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STEM Action Center's AmeriCorps Math Mentors Program: 2023-2024 Evaluation Report

THE UNIVERSITY OF UTAH
UTAH EDUCATION POLICY CENTER

Prepared by the Utah Education Policy Center for the STEM Action Center

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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.

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1 | Introduction

1.1 Evaluation Overview

In 2021-2022, the STEM Action Center launched the AmeriCorps Math Mentors Program (AMMP). The program builds upon the STEM Action Center's K-12 Math Personalized Learning Software Program[1] by pairing a mentoring intervention with a math software intervention. As designed, students involved in AMMP work with a mentor who offers guidance and encouragement to students as they complete activities in a math learning software program. Over a four-year period from 2021-2022 (Pilot Year) to 2024-2025 (Year 3), key aims of the program include:

- increasing the number of students in Utah receiving high-dosage tutoring,
- ensuring that mentors have the support they need to be effective tutors and to build strong relationships with students,
- improving students' confidence, engagement, and achievement in mathematics.[2]

In the pilot year of the program (2021-2022), the UEPC's Bridgeworks Team and Research & Evaluation Team worked together to support the STEM Action Center in developing a program that was designed in ways that align with evidence-based and practice-informed guidelines for tutoring and mentoring programs. In Year 1 of the program (2022-2023), the UEPC's Research and Evaluation Team conducted a preliminary implementation and outcome evaluation of AMMP. Data for this evaluation included student participation data collected by the STEM Action Center, mentors' responses to surveys, students' responses to surveys, and demographic and achievement data collected from LEAs by the UEPC. Among the key promising findings from this report were that student survey respondents showed statistically significant gains in their math self-efficacy, interest in math, and feelings of belongingness from the beginning of the year to the end of the year. Full pilot year (2021-2022) and Year 1 (2022-2023) reports were provided to the STEM Action Center (Altermatt, Groth, & Rorrer, 2022; Altermatt, Altermatt, Rorrer, Groth, & Timmer, 2023).

1.2 Evaluation Questions

For Year 2 (2023-2024), the UEPC sought to build upon Year 1 evaluation efforts by addressing four evaluation questions (EQs):

> **EQ1.** To what degree is AMMP being implemented with fidelity and in ways that align with evidence-based and practice-informed guidelines for high-dosage tutoring?
> **EQ2.** To what degree do mentors report that training and support opportunities prepared them to be effective tutors and to build strong relationships with students?
> **EQ3.** Is participation in AMMP associated with positive changes in students' mathematics attitudes?
> **EQ4.** Is participation in AMMP associated with positive changes in students' mathematics achievement?

To address these questions, the UEPC utilized data from six sources: 1. **program artifacts** , including a logic model and set of strategic goals developed by the STEM Action Center during the pilot year of the

[1] https://stem.utah.gov/educators/funding/k-12-math-personalized-learning-software-grant/
[2] https://stem.utah.gov/ammp/

program (2021-2022), 2. data from a **participation log** developed and administered by the STEM Action Center and completed by mentors to track tutoring participation and dosage (e.g., # of minutes of tutoring), 3. data from **mentor surveys** developed by the UEPC and administered to AMMP mentors, 4. data from **site supervisor surveys** developed by the UEPC and administered to supervisors at each participating site, 5. data from **student surveys** developed by the UEPC and administered to students by mentors, and 6. **demographic and achievement data** collected from participating Local Education Agencies (LEAs).[3] Importantly, interim reports were provided to the STEM Action Center throughout the academic year to support continuous improvement.

1.3 Report Organization

The report is divided into six sections. In this first section, we provide an overview of AMMP and of the evaluation. In the second section, we provide a summary of key findings. 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 examine the effectiveness of tutoring and math learning software interventions in improving student outcomes in mathematics. In the fourth section, we provide an implementation evaluation of Year 2 (2023-2024) activities, including mentor perceptions of training, supervision, and support (see EQ1 and EQ2). In the fifth section, we provide an outcome evaluation of Year 2 activities, focusing on changes in student attitudes (see EQ3). In the sixth section, we provide an outcome evaluation of Year 2 activities, focusing on changes in student achievement (see EQ4). Finally, in the seventh section, we offer recommendations for ongoing program improvement that could support the STEM Action Center in implementing and expanding the program in years to come to achieve the proposed outcomes.

1.4 Intended Audience

The primary audiences for this report include the STEM Action Center team implementing the AmeriCorps Math Mentors Program, AmeriCorps program personnel, and personnel from LEAs participating in the program. This report is intended to provide useful information for documenting the characteristics and outcomes of the program in Year 2 (2023-2024) and for identifying key action steps to ensure strong implementation and outcomes for Year 3 (2024-2025).

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[3] Data Privacy Agreements were established with LEAs participating in the evaluation of the AmeriCorps Math Mentors Program. The UEPC 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 STEM Action Center or the University of Utah.

2 |Summary of Key Findings

Detailed findings from the UEPC's implementation and outcome evaluation of the Year 2 (2023-2024) AmeriCorps Math Mentors Program (AMMP) are presented in each subsection of the report. Here, we summarize key findings related to program implementation, mentors' perceptions of training and support, changes in student attitudes, and changes in student achievement:

1. **Program Implementation.** During Year 2, STEM Action Center personnel recruited and placed 41 mentors in 12 LEAs, including 5 charter schools and 7 school districts. All mentors were offered in-person or virtual pre-service training as well as in-service support. Data from a participation log maintained by the STEM Action Center indicates these mentors provided tutoring to 1,796 students. A total of 1,005 of these students (60%) received at least 90 minutes of tutoring. Both mentors and site supervisors overwhelmingly agreed that their experiences with AMMP were positive and that students who participated gained confidence and skills in mathematics.
2. **Mentors' Perceptions of Training and Support.** Mentors who completed an exit survey after their pre-service training ($n = 12$) indicated that training opportunities were high-quality and effective in improving their knowledge. Data from the training exit survey, the participation log, and an end-of-year mentor survey ($n = 25$) indicated that mentors felt supported by both STEM Action Center staff and school personnel. At the same time, mentors indicated that they would benefit from additional training and support opportunities that would allow them to gain "just-in-time" knowledge about how to improve their tutoring and mentoring skills and ensure a shared understanding of program goals and expectations.
3. **Changes in Student Attitudes.** The sample of students who completed the retrospective pre/post survey ($n = 387$) reported statistically significant increases in their endorsement of attitudes and behaviors that are associated with positive achievement outcomes. These include high levels of math self-efficacy, strong perceptions of effort in math, growth mindsets, high interest in and valuing of math, and strong feelings of belongingness.
4. **Changes in Student Achievement.** By August 1, 2024, seven participating LEAs provided academic and demographic data that were utilized in accordance with data sharing agreements to examine changes in standardized test scores in mathematics among students who received tutoring. Analyses revealed some promising trends in achievement outcomes for AMMP participants as well as evidence that the program was successful in reaching students who were struggling in mathematics. AMMP participants in one charter school showed statistically significant improvements in standardized test scores. Overall, the pattern of findings was consistent with evidence that tutoring programs are most likely to be impactful when students receive substantial amounts of tutoring.

Based on the evaluation findings, key recommendations for Year 3 (2024-2025) include 1) increasing training and support opportunities for mentors and 2) continuing to work to ensure that evidence-based and program-prescribed recommendations for high-dosage tutoring are met for participating students. Specifically, AMMP participants should be receiving robust amounts of tutoring (e.g., 90 minutes per week for ten or more weeks) individually or in small groups as they work to complete activities in a math learning software program.

3 | Background

3.1 Learning Loss and Recovery Efforts in Mathematics

There is clear evidence that the Covid-19 pandemic resulted in significant learning loss in mathematics for many students across the United States, particularly for low-achieving students, students of color, and students who attend high-poverty schools (Callen, Goldhaber, Kane, McDonald, McEachin, & Morton, 2024; Fahle, Kane, Patterson, Reardon, Staiger, & Stuart, 2023; Lewis & Kuhfeld, 2022; Kuhfeld, Soland, & Lewis, 2022). Similar findings are emerging in Utah. For example, analyses of student RISE and Utah Aspire Plus assessments showed lower math scores post-pandemic than pre-pandemic, particularly among students who were economically-disadvantaged (Betebenner & Van Iwaarden, 2024; USBE and the National Center for the Improvement of Educational Assessment, Inc., 2021).

Using federal relief funds as well as state and local resources, school districts in Utah and across the country have invested in a variety of academic recovery initiatives, including high-dosage tutoring, out-of-school-time programs, and software interventions (Carbonari et al., 2022; Jordan, DiMarco, & Toch, 2022). Although the long-term efficacy of these interventions in supporting academic recovery efforts remains unknown (Carbonari et al., 2022; Lewis & Kuhfeld, 2022, 2023), there is increasing evidence that a return to pre-pandemic levels of achievement in mathematics may be achievable only with a sustained, multi-year commitment to effectively implementing interventions that have shown the greatest impact on student achievement (Betebenner & Van Iwaarden, 2024; Fahle et al., 2023; Fahle, Kane, Reardon, & Staiger, 2024; Lewis & Kuhfeld, 2022, 2023).

3.2 Research on the Effectiveness of Tutoring Interventions

A plethora of recent research suggests that high-dosage tutoring – sometimes referred to as "high-impact" or "high-intensity" tutoring – can have a significant positive effect on student learning outcomes (AmeriCorps, 2019; Guryan et al., 2023; Robinson, Kraft, Loeb, & Schueler, 2021; Parker, Nelson, Zaslofsky, Kanive, Foegen, Kaiser, & Heisted, 2019). For example, a 2020 meta-analysis of 96 K-12 tutoring interventions in which students were randomly assigned to treatment or control conditions found consistent and positive impacts on student learning outcomes as measured by standardized test scores (Nickow, Oreopoulos, & Quan, 2020; see also Dietrichson, Bøg, Filges, & Klint Jørgensen, 2017).

Although the precise mechanisms through which tutoring interventions contribute to learning are still being investigated, these interventions are often credited with providing students with high time-on-task, focused, and personalized instruction (Nickow et al., 2020). Consistent with this perspective, tutoring programs appear to be especially effective when tutoring is embedded in the existing school day, when tutors receive adequate pre-service training and ongoing in-service support, when the number of students paired with each tutor is small, when tutors are consistently paired with the same students so that strong mentor-like relationships can be built, when the dosage is high (e.g., three or more sessions per week for 10 or more weeks), and when program implementation is informed by ongoing formative and summative assessments (National Student Support Accelerator, 2023a, 2023b; Nickow et al., 2020; Pellegrini, Neitzel, Lake, & Slavin, 2021; Robinson et al., 2021).

Despite evidence that "high-dosage tutoring is plausibly the intervention most up to the task of meeting our learning-loss challenge" (Guryan & Ludwig, 2023, p. 157), there are indications that schools and districts are facing difficulties in implementing high-dosage tutoring at scale. Among the challenges that schools and districts face are that tutors – especially those with little to no teaching experience – often lack the content knowledge, pedagogical skills, access to high-quality instructional materials, and information about students' skill levels that they need to be effective tutors. Tutoring program personnel and classroom teachers, in turn, lack time to provide these resources and associated supports (see Carbonari et al., 2022; National Student Support Accelerator, 2023a).

3.3 Addressing the Scale-Up Challenge

One solution that has been offered to address the "scale-up challenge" faced by high-dosage tutoring programs has been to ensure that individuals who provide tutoring have access to high-quality educational technology tools that can support tutors' efforts (Guryan & Ludwig, 2023). Educational technology tools can support tutors by 1) scaffolding instruction in a way that meets the needs of individual students and 2) providing data to enhance tutors' understanding of students' skills and progress. In so doing, educational technology tools have the potential to reduce the burden on individuals who oversee tutors, on classroom teachers, and on tutors themselves (Guryan & Ludwig, 2023; National Student Support Accelerator, 2023; Thomas et al., 2024).

The STEM Action Center's AmeriCorps Math Mentors Program (AMMP) is well-aligned with this approach as it seeks to pair a tutoring intervention with an educational technology intervention. Although empirical evidence for the effectiveness of this type of "paired" or "stacked" intervention is still limited (Guryan & Ludwidg, 2023), AMMP's approach holds promise for mitigating some of the barriers associated with high-dosage tutoring (National Student Support Accelerator, 2023a). This approach is also bolstered by decades of research indicating that technology-enabled instruction can contribute to positive achievement outcomes for students (Huebner & Burstein, 2023)[4]. For example, student use of math learning software has been associated with heightened student engagement in the learning process, more positive achievement-related attitudes, and increased student achievement (e.g., Altermatt, Altermatt, Rorrer, & Moore, 2022; Altermatt, Rorrer, & Moore, 2022; Altermatt, Rorrer, Altermatt, Doane, & Timmer, 2023b; Cheung & Slavin, 2013; Hillmayr, Ziernwald, Reinhold, Hofer, & Reiss, 2020; Owens, Rorrer, Ni, Onuma, Pecsok, & Moore, 2020; Ma, Adesope, Nesbit, & Liu, 2014; Sarker, Wu, Cao, Alam, & Li, 2019; Young, Gorumek, & Hamilton, 2018).

[4] Technology-enabled instruction is an emerging concept that "encompasses not just whether technology is used in the classroom (technology integration) but also when and how teachers use technology in their instructional practices to improve learning outcomes" (Huebner & Burstein, 2023).

4 | Implementation Evaluation

4.1 Overview of Implementation Evaluation

In this section of the report, we provide an implementation evaluation of AMMP for Year 2 (2023-2024), with the goal of answering the first two evaluation questions:

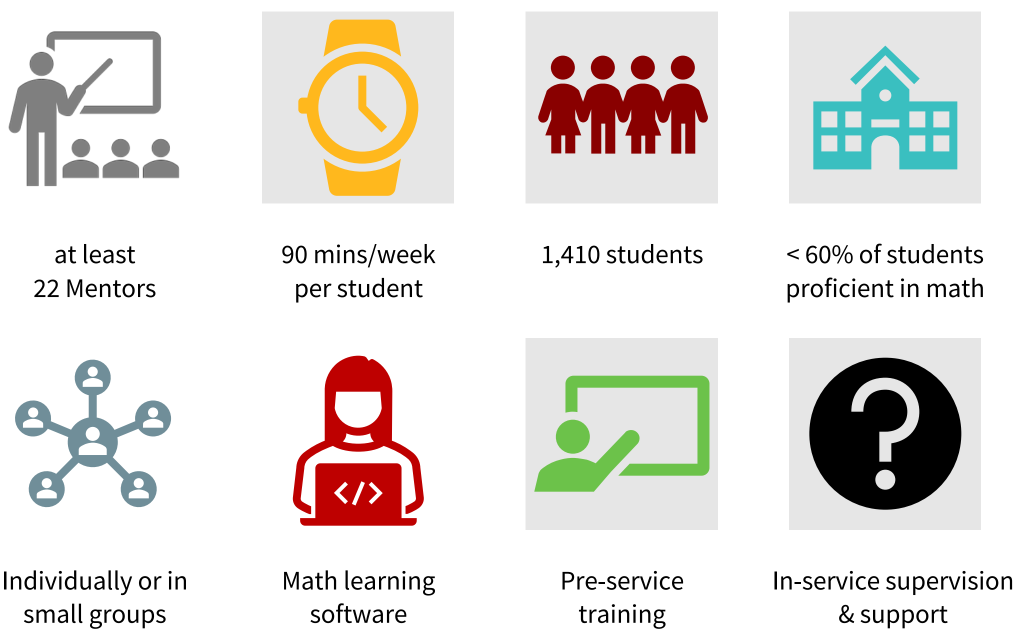
> **EQ1.** To what degree is AMMP being implemented with fidelity and in ways that align with evidence-based and practice-informed guidelines for high-dosage tutoring?
> **EQ2.** To what degree do mentors report that training and support opportunities prepared them to be effective tutors and to build strong relationships with students?

To answer these questions, we drew upon four sources of data: 1. **program artifacts**, 2. data from the **participation log**, 3. data from **mentor surveys**, and 4. data from **site supervisor surveys**.

4.2 Summary of Strategic Plans Goals

During the 2021-2022 pilot year, STEM Action Center personnel developed a logic model and strategic plan for AMMP. These documents are included in the Pilot Year report (see Altermatt, Groth, & Rorrer, 2022). As indicated in these documents, and as shown in Figure 1, the program seeks to recruit 22 AmeriCorps members annually to collectively provide 90 minutes of in-school math tutoring per week to 1,410 students. The program specifically targets schools or districts in Utah in which fewer than 60% of students are grade-level proficient in math.

Figure 1. Key strategic plan goals for the AmeriCorps Math Mentors Program



Consistent with recommendations from the National Student Support Accelerator, tutoring is designed to be delivered individually or in small groups and supported by high-quality instructional materials (here, evidence-based math learning software). Finally, mentors are to be provided with both pre-service training and ongoing supervision and support.

4.3 Successes in Implementation

The STEM Action Center team had several important successes in Year 2 (2023-2024) in meeting key strategic plans goals related to a) staffing, b) mentor recruitment, c) mentor placement, d) student participation, e) mentor training, and f) mentor supervision and support, as described below.

a. Staffing

During Year 2, AMMP was supported by a three-person team of STEM Action Center personnel with experience in STEM education, mathematics education, educational technology, youth development, and grants and fiscal management. This team was responsible for all aspects of the program, including recruitment, onboarding, training, supervision, and support.

b. Mentor Recruitment

During Year 2, STEM Action Center staff exceeded their goal of recruiting, onboarding, and placing at least 22 mentors. In all, 41 mentors served in the AMMP program in Year 2. Recruitment occurred on a rolling basis throughout the school year, with 13 of the 41 mentors beginning their service after December 31, 2023. Of the 41 mentors, 18 held half-time positions (900 total hours), and 11 held quarter-time positions (450 total hours). The remaining mentors held positions requiring 300 hours (*n* = 10) or 100 hours (*n* = 2) of service in Year 2.

c. Mentor Placement

During Year 2, mentors were placed in 12 LEAs, including five charter schools (Athenian eAcademy; Center for Creativity, Innovation, and Discovery; Gateway Preparatory Academy; Promontory School for Expeditionary Learning; Utah International Charter) and seven school districts (Davis; Garfield; Logan; Millard; Ogden; San Juan; and Weber). Table 1 provides a summary of proficiency rates on statewide RISE math assessment for participating LEAs in 2022-2023. Consistent with the strategic plan goal of targeting the AMMP intervention to schools and districts with proficiency rates lower than 60%, the percentage of students who were deemed to be proficient in math was below 60% for the 11 participating LEAs for which these data were publicly available (range = 20.3% to 53.6%).

Table 1. Proficiency rates on statewide RISE math assessments for participating LEAs in 2022-2023

Charter Schools	% proficient
Athenian e-Academy	20.3%
Center for Creativity, Innovation, and Discovery (CCID)	33.4%
Gateway Preparatory Academy	32.1%
Promontory School of Expeditionary Learning	23.6%
Utah International Charter	Not available
Districts	**% proficient**
Davis School District	47.4%
Garfield School District	37.3%
Logan School District	34.8%
Millard School District	53.6%
Ogden School District	24.1%

San Juan	26.9%
Weber	41.0%

d. Student Participation

During Year 2, data from the participation log indicated that mentors provided tutoring to 1,796 students.[5] The average amount of mentoring received by these 1,796 students was 249 minutes or 4.15 hours (median = 105 minutes or 1.75 hours) across an average of 10 sessions (median = 3 sessions). A total of 1,005 of these students (60%) received at least 90 minutes of tutoring. This is the equivalent of the program-prescribed 90 minutes of tutoring per week for one week or more. The average amount of mentoring received by these 1,005 students was 411 minutes or 6.85 hours (median = 265 minutes or 4.42 hours) across an average of 16 sessions (median = 9 sessions).

e. Pre-Service Training

On August 8, 2023, the STEM Action Center offered an in-person, regional training session for mentors participating in AMMP. The session was held in Ogden, Utah in partnership with a tutoring program administered through United Way of Northern Utah. Four AMMP mentors attended this initial training session. Three of these mentors were new to AMMP in Year 2 (2023-2024). One mentor was returning for a second year of mentoring. All four mentors who participated in the August 8th training completed the training exit survey. This was the only in-person training offered to AMMP mentors in Year 2. Additional mentors participated in a virtual initial training session. Among the mentors who completed virtual training, eight completed the training exit survey. Mentors were also provided other training opportunities, including virtual Saga Coach training[6], virtual math learning software training, and on-site training.

Following pre-service training opportunities, mentors were asked to complete "exit" surveys. Mentors could complete the survey more than once (e.g., following the initial in-person training session, following Saga Coach training, and/or following on-site training). In all, 18 responses were received on the training exit survey. Three mentors completed the survey more than once. In completing the survey, mentors were, first, asked to report on their satisfaction with the training by rating its quality, usefulness, design, and relevance on a scale that ranged from 1 ("poor") to 5 ("excellent").

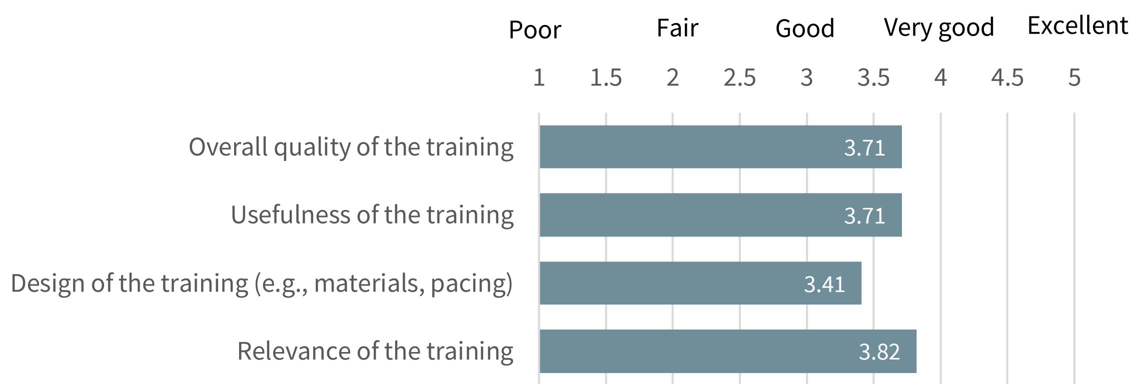
> *"… Training has really set me up for a better understanding of what my purpose is with these students. I was trained on how to run a successful small group with the ideal amount of students and how to find those students in the school within the math software. This has made it easier to form my groups, have conversations with teachers on data that I use from [math software] and has set me up for a successful mentor path. [Program personnel] provided links to the math software for training videos which have been very useful when it comes to working with the software. I was provided numbers for people who work in the software and those people have been amazing answering any questions our school as a whole may have."*

[5] STEM Action Center staff monitored and cleaned participation log data throughout the academic year to, for example, resolve spelling errors that could result in an overestimation of the number of student participants. The UEPC undertook a more thorough cleaning of the data prior to conducting analyses of achievement outcomes in Section 6. Additional cleaning was made possible by data from LEAs to help identify and resolve errors.

[6] SAGA Education provides resources to support high-impact tutoring, including Saga Coach, an "online training program [that] provides foundational skills for being an effective tutor." (https://www.sagaeducation.org/)

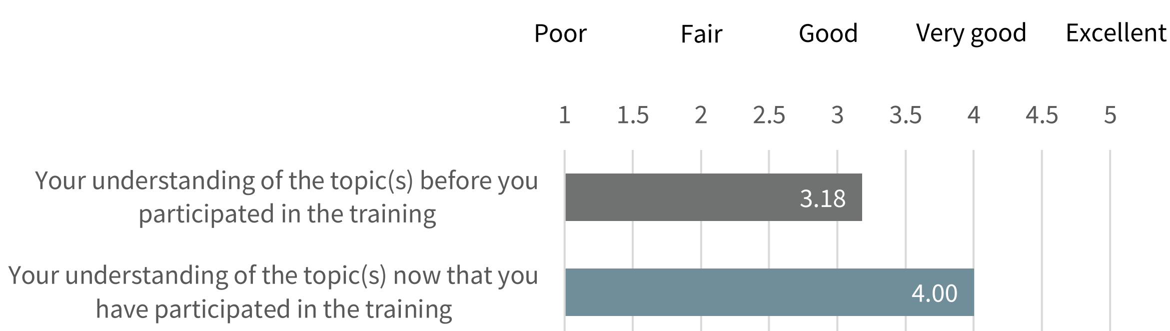
As shown in Figure 2, mean ratings for all four items were between “good” and “very good.” On an open-ended item tapping what mentors found most useful about training opportunities, several mentors indicated that they found strong value in training focused on how to build strong relationships with students, how to manage groups of students and address motivational and behavioral issues, how to help students develop growth mindsets, and how to use math learning software effectively, with one mentor capturing many of these elements in their response (see highlighted quote above).

Figure 2. Mean satisfaction ratings from training exit survey



Mentors were also asked to assess their understanding of covered topics before and after participating in the training on a scale that ranged from 1 (“poor”) to 5 (“excellent”). As shown in Figure 3, mentors’ ratings of their understanding reflected gains from before training (average rating = 3.18) to after training (average rating = 4.00). Results of a dependent *t*-test[7] indicate that these gains are statistically significant, $t(16) = 3.85$, $p < .001$.[8]

Figure 3. Mean ratings of understanding before and after training



[7] A dependent *t*-test, or paired sample *t*-test, is used to determine whether the mean difference between two sets of observations (here, “before” and “after” ratings) is zero.

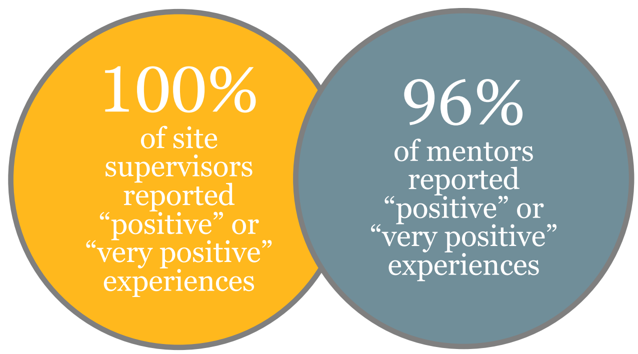
[8] A statistically significant result is one that is unlikely to occur by chance. When *p* values are less than .05, there is less than a 5% chance of finding a difference this large or larger if the null hypothesis is true. Here, the null hypothesis is that there are no differences in “before” and “after” ratings. When *p* values are greater than .05, this chance is greater than 5% which is traditionally considered unacceptable for rejecting the null hypothesis.

f. In-Service Supervision and Support

In Year 1 (2022-2023), STEM Action Center staff developed a participation log that allowed mentors to record information about their time with students (e.g., group size, minutes of tutoring, session notes). During that year, mentor utilization of the participation log was quite inconsistent. In Year 2 (2023-2024), mentor utilization of the participation log was much more consistent. Data from the participation log were used by the UEPC evaluation team to examine associations between dosage of tutoring and student outcomes (see Sections 5 & 6). These data were also used by STEM Action Center staff to offer supervision and support to mentors in real time. The UEPC assisted in these efforts by providing 11 interim reports across the academic year that summarized key usage metrics and themes that emerged from session notes.

4.4 Considerations for Improvement in Implementation

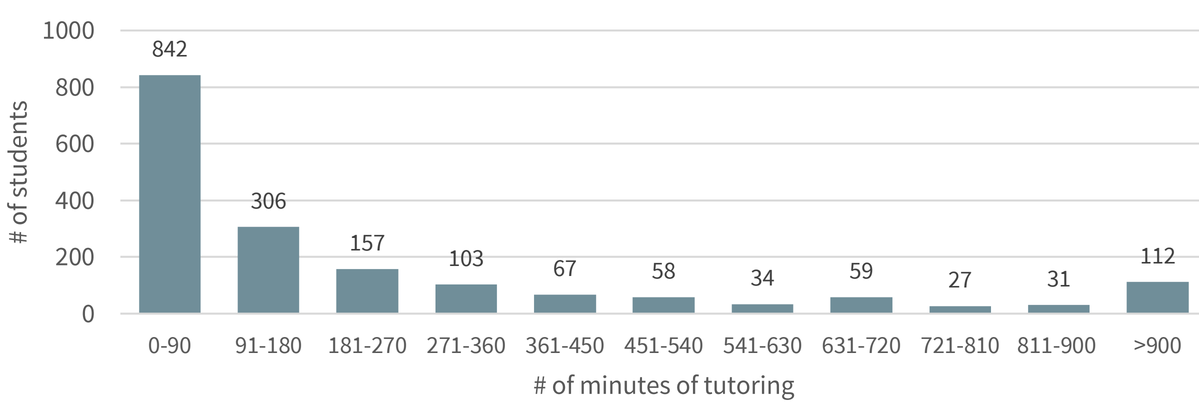
As detailed above, Year 2 (2023-2024) was a year marked by a variety of successes in program implementation including recruiting, placing, and supervising 41 mentors. Consistent with this conclusion, 7 out of 7 site supervisors and 24 out of 25 mentors who completed end-of-year surveys indicated that their overall experience with AMMP was "positive" or "very positive." To build upon these successes in Year 3 (2024-2025), STEM Action Center staff might consider three key areas for improvement that emerged from implementation data. These areas for improvement are related to a) tutoring dosage, b) tutoring contexts, and c) mentor onboarding, training, supervision and support.



a. Tutoring Dosage

One key area for improvement is ensuring that a greater number of students receive the program-prescribed 90 minutes of tutoring per week for closer to the 10 weeks recommended by the National Student Support Accelerator for high-dosage tutoring programs.

Figure 4. Distribution of number of minutes of tutoring across students

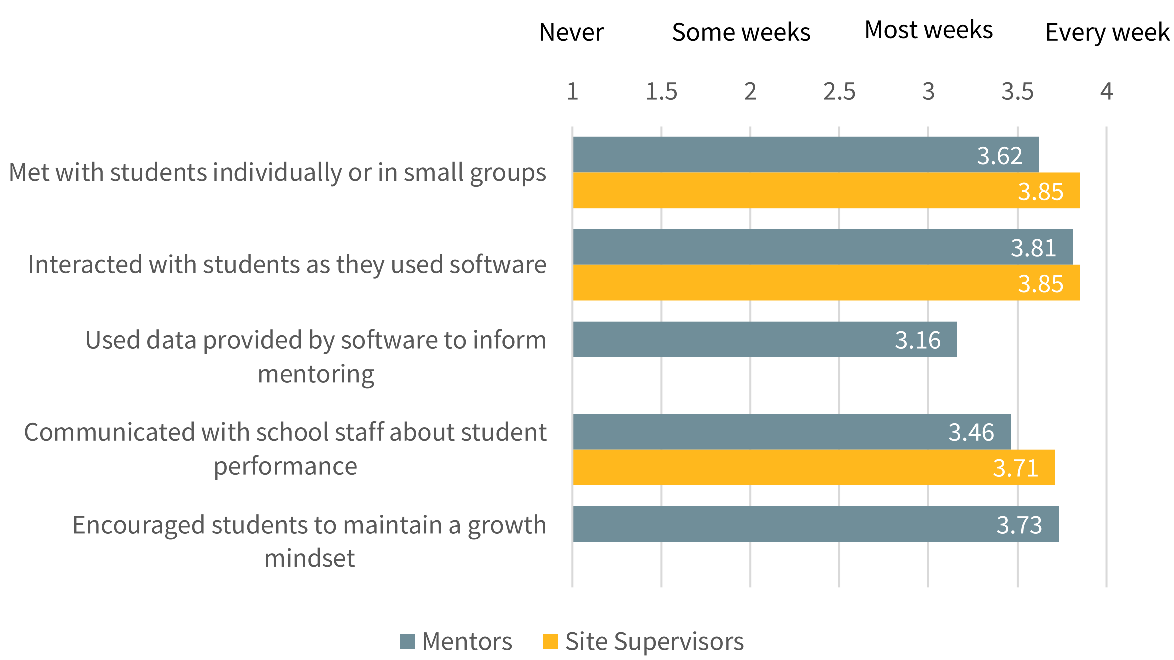


As shown in Figure 4, data from the participation log (see footnote 5) indicated a wide distribution in dosage, with only 321 students receiving more than 450 minutes of tutoring (i.e., the equivalent of the program-prescribed 90 minutes of tutoring per week for five weeks or more) and only 112 students receiving more than 900 minutes (i.e., the equivalent of the program-prescribed 90 minutes of tutoring per week for 10 weeks or more).

b. Tutoring Context

A second key area for improvement is working closely with mentors, school administrators, and site supervisors to ensure that mentors at all sites can implement the program with fidelity to program design features beyond dosage. These include a) meeting with students individually or in small groups, b) supporting students as they use math learning software, c) using data from math learning software to inform their instruction, d) communicating with school staff about student performance, and e) encouraging students to maintain a growth mindset. As shown in Figure 5, data from end-of-year mentor and site supervisor surveys suggest that, overall, mentors engaged in key program design features "most weeks" to "every week." However, these findings should be interpreted with some caution as behaviors are self-reported and thus susceptible to social desirability biases. In addition, not all mentors or site supervisors responded to the survey, and item means do not capture some of the variability in responses. For example, one mentor indicated that they engaged in each of the five program design features only "some weeks" while another indicated that they spent "half of the time on the math software and half either on a paper worksheet, math activity or game." Importantly, STEM Action Center staff have added items to the form that populates the participation log to better identify lapses in implementation fidelity in Year 3 (2024-2025). For example, mentors will now be asked to indicate whether math learning software was used during each tutoring session to allow tracking and intervention, as needed, in real time.

Figure 5. Mean responses from mentors and site supervisors for items assessing implementation

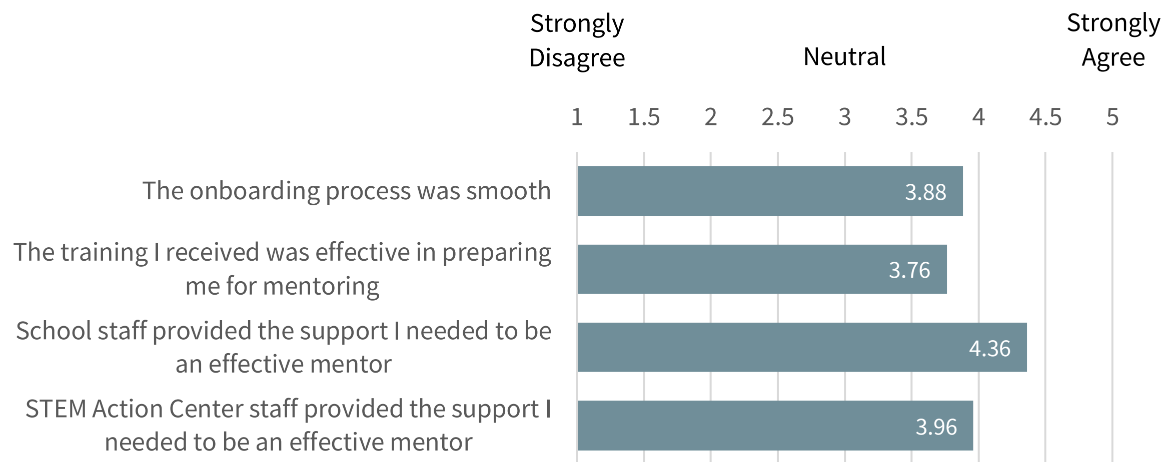


Note. 25 mentors and 7 site supervisors completed end-of-year surveys. Only mentors were asked to respond to items about using data provided by software to inform mentoring and encouraging students to maintain a growth mindset.

c. Mentor Onboarding, Training, Supervision, and Support

A third key area for improvement is to continue to work to ensure that onboarding, training, supervision, and support opportunities are meeting mentors' needs. Data from an end-of-year survey administered to mentors indicated that, as a group, mentors had more positive than negative perceptions of these opportunities (see Figure 6).

Figure 6. Mean satisfaction ratings from mentor end-of-year survey



At the same time, in response to an open-ended survey item asking mentors to indicate how the program might be improved to increase impact on students, more than half of responses focused on onboarding, training, supervision, or support opportunities. Common themes included the following:

Mentors would benefit from additional pre-service training as well as in-service supervision and support. For example:

- "[Mentors need] more beginning of year in person training."
- "Have better training, not only how to teach math, but how to deal with upset or antsy kiddos. Teaching math to kids who want to learn is very easy and fun, but to teach students who are upset or don't want to be there is very tricky."
- "More tools to learn how to help kids learn and identify students air patterns/where they struggle."
- "Resource sessions of how to teach a certain math topic and how to deal with 4 students who are all misbehaving. We need more supplies and resources to teach to help us prepare for the mentoring session. We get thrown on the spot."
- "I think more communication with [STEM Action Center Staff] about how we are doing once in a while would be good."

- “[More help] with how students can receive help through the software. Or how to work the software.”

- “Having some coaching on what information is specifically helpful for reporting [on participation log] would be useful.”

Mentors would benefit if STEM Action Center Staff, mentors, and site supervisors had a clearer, mutual understanding of program goals and expectations. For example:

- “Make sure schools and teachers completely understand what the program is and what the grant money is for. The administration and teachers need to know what this is all about and it would make the onboarding process much easier!”

- “The program implementation needs to be integrated with the schools even more so there is no communication breakdown of expectations.”

5 | Outcome Evaluation: Student Attitudes

5.1 Overview

In this section of the report, we provide an evaluation of the impact of the AmeriCorps Math Mentors Program (AMMP) on student attitudes. The UEPC's evaluation was guided by the following evaluation question:

> **EQ3.** Is participation in AMMP associated with positive changes in students' mathematics attitudes?

To answer this question, we drew upon three sources of data: 1. data from a **student survey**, 2. data from **mentor surveys**, and 3. data from **site supervisor surveys**.

5.2 Results from Student Survey

Students in 3rd grade and above were asked to complete a retrospective pre/post survey designed to assess changes in their **math self-efficacy**, **growth mindsets and self-perceptions of effort**, **valuing of math**, and **perceptions of belongingness** from the beginning of the year (BOY; that is, before their involvement in the AMMP) to the end of the year (EOY; that is, after their involvement in the AMMP). Importantly, prior research has established that these attitudes and behaviors are associated with positive achievement outcomes (e.g., Gottfried, Marcoulides, Gottfried, Oliver, & Guerin, 200; Korpershoek, Canrinus, Fokkens-Bruinsma, & de Boer, 2020; McLeod, 1994).

From April 30 to May 13, 2024, a total of 387 students completed the survey. Table 2 provides the distribution of respondents by LEA. Importantly, students at two charter schools and one school district were not asked to complete surveys either because of LEA policies or because mentors were placed in the LEA late in the academic year.

Table 2. Number of student survey respondents by LEA

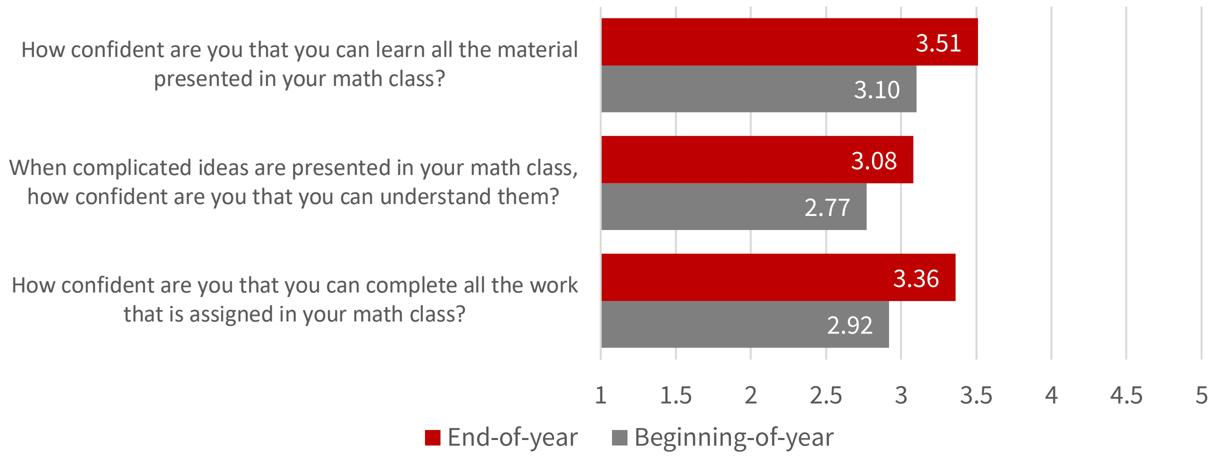
Charter Schools	# of responses
Athenian e-Academy	0
Center for Creativity, Innovation, and Discovery (CCID)	Not invited to complete survey
Gateway Preparatory Academy	52
Promontory School of Expeditionary Learning	26
Utah International Charter	Not invited to complete survey
Districts	**# of responses**
Davis School District	0
Garfield School District	0
Logan School District	95
Millard School District	0
Ogden School District	Not invited to complete survey
San Juan	169
Weber	32

Note. 13 students did not provide information on their LEA.

a. Math Self-Efficacy

Students were asked to provide ratings for three items assessing their math self-efficacy. Respondents rated all three items on a scale that ranged from 1 (“not confident at all”) to 5 (“extremely confident”). Mean self-efficacy ratings are provided in Figure 7. As shown, students’ EOY ratings of math self-efficacy were higher than their BOY ratings. Results of dependent *t*-tests indicated that these were statistically significant increases, $ts > 4.72$, $ps < .001$. Effect sizes ranged from $d = .24$ to .33.

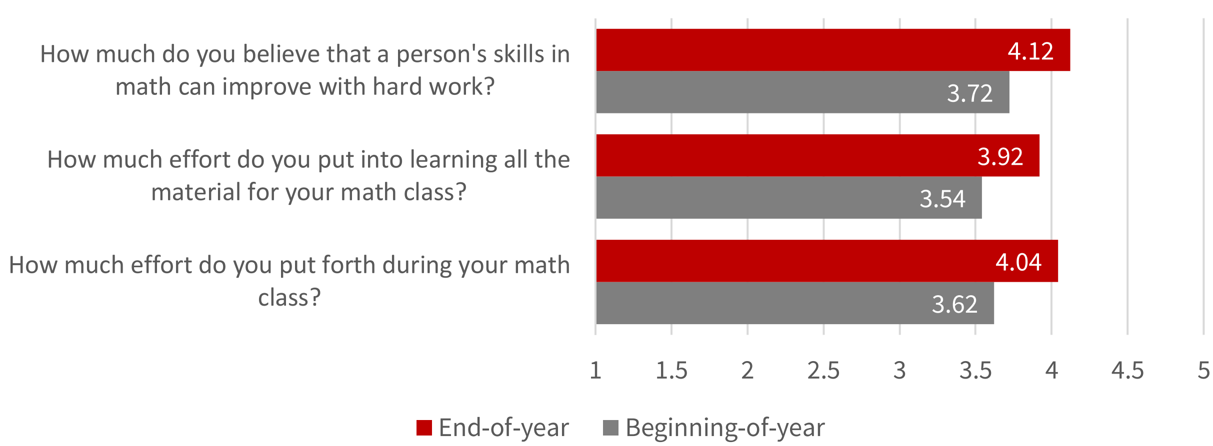
Figure 7. Mean ratings on items assessing math self-efficacy



b. Growth Mindsets and Self-Perceptions of Effort

Students were asked to provide ratings for three items assessing the degree to which they adopted growth mindsets and their self-perceptions of effort in math. Respondents rated these items on scales that ranged from 1 (i.e., “not at all” or “almost no effort”) to 5 (i.e., “a lot” or “a great deal of effort”). Mean growth mindset and effort ratings are provided in Figure 8. As shown, students’ EOY growth mindset ratings and ratings of effort in math were higher than their BOY ratings. Results of dependent *t*-tests indicated that these were statistically significant increases, $ts > 6.61$, $ps < .001$. Effect sizes ranged from $d = .34$ to .37.

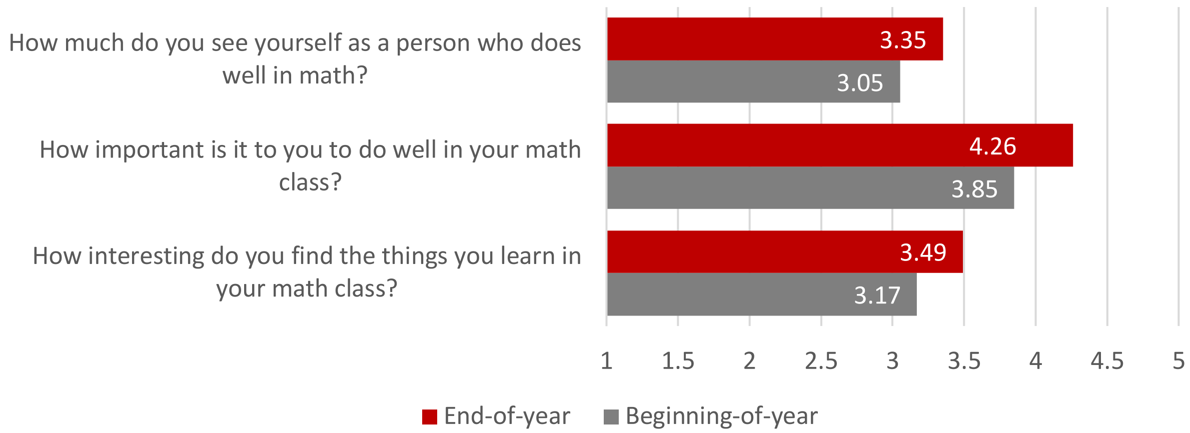
Figure 8. Mean ratings on items assessing growth mindsets and perceptions of effort



c. Interest in and Valuing of math

Students were asked to provide ratings for three items assessing their interest in and valuing of math. Respondents rated all three items scales that ranged from 1 (i.e., "not at all") to 5 (i.e., "a lot"). Mean value ratings are provided in Figure 9. As shown, students' EOY ratings of their interest in and valuing of math ranged were higher than their BOY ratings. Results of dependent *t*-tests indicated that these were statistically significant increases, *ts* > 4.90, *ps* < .001. Effect sizes ranged from *d* = .25 to .36.

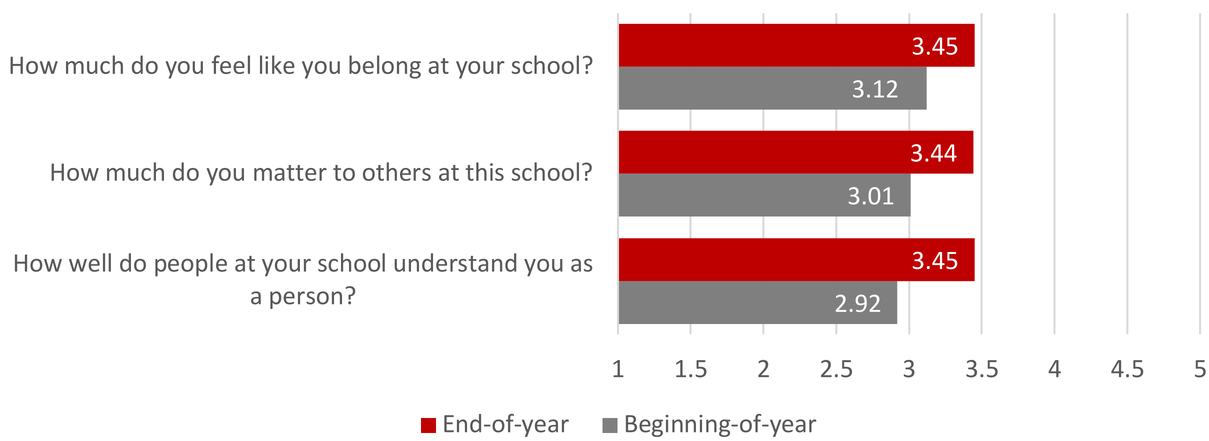
Figure 9. Mean ratings on items assessing interest in and valuing of math



d. Perceptions of Belongingness

Students were asked to provide ratings for three items assessing their perceptions of belongingness. Respondents rated all three items scales that ranged from 1 (e.g., "not at all") to 5 (e.g., "a great deal"). Mean belongingness ratings are provided in Figure 10. As shown, students' EOY ratings of belongingness were higher than their BOY ratings. Results of dependent *t*-tests indicated that these were statistically significant increases, *ts* > 5.38, *ps* < .001. Effect sizes ranged from *d* = .28 to .44.

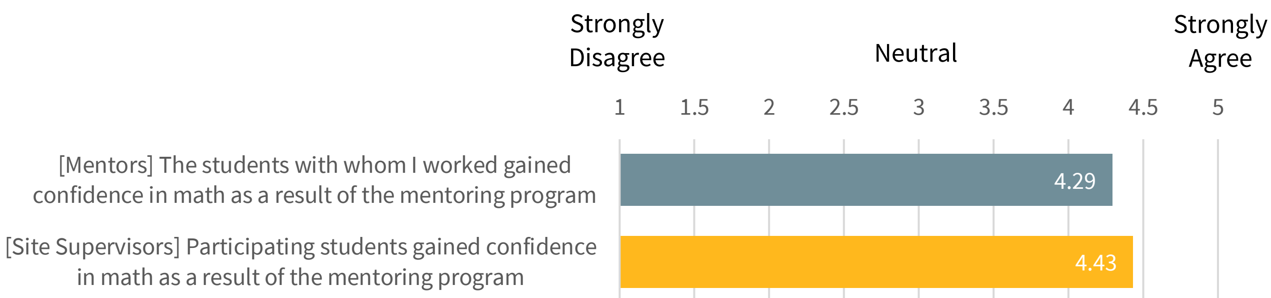
Figure 10. Mean ratings on items assessing perceptions of belongingness



5.3 Results from Mentor and Site Supervisor Surveys

As noted previously, both mentors and site supervisors were asked to complete an end-of-year survey. As part of this survey, mentors and site supervisors responded to one item assessing their perceptions of changes in students' confidence in math as a result of their participation in the program. In both cases, ratings were made on a scale that ranged from 1 (strongly disagree) to 5 (strongly agree). As shown in Figure 11, mean ratings were well above the midpoint of the scale between "agree" and "strongly agree."

Figure 11. Mean ratings for mentors and site supervisor on items assessing changes in confidence



In response to an open-ended question asking respondents to describe features of the program that had the most impact, both mentors and site supervisors indicated that changes in student attitudes – including student confidence – were bolstered by consistent one-one-one or small group interactions with a caring mentor that were data-informed and growth-mindset-focused. For example:

- "The students loved having someone there they could depend on to be there. I think the confidence they gained would be the biggest impact …. I wanted them to be confident and know they were able to do the math and having extra help for those kids really I think made a huge difference." [Site Supervisor]

- "Students have designated time during the day for the [math learning software] program. She was able to quickly identify which students were struggling and create a plan to meet with them 1-2 times a week for assistance." [Site Supervisor]

- "We were able to pick 5 students every class period and have them go work in small groups in a separate room on their own math level with our online math program. It was helpful to those students as they received one on one time with an adult math mentor to help them solve problems." [Site Supervisor]

- "Creating a bond with an adult helped their confidence along with their academics." [Site Supervisor]

> "My mentors go above and beyond to meet the needs of the students they are working with. They use data to inform their decisions on who they are working with and how much of an impact it is making. They also are very positive and build confidence in the students they work with."

"Being consistent and having a set time to meet with the students every week helped a lot. I was able to work on specific things and monitor their progress as the year progressed. Getting to know the students also really helped in my effectiveness and made the students eager to learn from me. Having help from the local school staff also is very helpful and made it much easier to know how to be effective."

- "I think getting to know the kids and being a friend to them has made the most impact. When they feel comfortable enough to come to me and ask questions, that's the best!" [Mentor]

- "Some aspects that have helped make an impact with the students I work with is working with the students right when they need help, making sure the students are confident in their math skills, and also ensuring the students have a strong support system in class." [Mentor]

- "I love the focus on growth mindset, and the focus on math because so many students are apprehensive of it. I love the help I am able to provide the students and the relationships I foster with them." [Mentor]

5.4 Conclusions and Caveats for Impact on Student Attitudes

Findings from the retrospective pre/post survey administered to students indicate that students showed statistically significant increases in levels of math self-efficacy, perceptions of effort in math, valuing of math, and feelings of belongingness. Effect sizes ranged .24 to .44.[9] The largest effect size emerged for students' perceptions of the degree to which "people at your school understand you as a person." Examining changes in the percentage of students who indicated that they felt this way "quite a bit" or "a lot" provides insights into the practice significance of this effect. When asked to reflect back on the beginning of the school year, only 34% of students indicated that they felt this way "quite a bit" or "a lot." In contrast, 53% of students indicated that they felt this way "quite a bit" or "a lot" by the end of the school year.

These findings should be interpreted with some caution given that no students at several participating LEAs completed the survey. As a result, it is unclear to what degree findings are generalizable to the population of students who received mentoring as part of the AMMP program. In addition, while retrospective pre/post surveys have many benefits – including reducing survey fatigue for respondents and allowing evaluators to analyze paired data even when responses are anonymous – this approach, like other self-report methods, is susceptible to social desirability biases and is dependent on students being able to accurately recall their beginning-of-year attitudes.[10] Finally, because only students involved with AMMP were asked to complete the surveys, it is unclear how these changes might compare to non-participants. Stated differently, although these changes are

[9] Kraft (2020) proposes that, for causal studies of educational interventions, an effect size less than 0.05 is small, 0.05 to less than 0.20 is medium, and 0.20 or greater is large. These proposed benchmarks are based on the distribution of 1,942 effect sizes from 747 Randomized Control Trials (RCTs) evaluating education interventions with standardized test outcomes. Caution should be taken in applying these benchmarks – or any other benchmarks – to the current findings as debate about the most appropriate interpretation of effect sizes is ongoing. Importantly, effect sizes for correlational studies – like the current study – are typically larger than for causal studies (Kraft, 2020). Moreover, some scholars recommend against reporting effect size for within-group changes (see Bakker, Cai, English, Kaiser, Mesa, & Van Dooren, 2019).

[10] https://fyi.extension.wisc.edu/programdevelopment/files/2021/12/RetrospectivePost-then-Pre.pdf

encouraging, because of the correlational nature of the current study, they cannot be causally attributed to participation in the AMMP program.

Importantly, however, the results from the student retrospective pre/post survey were consistent with the perceptions of mentors and site supervisors who completed surveys. As shown in Figure 11 (above), mentors and site supervisors overwhelmingly agreed that students who participated in AMMP gained confidence in math. Moreover, mentors and site supervisors attributed these gains to key program design elements including ensuring that tutoring takes place individually or in small groups and is supported by high-quality instructional materials (here, evidence-based math learning software). These results are also consistent with students' overall positive perceptions of the program. Specifically, 80% or more of participating students reported that they their mentor helped them learn "quite a bit" or "a lot" and that they liked learning from their mentor "quite a bit" or "a lot."

83%
of students reported that their mentor helped them learn "quite a bit" or "a lot"

80%
of students reported that they liked learning from their mentor "quite a bit" or "a lot"

6 | Outcome Evaluation: Student Achievement

6.1 Overview

In this section of the report, we provide an evaluation of the impact of the AmeriCorps Math Mentors Program (AMMP) on student achievement. The UEPC's evaluation was guided by the following evaluation question:

> **EQ4.** Is participation in AMMP associated with positive changes in students' mathematics achievement?

To answer this question, we drew upon four sources of data: 1. data from the **participation log**, 2. **student achievement and demographic data,** provided to the UEPC by participating LEAs, 3. data from **mentor surveys**, and 4. data from **site supervisor surveys**.

6.2 Methods for Student Achievement Outcomes

To compare end-of-year math achievement outcomes of students who received tutoring through AMMP with students who did not receive tutoring, the UEPC established Data Privacy Agreements with nine of the twelve participating LEAs to permit the sharing of student achievement and demographic data. Two charter schools and one school district were not asked to provide achievement and demographic data either because of LEA policies or because mentors were placed in the LEA late in the academic year.

Data

Eight of the nine LEAs provided the requested achievement and demographic data by August 1, 2024. One LEA provided data exclusively for AMMP participants. Students from this LEA were excluded from analyses due to the lack of a comparison group. Students from any LEA who were missing data on key variables (e.g., test scores) were also excluded. Achievement and demographic data from LEAs were matched with participation log data. After matching, 2,536 students (representing both AMMP participants and non-participants) from 7 LEAs were included in the analyses. Analyses for the current report used this combined dataset to improve statistical power.

Measures

Participation. Participation in the program was assessed using two methods:

- Binary Classification: Individuals were categorized as participants or non-participants based on whether they received any tutoring.
- Stratification by Tutoring Dosage: Students were divided into four groups based on the total amount of tutoring received throughout the academic year: Group 1. non-participants; Group 2. less than 110 minutes (below median). Group 3. 110-450 minutes (above median), and Group 4. more than 450 minutes (well above median).

Math Achievement. Depending on the LEA and the student's grade level, the UEPC received either RISE Math or Acadience Math scores for students.

- RISE Math Scores: RISE Math scores for 2023-2024 were used as a post-intervention measure of achievement, while scores for 2022-2023 were used as a baseline measure.
- Acadience Math Scores: End-of-year (EOY) Acadience Math scores for 2023-2024 were used as a post-intervention measure of achievement, while beginning-of-year (BOY) scores for the same academic year were used as a baseline measure.

All scores were standardized within each school, grade, and assessment type to ensure consistency. Additionally, **a difference score** was calculated by subtracting baseline standardized scores from post-intervention standardized scores. The difference scores represent the magnitude of each student's improvement in math achievement over the intervention period in terms of standardized units (*z* scores).

Covariates. Regression analyses adjusted for gender, race, and grade level. Although some districts provided additional demographic data (e.g., low-income status and English learner status), these were excluded from the analyses due to incomplete data across all districts.

6.3 Findings for Student Achievement Outcomes

We begin by presenting descriptive statistics on key variables. Following this, we examine whether baseline scores or changes in scores from baseline to post-intervention differ by AMMP participation status or dosage. Next, we summarize the findings from regression analyses that further examined program impact, including by controlling for students' demographic characteristics. Finally, we focus on the results from one LEA where significant effects of tutoring on math achievement were observed.

Descriptive Statistics

Table 3 presents descriptive statistics for each LEA. The total sample included 2,536 students from 7 LEAs encompassing 9 different schools. Of these, 546 students (21.53%) received some tutoring. The students in the sample ranged from grades K to 9. The median amount of tutoring received in the sample of students for whom achievement data were available was 110 minutes. Importantly, this is close to the median number of minutes of tutoring (i.e., 105 minutes; see p. 13) reported for all students who appeared in the participation log, providing some evidence that this sample is representative of the population of students who received tutoring.

Table 3: Descriptive statistics by LEA

LEA	# of Schools	Grade levels	# of Students	# of AMMP Participants	% of AMMP Participants	Median Tutoring Time (in minutes)
Davis	2	K-9	1248	158	12.66%	90
Millard	2	6-8	512	129	25.20%	120
Gateway	1	K-5	367	151	41.14%	95
Promontory	1	5-8	171	66	38.60%	193
Athenian	1	3-8	142	8	5.63%	445
Weber	1	3	62	23	37.10%	60
Garfield	1	5-6	34	11	32.35%	150
Total	9	K-9	2536	546	21.53%	110

Math Achievement Outcomes by Participation Status

As shown in Figure 12, students who received tutoring as part of their participation in the AMMP program had significantly lower baseline scores, on average, than those who did not. Specifically, AMMP participants had standardized test scores below the sample's mean, while non-participants had standardized test scores slightly above the sample's mean. This is unsurprising, given that the AMMP program was designed to provide support to students who are struggling in mathematics. This finding is, however, important as it indicates that teachers were able to effectively direct tutoring resources to students in need.

Figure 12: Average baseline and post-intervention standardized scores by participation status

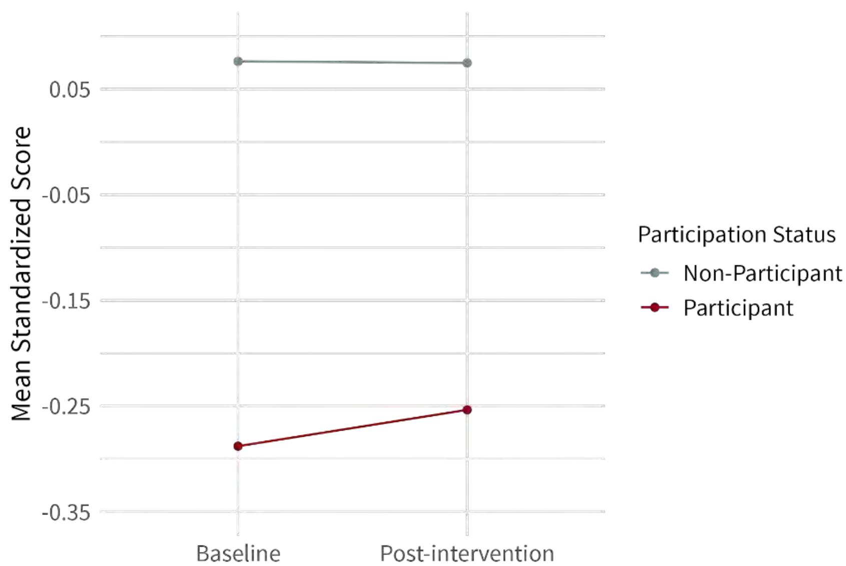
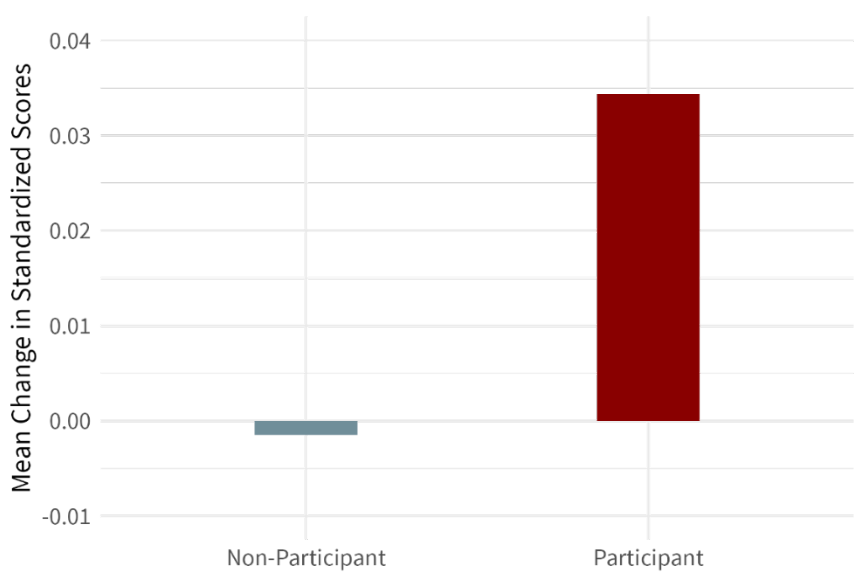


Figure 13: Average change in standardized scores by participation status

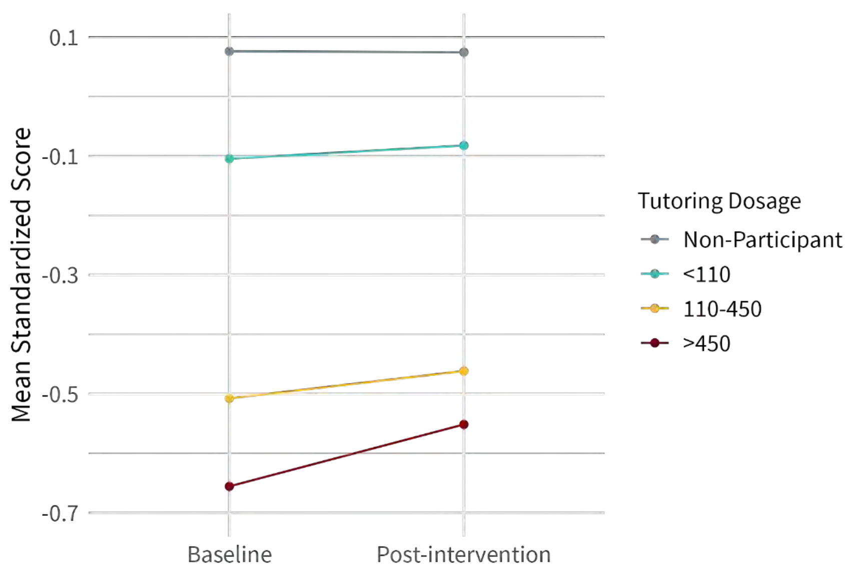


As indicated by the blue line in Figure 12 and the blue bar in Figure 13, the average standardized test score for non-participants decreased slightly from baseline to the post-intervention period. In contrast, as indicated by the red line in Figure 12 and the red bar in Figure 13, the average standardized test score for participants in the AMMP program increased slightly. Although this increase is encouraging, it is important to note that it was not statistically significant, meaning that the magnitude of the increase is no greater than would be expected by chance.

Math Achievement Outcomes by Tutoring Dosage

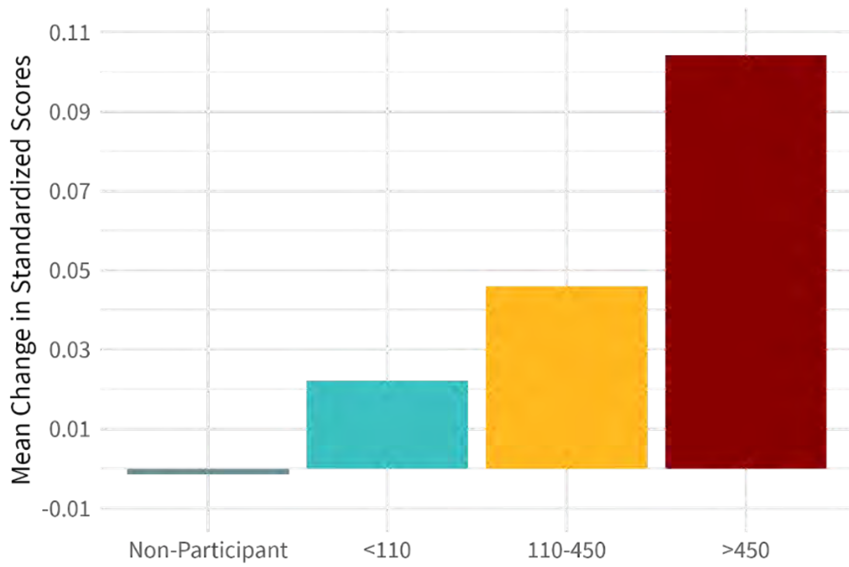
To examine the effect of tutoring dosage on students' achievement outcomes in mathematics, students were categorized into four groups: non-participating, less than 110 minutes, 110-450 minutes, and more than 450 minutes. As shown in Figure 14, higher tutoring dosage corresponded with lower baseline scores. This is, again, unsurprising, and indicates that teachers were effectively identifying struggling students and recommending them to participate in tutoring for longer periods. As shown by the red, gold, and turquoise lines in Figure 14, after tutoring, the average standardized test score increased for students in all tutoring dosage groups, with higher increases observed in groups with greater tutoring dosage. In contrast, as shown by the blue line in Figure 14, the average standardized score slightly decreased for non-tutored students.

Figure 14: Average baseline and post-intervention standardized scores by tutoring dosage



This pattern is even clearer in Figure 15, which illustrates the magnitude of change for each group. Although the score changes for students who received 450 minutes of more of tutoring is encouraging, it is important to note that it was not statistically significant and, therefore, not greater than expected by chance. One reason that this difference may have failed to reach statistical significance is that statistical power was low as only 14 students in the sample for whom achievement data were available received 450 minutes or more of tutoring.

Figure 15: Average change in standardized scores by tutoring dosage



Regression Analyses

To further explore the pattern of findings, we conducted both single-level and multilevel regression analyses. These analyses were performed using two different outcome measures: post-tutoring standardized scores (controlling for pre-tutoring standardized scores as the baseline) and the difference in test scores from baseline to post-intervention. These analyses also included covariates (e.g., student gender). We examined the effects of total minutes of tutoring (continuous variable), participation status (binary variable), and tutoring dosage groups (categorical variable). Across all models, no significant effects of tutoring were observed.

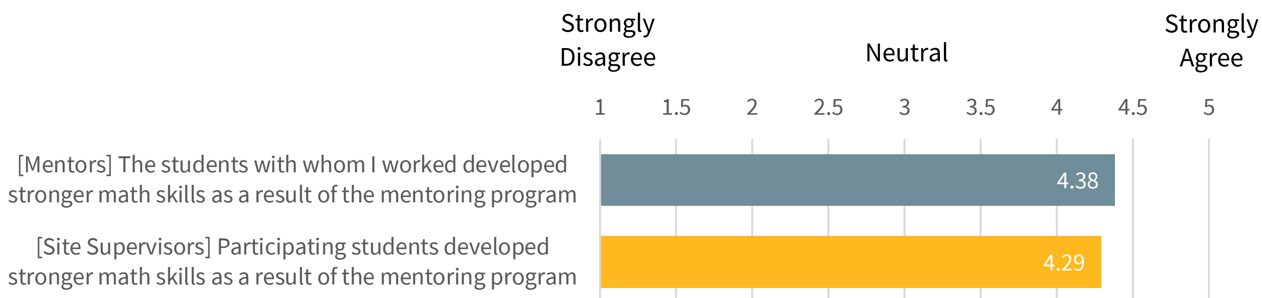
Gateway Preparatory Academy

Even though the analyses using the combined dataset did not yield any statistically significant effects, separate analyses by LEAs revealed some. Results from Gateway Preparatory Academy are detailed in Appendix A as results from this LEA provide the strongest evidence that the AMMP program can have a statistically significant, positive impact on student achievement outcomes in mathematics. The differences in score change between participants and non-participants are shown in Figures 17 and 18. Independent sample *t*-test results confirm that this difference in score change is statistically significant. Similarly, Figures 19 and 20 illustrate the differences in score change across tutoring dosage groups, with the 110–450-minute group showing a distinct change compared to non-participants, which is also statistically significant according to independent sample *t*-tests. Furthermore, regression analyses adjusting for covariates (gender, race, low-income status, and grade level) indicated that participation (binary) had a significant and positive effect on change in standardized scores (see Table 4, model 1). Among the tutoring dosage groups, the 110–450-minute group had a significant positive coefficient, with non-participants serving as the reference group (see Table 4, model 2).

6.4 Results from Mentor and Site Supervisor Surveys Related to Student Achievement

The promising findings from analyses of student achievement test data are bolstered by findings from mentor and site supervisor surveys. Specifically, as part of the end-of-year survey, mentors and site supervisors responded to one item assessing their perceptions of changes in students' skills in math as a result of their participation in the program. In both cases, ratings were made on a scale that ranges from 1 (strongly disagree) to 5 (strongly agree). As shown in Figure 16, mean ratings were well above the midpoint of the scale between "agree" and "strongly agree," indicating that both mentors and site supervisor perceived that the program was effective in helping students build strong math skills.

Figure 16. Mean ratings for mentors and site supervisor on items assessing changes in math skills



6.5 Conclusions and Caveats for Impact on Student Achievement

Analyses of student achievement data indicate that the AMMP program has been effective in identifying and providing support to students struggling in mathematics. Although the results do not support the conclusion the participation in the AMMP program is associated with achievement gains that are larger than would be expected by chance, the improvements observed among students who received higher doses of tutoring indicate potential benefit. The positive results from Gateway Preparatory Academy also indicate that the program can be effective in specific contexts.

Caution is warranted in interpreting these findings. Small sample sizes, especially in the group receiving tutoring at levels that were well above the median, may have reduced the likelihood of detecting positive impacts. Additionally, the variability in outcomes across different LEAs suggests that the program's effectiveness may be context-dependent, influenced by factors such as implementation practices and student demographics. Future research and evaluation efforts will be enhanced to the degree that all LEAs provide the requested data and more students receive program-prescribed levels of tutoring.

7 | Recommendations

The UEPC offers the following recommendations for sustaining and strengthening the AmeriCorps Math Mentors Program. Importantly, these recommendations are aligned with the extant literature on design principles for high-dosage tutoring programs (e.g., Nickow et al., 2020; Pellegrini et al., 2021; Robinson et al., 2021) that have shown promise in addressing historic and pandemic-related underperformance in math (e.g., Fahle et al., 2023). Recommendations should be evaluated by STEM Action Center personnel in light of local constraints, including constraints associated with recruiting and thoroughly training mentors and establishing strong and informed partnerships with participating schools.

7.1 Ensure that more participating students are receiving "high-dosage" tutoring

There is growing evidence that tutoring can have "impressive effects" on learning among K-12 students (Nickow et al., 2020). However, the effects of tutoring vary considerably by program characteristics. Resources from the National Student Support Accelerator (NSSA) indicate that tutoring appears to be most effective when it is conducted one-on-one or in small groups and when it occurs for at least three sessions per week at 30 to 60 minutes per session for at least 10 weeks (Robinson et al., 2021). Available evidence from both the participation log and from the analyses of achievement data indicate that many student participants in the AMMP received far less than the program-prescribed or NSSA-recommended number of hours for high-dosage tutoring. Potential solutions to this problem include 1) working with site supervisors and mentors to ensure that there is a shared understanding of what "high-dosage" tutoring is and why it is important to aim to meet recommendations, 2) using the participation log to identify mentors with unusually high caseloads which may be an early indicator that a mentor is distributing their efforts across too many students, and 3) using the participation log to identify mentors with unusually high numbers of sessions with just one or two students which indicates that some potential tutoring "slots" are going unfilled. Importantly, these recommendations are consistent with recommendations offered by mentors, themselves, in response to an open-ended question on the end-of-year survey about potential program improvements. For example:

> "I think it would help to have the mentors more individualized with the students. I did work with the same students a lot throughout the year, but every week and every day it was mixed up. I noticed that when I worked with the same student every day, [I] got to know them better (personally and math-wise) [and] they would improve much faster and be more willing to work with me. I think the consistency is good and that if we did better with having specific students with specific tutors, it would make it all around more beneficial. There were less behavioral issues with the students that I worked with on [a] regular [basis] and in becoming friends they were excited to do math and cooperate."

7.2 Provide ongoing training and support opportunities that will ensure that all mentors have the knowledge, skills, and tools they need to engage in "high impact" tutoring

Overall, findings from the participation log speak to a cohort of mentors that are dedicated, thoughtful, and engaged. However, data from training exit surveys, the participation log, and end-of-year surveys indicated that mentors would benefit from additional pre-service and in-service training/support opportunities. These opportunities would allow them to gain additional "just in time" knowledge about how to improve their tutoring and mentoring skills, share their successes, and brainstorm with other mentors, site supervisors, classroom teachers, and STEM Action Center staff about how to approach challenges. Indeed, prior research indicates that AmeriCorps members can be effective mentors, but that, compared to experienced classroom teachers, these types of mentors are likely to need substantial and ongoing training and support to engage in critical features of high-dosage tutoring. These features include a) building sustained and strong relationships with students, b) ensuring that there is a strong alignment between mentoring activities and regular classroom instruction, and c) carefully monitoring student knowledge and skills (Robinson et al., 2021).

The strategic plan developed by STEM Action Center personnel makes clear that both training and support are priorities. For example, mentors are expected to participate in a pre-service orientation, attend a pre-service training with vendors, complete Saga Coach training modules, participate in weekly check-ins with STEM Action Center staff, engage in 30-minutes per week of in-service training, participate in monthly trainings/collaborations with other mentors, and participate in weekly meetings with site supervisors. As STEM Action Center personnel work to implement and/or strengthen these program elements, it will be important to develop a system for monitoring attendance and gathering additional feedback on training and support efforts.

Importantly, the National Student Support Accelerator (NSSA) offers guidance for in-service training and support that STEM Action Center personnel might find useful. Among the important principles for in-service training and support highlighted in this resource are that:

- Training and support opportunities should focus on specific skills, mindsets, or values that are important for the program. For the AMMP, these might include how to plan for tutoring sessions, how to use math learning software, how to use data to inform instruction, how to provide support to struggling students, and how to overcome potential barriers to communication with classroom teachers or site supervisors.

- Training and support opportunities should incorporate a culture of open communication and feedback. One key strategy for creating this culture includes asking tutors for feedback and explicitly acknowledging when feedback has been taken into account in making a decision.

- Training and support opportunities should include regular observation and debrief cycles**.** Two key strategies for engaging in this work include a) observing each tutor working directly with individual or small groups of students and b) providing regular feedback so that mentors get multiple opportunities to learn, reflect, and improve.

7.3 Increase participation in data collection efforts to support data-informed improvements

Since its inception, the UEPC evaluation team has worked to develop or revise a variety of tools, including exit surveys, "pulse surveys," and retrospective pre/post surveys, to collect information from mentors, site supervisors, and students regarding their experiences with and perceptions of the impact of AMMP. In addition, STEM Action Center personnel have worked to develop processes for monitoring administrative data (e.g., # of hours of mentoring per student) via a participation log. Exit surveys are designed to be administered after each major training opportunity (e.g., the pre-service orientation, pre-service trainings with vendors, and completion of three sets of Saga Coach modules). “Pulse” surveys are designed to be administered periodically (e.g., as often as once per month) during the academic year. While findings from exit surveys and “pulse” surveys are helpful in making necessary adjustments to program elements and mentor activities in real-time, pre/post surveys, administrative data, and school-provided assessment data can be useful in understanding implementation fidelity and quantifying end-of-year impact (see National Student Support Accelerator, 2021, for more information).

In Year 2 (2023-2024), mentors were, as a group, quite consistent in completing the participation log which was monitored by both STEM Action Center staff and UEPC evaluators. Response rates for training exit surveys, “pulse” surveys, the end-of-year mentor survey, the end-of-year site supervisor surveys, and the student retrospective pre/post survey indicate room for improvement. For example, the UEPC received only 18 responses to the training exit survey across 41 mentors who had the opportunity to complete the survey multiple times. Moreover, only 7 mentors completed the “pulse” survey administered in Fall 2024, and student pre/post survey responses were entirely missing for four LEAs. Given other demands on mentors, site supervisors, and students, it will be important for STEM Action Center personnel to dedicate time during pre-service training sessions to introduce and discuss with mentors and site supervisors the data collection tools they will be using.[11] It will also be important to be intentional about setting aside time for ongoing training and support for mentors on how to collect, review, and use these data throughout the academic year (Kupersmidt et al., 2018; Robinson & Loeb, 2021; Robinson et al., 2021; Sarker et al., 2019). Weekly check-in meetings may be an optimal time to provide this training and support.

[11] In Year 3 (2024-2025), the UEPC will work carefully with STEM Action Center personnel and LEAs to ensure that student survey administration complies with H.B. 182 which took effect on July 1, 2024 and local policies.

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Appendix A: Gateway Preparatory Academy Findings

Figure 17. Average baseline and post-intervention standardized scores by participation status (Gateway)

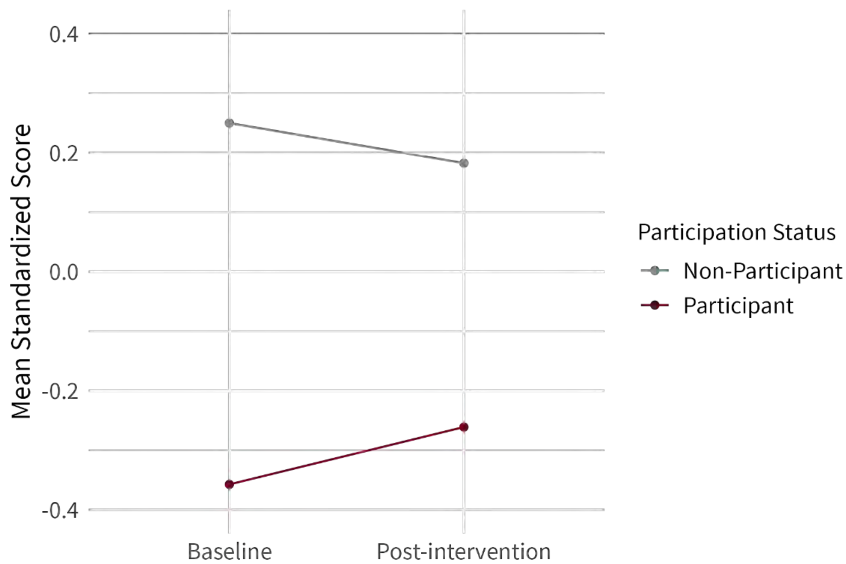

Figure 18: Average change in standardized scores by participation status (Gateway)

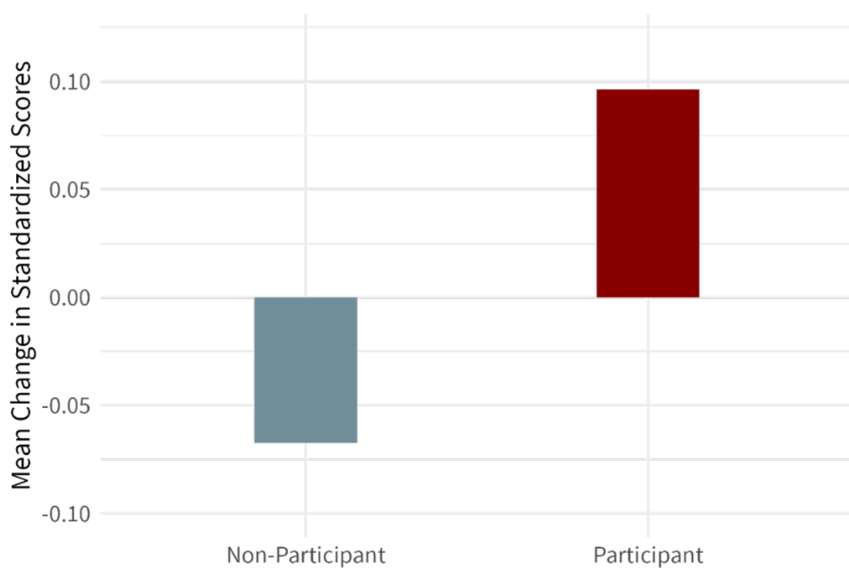

Figure 19: Average baseline and post-intervention standardized scores by tutoring dosage (Gateway)

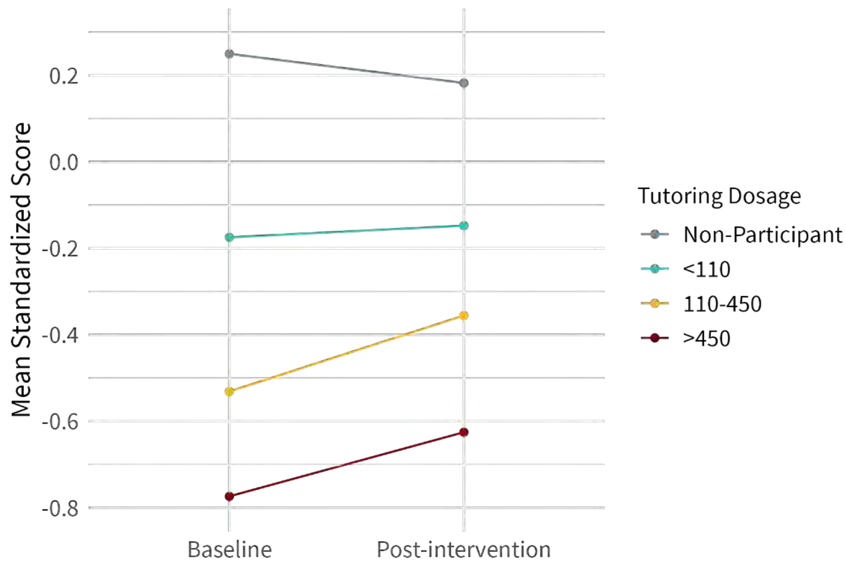

Figure 20: Average change in standardized scores by tutoring dosage (Gateway)

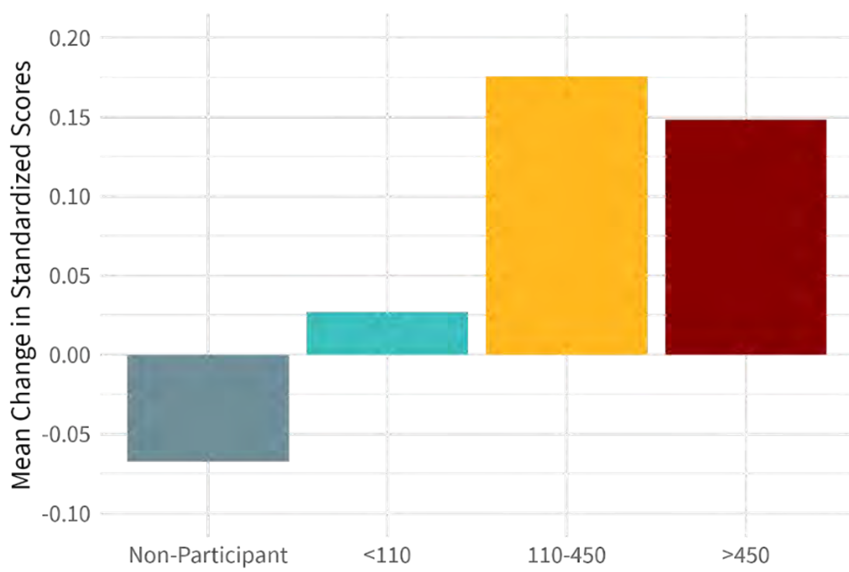

Table 4. Multivariate regression models predicting the difference in test scores from baseline to post-intervention

	Model 1		Model 2	
	Estimate	Std. Error	Estimate	Std. Error
Binary Classification				
Participation status	**.16***	.07		
Tutoring Dosage[1]				
<110			.09	.09
110-450			**.25***	.10
>450			.21	.26
Adj. R^2	.01		.01	
N	367			

* $p < .05$.

Note. Both models are adjusted for gender, race, low-income status, and grade level.
[1] Non-participants are the reference category