backgrounds using MLS less frequently than their more affluent peers. This trend is especially concerning given evidence that these students may benefit more from MLS use.

To strengthen MLS implementation and improve positive impacts, the UEPC recommends:

- **expanding professional learning opportunities and planning time** to build educators' capacity to implement promising practices;
- **enhancing MLS features and tools,** including by replacing or supplementing static dashboards with dynamic real-time alerts to guide teachers' discussions with students and by improving platform flexibility so teachers can more easily select, sequence, and customize content;
- **prioritizing and providing additional resources for students and schools where math achievement is neither proficient nor progressing,** including by expanding initiatives that "stack" interventions such as high-dosage tutoring with MLS use to help students facing the greatest barriers to fully engage with MLS platforms.

Implementing these recommendations will require greater coordination among STEM Action Center personnel, schools, and MLS providers, but this type of coordination is essential to realizing MLS's potential as an effective instructional tool for supporting student learning in mathematics.

2 | Introduction

This report presents findings from the 2024-2025 evaluation of the *K-12 Math Personalized Learning Software Grant Program* conducted by the Utah Education Policy Center (UEPC). The UEPC has served as the external evaluator for the *K-12 Math Personalized Learning Software Grant Program* since 2016. As a trusted research and evaluation partner, the UEPC brings expertise in rigorous, actionable research and a commitment to advancing educational improvement through evidence-based inquiry. In this partnership role, the UEPC has conducted studies to assess the effectiveness of more than a dozen MLS programs in improving student outcomes on statewide math assessments (e.g., Altermatt et al., 2022). In addition, the UEPC has conducted research focused on understanding how teachers use MLS in their classrooms and examining "promising practices" for implementation (e.g., Altermatt et al., 2023b, 2023c, 2023d; Altermatt & Rorrer, 2024a, 2024b). Results have been shared in reports, accessible research briefs, and a peer-reviewed publication.

2.1 Program Overview

Utah's STEM Action Center is responsible for acquiring, distributing, and evaluating a STEM-related instructional technology program in schools (Utah Code 9-22-107; 9-22-108).[1] To fulfill this obligation, the STEM Action Center launched the *K-12 Math Personalized Learning Software Grant Program*.[2] The Grant Program provides funds to school districts and charter schools to acquire math learning software (MLS) licenses and supports professional development for using these software programs.

STEM Action Center personnel select MLS programs for participation in the *K-12 Math Personalized Learning Software Grant Program* through a competitive process that prioritizes the effectiveness of each program in improving student learning outcomes. School or district level administrators submit applications to participate in the Grant Program in the spring of each school year. In Spring 2023 and Spring 2024, applicants could request licenses for up to two MLS programs from a list of **10 approved vendors**. This was an increase from six approved program options in prior years.

Table 1 provides a summary of the number of schools requesting licenses for each MLS program, the number of requested licenses across schools, and the number of awarded licenses across schools for AY 2023-2024 and AY 2024-2025. In all, 741 schools requested MLS licenses in Spring 2023 for Academic Year (AY) 2023-2024 and 739 schools requested MLS licenses in Spring 2024 for AY 2024-2025. As shown, i-Ready was the most requested MLS programs in both years, followed by Derivita and ALEKS. Freckle/Star Math and My Math Academy were the least requested MLS programs in both years. In all, requests were made for 397,822 licenses in AY 2023-2024 and 456,843 licenses in AY 2024-2025. Available Grant Program funding permitted STEM Action Center to award 142,102 (or 36% of requested licenses) in AY 2023-2024 and 132,536 licenses (or 29% of requests) in AY 2024-2025.

[1] See Utah Code Sections 9-22-101-9-22-114 for information on the establishment and guidance for STEM Action Center programs.
[2] https://stem.utah.gov/educators/funding/k-12-math-personalized-learning-software-grant/

Table 1. Math Learning Software Requests and Awards by Vendor

Math Learning Software (MLS) Vendor	# of schools requesting licenses		# of requested licenses across schools		# of awarded licenses across schools	
	2023-2024	2024-2025	2023-2024	2024-2025	2023-2024	2024-2025
ALEKS	151	146	49,351	49,832	17,868	14,457
Derivita	111	107	102,916	125,940	35,858	36,531
DreamBox	39	37	10,927	7,928	4,043	2,303
Freckle/Star Math	3	3	775	1,045	279	304
i-Ready	330	350	144,023	164,756	51,826	47,792
Imagine Learning	87	66	26,833	19,773	9,571	5,740
IXL	81	126	26,703	50,891	9,636	14,764
Mathspace	22	23	6,436	8,447	2,317	2,451
My Math Academy	7	10	668	2,296	241	667
ST Math	95	81	29,190	25,935	10,463	7,527
TOTAL	741*	739*	397,822	456,843	142,102 (= 36% of requests)	132,536 (= 29% of requests)

* The sum of counts in these columns exceeds the total number of schools requesting licenses (i.e., 741 in 2023-2024 and 739 in 2024-2025) because schools could request licenses for up to two MLS programs. Each request is counted separately in the vendor-specific rows.

2.2 Evaluation Overview

In the current evaluation, the UEPC sought to build upon its prior research and evaluation efforts related to the *K-12 Math Personalized Learning Software Grant Program* by addressing five evaluation questions (EQs):

EQ1. To what degree did teachers report using “promising practices” for math learning software implementation?
EQ2. To what degree did teachers report that math learning software was valuable for their teaching or for their students’ learning?
EQ3. To what degree did students report that math learning software was valuable for their learning?
EQ4. To what degree were changes in student math attitudes related to students’ self-reported levels of math learning software usage?
EQ5. What was the relationship between math learning software usage and student outcomes on statewide math assessments, and were these relationships moderated by characteristics of the school or characteristics of students?

The first four evaluation questions focus on teacher and student perceptions of the value of MLS, teacher implementation practices, and associations between student use of MLS and student math attitudes. To answer these four questions, the UEPC utilized data from surveys administered to teachers and students in Spring 2025.

The final evaluation question focuses on examining the effectiveness of MLS in improving student achievement outcomes in mathematics. To answer this question, the UEPC drew upon MLS usage data provided by MLS vendors and student demographic and achievement data.[3] The current report focuses on the results of analyses examining the effectiveness of MLS in improving student outcomes in AY 2023-2024, as data from summative math assessments administered in AY 2024-2025 are not yet available from the USBE. The results of analyses examining effectiveness in AY 2024-2025 will be shared in a report to be delivered to the STEM Action Center in July 2026.

Data sources for this evaluation include **teacher and student surveys** administered in Spring 2025, **MLS usage data** from participating vendors, and **statewide administrative data**. Items for the teacher and student surveys were drawn from surveys that the UEPC designed in consultation with the STEM Action Center and the Utah State Board of Education in AY 2022-2023. A full description of the Spring 2023 teacher and student surveys – including methods for survey development and administration, response rates, and descriptive statistics for each item – is provided in a report available on the UEPC's website (Altermatt et al., 2023a). Math teachers and students across the state participated in these surveys, which were approved for administration by the USBE, in Spring 2023. One key goal of administering surveys in Spring 2023 was to identify practices for MLS implementation that predicted the most positive teacher and student attitudes as well as the strongest gains in student achievement on statewide math assessments. Reports, briefs, and a publication describing the **"promising practices"** for MLS implementation that emerged from these analyses are on the UEPC's website (see Altermatt et al., 2023b, 2023c, 2023d; Altermatt & Rorrer, 2024a, 2024b).

2.3 Report Organization

This evaluation report is divided into nine sections. In the first section, we provided an **executive summary**, with key findings, conclusions, and recommendations. In this second section, we have provided an **overview** of the *K-12 Math Personalized Learning Software Grant Program* and of the UEPC's evaluation of this program. In In the third section, we offer **background** for the current report by providing a brief review of the research and evaluation literatures that have sought to understand the role that educational technology – including math learning software programs – might play in improving student outcomes in mathematics. In the fourth section, we summarize findings related to **EQ1** which focuses on **teachers' use of "promising practices."** In the fifth section, we summarize findings related to **EQ2** which focuses on **teachers' perceptions of the value of MLS**. In the sixth section, we summarize findings related to **EQ3** which focuses on **students' perceptions of the value** of MLS. In the seventh section, we summarize findings related to **EQ4** which focuses on associations between MLS use and **changes in students' math attitudes**. In the eighth section, we summarize findings related to **EQ5** which focuses on analyses of **MLS effectiveness**. Each of these sections presents an overview, methods, findings and conclusions for the respective evaluation question. Finally, in the ninth section, we offer **recommendations** for ongoing program improvement that could support the STEM Action Center in implementing and modifying the program in years to come to achieve the proposed outcomes.

[3] The Utah Education Policy Center has a Master Data Sharing Agreement with the Utah State Board of Education, which permits use of education data for evaluation and research purposes. Importantly, the UEPC adheres to terms of the Master Data Sharing Agreement, including terms of use, confidentiality and non-disclosure, data security, monitoring, and applicable laws. The UEPC also complies with University of Utah Institutional Review Board policies for educational research and evaluation. Though the UEPC is housed at the University of Utah, only authorized UEPC staff may access the data, and data are not available throughout the University or to other parties. The views expressed in this report are those of UEPC staff and do not necessarily reflect the views or positions of the USBE or the University of Utah.

2.4 Intended Audience

The primary audiences for this report include STEM Action Center staff; personnel from the Utah State Board of Education with expertise and interest in mathematics education, technology-enabled instruction, and personalized competency-based learning; math learning software providers; and administrators and educators from LEAs participating in the program. The report is intended to provide useful information for documenting the characteristics and outcomes of the program in AY 2023-2024 and 2024-2025 and for identifying key action steps to ensure strong implementation and outcomes in AY 2025-2026.

3 | Background

3.1 Learning Loss and Recovery Efforts in Mathematics

The Covid-19 pandemic resulted in significant learning loss for many students across the United States, particularly in mathematics (Callen et al., 2024; Fahle et al., 2023; Kuhfeld & Lewis, 2024; Lewis & Kuhfeld, 2022, 2023). Similar findings have emerged in Utah. For example, analyses of statewide assessments showed lower math scores post-pandemic than pre-pandemic, especially among students who were eligible for free or reduced-price lunch (Betebenner & Van Iwaarden, 2024; USBE & NCIEA, 2021; USBE Strategic Plan Implementation Update, 2024). Although some encouraging trends point to a gradual return to pre-pandemic mathematics performance both in Utah and nationally, researchers estimate that full recovery, if attainable, may take years, especially among some groups of students (e.g., economically disadvantaged students) who were disproportionately impacted by the pandemic (Betebenner & Van Iwaarden, 2024; Fahle et al., 2024; Goldhaber et al., 2023; Kuhfeld & Lewis, 2022; Kuhfeld et al., 2022; Lewis & Kuhfeld, 2022, 2023, 2024; Lewis et al., 2022).

Supported by federal relief funds along with state and local resources, school districts in Utah and across the nation have invested in a variety of academic recovery initiatives, including high-dosage tutoring and out-of-school-time programs (Carbonari et al., 2022, 2024; Jordan et al., 2022). Despite substantial investments, the existing evidence indicates that the effects of these interventions are mixed and often modest due to challenges in both uptake and implementation. Specifically, many interventions have failed to reach the intended number of students, and the effectiveness of interventions often diminishes as they are taken to scale (e.g., Carbonari et al., 2022, 2024; Fahle et al., 2024; Kraft, Sanderson et al., 2024; Kraft, Schueler et al., 2024; Lewis & Kuhfeld, 2022, 2023, 2024; Robinson et al., 2022).

3.2 Math Learning Software as Recovery Intervention

Amidst these challenges, “personalized” math learning software (MLS) continues to receive attention as a promising approach to support and accelerate post-pandemic learning recovery. Specifically, proponents of technology-enabled learning argue that MLS offers unique advantages as an academic recovery intervention because it can be scaled quickly and cost-effectively, even in settings where widespread access to other interventions is untenable. Additionally, proponents argue that MLS can a) reduce the burden on educators working to adapt to a broader range of student performance by offering learning experiences tailored to the needs of individual students, b) provide educators with real-time data on student performance, and c) include interactive and gamified elements that can bolster student enjoyment of and engagement with learning (e.g., Brizard, 2023; Canbolat & Arndt, 2024; Huebner & Burstein, 2023; Thomas et al., 2023).

Proponents argue that MLS holds promise as both a stand-alone intervention and a complement to other recovery efforts. For example, despite evidence that high-dosage tutoring can be quite effective in improving student learning outcomes (Bhatt et al., 2024; Guryan & Ludwig, 2023, p. 157), there are indications that schools and districts face challenges in implementing high-dosage tutoring at scale (Carbonari et al., 2024; Kraft, Sanderson et al., 2024; Kraft, Schueler et al., 2024). Among these challenges are that tutors often lack the content knowledge, pedagogical skills, and information about students’ performance that they need to be effective tutors in mathematics. Tutoring program personnel and classroom teachers, in turn, lack time to provide these resources and associated supports (see Carbonari et al., 2022, 2024; Makori et al., 2024; National Student Support Accelerator, 2023a). MLS has the potential to ease the demands on individuals who oversee tutors, on classroom teachers, and on tutors themselves (Bhatt et al., 2024; Guryan & Ludwig, 2023; National Student Support Accelerator, 2023; Thomas et al., 2024).

3.3 Contributions of the Current Evaluation

The promise of MLS as a learning recovery intervention is supported by research indicating that MLS use is associated with positive achievement outcomes for students, including higher scores on summative assessments, including in Utah (e.g., Altermatt et al., 2022; Cheung & Slavin, 2013; Kulik & Fletcher, 2015; Zheng et al., 2022). Importantly, however, the effectiveness of MLS – like other interventions – appears to be moderated by a variety of factors, including implementation fidelity, student characteristics, and school characteristics (Altermatt & Rorrer, 2024a, 2024b; Bernacki et al, 2021; Carbonari et al., 2024; Pane et al., 2017; U.S. Department of Education, 2012; Van Schoors et al., 2023; Thomas et al., 2024; Zheng et al., 2022). Given the enormous time and financial investments that schools nationally and in Utah are making in MLS (see Utah State Board of Education Covid-19 Relief Funding for K-12, 2024), there is a pressing need to understand variations in implementation and to empirically evaluate MLS as an effective intervention to support learning recovery. The current evaluation report contributes to this effort by providing new information about: (1) how MLS programs are being used in Utah's classrooms, (2) teachers' and students' perceptions of the value of these programs in supporting teaching and learning, and (3) the effectiveness of these programs in supporting positive mathematics attitudes and achievement.

4 | Teacher Use of "Promising Practices"

4.1 Overview

In this section of the report, we describe methods and findings related to the first evaluation question:

EQ1. To what degree did teachers report using "promising practices" for math learning software (MLS) implementation?

To address this question, the UEPC used data from the Spring 2025 teacher survey introduced in Section 2.2. This anonymous survey contained items assessing teachers' self-reported practices for using MLS and their perceptions of the value of MLS. Although individual teacher participation in the survey is voluntary, administering the teacher survey is a condition of participation in STEM Action Center's Grant Program, as agreed upon to by participating LEAs and schools.

In answering EQ1, we focused on three promising practices related to teachers' goal-setting for students' MLS use and their use of MLS-generated data:

1. **Setting mastery-based goals,**
2. **Using data to reflect on instruction**, and
3. **Using data to discuss learning with students**.

These practices were selected because prior research shows they are associated with greater student gains on statewide math assessments (Altermatt & Rorrer, 2024a). Moreover, each practice is amenable to change through professional learning or enhancements to MLS platforms (e.g., simplified dashboards). We also examined one additional practice – setting time-based goals for students' MLS use – given evidence from the Spring 2023 teacher survey indicating that teachers set time-based goals more than mastery-based goals (e.g., Altermatt & Rorrer 2024a, 2024b). It is important to note that time-based goals are *not* considered a promising practice as they predict smaller student gains on statewide math assessments (Altermatt & Rorrer, 2024b).

4.2 Methods

Participants

In all, 2,031 teachers from 340 schools were included in the analytic sample for answering EQ1. These teachers provided consent for participating in the Spring 2025 teacher survey, completed at least 70% of the survey, and indicated that they were using one of the ten approved MLS programs to support their instruction in AY 2024-2025.

Key Survey Items

Our analyses for EQ1 focused on the four implementation practices introduced in Section 4.1. As shown in Table 2, each implementation practice was assessed with a single item. A four-point response scale was used for all four items where 1 = "not at all," 2 = "to a small extent," 3 = "to a moderate extent," and 4 = "to a large extent." Display logic was used to replace instances of [math software] with the name of the software program that teachers indicated that they used most often.

Table 2. Items Used to Assess Teachers' Self-Reported MLS Implementation Practices

Implementation Practice	Item
Set time-based goals	I require students to spend a certain amount of time using [math software]
Set mastery-based goals	I require students to demonstrate mastery of a certain number of concepts, topics, or skills when using [math software]
Use data to reflect on instruction	[I] use data from [math software] to identify areas where I need to strengthen my content knowledge or teaching skills
Use data to discuss learning with students	[I] use data from [math software] to reflect on and discuss learning with my students

In addition to examining the overall use of these practices among teachers, we explored whether four teacher-reported factors were associated with their use: (1) number of years of experience teaching math, (2) number of years of experience using their current MLS program, (3) level of attention to students during MLS use, and (4) teaching at the secondary level. The third factor, ***teacher attention***, was assessed with an item that read: "When students use [math software], my attention is focused on students while they work." Teachers were asked to respond to this item on the same four-point scale used for other implementation practices.

Analysis Plan

Two sets of analyses were conducted to answer EQ1. First, we calculated descriptive statistics to determine the degree to which teachers, as a group, reported using each practice. Second, we ran a series of regression analyses to examine factors that predict teachers' use of each promising practice. Teacher reports of their students' average weekly math software usage at school and at home was included as a covariate in regression analyses.

4.3 Findings

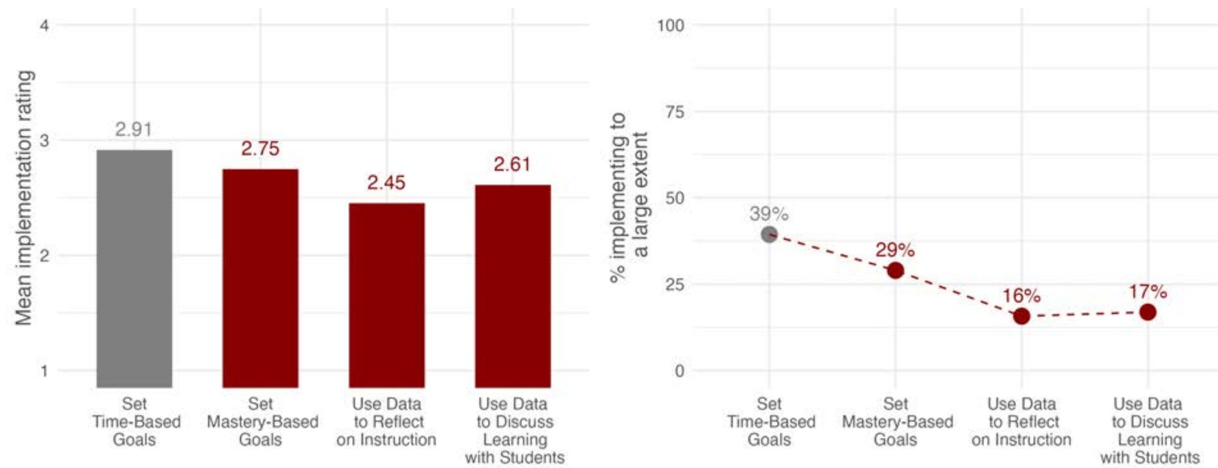
Descriptive Statistics

Figure 1 provides means (panel a) for each of the items assessing the four implementation practices presented in Table 1 along with the percentage (panel b) of teachers who indicated that they implemented each practice "to a large extent." As shown, teachers reported implementing each of the promising practices – setting mastery-based goals, using data to reflect on instruction, and using data to discuss learning with students – at low to moderate levels, with mean ratings between 2.45 and 2.61 (i.e., between "to a small extent" and "to a moderate extent"). Teachers were most likely to report setting time-based goals for MLS use (mean = 2.91), with 39% indicating they did so "to a large extent." In contrast, fewer than 30% of teachers reported consistently using any of the three promising practices for MLS implementation.

These findings are concerning given the results of prior research conducted by the UEPC, which indicates that teachers who report high levels of mastery-based goal setting for their students' use of MLS and frequent use of MLS data have students who show *stronger* gains on statewide tests of math achievement. In contrast, teachers who report high levels of time-based goal setting for MLS use show *weaker* gains on statewide tests of math achievement (see Altermatt et al., 2024).

Figure 1. Means and Percentages for Items Assessing Teacher Use of Promising Practices

a. Means b. Percentages



Predictors of Teachers' Use of "Promising Practices"

Among the four potential predictors of promising practice use, one stood out as especially strong and consistent: teacher attention to students during MLS time.

Figure 2. Associations Between Teachers' Attention and Use of Promising Practices

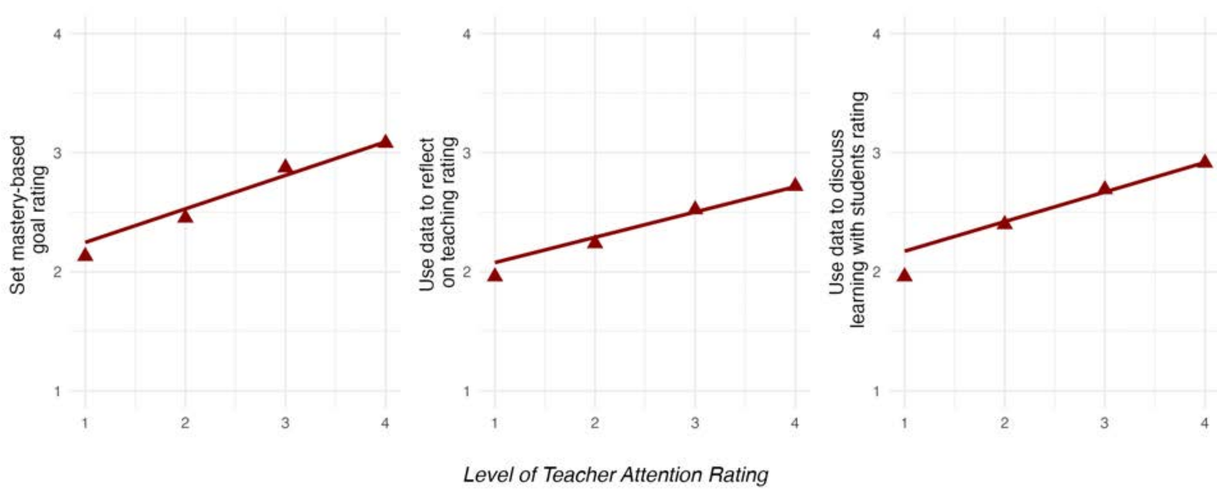


Figure 2 illustrates the relationship between teacher attention and the three promising implementation practices. The lines represent predicted values from regression models, while the triangles indicate the actual mean implementation ratings. As shown, teachers who reported the highest levels of attention to students during MLS use reported implementing promising practices at levels that were up to a full point higher than teachers who reported the lowest levels of attention. These relationships suggest that when teachers remain actively engaged with students during their

MLS use, they may be better positioned to emphasize mastery goals, use data to reflect on and guide their instruction, and engage students in meaningful conversations about their progress.

4.4 Conclusions

Results from the Spring 2025 teacher survey show that fewer than 30% of respondents reported consistently setting mastery-based goals or using MLS data to guide instruction and engage students in conversations about their learning. This is concerning, as these practices are linked to greater gains in students' math achievement. Importantly, teachers who reported paying greater attention to students during MLS use were significantly more likely to implement all three of these promising practices. This finding underscores the importance of teachers playing an active role during technology-enabled learning, rather than treating MLS as a stand-alone activity (see Huebner & Burstein, 2023). Professional learning opportunities and enhancements to MLS programs (e.g., real-time alerts to guide teachers' discussions with students) that support mastery-based goal setting and meaningful use of MLS data could help amplify the instructional benefits of these programs.

5 | Teacher Perceptions of Value

5.1 Overview

In this section of the report, we describe methods and findings related to the second evaluation question:

> **EQ2.** To what degree did teachers report that math learning software (MLS) was valuable for their teaching or for their students' learning?

To address this question, the UEPC used data from the Spring 2025 teacher survey described in Sections 2.2 and 4.1. Although individual teacher participation in the survey is voluntary, administering the teacher survey is a condition of participation in STEM Action Center's Grant Program, as agreed upon to by participating LEAs and schools.

5.2 Methods

Participants

In all, 2,031 teachers from 340 schools were included in the analytic sample for answering EQ2. These teachers consented to participating in the Spring 2025 Teacher Survey, completed at least 70% of survey items, and indicated that they were using one of the ten approved MLS programs to support their instruction in AY 2024-2025.

Key Survey Items

Analyses for EQ2 focused on three items (see Table 3) assessing teachers' perceptions of the value of MLS for their teaching and students learning. A five-point response scale was used for all three items where 1 = "strongly disagree," 2 = "disagree," 3 = "neither agree nor disagree," 4 = "agree," and 5 = "strongly agree." Display logic was used to replace instances of [math software] with the name of the software program that teachers indicated that they used most often.

Table 3. Items Used to Assess Teachers' Perceptions of the Value of MLS

Survey Items
[Math software] helps my students improve their confidence in math
[Math software] helps my students improve their skills in math
[Math software] helps me address the learning needs of all of my students in math

Analysis Plan

Two sets of analyses were conducted to answer EQ2. First, we calculated descriptive statistics to determine the degree to which teachers, as a group, perceived software to be valuable and to examine perceptions of value across vendors. Second, we ran regression analyses to examine whether teacher perceptions of value were related to their level of implementation of the three promising practices examined in Section 4.

5.3 Findings

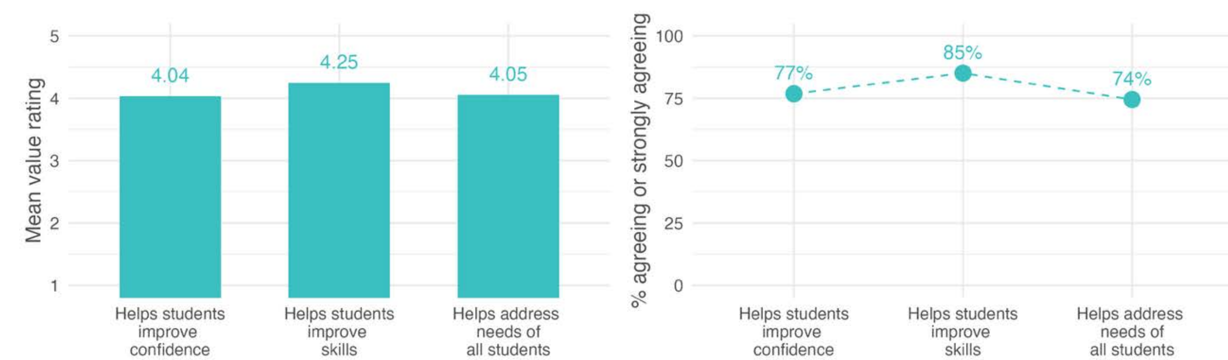
Descriptive Statistics

Figure 3 provides means (panel a) and percentages (panel b) for each of the perceptions of value items. As shown, teachers, as a group, overwhelmingly perceived that MLS has value, with more than 70% of teachers agreeing or strongly agreeing that MLS is helpful in building student confidence and skills and for helping them address the needs of their students

Figure 3. Means and Percentages for Items Assessing Teacher Perceptions of the Value of MLS

a. Means

b. Percentages



Because teacher responses were correlated across the three items (*r*s = .63 to .77), responses were averaged across items to form a perceptions of value scale that was used in subsequent analyses. Cronbach's alpha for the scale was .86. The mean rating on this scale was 4.10.

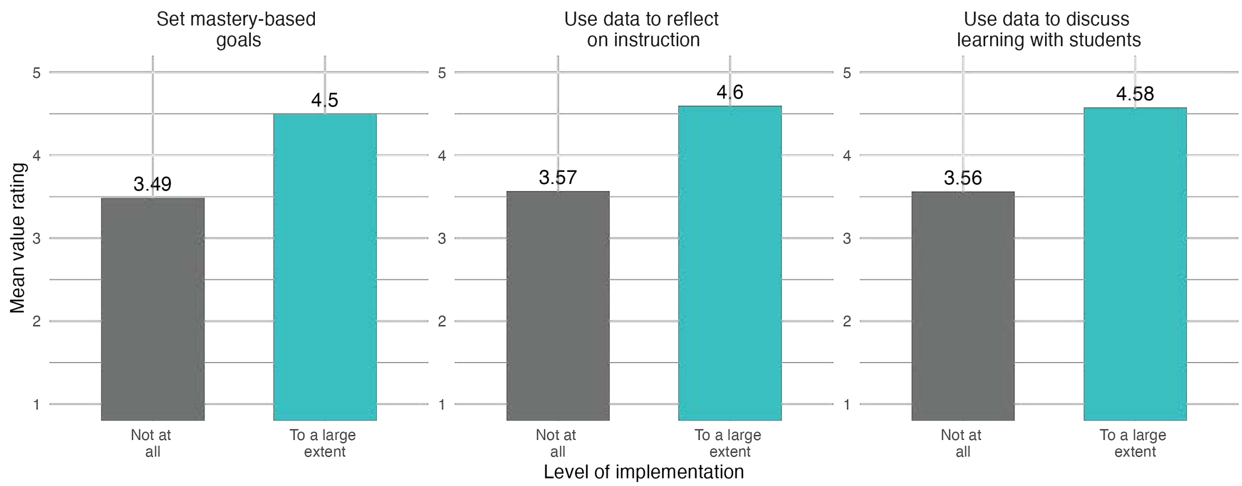
Importantly, perceptions of value were generally similar across vendors. For example, among vendors with at least 150 respondents, the mean rating on the perceptions of value scale was between 4.00 and 4.50 for ALEKS (mean = 4.29, *n* = 206), Derivita (mean = 4.01, *n* = 161), i-Ready (mean = 4.06, *n* = 946), IXL (mean = 4.38, *n* = 328), and ST Math (mean = 4.19, *n* = 187). Comparisons should be made with caution as there are differences in the representativeness of survey respondents across vendors.

Predictors of Teachers' Perceptions of Value

Regression analyses were used to examine associations between teachers' self-reported level of implementation of the three promising practices for MLS implementation and their perceptions of the value of MLS. Analyses controlled for teacher reports of their students' average weekly math software usage, years of teaching experience, years of experience with their current MLS program, and grade level. The results of these analyses indicated that all three promising practices were associated with higher perceptions of the software's value, all *p*s < .001.

To illustrate the magnitude of the effects, Figure 4 presents actual mean value ratings at two levels of implementation for each promising practice: "not at all" and "to a large extent." The results show that teachers who reported implementing each promising practice "to a large extent" had perceptions of value that were more than a full point higher on the five-point scale compared to those who reported not implementing them at all.

Figure 4. Mean Perceptions of Value by Level of Implementation of Promising Practices



5.4 Conclusions

Findings from the Spring 2025 teacher survey indicate that, overall, teachers perceived MLS as valuable. Across more than 2,000 respondents, over 70% of teachers indicated that MLS helped students build confidence and skills and helped them meet the diverse learning needs of students. Importantly, these positive perceptions were generally consistent across MLS vendors, suggesting a broadly held view of MLS as a beneficial instructional tool.

Importantly, teacher perceptions of value were significantly associated with the extent to which they implemented three promising practices for MLS use. Specifically, teachers who reported setting mastery-based goals for students' use of MLS and using data from MLS to support their instruction "to a large extent" rated the software as markedly more valuable than those who did not implement these practices at all. These findings highlight the importance of implementation quality and suggest that professional learning and support aimed at helping teachers adopt effective practices may enhance both perceived and actual benefits of MLS in the classroom.

6 | Student Perceptions of Value

6.1 Overview

In this section of the report, we describe methods and findings related to the third evaluation question:

EQ3. To what degree did students report that math learning software (MLS) was valuable for their learning?

To address this question, the UEPC used data from the Spring 2025 student survey introduced in Section 2.2. Although individual student participation in the survey is voluntary, administering the student survey is a condition of participation in STEM Action Center's Grant Program, as agreed upon to by participating LEAs and schools. The anonymous survey was administered to students by teachers and contained items assessing the frequency with which students use MLS, student perceptions of the value of MLS, and student attitudes toward mathematics.

6.2 Methods

Participants

In all, 35,306 students were included in the analytic sample for answering EQ3. These students provided assent, completed at least 70% of the survey items, and indicated that they were using one of the ten approved MLS programs to support their math learning.

Key Survey Items

Analyses for EQ3 focused on four items (see Table 4) assessing student perceptions of the value of MLS for their learning. A five-point response scale was used for all four items where 1 = "strongly disagree," 2 = "disagree," 3 = "neither agree nor disagree," 4 = "agree," and 5 = "strongly agree." Display logic was used to replace instances of [math software] with the name of the software program that students indicated that they used most often.

Table 4. Items Used to Assess Students' Perceptions of the Value of MLS

Survey Items
[Math software] helps me improve my confidence in math
[Math software] helps me improve my skills in math
[Math software] makes math more interesting
[Math software] makes math more fun

Analysis Plan

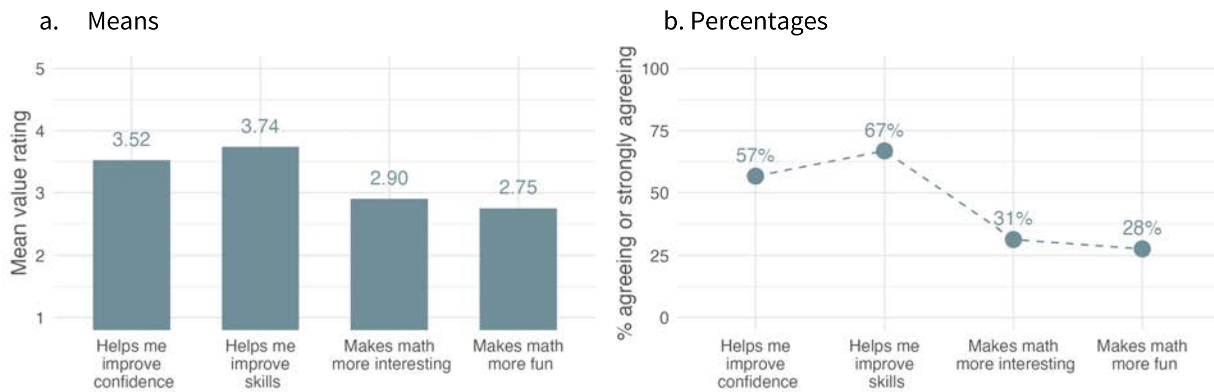
Two sets of analyses were conducted to answer EQ3. First, we calculated descriptive statistics to determine the degree to which students, as a group, perceived software to be valuable and to examine perceptions of value across vendors. Second, we used regression analyses to examine whether student perceptions of value were related to their experiences in using their current MLS program (e.g., frequency of use and alignment with class material).

6.3 Findings

Descriptive Statistics

Figure 5 provides means (panel a) and percentages (panel b) for each of the perceptions of value items. As shown, students, as a group, were more likely to agree than disagree MLS has value for building their confidence and skills in math. However, they were more likely to disagree than agree (panel b) that MLS has value in make math more engaging (i.e., interesting) and enjoyable (i.e., fun).

Figure 5. Means and Percentages for Items Assessing Student Perceptions of the Value of MLS



Because student responses were correlated across the four items (*r*s = .49 to .77), responses were averaged across items to form a perceptions of value scale. Cronbach's alpha for the scale was .86. The mean rating on this scale was 3.23.

Importantly, students' perceptions of value were generally similar across vendors. For example, among vendors with at least 300 student respondents, the mean rating on the perceptions of value scale was 3.11 for ALEKS (*n* = 6,494), 3.20 for Derivita (*n* = 9,434), 3.38 for DreamBox (*n* = 382), 3.31 for i-Ready (*n* = 10,495), 3.32 for Imagine Learning (*n* = 708), 3.25 for IXL (*n* = 5,167), 2.95 for Mathspace (*n* = 1,040), and 3.45 for ST Math (*n* = 1,562). Comparisons should be made with caution given the differences in the representativeness of survey respondents across vendors.

Predictors of Students' Perceptions of Value

In addition to items assessing students' perceptions of the value of MLS, the student survey also contained items related to students' self-reported experiences using their current MLS, including the frequency of their software use at school and at home, their perceptions of the degree of alignment between MLS material and class material, and their perceptions of the degree to which they had access to help in using the MLS program at school and at home. Information on each item, including means, is provided in Table 5. Display logic was used to replace instances of [math software] with the name of the software program that students indicated that they used most often. Only students who reported that they used software at school were asked to respond to the question about support at school and only students who reported that they used software at home were asked to respond to the question about support at home.

Table 5. Items Used to Assess Students' Experiences Using MLS

Survey Item	Response Scale	Mean	*n*
How frequently do you use [math software] at school	1 = "never" to 8 = "daily"	6.98	35,085
How frequently do you use [math software] at home	1 = "never" to 8 = "daily"	3.59	35,013
The work I do in [math software] is related to the work we are doing in math class	1 = "strongly disagree" to 5 = "strongly agree"	3.70	34,248
If I have trouble using [math software] when I am at school, there is someone who can help me	1 = "strongly disagree" to 5 = "strongly agree"	3.76	34,021
If I have trouble using [math software] when I am at home, there is someone who can help me	1 = "strongly disagree" to 5 = "strongly agree"	3.50	20,072

As shown in Table 5, students reported using MLS more frequently at school than at home. Moreover, students were more likely to agree than disagree that there was alignment between MLS and class material and that they had help available to them in using software, both in school and at home.

To examine whether students' experiences using MLS predicted their perceptions of its value, we regressed students' value ratings on students' responses to items assessing students' experiences using MLS. To allow for direct comparisons across items measured on different scales, all predictors were standardized. As shown in Figure 6 (panel a), students were more likely to perceive MLS as valuable when they used math software more frequently and when they believed that support was available. The strongest predictor, however, was the perceived alignment between MLS content and class material. As shown in Figure 6 (panel b), students who had the lowest ratings of the degree to which MLS was aligned with classwork reported an average value rating of 2.25, while those with the highest ratings reported much higher value ratings—averaging 3.68.

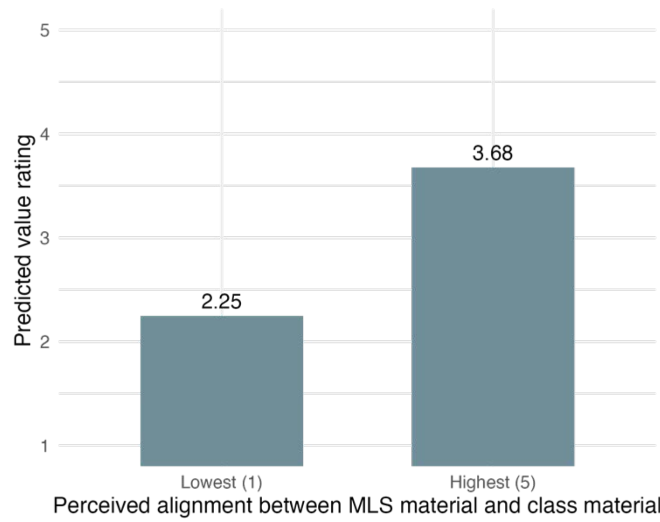
Figure 6. Summary of Analyses Examining Factors that Predict Students' Perceptions of Value

a. Regression Results

Predictor	*Estimate*	*t* - value
Frequency of math software use at school	.08	10.64***
Frequency of math software use at home	.03	3.39***
Alignment between MLS material and class material	.30	43.14***
Availability of help at school	.12	15.01***
Availability of help at home	.17	23.75***

Note. Estimates are standardized beta coefficients. Standardization permits direct comparisons across predictors measured on different scales.
*** $p < .001$.

b. Perceptions of value by perceived alignment



6.4 Conclusions

Findings from the student survey indicate that while students generally perceived math learning software (MLS) as helpful for improving their confidence and skills in math, they were less likely to view it as making math more interesting or fun. On average, students' perceptions of value were moderately positive (mean = 3.23 on a 5-point scale) and were consistent across most MLS vendors. Importantly, regression analyses revealed that students' perceptions of value were significantly influenced by their experiences using the software. Students rated MLS as more valuable when they used it more frequently, had access to help when needed, and – most strongly – when they perceived the content to be well aligned with their classroom instruction. These findings suggest that improving the alignment between MLS and in-class content, and ensuring students have adequate support at school and at home while using the software may enhance the perceived value and effectiveness of MLS as a learning tool.

7 | Changes in Student Math Attitudes

7.1 Overview

In this section of the report, we describe methods and findings related to the fourth evaluation question:

EQ4. To what degree were changes in math attitudes related to students' self-reported math learning software (MLS) usage?

To address this question, the UEPC used data from the Spring 2025 student survey described in Sections 2.2 and 6.1. Although individual student participation in the survey is voluntary, administering the student survey is a condition of participation in STEM Action Center's Grant Program, as agreed upon to by participating LEAs and schools.

7.2 Methods

Participants

In all, 35,306 students were included in the analytic sample for answering EQ3. These students provided assent, completed at least 70% of the survey items, and indicated that they were using one of the ten approved MLS programs to support their math learning.

Key Survey Items

Analyses for EQ4 focused on three items (see Table 6) assessing changes in student attitudes toward math. A five-point response scale was used for all three items where 1 = "strongly disagree," 2 = "disagree," 3 = "neither agree nor disagree," 4 = "agree," and 5 = "strongly agree."

Table 6. Items Used to Assess Changes in Student Attitudes Toward Math

Survey Item	Response scale	Mean	*n*
My confidence in math has improved this year	1 = "strongly disagree" to 5 = "strongly agree"	3.70	33,550
My skills in math have improved this year	1 = "strongly disagree" to 5 = "strongly agree"	3.94	33,352
I believe that math ability can change through hard work more NOW than I believed this at the beginning of the year	1 = "strongly disagree" to 5 = "strongly agree"	3.83	33,737

As shown in Table 6, students who used MLS were more likely to agree than disagree that they had experienced positive changes in their confidence in math, their math skills, and their belief that math ability can improve with effort. Because student responses were correlated across the three items (*r*s = .58 to .74), responses were averaged across items to form a change in attitudes scale. Cronbach's alpha for the scale was .84. The mean rating on this scale was 3.83.

Importantly, students' perceptions of change were generally similar across vendors. For example, among vendors with at least 300 student respondents, the mean rating on the change in math attitudes scale was 3.74 for ALEKS (*n* = 6,494), 3.61 for Derivita (*n* = 9,434), 4.06 for DreamBox (*n* = 382), 3.99 for i-Ready (*n* = 10,495), 4.08 for Imagine Learning (*n* = 708), 3.93 for IXL (*n* = 5,167), 3.50 for

Mathspace (n = 1,040), and 4.07 for ST Math (n = 1,562). Comparisons should be made with caution given the likelihood that there are differences in the representativeness of survey respondents across vendors.

Analysis Plan

To examine whether students' experiences using MLS predicted changes in their math attitudes, we regressed students' change ratings on each of the items listed in Table 6. To allow for direct comparisons across items measured on different scales, all predictors were standardized.

7.3 Findings

As shown in Figure 7 (panel a), students were more likely to report positive changes in math attitudes when they used MLS frequently in class, when perceived alignment between MLS content and classroom material was high, and when support was available at school. However, students were less likely to report positive changes in math attitudes when they used MLS frequently at home, especially, as shown in Figure 7 (panel b) when the level of availability of help at home was low.

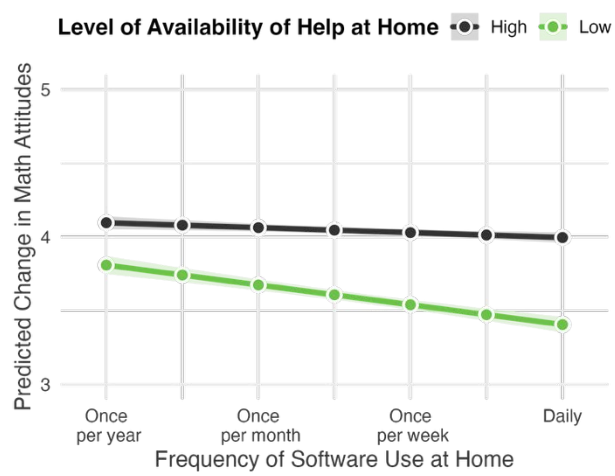
Figure 7. Summary of Analyses Examining Factors that Predict Changes in Students' Math Attitudes

a. Regression Results

Predictor	*Estimate*	*t* - value
Frequency of math software use at school	.09	12.41***
Frequency of math software use at home	-.09	-9.92***
Alignment between MLS material and class material	.17	24.05***
Availability of help at school	.15	19.55***
Availability of help at home	.14	19.84***

Note. Estimates are standardized beta coefficients. Standardization permits direct comparisons across predictors measured on different scales.
*** $p < .001$.

b. Change in attitudes by frequency of use at home



7.4 Conclusions

Findings from the student survey suggest that frequent MLS use in school settings – particularly when paired with strong instructional alignment and support – is associated with positive changes in math attitudes. However, unlike school-based MLS use, home use does not reliably promote positive shifts in math attitudes. Moreover, the results indicate that home use of the MLS may even undermine the promotion of positive shifts in math attitudes. One possible explanation is that, without consistent instructional support, frequent home use may lead to unproductive struggle or disengagement. These findings highlight the importance of the availability of structured instructional guidance in ensuring that MLS use contributes positively to students' attitudes toward math.

8 | Math Learning Software Effectiveness

8.1 Overview

In this section of the report, we describe methods and findings related to the fifth evaluation question:

> **EQ5.** What was the relationship between math learning software usage and student outcomes on statewide math assessments, and were these relationships moderated by characteristics of the school or characteristics of students?

This question focuses on the *effectiveness* of the MLS programs funded through the K–12 Math Personalized Learning Software Grant Program. Specifically, it asks whether greater usage or progress within these programs is associated with improved student performance in mathematics.

Because schools and students were not randomly assigned to MLS programs – and because the widespread use of MLS made it difficult to identify an appropriate comparison or control group – we did not pursue a quasi-experimental design. Instead, we conducted regression analyses that controlled for a range of student- and school-level characteristics. This approach allowed us to estimate the relationship between MLS usage and student achievement while accounting for other factors that may influence outcomes. We also tested for moderation effects to determine whether the strength of this relationship varied across different student groups or school contexts.

Importantly, analyses are based on MLS usage and math achievement data from AY 2023–2024. As of July 2025, state-level data for AY 2024–2025 are not yet available. The results of analyses examining effectiveness in AY 2024-2025 will be shared in a report to be delivered to the STEM Action Center in July 2026.

8.2 Data Sources

Analyses for EQ5 relied on two sources of data: **(1) MLS usage data** for AY 2023-2024 from eight vendors and **(2) student- and school-level demographic and achievement data** for AY 2023-2024 from the USBE. Below, we describe these data sources in more detail and explain how they were merged for analysis.

Importantly, two vendors were excluded from the EQ5 analyses of student achievement: Freckle/Star Math and My Math Academy. Freckle/Star Math was excluded because usage data were not provided. For My Math Academy (Age of Learning), usage data were submitted and are included in the descriptive analyses presented in this section. However, the majority of My Math Academy users were in kindergarten through 2nd grade, and the UEPC only has access to statewide math achievement data beginning in 3rd grade. As a result, we were unable to match most My Math Academy users with relevant outcome data and, therefore, excluded My Math Academy from the regression analyses focused on student growth.

MLS Usage Data

As noted above, nine of the ten MLS vendors provided monthly student-level usage reports from September 2023 to May 2024. These reports included several usage metrics, including minutes of use, number of logins, days of use, fidelity indicators, and units completed. Usage data also contained student and school names, which facilitated the matching process with state education records.

Student- and School-Level Demographic and Achievement Data

For this analysis, we used student- and school-level demographic data and measures of academic achievement.[4] **Student-level demographic data** included gender, race/ethnicity, grade level, English Language Learner (ELL) status, special education status, and low-income status. **School-level demographic data** included the percentage of students classified as low-income, the percentage of English Language Learners, and the racial/ethnic composition of the student body, including the percentage of students identifying as White. **Academic achievement data** included student scores on the Readiness Improvement Success Empowerment (RISE) assessment for students in grades 3–8 and from the Utah Aspire Plus (UA+) assessment for students in grades 9–10.

For this report, the UEPC focused on **Student Growth Percentiles (SGPs)** as the key outcome variable. An SGP is a continuous measure of academic progress that reflects a student's growth from one year to the next, relative to peers with similar prior achievement. SGP scores range from 1 (indicating the lowest relative growth) to 99 (indicating the highest). For example, a score of 52 means the student demonstrated more growth than 52% of students with comparable scores in the previous year. SGPs are more nuanced than student proficiency levels, which indicate whether a student met a specific benchmark at a single point in time and do not provide information about student growth.

SGPs can be especially useful in evaluating the effectiveness of educational interventions because they allow researchers to control for students' prior performance while simultaneously comparing their growth to peers with similar starting points. Since SGPs are only available for students in Grades 4-10, our analyses are limited to these grade levels. Other approaches would also be limited to these grades due to the need to control for prior performance.

Approach to Merging Data Sources

Student software usage data were merged with student-level records using data security protocols and a matching algorithm on a limited set of identifying fields (i.e., student name, grade level, and school name). This ensured that each student's usage data aligned with their corresponding demographic and achievement records. Match rates are provided in the results section.

8.3 Samples

Two different samples were used in this evaluation to address different analytic goals and to maximize the use of available data. The *User Sample* was used to describe software usage and student demographics across all participating vendors who provided MLS usage data. The more refined *Analytic Sample* was used to answer the central research question concerning the relationship between software usage and academic outcomes.

User Sample

This sample included all students across the eight vendors with matched usage data. It was used to calculate vendor-level summaries of student demographics, overall usage patterns, and trends in

[4] The UEPC used data available through its MDSA.

engagement over time. These analyses helped provide a descriptive portrait of who used the software and how it was used throughout the school year.

Analytic Sample

This restricted sample was used for all inferential analyses examining the relationship between usage and student academic growth. It included only students in grades 4–10 who had a valid SGP score, were successfully matched to student records, and had at least one minute of recorded usage. Kindergarten through 2nd grade students were excluded due to the lack of statewide math assessments, and 3rd graders were excluded because SGPs require a prior-year test score, which is unavailable for them. This refined sample ensured that only students with sufficient data and meaningful levels of engagement were included in the outcome analyses.

8.4 Usage metrics

The UEPC created six MLS usage metrics to capture both the quantity and consistency of student engagement with each program. These metrics were: *average monthly usage, average monthly units completed*, *average monthly days of usage*, *number of months with fidelity-level usage*, *number of months with zero usage*, and *usage trend*, calculated as the slope from a student-level regression where monthly usage is predicted from time (month index). A positive usage trend indicates that a student's usage increased over the course of the year, while a negative trend suggests a decline in usage over time. Table 7 provides definitions of each usage metric. Using multiple metrics allows us to capture a more nuanced view of student engagement and expands on our prior work, which focused primarily on average monthly usage.

Table 7. Usage Metrics and Definitions

Usage Metric	Definition
Average Monthly Usage	Total number of minutes divided by the number of months.
Average Monthly Units Completed	Total number of units completed divided by the number of months.
Average Monthly Days of Usage	Total number of days a student used the software divided by the number of months.
Months with Fidelity-Level usage	Number of months in which a student met vendor-specific thresholds for meaningful or "fidelity" usage.
Months with Zero Usage	Number of months during the school year in which the student had no recorded usage.
Usage Trend	The slope from a student-level regression where monthly usage is predicted from time. This metric indicates increases or decreases in usage over time.

8.5 Analysis Plan

The analysis plan for EQ5 focused on examining the relationship between MLS usage and student growth in mathematics, as measured by Student Growth Percentiles (SGPs) from statewide assessments. To accomplish this, we followed a four-step analytic process:

First, we conducted **descriptive analyses** to establish a foundation for understanding the data. This included calculating match rates between vendor-provided usage data and student demographic and achievement records, summarizing the demographic characteristics of users for each vendor (e.g., grade level, income status, English Learner status, race/ethnicity), and exploring usage patterns over time, such as average monthly usage from September to May. These descriptive statistics help contextualize student engagement levels and highlight differences across MLS programs.

Second, we explored **bivariate associations** between usage and student growth by plotting each student's average usage against their SGP. These relationships were visualized using generalized additive models (GAMs) with smooth splines, which allow for the detection of nonlinear patterns that a simple linear model might miss.[5] These visualizations helped identify differences across vendors, including highlighting those with clear, linear positive associations between usage and growth, as well as those with more erratic or non-linear patterns between usage and growth.

Third, we estimated a series of **multilevel regression models** to examine associations between the MLS usage metrics described in Section 8.4 and SGPs while controlling for relevant student- and school-level characteristics. The six usage metrics tested—average monthly usage, average monthly units completed, average monthly days of usage, number of months with fidelity usage, number of months with zero usage, and usage trend—were standardized within each vendor to allow comparability across platforms. These models included controls for student characteristics (e.g., ELL status, special education status, low-income status, race/ethnicity) and accounted for the nested data structure of students within schools.

Finally, we tested for **interaction effects** to assess whether the relationship between average usage and student growth varied across student and school groups. In particular, we examined whether these associations were moderated by student-level low-income status and school-level poverty, recoded as a binary indicator (less than 40% vs. 40% or more low-income). We focused on these variables for three reasons: (1) our prior work has shown that economically-disadvantaged students tend to use math software for less time than their more affluent peers (Altermatt et al., 2022); (2) existing research suggests that students in less affluent schools experienced greater academic disruption during the pandemic (e.g., Fahle et al., 2023); and (3) our preliminary analyses indicated that these factors were among the strongest moderators of the usage–growth relationship. These interaction models helped identify whether MLS was especially beneficial for students who often face systemic barriers to academic opportunity

[5] A Generalized Additive Model (GAM) is a type of statistical model that allows for flexibility in how predictors (independent variables) relate to the outcome (dependent variable). Unlike linear models, which assume a straight-line relationship between predictors and outcomes, GAMs can model more complex, nonlinear relationships. A smooth spline is a mathematical technique used within GAMs to create smooth, continuous curves.

This step-by-step approach provided a comprehensive picture of MLS usage patterns, their relationship to student outcomes, and how those relationships may vary across student populations and educational settings.

8.6 Results

The results corresponding to Steps 1 - 4 in the analytic process outlined above are presented and discussed in detail below.

Step 1: Descriptive Analyses

Unique Student Users and Match Rates. Student MLS usage records provided by vendors were matched with demographic and achievement data (i.e., student name, grade level, and school) using data security protocols and a matching algorithm. Table 8 presents the number of unique student users, the number of successfully matched records, and the match rate for each vendor. Across eight vendors, a total of 306,891 students were identified as software users, with 275,816 (89.87%) successfully matched to student records. Match rates varied by vendor, ranging from 78.71% (Mathspace) to 94.5% (DreamBox). Consistent with the number of awards made (see Table 1), i-Ready had the highest number of unique student users that could be matched to student records, followed by Derivita and ALEKS.

Table 8. Unique Student Users and Match Rates

Vendor	Unique Student Users	Matched	Match Rate (%)
ALEKS	46,073	40,155	87.16
Derivita	54,150	46,866	86.55
DreamBox	600	567	94.50
i-Ready	143,303	132,520	92.48
Imagine Learning	18,973	17,539	92.44
IXL	16,767	14,160	84.45
Mathspace	2,001	1,575	78.71
My Math Academy	502	464	92.43
ST Math	24,522	21,970	89.59
Total	**306,891**	**275,816**	**89.87**

User Demographics. Table 9 presents key demographic indicators for each vendor, including the grade level range encompassing 95% of users as well as the percentage of students classified as low-income, English Language Learners (ELL), receiving special education services, and identified as chronically absent. Additionally, racial/ethnic composition is reported to further capture the diversity of student populations served by each vendor.

Table 9. Student Demographics by Vendor

Vendor	Grade levels*	Low income (%)	ELL (%)	Special Ed (%)	Chronically Absent (%)	W (%)	H (%)	B (%)	A (%)	AI (%)	PI (%)	O (%)
ALEKS	3 - 12	34	5	14	22	77	16	1	1	1	1	3
Derivita	6 - 12	26	5	8	19	74	15	2	2	1	2	4
DreamBox	2 - 8	54	17	20	27	58	35	1	2	1	1	2
i-Ready	K - 8	35	11	17	24	70	21	2	2	1	2	4
Imagine Learning	K - 9	28	6	18	24	74	16	1	2	1	2	4
IXL	K - 12	32	9	22	25	72	19	1	1	1	1	4
Mathspace	6 - 12	31	3	26	30	80	12	1	1	3	1	2
My Math Academy	K - 2	56	17	21	38	51	27	2	2	14	2	1
ST Math	PK - 9	36	10	19	25	70	18	2	2	1	2	4

* 95% of users fell within these grade levels

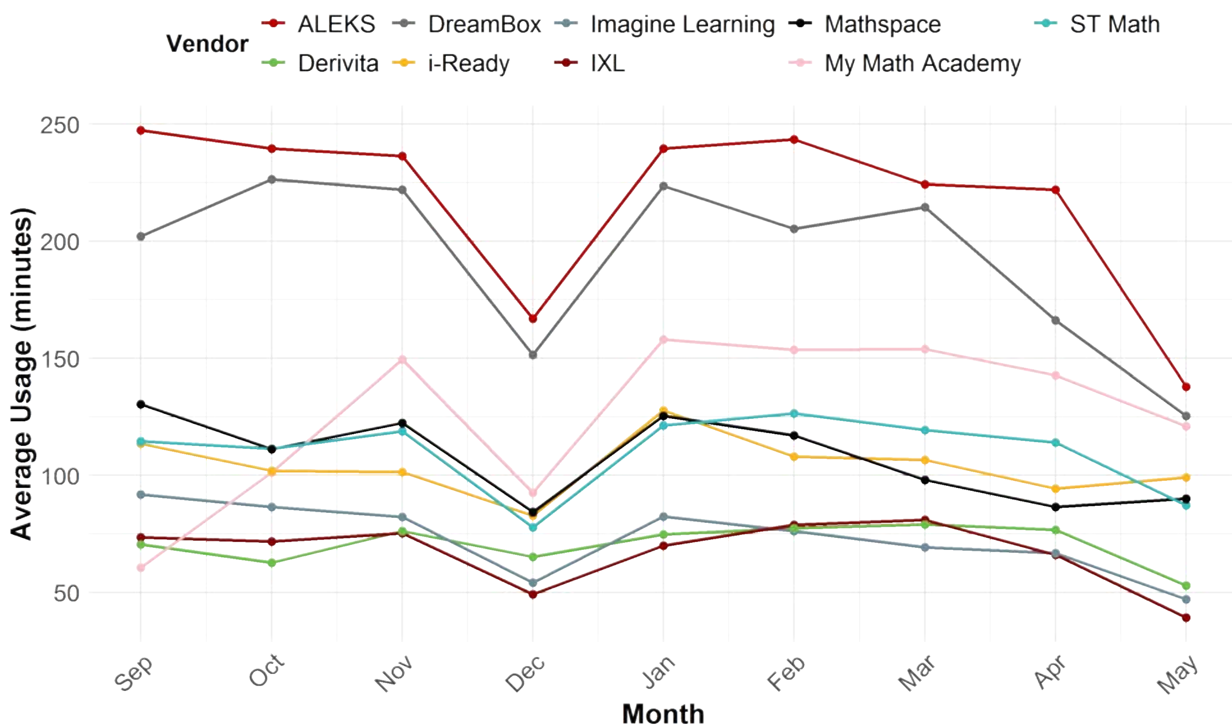
Note: ELL = English Language Learner. W = White. H = Hispanic. B = Black. A = Asian. AI = American Indian. PI = Pacific Islander. O = Other.

The demographic composition of students varied across vendors, indicating differences in grade levels served and school populations. Some vendors primarily supported elementary students (e.g., ST Math, DreamBox), while others focused on secondary grades (e.g., Derivita, Mathspace). The percentage of low-income students ranged from 26% (Derivita) to 54% (DreamBox), while the proportion of English Learners was highest for DreamBox (17%), My Math Academy (17%), and i-Ready (11%) and lowest for Mathspace (3%). Special education representation also varied, from 8% (Derivita) to 26% (Mathspace), as did chronic absenteeism, which ranged from 19% (Derivita) to 38% (My Math Academy). Racial composition differed across vendors, with the percentage of white students highest in Mathspace (80%) and lowest in DreamBox (58%) and My Math Academy (51%), which had the largest proportion of Hispanic students (35% and 27%, respectively). These demographic differences provide important context for interpreting the effectiveness of each software program.

Usage Trends. Figure 8 is a line graph that illustrates how students interact with MLS programs throughout the school year by showing the average monthly usage[6] for each vendor from September 2023 to May 2024. ALEKS and DreamBox consistently show the highest usage levels, suggesting that students using these platforms spend more time on them than students using other platforms. Differences across vendors in average monthly usage should, however, be interpreted with caution as time may be recorded differently depending on each platform's tracking methods. A noticeable decline in usage appears in December and May, aligning with school holidays and the end of the academic year. Usage generally rebounds from December to January, suggesting that students return to regular engagement after the holiday break.

[6] We focus on average monthly usage for visualizing time-based trends and conducting interaction analyses because it is the most consistently defined and interpretable metric across vendors. While our regression models include additional usage indicators, average monthly usage offers a clear, comparable reference point for examining patterns over time and student group differences.

Figure 8. Usage Trends by Month and Vendor

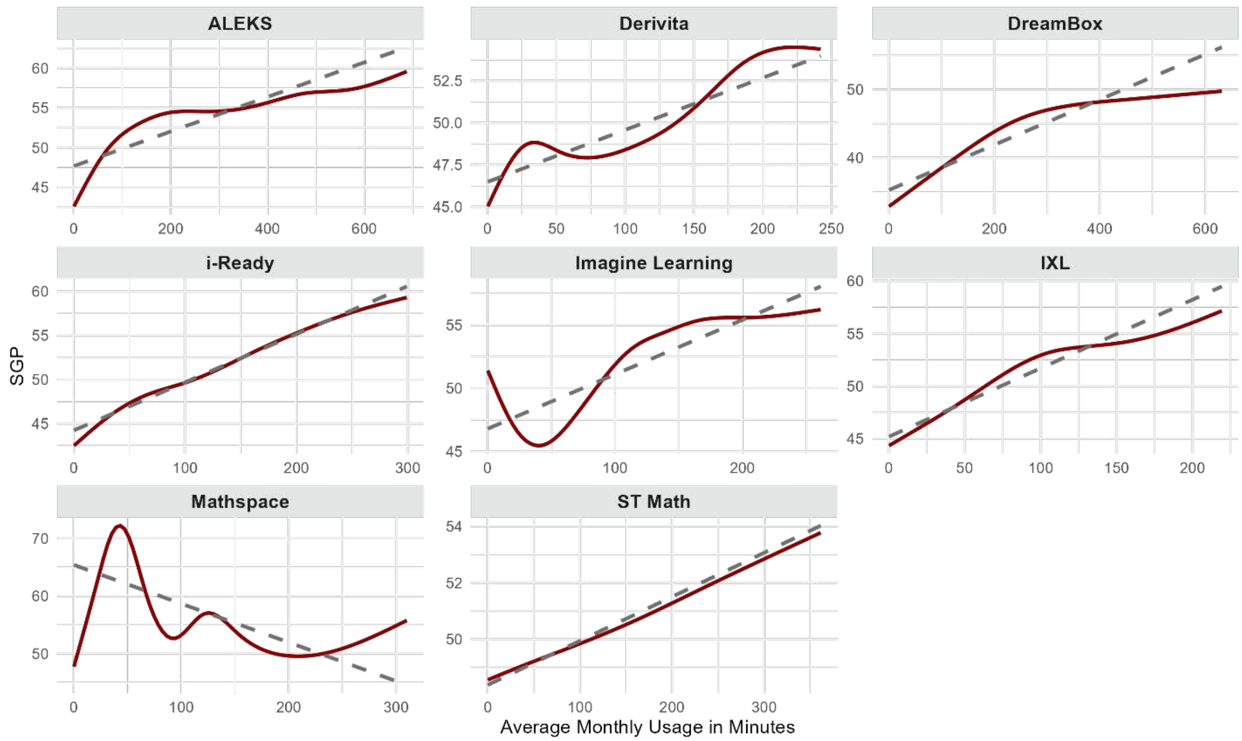


Step 2: Bivariate Associations

Figure 9 presents the association between students' average monthly usage in minutes and their Student Growth Percentiles (SGPs) for each of the eight vendors. These visualizations provide preliminary evidence of a positive association between program engagement and academic growth, which is further explored through multilevel regression modeling in the next section. Each panel shows a separate vendor, with two lines displayed: a red solid line representing a generalized additive model (GAM) with a smooth spline, and a gray dashed line representing the best-fitting linear trend. The GAM line flexibly models the relationship between usage and growth, allowing for the detection of non-linear patterns that a simple straight-line model might miss. Because average usage and SGPs vary across vendors, the axes are scaled individually for each panel.

Overall, most vendors exhibit a positive and approximately linear relationship between software usage and student growth. This trend suggests that students who used the programs more frequently tended to demonstrate higher academic growth. For example, vendors like i-Ready, IXL, and ST Math show clear upward trends in both the moving average and linear fit lines. Some vendors, such as ALEKS and DreamBox, display growth that plateaus at higher usage levels, indicating possible diminishing returns. Mathspace stands out as an exception, showing a more erratic pattern in the moving average line with an early spike followed by a decline, which may reflect anomalies in usage data or differences in implementation across schools.

Figure 9. Bivariate Associations Between Usage and Student Growth Percentiles (SGPs)



Step 3: Multilevel Regression Models

We used multilevel regression to examine the relationship between each of the six usage metrics and student growth, as measured by Student Growth Percentiles (SGPs), while controlling for student- and school-level characteristics. Table 10 presents the standardized coefficients for each usage metric across the eight included vendors. All usage variables were standardized within vendor to allow for comparability across models. Taken together, the results highlight that not only the quantity of usage, but also the consistency and trajectory of engagement, play a role in supporting student growth across different personalized math learning platforms.

Table 10. Summary of Results from Regression Models

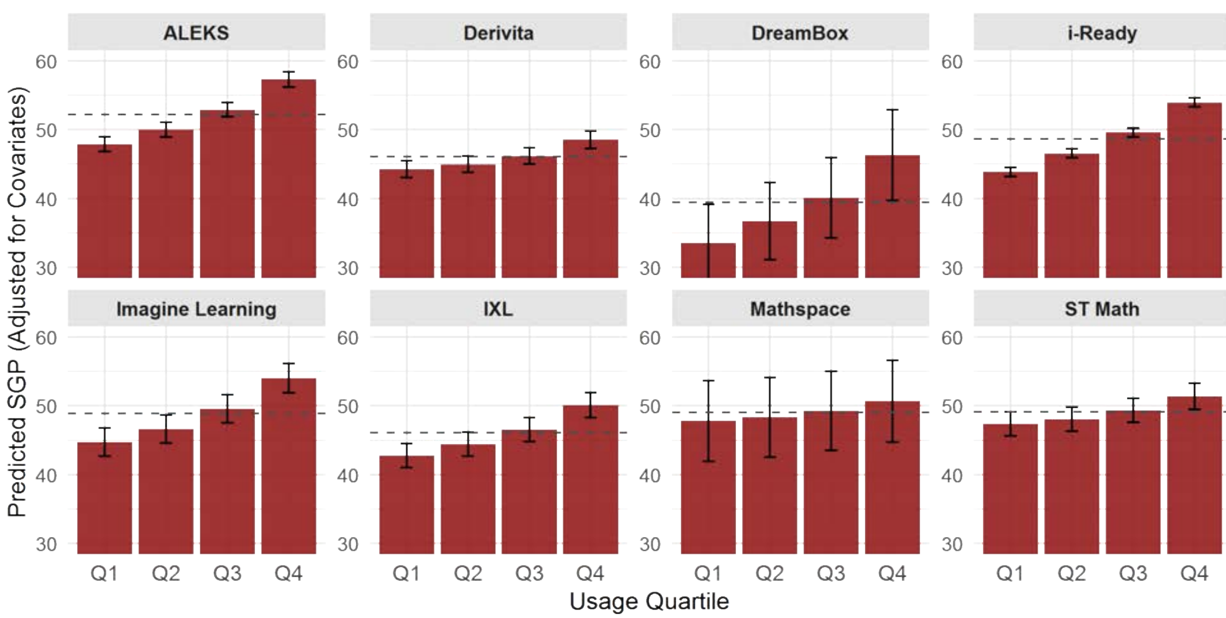
Usage Metrics	ALEKS	Derivita	Dream-Box	i-Ready	Imagine Learning	IXL	Math-space	ST Math
Average usage	3.97***	1.86***	5.14***	4.27***	3.98***	3.10***	NS	1.46**
Units completed	5.83***	NS	5.32**	4.88***	3.94***	2.87***	NS	3.97***
Days of Usage	3.91***	0.67**	4.98**	2.95***	3.24***	3.28***	NS	NS
Fidelity	4.18***	NS	6.34**	4.66***	3.86***	4.05***	3.04**	1.55***
Zero usage months	-2.68***	-1.77***	-4.26**	-1.83***	-2.28***	-2.05***	NS	NS
Usage trend	NS	1.15***	NS	0.99***	NS	NS	NS	1.69***

** $p < .01$. *** $p < .001$.

Average monthly usage was a significant positive predictor of student growth for all vendors except Mathspace, with coefficients ranging from 1.46 (ST Math) to 5.14 (DreamBox). Average monthly units completed and average days of usage were also positively associated with SGPs for most vendors, though days of usage was not significant for ST Math, and units completed was not significant for Derivita. **Fidelity of usage**, which is the number of months a student met vendor-specific usage thresholds, was consistently associated with higher SGPs for all vendors except Derivita. In contrast, months with zero usage were negatively associated with growth for all vendors except ST Math, indicating that inconsistent or interrupted usage may be detrimental to academic progress. The **usage trend**, which captures whether a student's usage increased or decreased over time, was a significant predictor for Derivita, i-Ready, and ST Math. A positive trend in usage over the year was associated with higher SGPs, suggesting that increasing engagement may be particularly important for these programs.

To further illustrate the relationship between student usage and growth, we plotted the model-adjusted predicted SGP values across quartiles of average usage for each vendor in Figure 10. The first quartile (Q1) represents the bottom 25% of students with the lowest usage, while the fourth (Q4) represents the top 25% of students with the highest usage levels. Quartiles were calculated within each vendor to account for differences in scale and usage patterns. These estimates are based on the multilevel regression models and are adjusted for student- and school-level covariates. Error bars represent 95% confidence intervals. The horizontal dashed lines indicate the model-predicted mean SGP for users of each vendor. Since vendors serve different student and school populations—some with higher average growth and others with lower—the dashed lines help highlight these underlying differences and offer important context for understanding variation in growth across vendors.

Figure 10. Predicted Student Growth Percentiles (SGPs) by Usage Quartile Across Vendors



Across most vendors, a clear positive trend emerges: students in higher usage quartiles tend to have higher predicted SGPs. The pattern is especially pronounced for vendors such as ALEKS, DreamBox, i-

Ready, Imagine Learning, and IXL. While the relationship is somewhat flatter for Derivita, Mathspace, and ST Math, a positive association is still visible across quartiles**.**

To contextualize these modeled predictions with actual usage patterns, Table 11 shows the median monthly usage (in minutes) for students in the lowest 25% (Q1) and highest 25% (Q4) usage quartiles, along with differences in the model-predicted SGPs at these usage levels. As shown, students in the highest quartile had predicted SGPs that were 3 to 13 points higher, on average, than students in the lowest quartile. Usage levels and SGPs for all four quartiles are presented in Appendix A.

Table 11. Usage Levels (Q1 and Q4) and Predicted Student Growth by Vendor

Vendor	Q1 Usage (monthly mins)	Predicted SGP for Q1	Q4 Usage (monthly mins)	Predicted SGP for Q4	Difference
ALEKS	26	47.90	411	57.31	**+9.40**
Derivita	7	44.26	141	48.55	**+4.30**
DreamBox	32	33.53	413	46.31	**+12.78**
i-Ready	35	43.88	186	53.96	**+10.08**
Imagine Learning	8	44.72	154	54.02	**+9.30**
IXL	11	42.78	132	50.11	**+7.33**
Mathspace*	25	47.80	188	50.67	**+2.87**
ST Math	6	47.38	212	51.39	**+4.01**

*For Mathspace, monthly usage was not a statistically significant predictor of student growth in the model; results for Mathspace should be interpreted with caution.

Importantly, comparisons across MLS programs should be made with considerable caution, as vendors differ not only in implementation contexts and student populations, but also in the intended use and instructional design of their products. For example, as detailed in Table 9, DreamBox supports a student population that includes a higher proportion of low-income (54%) and English Language Learners (17%) than other vendors, which likely contributes to its mean predicted SGPs being below 50—even among students with the highest usage levels. This does not indicate program ineffectiveness; rather, the substantial differences in predicted growth between high- and low-usage students demonstrate that DreamBox use is positively associated with achievement gains, despite serving a more educationally challenged population.

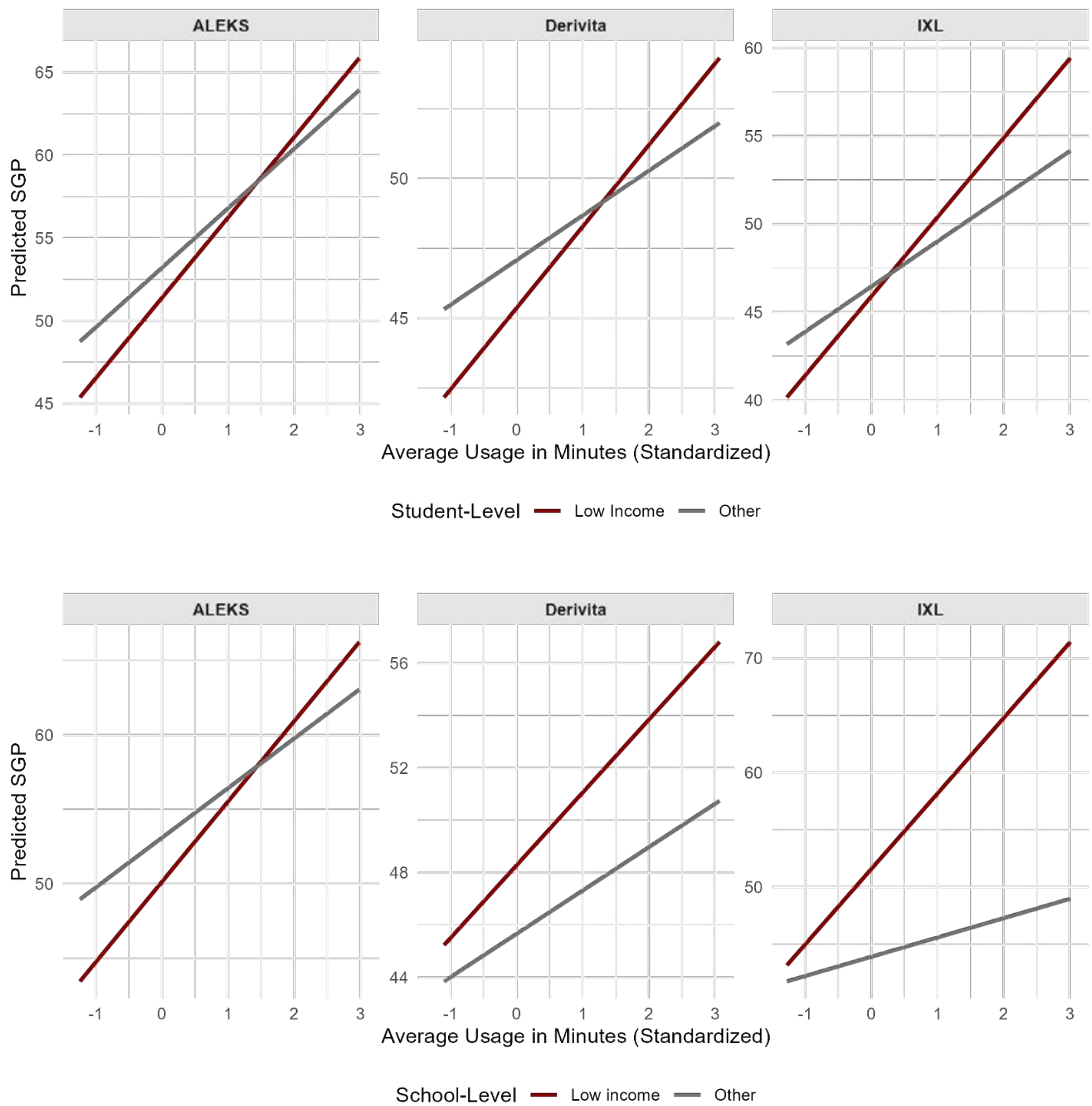
Step 4: Interaction Effects

In addition to examining the main effects of usage metrics, we also tested whether the relationship between average monthly usage and student growth varied by student- and school-level characteristics. In these models, average monthly usage was standardized within each vendor, so interaction effects represent relative differences in how usage relates to growth across student groups. These interaction models help identify whether certain groups of students benefit more—or less—from increased software engagement.

The most meaningful and consistent interactions emerged around student- and school-level low-income status. Significant positive interactions were observed for ALEKS, Derivita, and IXL, at both the student and school levels. This means that the relationship between software usage and student growth was stronger for students from low-income backgrounds and for those attending schools with higher concentrations of low-income students. In other words, greater usage appears to offer additional benefits for students who may face heightened academic challenges related to socioeconomic disadvantage.

These interactions are visualized in Figure 11. The upward slopes for low-income groups and high-poverty schools illustrate that increased usage is more strongly associated with higher growth for these student populations. These findings suggest that when used consistently, personalized math learning software may help narrow achievement gaps.

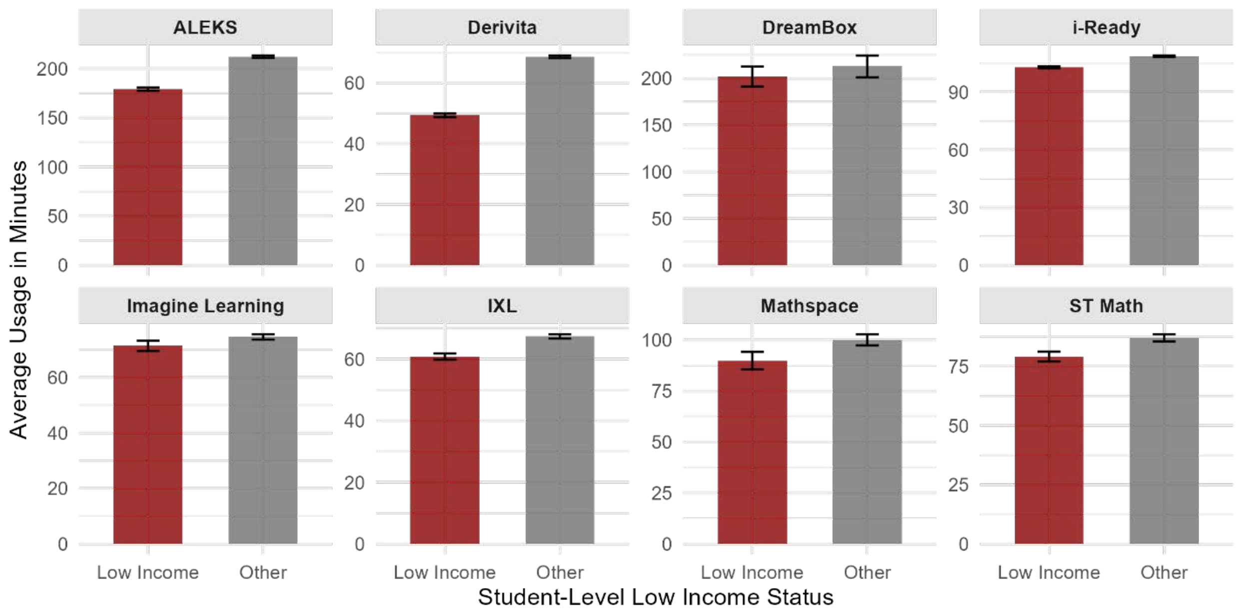
Figure 11. Interactions with Low-Income



Note: Schools are identified as low-income if 40% or more of students were eligible for free or reduced-price lunch.

At the same time, these promising results point to an important challenge: students from low-income backgrounds consistently show lower average usage than their peers across most vendor platforms, as shown in Figure 12. This disparity in usage limits the potential for these programs to reduce achievement gaps at scale. Together, these findings highlight a critical concern: while personalized math software can support low-income students' academic growth, intentional strategies are needed to ensure that these students have systemic access to and engagement with the programs throughout the school year.

Figure 12. Usage by Student Income Status



Finally, we also identified a few additional statistically significant interactions that are not visualized here. For ALEKS, ST Math, and IXL, there were significant negative interactions between usage and grade level, suggesting diminishing returns in later grades. Additionally, for ALEKS and i-Ready, there were significant negative interactions between usage and gender (female), indicating that the positive effect of usage was more pronounced for male students. While these findings are vendor-specific, they provide further insight into how software engagement may vary across student groups and contexts.

8.7 Conclusions

Positive associations were found between MLS usage and math achievement gains across all eight vendors for which MLS usage and achievement data were available. Positive associations were especially pronounced for ALEKS, DreamBox, i-Ready, Imagine Learning, and IXL. While flatter, positive associations were also observed for Derivita, Mathspace, and ST Math. Across most products, students from low-income backgrounds used MLS less frequently than their peers (see also Altermatt et al., 2022). This is concerning, as there is some evidence that, when usage is equal, economically disadvantaged students and students from schools with a high percentage of students from low-income backgrounds often experience greater academic gains.

9 | Recommendations

Based on our evaluation of the *K–12 Math Personalized Learning Software Grant Program*, the Utah Education Policy Center offers the following recommendations to help strengthen implementation, increase access to academic opportunity through math learning software (MLS) usage, and improve outcomes associated with MLS use across Utah's schools.

9.1 Strengthen Supports for Implementing Promising Practices

Teachers reported using three promising practices for MLS implementation – that is, setting mastery-based goals, using MLS data to guide instruction, and engaging students in data-informed conversations – at only low to moderate levels. Fewer than 30% reported using these practices extensively. This is a concern, as these strategies were linked in the current study to more positive perceptions of the value of MLS and have previously been linked with stronger student achievement gains (Altermatt et al., 2024b).

To support broader use of these practices, the STEM Action Center and vendors should consider expanding professional learning opportunities focused on instructional strategies that promote high-quality MLS use and integration. In addition, enhancing MLS tools to better support goal setting and data use could help make these practices more accessible and intuitive for teachers. Research in learning analytics suggests that many existing tools are not well aligned with teachers' instructional needs (Van Schoors et al., 2023). For example, Holstein et al. (2017) found that static dashboards showing students' mastery levels may be less helpful than dynamic, real-time alerts that identify when a student has lost the motivation to meaningfully engage with MLS, is productively struggling with MLS content, or is approaching mastery and could benefit from targeted encouragement or guidance. Such features could empower teachers to intervene more effectively and meaningfully integrate MLS data into daily instruction.

9.2 Foster Alignment Between Software Content and Classroom Instruction

Students perceived MLS tools as more valuable and reported greater improvements in math attitudes when there was clear alignment between the software content and what they were learning in class. Strengthening this alignment can enhance both MLS engagement and academic outcomes (see also Pane et al., 2017).

MLS vendors could support better integration by continuing to improve the flexibility of their products. This might include incorporating features that allow teachers to more easily sequence, customize, and select content that aligns with their specific instructional goals and the pacing of their curriculum. Providing teachers with more intuitive controls and clearer guidance for aligning digital content with state standards or district curricula would further support this goal.

LEAs can also play a critical role in fostering alignment by offering dedicated planning time for maximizing effective MLS use and facilitating collaborative professional learning (e.g., Professional Learning Communities or Communities of Practice). Equipping educators with both the planning time and the skills to use MLS effectively will help create greater instructional coherence, maximize the impact of the software, and support more personalized and meaningful learning experiences for students.

9.3 Expand MLS Participation Through Targeted Supports

Students from low-income backgrounds used MLS less frequently, on average, than their more affluent peers. This gap is especially concerning given evidence that, when usage is equivalent, economically disadvantaged students often make greater academic gains (Canbolat & Arndt, 2024; Darling-Aduana & Capers, 2024). Lower usage may reflect structural barriers such as limited home internet access, inconsistent device availability, or differences in adult support – all of which can reduce students' ability to engage with MLS.

To help close this gap, the USBE, STEM Action Center, LEAs, and/or vendors could prioritize investments in funding, technical assistance, and targeted implementation support for schools serving higher percentages of low-income students. These efforts are particularly important given findings from a prior UEPC report indicating that teachers in these schools were less likely to adopt effective MLS implementation practices (Altermatt et al., 2024b).

Even with strong teacher-level supports, some students – especially those facing the greatest barriers – may still need more targeted help to fully engage with MLS. Pairing MLS use with high-dosage tutoring is one promising way to provide that support. Tutors can offer consistent encouragement, help students stay on track, and troubleshoot challenges as they arise. This kind of "stacked" model has the potential to boost both MLS engagement and learning, particularly for students who have historically been underserved by educational technology initiatives (Bhatt et al., 2024; Thomas et al., 2023). With its dual investment in MLS licenses and the Math Mentors Program – which integrates high-dosage tutoring with MLS use – the STEM Action Center is uniquely positioned to lead in this area.

References

Altermatt, E. R., & Rorrer, A. K. (2024a). Teacher goal setting for personalized learning software: Associations with perceptions of the value of software and growth mindsets. *Journal of Research on* Technology in Education. 1–16. https://doi.org/10.1080/15391523.2024.2411697

Altermatt, E. R. & Rorrer, A. K. (2024b). *Promising practices for creating strong technology-enabled learning environments: Associations between teachers' math learning software implementation practices and students' mathematics achievement.* Salt Lake City, UT: Utah Education Policy Center.

Altermatt, E. R., Timmer, M., Doane, M., Altermatt, T. W., & Rorrer, A. K. (2023a). *Best practices for creating strong blended learning environments for mathematics in Utah: Teacher and student survey results.* Salt Lake City, UT: Utah Education Policy Center.

Altermatt, E. R., Rorrer, A. K., Altermatt, T. W., Doane, M., & Timmer, M. (2023b*). Blended learning research brief No. 1.: Associations between math personalized learning software use and personalized, competency-based instructional strategies.* Salt Lake City, UT: Utah Education Policy Center.

Altermatt, E. R., Rorrer, A. K., Altermatt, T. W., Doane, M., & Timmer, M. (2023c*). Blended learning research brief No. 2: Associations between student attitudes toward math and math personalized learning software use.* Salt Lake City, UT: Utah Education Policy Center.

Altermatt, E. R., Rorrer, A. K., Altermatt, T. W., Doane, M., & Timmer, M. (2023d*). Blended learning research brief No. 3.: Associations between teachers' goals for students' math software use and teachers' perceptions of the value of software.* Salt Lake City, UT: Utah Education Policy Center.

Altermatt, T. W., Altermatt, E. R., Rorrer, A. K., & Moore, B. (2022). *Math personalized learning software: Examining usage and associations with achievement in Utah during the Covid-19 pandemic.* Salt Lake City, UT: Utah Education Policy Center.

Bernacki, M.L., Greene, M.J. & Lobczowski, N.G. (2021). A systematic review of research on personalized learning: Personalized by whom, to what, how, and for what purpose(s)? *Educational Psychology Review, 33,* 1675–1715.

Betebenner, D. W., & Iwaarden, A. V. (2024). *Academic impact and recovery in Utah during the COVID-19 pandemic.* The National Center for the Improvement of Educational Assessment.

Bhatt, M., Guryan, J., Khan, S., LaForest, M., & Mishra, B. (2024). *Can technology facilitate scale? Evidence from a randomized evaluation of high dosage tutoring*. NBER Working Paper, 32510. https://doi.org/10.17605/OSF.IO/UW8EH

Brizard, J.-C., (2023, April). Breaking with the past: Embracing digital transformation in education. *Digital Promise.* https://doi.org/10.51388/20.500.12265/176

Callen, D., Goldhaber, D., Kane, T. J., McDonald, A., McEachin, A., & Morton, E. (2024). *Pandemic learning loss by student baseline achievement: Extent and sources of heterogeneity.* CALDER Working Paper No. 292-0224.

Canbolat, Y., & Arndt, R. (2024). *Can computer-assisted instruction help schools to close the achievement gap: Evaluation of a district-wide reading intervention?* (EdWorkingPaper: 24-938). Annenberg Institute at Brown University. https://doi.org/10.26300/f6dd-v158

Carbonari, M. V., Davison, M., DeArmond, M., Dewey, D., Dizon-Ross, E., Goldhaber, D., Hashim, A., Kane, T. J., McEachin, A., Morton, E., Patterson, T., & Staiger, D. O. (2022). *The challenges of implementing academic COVID recovery interventions: Evidence from the Road to Recovery Project.* CALDER Working Paper No. 275-1222.

Carbonari, M. V., DeArmond, M., Dewey, D., Dizon-Ross, E., Goldhaber, D., Kane, T. J., McDonald, A., McEachin, A., Morton, E., Muroga, A., Salazar, A., & Staiger, D. O. (2024). *Impacts of academic recovery interventions on student achievement in 2022-23*. Research Report. Cambridge, MA: Center for Education Policy Research, Harvard University/CALDER Working Paper No. 303-0724.

Cheung, A. C., K, & Slavin, R. E. (2013). The effectiveness of educational technology applications for enhancing mathematics achievement in K-12 classrooms: A meta-analysis. *Educational Research Review, 9,* 88-113.

Darling-Aduana, J. & Capers, K. J. (2024). The Efficacy of Online Learning Assessment Tools for COVID-19 Recovery Intervention. Georgia Policy Labs.

Fahle, E. M., Kane, T. J., Patterson, T., Reardon, S. F., Staiger, D. O., & Stuart, E. A. (2023). *School district and community factors associated with learning loss during the COVID-19 pandemic.* https://cepr.harvard.edu/sites/hwpi.harvard.edu/files/cepr/files/ explaining_covid_ losses_5.23.pdf

Fahle, E. M., Kane, T. J., Reardon, S. F., & Staiger, D. O. (2024). *The first year of pandemic recovery: A district-level analysis.* https://educationrecoveryscorecard.org/wp-content/ uploads/2024/01/ERS-Report-Final-1.31.pdf

Goldhaber, D., Kane, T. J., McEachin, A., Morton, E., Patterson, T., & Staiger, D. O. (2023). The educational consequences of remote and hybrid instruction during the pandemic. *American Economic Review: Insights, 5*(3), 377-92.

Guryan, J., & Ludwig, J. (2023). Overcoming pandemic-induced learning loss. In M. S. Kearney, J. Shardin, & L Pardue (Eds.), *Building a More Resilient US Economy.* Washington, DC: Aspen Institute.

Holstein, K., McLaren, B. M., & Aleven, V. (2017). Intelligent tutors as teachers' aides: Exploring teacher needs for real-time analytics in blended classrooms. *Proceedings of the Seventh International Learning Analytics & Knowledge Conference (LAK '17)*, 257–266. https://doi.org/10.1145/3027385.3027451

Huebner, T. A., & Burstein, R. (2023). *Strategies for encouraging effective technology-enabled instructional practices in K–12 education: A thought piece drawing on research and practice.* WestEd. https://www.wested.org/resource/strategies-for-encouraging-effective-technology-enabled-instructional-practices-in-k-12-education-a-thought-piece-drawing-on-research-and-practice/

Jordan, P. W., DiMarco, B., & Toch, T. (2022*). An analysis of local school districts' ambitious post-Covid tutoring plans* [Explainer]. FutureEd. https://www.future-ed.org/an-analysis-of-local-school-districts-ambitious-post-covid-tutoring-plans/

Kuhfeld, M., & Lewis, K. (2022). *Student achievement in 2021-2022: Cause for hope and continued urgency.* NWEA Research Brief, July 2022.

Kuhfeld, M. & Lewis, K. (2024). *Recovery Still Elusive: 2023-24 student achievement highlights persistent achievement gaps and a long road ahead.* NWEA Research Brief.

Kuhfeld, M., Soland, J., & Lewis, K. (2022). Test score patterns across three COVID-19-impacted school years. *Educational Researcher, 51*(7), 500–506.

Kulik, J. A., & Fletcher, J. D. (2016). Effectiveness of intelligent tutoring systems: A meta-analytic review. *Review of Educational Research, 86*(1), 42-78.

Kraft, M. A., Sanderson, D. E., and Cannata, M. (2024). *The scaling dynamics and causal effects of a district-operated tutoring program*. (EdWorkingPaper: 24-1030). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/zcw7-4547

Kraft, M. A., Schueler, B. E., & Falken G. (2024). *What impacts should we expect from tutoring at scale? Exploring meta-analytic generalizability*. (EdWorkingPaper: 24-1031). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/zygj-m525

Lewis, K., & Kuhfeld, M. (2022). *Progress towards pandemic recovery: Continued signs of rebounding achievement at the start of the 2022–23 school year.* NWEA.

Lewis, K. & Kuhfeld, M. (2023). *Education's Long COVID: 2022–23 achievement data reveal stalled progress toward pandemic recovery.* NWEA Research Brief.

Lewis, K., Kuhfeld, M., Langi, M., Peters, S., & Fahle, E. (2022). *The widening achievement divide during COVID-19.* NWEA Research Brief.

Makori, A., Burch, P., & Loeb, S. (2024). *Scaling high-impact tutoring: School level perspectives on implementation challenges and strategies.* (EdWorkingPaper: 24-923). Annenberg Institute at Brown University: https://doi.org/10.26300/h8z5-t461

National Student Support Accelerator (2023*). Challenges and solution to implementing tutoring at scale*. https://studentsupportaccelerator.org/sites/default/files/Challenges%20Solutions%20Implementing%20Turoing%20at%20Scale.pdf

Pane, J. F., Steiner, E. D., Baird, M. D., & Hamilton, L. S. (2017). Informing Progress: Insights on Personalized Learning Implementation and Effects. RAND Corporation. https://www.rand.org/pubs/research_reports/RR2042.html

Robinson, C. D., Bisht, B., and Loeb, S. (2022). *The inequity of opt-in educational resources and an intervention to increase equitable access*. (EdWorkingPaper: 22-654). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/ja2n-ys82

Thomas, D. R., Lin, J., Gatz, E., et al. (2024). *Improving student learning with hybrid human-AI tutoring: A three-study quasi-experimental investigation.* The 14th Learning Analytics and Knowledge Conference (LAK '24), March 18–22, 2024, Kyoto, Japan. ACM, New York, NY, USA.

Utah Code § 9-22-107 (2019). Retrieved from https://le.utah.gov/xcode/Title9/Chapter22/9-22-S107.html?v=C9-22-S107_2019051420190701

Utah State Board of Education and the National Center for the Improvement of Educational Assessment, Inc. [USBE & NCIEA] (2021). *Exploring the effects of the Covid-19 pandemic on student achievement in Utah.* https://le.utah.gov/interim/2021/pdf/00003999.pdf.

Utah State Board of Education (2023). *Strategic plan. 2023 implementation update.* Retrieved from https://www.schools.utah.gov/board/utah/_strategies_/USBEStrategicPlan2024ImplementationUpdate.pdf.

Utah State Board of Education (2024). *Covid-19 Relief Funding for K-12.* https://usbe.portal.civicclerk.com/event/440/files/attachment/21707.

Van Schoors, R., Elen, J., Raes, A., Vanbecelaere, S., & Depaepe, F. (2023). *The charm or chasm of digital personalized learning in education: Teachers' reported use, perceptions and expectations*. *TechTrends, 67*(2), 315–330. https://doi.org/10.1007/s11528-022-00802-0

Zheng, L., Long, M., Zhong, L., Gyasi, J. F. (2022). The effectiveness of technology-facilitated personalized learning on learning achievements and learning perceptions: A meta-analysis. *Education and Information Technologies, 27*(8), 11807-1183.

Appendix A: Usage Levels and Predicted Student Growth Percentiles (SGPs) by Quartile and Vendor

Vendor	Q1 Usage	Q1 SGP	Q2 Usage	Q2 SGP	Q3 Usage	Q3 SGP	Q4 Usage	Q4 SGP
ALEKS	26	47.90	111	49.99	231	52.91	411	57.31
Derivita	7	44.26	29	44.97	67	46.19	141	48.55
DreamBox	32	33.53	127	36.73	229	40.14	413	46.31
i-Ready	35	43.88	75	46.56	121	49.61	187	53.96
Imagine Learning	8	44.72	38	46.64	84	49.58	154	54.02
IXL	11	42.78	38	44.44	73	46.53	132	50.11
Mathspace	25	47.80	55	48.33	110	49.30	188	50.67
ST Math	6	47.38	41	48.06	107	49.36	212	51.39

Notes:

1. Usage values represent the median average monthly usage (in minutes) among students in each quartile. Predicted SGP values are based on multilevel regression models adjusted for student- and school-level covariates.

2. Comparisons across MLS programs should be made with considerable caution, as vendors differ not only in implementation contexts and student populations, but also in the intended use and instructional design of their products. For example, as detailed in Table 9, DreamBox supports a student population that includes a higher proportion of low-income (54%) and English Language Learners (17%) than other vendors, which likely contributes to its mean predicted SGPs being below 50—even among students with the highest usage levels. This does not indicate program ineffectiveness; rather, the substantial differences in predicted growth between high- and low-usage students demonstrate that DreamBox use is positively associated with achievement gains, despite serving a more educationally challenged population.