2022

AmeriCorps Math Mentors Program: 2021-2022 Pilot Year Report

Prepared by the Utah Education Policy Center in collaboration with STEM Action Center Staff

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THE UNIVERSITY OF UTAH
UTAH EDUCATION POLICY CENTER

Bridging Research, Policy, and Practice

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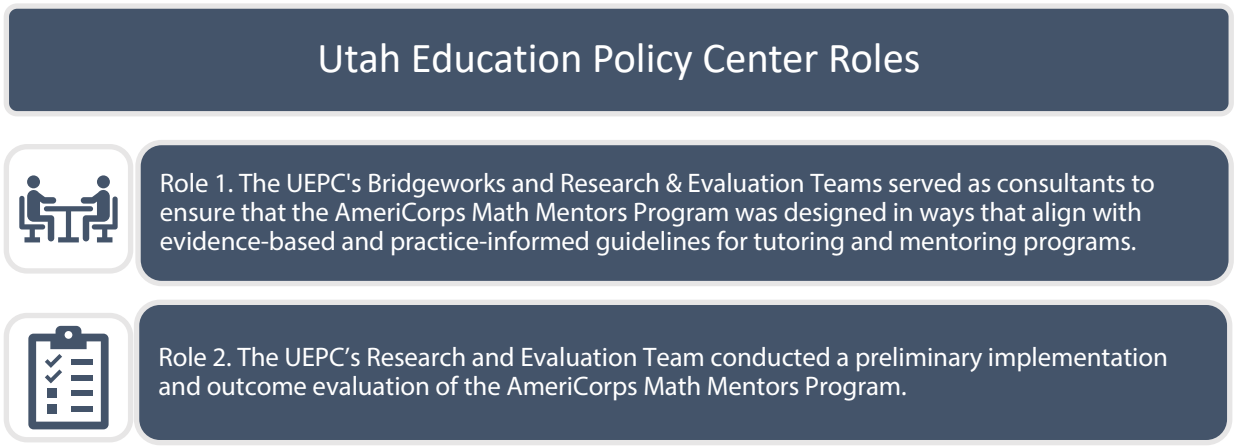
Introduction

Overview

Starting in Summer 2021 and continuing through the 2021-2022 academic year, the STEM Action Center sought to develop and begin to implement the AmeriCorps Math Mentors Program. The program builds upon the STEM Action Center's successful K-12 Math Personalized Learning Software Program by pairing a mentoring intervention with a math software intervention. Over a four-year period from 2021-2022 (Pilot Year) to 2024-2025 (Year 3), key aims of the program include increasing the number and effectiveness of mentors in classrooms, increasing the number of students receiving mentoring, increasing students' interest in, engagement with, and confidence in mathematics, and increasing students' mathematics proficiency to address disparities in mathematics achievement in Utah (https://stem.utah.gov/ammp/).

During the 2021-2022 pilot year, the Utah Education Policy Center (UEPC) worked closely with the STEM Action Center in dual roles as summarized below.

Figure 1. Utah Education Policy Center Roles



Pilot year activities focused heavily on program design and ensuring that processes and tools were in place for a robust Year 1 (2022-2023) implementation and outcome evaluation. STEM Action Center personnel encountered significant challenges in recruiting and onboarding AmeriCorps members and in securing data share agreements with schools that would allow for the administration of student surveys and the collection of student achievement data. In addition, there was limited participation in surveys and interviews. As a result, implementation and outcome evaluations rely primarily on program artifacts, on interviews conducted with two mentors, and on an end-of-year survey completed by three mentors who did not participate in interviews. Recommendations for overcoming obstacles that impacted evaluation efforts are included in Section 4 of this report.

Report Organization and Audience

The report is divided into four sections. In the first section, we offer background for the current report by providing a brief review of the research and evaluation literatures that have sought to link changes in student achievement outcomes to tutoring and mentoring interventions and to math personalized software use. We review the literatures on both tutoring and mentoring given that the AmeriCorps Math Mentors Program has elements of both. Second, we summarize program design activities,

beginning with the evidence-based and research-informed design principles that guided UEPC's consultative efforts. Third, we provide a summary of implementation and outcome evaluation findings for 2021-2022 pilot year activities. Finally, 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 proposed outcomes.

The primary audience for this report includes the STEM Action Center team implementing the AmeriCorps Math Mentors Program. The report is intended to provide useful information for documenting the efforts to design and launch the program to date and to identify key action steps to ensure strong implementation and outcomes for Year 1 to Year 3. Additionally, this report may provide useful information for STEM Action Center partners, such as schools and school districts, who are collaborating to implement the AmeriCorps Math Mentors Program.

1 | Background

The Promise of Tutoring and Mentoring Interventions

There is growing evidence that tutoring programs – defined as one-on-one or small-group instructional interventions – can have large, positive effects on student learning outcomes (see Robinson, Kraft, Loeb, & Schueler, 2021, for a review). 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 effects on student learning outcomes as measured by standardized test scores (Nickow et al., 2020). By one estimate, the effects of tutoring programs translate, on average, to between three and fifteen additional months of learning for students (Robinson et al., 2021).

Tutoring programs appear to be especially effective when tutors receive adequate training and support, when the number of students paired with each tutor is small, when instruction is aligned with classroom learning, and when program implementation is informed by ongoing formative and summative assessments (Nickow et al., 2020; Pellegrini, Neitzel, Lake, & Slavin, 2021; Robinson et al., 2021). Outcomes also appear stronger when tutors are consistently paired with the same students so that strong mentor-like relationships can be built (Robinson et al., 2021). Although the mechanisms by which tutoring interventions contribute to learning are still being investigated, tutoring programs are frequently credited for providing students with opportunities to receive additional, focused, and customized instruction and for introducing alternative pedagogies (Nickow et al., 2020).

> "Tutoring interventions rank among the most widespread, versatile, and potentially transformative instruments in today's educational toolkit."
>
> National Bureau of Economic Research (Nickow et al., 2020)

Among the tutoring programs that have shown positive outcomes for students are several supported by AmeriCorps, including Minnesota Math Corps, which provides math tutoring to struggling students in grades four through eight. End-of-year STAR Math tests showed that participants in Minnesota Math Corps scored 11.2 points higher on average compared to a control group. A higher percentage of participants also passed end-of-year benchmarks (AmeriCorps, 2019; see also Parker, Nelson, Zaslofsky, Kanive, Foegen, Kaiser, & Heisted, 2019). The Minnesota Reading Corps K-3 program, also supported by AmeriCorps, showed significantly higher literacy scores for kindergarten through 3rd grade participants compared to their peers. A randomized control trial study, completed by NORC, showed these positive impacts across at-risk student groups, including dual language learners and students who qualified for free and reduced lunch (NORC.Org, 2014).

In recent years, mentoring has also become a popular approach for increasing student engagement, persistence, and achievement in Science, Technology, Engineering, and Math (STEM) fields. Despite a proliferation of such programs, rigorous research and evaluation on math-focused mentoring programs for K-12 students is quite sparse. More experimental or quasi-experimental work is needed to compare the outcomes of youth who are involved in math-focused mentoring with those who are not and to identify which elements of math-focused mentoring programs are most important for realizing intended outcomes (Garringer, Kupersmidt, Rhodes, Stelter, & Tai, 2015; Kupersmidt, Stelter, Garringer, & Bourgoin, 2018; Robinson et al., 2021).

The Promise of Math Personalized Learning Software Use

There is growing evidence that personalized learning software can also contribute to positive achievement outcomes, including positive impacts on learning and attitudes in mathematics for K-12 students (Cheung & Slavin, 2013; Li & Ma, 2010; Ma, Adesope, Nesbit, & Liu, 2014; but see Dynarski et al., 2007). For example, personalized learning software use has been associated with heightened student engagement in the learning process, improved teacher-student interactions, enhanced higher-order problem solving techniques, and increased student math achievement (Cheung & Slavin, 2013; Hillmayr, Ziernwald, Reinhold, Hofer, & Reiss, 2020; Owens, Rorrer, Ni, Onuma, Pecsok, & Moore, 2020; Young, Gorumek, & Hamilton, 2018).

> "Learning with technology doesn't happen because a specific tool 'revolutionizes' education; it happens when proven teaching strategies intersect with proven technology tools."
>
> Kolb (2017). *Learning First, Technology Second.*

Importantly, education technology use does not inevitably or independently contribute to student learning. More rigorous research and evaluation work is needed to understand the conditions under which personalized learning software has its greatest impact. Current research suggests that associations between educational technology interventions and student achievement outcomes appear to be moderated by a variety of factors including the type of educational technology used (Ran, Kasli, & Secada, 2021), the duration and intensity of use (Campuzano, Dynarski, Agodini, & Rall, 2009; Cheung & Slavin, 2013), and the quality of educator training that is provided (Hillmayr, 2020).

Math personalized learning software appears to be especially effective when student software usage levels are high (Su, Rorrer, Owens, Pecsok, Moore, & Ni, 2020), when educators have strong technological and pedagogical content knowledge (Koehler & Mishra, 2009), and when educators are provided with sufficient training and support to utilize educational technology with fidelity and to align technology use with other types of instruction (e.g., Sarker, Wu, Cao, Alam, & Li, 2019). Because tutoring and mentoring programs often employ volunteers or paraprofessionals, training may be especially important for these individuals compared to experienced teachers.

2 | Program Design

In its consultative role, the UEPC's Bridgeworks and Research & Evaluation teams worked together to ensure that the AmeriCorps Math Mentors Program was designed in ways that align with evidence-based and practice-informed guidelines for tutoring and mentoring programs. Although the research base on design principles for math-focused mentoring programs is still developing, growing literatures on K-12 mentoring programs (Garringer et al., 2015), STEM mentoring programs (Kupersmidt et al., 2018), and K-12 tutoring programs (Pelligrini et al., 2021; Robinson et al., 2021) yield a variety of evidence-based and practice-informed principles that are relevant for developing, implementing, and improving math-focused mentoring programs. Together, these literatures indicate that the effectiveness of tutoring and mentoring programs depends on factors including strategies used for 1) mentor recruitment, training, and support, 2) instruction, and 3) data use.

A short list of design principles that informed the UEPC's program design work in each of these three areas is provided in Table 1. The list draws heavily on resources provided by the National Student Support Accelerator (https://studentsupportaccelerator.com/tutoring) and MENTOR: The National Mentoring Partnership (https://www.mentoring.org/).

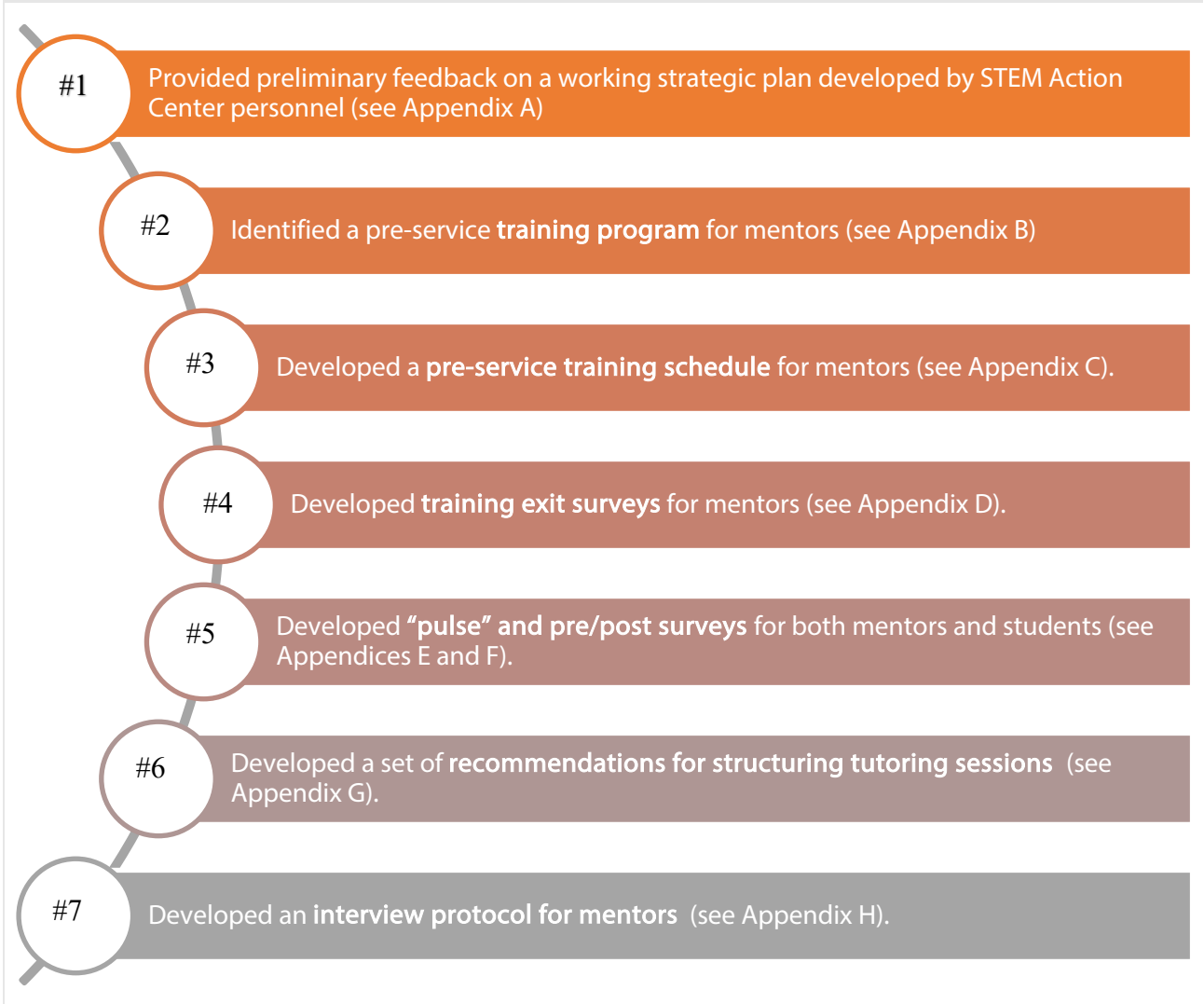
Table 1. Design Principles for Effective Tutoring and Mentoring Programs

	Recruitment, Training, and Support	• Volunteers and paraprofessionals can be effective tutors. • Tutoring programs that rely on volunteers and paraprofessionals are most effective when tutors receive intensive, high-quality pre-service training and ongoing oversight and coaching. • Training and support are most effective when they are broad-based, focusing on a range of issues including instructional strategies, relationship-building, and cultural competency.
	Instruction	• Tutoring is more effective when delivered in high doses, with students receiving tutoring at least three times per week at 30 to 60 minutes per session. • Although experienced educators can provide effective individualized instruction to three or four students at a time, volunteers and paraprofessionals may have better outcomes when working with only one or two students at a time. • Tutoring and mentoring programs are more effective when students are paired with a consistent tutor or mentor. Consistency facilitates positive relationships and a stronger understanding of students' learning needs. • Tutoring programs are more effective when instruction is focused on acceleration rather than remediation. • Tutoring programs are more effective when instructional materials are of high-quality and are aligned with classroom content so that tutors can reinforce and support teachers' classroom instruction. • Tutoring programs are more effective when schools commit the time and resources necessary to implement a high-quality tutoring program. Successful implementation requires oversight, accountability, and a strong connection between tutoring program personnel and school personnel.

3	Data Use	• Tutoring and mentoring programs are more effective when implementation and outcome evaluation data are collected and used for continuous improvement. • Tutoring programs are more effective when tutors utilize formative assessments to personalize instruction based on the needs of individual students. Tutors need time to review formative assessment data and training on how to use these data.

Guided by the design principles outlined in Table 1, UEPC staff engaged in myriad program design activities, including the seven activities summarized below. Developing evaluation tools (e.g., surveys and interview protocols) was an important component of program design. Figure 2 summarizes Pilot Year (2021-2022) program design activities.

Figure 2. Pilot Year (2021-2022) Program Design Activities



#1. The **strategic plan**, which includes a logic model overview, will continue to be updated to align with a still-growing research literature, developing evaluation tools, and knowledge about the local contexts in which the AmeriCorps Math Mentors Program is being implemented (see Appendix A)

#2. In addition to training provided by STEM Action Center staff, mentors will be asked to complete the SAGA Coach pre-service **training program**. This is "a free self-paced online training portal" designed "to deliver the essential components of effective tutoring" to pre-service tutors. The online program consists of 18 modules focused on "relationships, ratio, and rigor." Summaries of content for each module can be found in Appendix B.

#3. UEPC staff developed a **pre-service training schedule** to ensure that pre-service training is completed before tutors meet with students (see Appendix C).

#4. UEPC staff developed **training "exit surveys"** for mentors to assess mentors' perceptions of the training provided by STEM Action Center staff and via the Saga Coach online platform (see Appendix D). The suite of exit surveys will be expanded over time to include new program initiatives (e.g., training to be provided by math personalized learning software vendors).

#5. UEPC staff developed **"pulse" and pre/post surveys** for both mentors and students**.** All surveys were modeled after surveys developed by the National Student Support Accelerator[1]. Mentor surveys assess mentor perceptions of the effectiveness of tutoring/mentoring sessions and changes in mentoring self-efficacy and relational self-efficacy (See Appendix E). Student surveys assess student perceptions of the effectiveness of tutoring/mentoring sessions and changes in students' mathematics attitudes, including interest in STEM, mathematics self-efficacy or confidence, sense of belongingness, mathematics identity, and growth mindset (see Appendix F). Training sessions for mentors will need to familiarize mentors with these surveys and instructions on when and how to administer the surveys.

#6. UEPC staff developed a set of **recommendations for structuring tutoring sessions** based on materials developed by the National Student Support Accelerator and the Annenberg Institute at Brown University[2] (see Appendix G). Training on how to facilitate high-quality one-on-one and small-group mentoring sessions is important, especially for inexperienced tutors.

#7. UEPC staff developed an **interview protocol for mentors** to provide formative feedback on training and support activities (see Appendix H).

[1] https://studentsupportaccelerator.com/research/tutoring-surveys

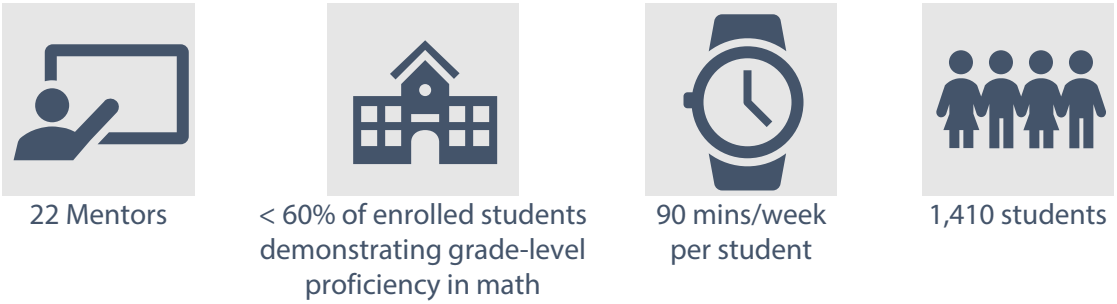
[2] https://www.annenberginstitute.org/recovery/edresearch1

3 | Implementation and Outcome Evaluation

Program Overview

During the 2021-2022 pilot year, STEM Action Center personnel developed and refined a logic model and strategic plan for the AmeriCorps Math Mentors Program. As designed, the program seeks to recruit 22 AmeriCorps members annually who will, as a group, provide 90 minutes of in-school math mentoring per week to 1,410 students in Grades 4 – 8. The program seeks to provide math mentoring to students at schools or districts in Utah in which fewer than 60% of students are grade-level proficient in math. The program is being supported by a growing team of STEM Action Center personnel with expertise in math education, personalized software, and grants and fiscal management.

Figure 3. Proposed AmeriCorps Math Mentor Program Participants



Despite significant challenges that STEM Action Center personnel encountered in recruiting and onboarding AmeriCorps members, progress was made in reaching these targets during the 2021-2022 pilot year. Specifically, 10 AmeriCorps members were recruited to provide mentoring in two districts: Ogden School District (n = 2) and San Juan School District (n = 8). Two additional AmeriCorps members were recruited to provided support for summer camp activities and math mentoring during Summer 2022. Estimates provided by STEM Action Center personnel indicated that the program provided approximately 60 to 90 minutes of mentoring per week (divided across two to three sessions per week) to 304 students in Grades 4 to 8 in the Ogden City District and San Juan District during the pilot year.

As outlined in the logic model and strategic plan developed by STEM Action Center personnel, the expectation is that the AmeriCorps Math Mentors Program will increase the number of students in the state of Utah who are able to participate in math mentoring which will, in turn, lead to an increase in the percent of students reaching grade-level proficiency. As shown in Table 2, there is considerable room for improvement in math outcomes in both Ogden and San Juan where, across grade levels, the percent of students whose scores indicated that they were "proficient" or "highly proficient" on 2021 summative RISE assessments in math ranged from 15.8% to 53.6%. One proposed program outcome is that 64% of participating students will reach grade level proficiency by Year 3 (2024-2025).

Table 2. Percent of Students Proficient on 2021 RISE mathematics assessment

Assessment Type	Ogden School District	San Juan School District
RISE 3rd Grade Math	33.9%	44.3%
RISE 4th Grade Math	30.3%	53.6%
RISE 5th Grade Math	25.5%	39.5%
RISE 6th Grade Math	23.3%	37.4%
RISE 7th Grade Math	27.9%	43.4%
RISE 8th Grade Math	15.8%	47.5%

Implementation Evaluation

The UEPC's implementation evaluation of AmeriCorps Math Mentors Program pilot year activities was guided by the following question:

- To what degree was the AmeriCorps Math Mentors Program implemented in ways that align with evidence-based and practice-informed guidelines?

To inform its evaluation, UEPC staff reviewed program artifacts (e.g., strategic planning documents), conducted interviews with two mentors, and analyzed data from end-of-year surveys completed by three mentors who did not participate in interviews. Key findings are summarized here, organized by the three sets of guiding principles outlined in Table 1. Importantly, it is unclear whether the samples of mentors who participated in interviews or who completed the survey are representative of the population of mentors who participated in pilot year activities. As a result, findings should not be generalized and should be interpreted with caution.

1 Recruitment, Training, and Support

Mentor Recruitment. During 2021-2022 pilot year, 12 individuals were recruited to serve as mentors in the AmeriCorps Math Mentors Program. Mentors were recruited on a rolling basis, with the first of these mentors identified during Fall 2021 and the last identified in late Spring 2022. As outlined in the STEM Action Centers' strategic planning document, improving recruitment processes and outcomes will be a focus area in upcoming years, with the goal of recruiting 22 mentors per year beginning in 2022-2023 (Year 1). To improve recruitment outcomes, the STEM Action Center proposes to engage schools more fully in recruitment efforts with the expectation that 50% of mentors will be recruited directly by schools – rather than STEM Action Center personnel – in Year 1 (2022-2023) and 95% of mentors will be recruited directly by schools in Year 2 (2023-2024).

Mentor Onboarding. The first two mentors for the pilot year (2021-2022) completed the onboarding process in November/December 2021 and began training in January 2022. STEM Action Center personnel reported that the onboarding of mentors was challenging for a variety of reasons including a) difficulties in identifying potential mentors, b) difficulties in communicating with the human resources vendor selected to assist with onboarding mentors after they had been recruited, and c) difficulties in hiring additional STEM Action Center staff to support the program. As outlined in the STEM Action Center's strategic planning document, shortening the timeline for mentor onboarding will be a focus area in upcoming years, with the goal of reducing onboarding time to four weeks in Year 1 (2022-2023) and to three weeks in Year 2 (2023-2024). These efforts will now be supported by three STEM Action Center staff (an increase from two STEM Action Center staff in Fall 2021).

Interview and survey data suggest that many of the initial challenges with mentor onboarding have been resolved. Specifically, all of the survey respondents (none of whom was among the earliest pilot year recruits) "agreed" or "strongly agreed" that "the onboarding process was easy."

Mentor Training. During the 2021-2022 pilot year, all school-based mentors completed virtual, pre-service orientation sessions that introduced them to the AmeriCorps program (in general) and to the AmeriCorps Math Mentors Program (in particular) before beginning their work in schools. In addition, mentors were asked to complete the SAGA Coach online training program which consists

of 18 modules focused on building relationships with students and facilitating strong, data-informed tutoring sessions. STEM Action Center staff indicated that training has been delivered on a rolling basis as new mentors are recruited and that mentors have varied in their pace of progress through the SAGA Coach modules. As outlined in STEM Action Center's strategic planning document, improving training opportunities and engagement will be a focus area in upcoming years. For example, beginning in Year 1 (2022-2023), the STEM Action Center plans to host training sessions with math personalized software vendors to take place two to four weeks before the beginning of the academic year. In addition, STEM Action Center staff plan to implement monthly training sessions that will allow mentors to interact, collaborate, and learn from one another.

There is evidence that mentor training was generally successful. Specifically, all of the survey respondents "agreed" or "strongly agreed" that they "knew what was expected of me as a mentor" and "knew who to reach out to with questions." At the same time, both survey and interview responses indicated that planned efforts to improve training will benefit both mentors and students. For example, while two surveys respondents indicated that the training was "very effective," one respondent was "neutral" about the effectiveness of the training. In their evaluation of the training, one mentor noted that while it was nice to have the SAGA training spaced out over the course of many weeks so that mentors could "implement it slowly and improve along the way," this mentor also noted that they "could have done better in the beginning if I had known those things."

Mentor Support/Supervision. As outlined in the STEM Action Center's strategic planning document, increasing the level of support and supervision provided to mentors by STEM Action Center staff, site supervisors and/or classroom teachers, and Lead Mentors will be a focus in upcoming years. For example, beginning in Year 1 (2022-2023), the STEM Action Center plans to ensure that all mentors have a site supervisor by the beginning of the year. By Year 2 (2023-2024), the expectation is that 75% of mentors will be meeting weekly with their site supervisors and that STEM Action Center personnel will be visiting 75% of sites during the academic year. By Year 3 (2024-2025), the expectation is that 95% of mentors will be meeting weekly with their site supervisors and that STEM Action Center personnel will be visiting 95% of sites during the academic year. In addition, the STEM Action Center plans to host yearly site supervisor trainings and quarterly site supervisor meetings beginning in Year 1 (2022-2023), with 75% participation in trainings and 25% average attendance in meetings by Year 2 (2023-2024) and 95% participation in trainings and 50% average attendance in meetings by Year 3 (2024-2025). To reach these targets, it will be important for STEM Action Center personnel to identify site supervisors before or very early in the academic year and to clearly communicate these expectations with site supervisors and other school personnel.

Both interview and survey responses indicated that support and supervision was inconsistent and that planned efforts to increase mentor support and supervision would be welcomed. For example, one mentor indicated that they "never" communicated with classroom teachers about students' math performance and another mentor indicated that they did so only "some weeks." Mentors indicated that they appreciated when interactions with STEM Action Center staff (e.g., weekly meetings) and/or with school personnel (e.g., teacher check-ins) were a regular part of their experience. For example:

> "Recently, we've started doing weekly meetings with [STEM Action Center staff]. And, I've really like that because it [gives us a chance to] brainstorm together how we can all improve our little system in our little schools."

> "[One of the aspects of the mentoring program that worked best] was going up to my supervisor every day and asking her what she wanted me to do today, and receiving updates about the kids."

Mentors indicated that they would benefit specifically from more support on math content and more collaboration between STEM Action Center staff and school personnel. For example:

> "The program is kind of going under the assumption that, yes, you want to have basic math skills, but, other than that, it's mainly just pushing students along. But, I think I did need to know a lot of the junior high math. [I would have benefitted from] collaborating with teachers ... and seeing a paper with what the answers are."

> "I am still not always sure what to be doing that will help the students best. The teachers, myself, and the program directors don't seem to be 100% on the same page, even though we feel we are when conversing. More clarity, training, and direct help might make everything more cohesive."

2 Instruction

Dosage. As outlined in the STEM Action Center's draft logic model, the AmeriCorps Math Mentors program aims to provide 90 minutes of in-school math mentoring per week to 1,410 students performing below grade level in Grades 4 – 8. If each mentor is able to provide 25 hours of mentoring for each of 32 instructional weeks (i.e., 900 hours ÷ 32 instructional weeks, less three hours per week for training, support, and other non-mentoring activities), each mentor would have to work with 4 students per session as outlined here:

# of students who need mentoring	1,410
# of hours of mentoring per student per week	x 1.5 hours = 2,115 hours/week
# of hours of mentoring per mentor per week	÷ 25 hours = 85 mentors at 1:1 ratio
# of students per mentor during a session	÷ 4 students = 22 mentors at 4:1 ratio

Modifications would need to be made to the program to reduce the student:mentor ratio. Although the ideal student:mentor ratio is still not well-understood (see recent meta-analyses by Nickow et al., 2020, Robinson et al., 2021, and Pellegrini et al., 2021), the National Student Support Accelerator recommends lower student:mentor ratios for less experienced tutors (National Student Support Accelerator, 2021). Given a fixed number of mentors and hours per mentor, the program could reduce the student:mentor ratio to 3:1 by reducing the number students served to 1,100. More mentors serving fewer students would also be required if students were to receive the two to three hours of mentoring per week often recommended by the National Student Support Accelerator.[3] For example, 40 mentors would be needed to mentor 1,000 students for three hours per week if mentors could mentor 25 hours per week.

STEM Action Center personnel have outlined a plan to address the potential gap between available and "ideal" mentoring hours in their strategic planning document. Specifically, the expectation is that STEM Action Center personnel and mentors will work together to recruit an additional 50 volunteers from the community by Year 2 (2022-2023) to support the program. If successful, these efforts will allow the program to increase the number of hours of mentoring for each student and to decrease the student:mentor ratio to more closely match recommendations for high-dosage tutoring programs with

[3] https://ies.ed.gov/ncee/edlabs/regions/west/relwestFiles/pdf/4-2-50_Tutoring_Webinar_2_Participant_Slides_508c.pdf

inexperienced tutors. Potential challenges with this approach – including recruiting, training, and supporting volunteers – are addressed in the recommendations section.

Strategies for Instructing and Connecting with Students. As evidenced in the summary of SAGA Coach training materials provided in Appendix B, the AmeriCorps Math Mentors program, as designed, highlights the importance of building strong relationships, setting high expectations, and ensuring that mentoring sessions are carefully structured and aligned with classroom content. The UEPC will work closely with STEM Action Center personnel in Year 1 (2022-2023) to incorporate these principles into strategic planning and logic model documents and to evaluate the degree to which these principles are reflected in program-specific training and practice.

The importance of student-to-mentor connections was clear in both interview and survey responses. When asked what aspects of the program were most important in making an impact on students, several mentors mentioned connecting with students. For example:

> "I think me showing up every day allowed me to make stronger connections to the kids and allowed me to get to know them more."
>
> "As school ended, I was able to spend more time with the students because they were done with their other courses."

Moving forward, it will be important for STEM Action Center personnel to clearly communicate – internally, to stakeholders, and to mentors – the degree to which the AmeriCorps Math Mentors Program is a program that is primarily focused on tutoring (with an emphasis on building strong relationships over time to support student learning needs) or primarily focused on mentoring. As currently designed, the emphasis appears to be on tutoring.

3 Data Use

Collecting Implement and Outcome Evaluation Data. During the 2021-2022 pilot year, both STEM Action Center personnel and UEPC staff worked to develop a number of data collection tools to inform program improvement efforts and to evaluate whether key programs goals are being met. These tools include:

- Mentor tracking sheets to record student demographic information (e.g., grade level), student performance metrics (e.g., beginning-of-year math software scores), and dosage/activity information including, for each mentoring session, the date, duration, group size (e.g., individual or group), and activity type (e.g., mentoring focused on digital math software).
- Training exit surveys to assess mentors' perceptions of the training provided by STEM Action Center staff and via the Saga Coach online platform (see Appendix D).
- "Pulse" and pre/post surveys for mentors to assess mentor perceptions of the effectiveness of mentoring sessions and changes in mentoring self-efficacy and relational self-efficacy (See Appendix E).
- "Pulse" and pre/post surveys for students to assess student perceptions of the effectiveness of mentoring sessions and changes in students' mathematics attitudes, including interest in STEM, mathematics self-efficacy or confidence, sense of belongingness, mathematics identity, and growth mindset (see Appendix F)

- an interview protocol for mentors to provide formative feedback on training and support activities (see Appendix H).

During the 2021-2022 pilot year, collecting program data proved challenging. STEM Action Center personnel were not able to secure data share agreements with schools to allow for administration of student surveys. In addition, mentors were reticent to participate in surveys and interviews. As outlined in the STEM Action Center's Strategic Planning document, securing data share agreements and increasing mentor participation in surveys is an important goal in upcoming years. The goal is to increase both student and mentor survey completion rates each year, with 60% completion rates in Year 1 (2022-2023), 75% completion rates in Year 2 (2023-2024), and 95% completion rates in Year 3 (2024-2025). The UEPC is committed to supporting these efforts by providing formative assessment data in a timely manner and to participating in weekly check-in meetings to offer guidance on how (and why) to use data for continuous improvement. The UEPC is also committed to developed additional assessment tools including, for example, surveys or interview protocols for school personnel to examine the perceived impact of the AmeriCorps Math Mentors Program on student outcomes from the perspective of classroom teachers or school administrators. The perspectives of school personnel will be especially important in examining the perceived impact of this intervention compared to other interventions.

Mentor Use of Formative Assessment Data. Mentor interview and survey responses suggest that providing additional training to mentors about how (and why) to use survey data and assessment data (from teachers and/or personalized math software) will be important. For example, one mentor indicated that they "never" reviewed student assessment data provided by personalized math software and another mentor indicated that they did so only "some weeks."

Outcome Evaluation

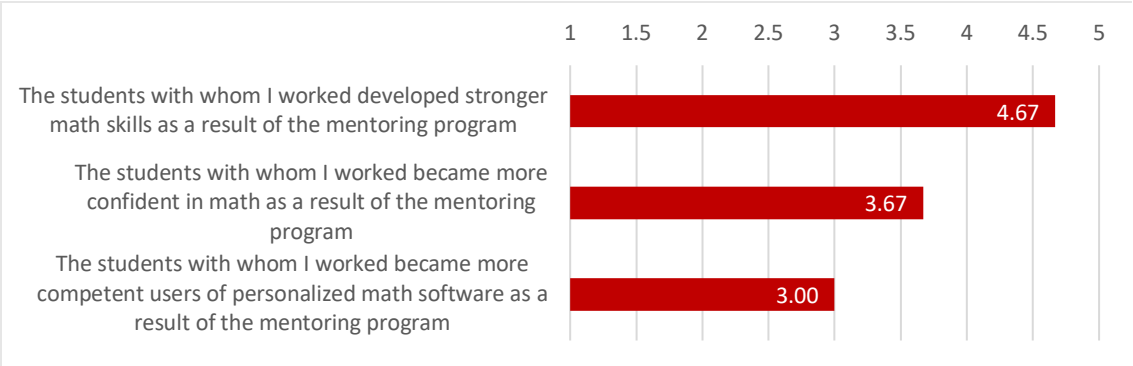
The UEPC's outcome evaluation of AmeriCorps Math Mentors Program pilot year activities was guided by the following question:

- What was the impact of the AmeriCorps Math Mentors Program on student attitudes about and performance in mathematics?

To inform its evaluation, UEPC staff reviewed interview responses provided by two mentors, analyzed end-of-year survey responses provided by three mentors who did not participate in interviews, and reviewed "success stories" that one mentor provided to STEM Action Center personnel. The STEM Action Center was unable to secure data share agreements that would have allowed for the administration of surveys to students or the collection of vendor data (e.g., # of minutes of weekly use of personalized math software) or student achievement data (e.g., Acadience test scores). It is unclear whether the samples of mentors who participated in interviews, who completed the survey, or who provided "success stories" are representative of the population of mentors who participated in pilot year activities. As a result, findings should not be generalized and should be interpreted with caution.

To assess mentors' perceptions of the effectiveness of the AmeriCorps Math Mentors Program in building students' competence and confidence in math, survey respondents were asked to indicate the degree to which they agreed with three statements on scales ranging from 1 (strongly disagree) to 5 (strongly agree).

Figure 4. Mentors' Perceptions of Student Outcomes (n = 3)



As shown in Figure 4, mentors were most likely to agree that the students with whom they worked developed stronger math skills as a result of the program; indeed, all three mentors "agreed" or "strongly agreed" with this statement. Mentors were somewhat less confident that the students with whom they worked became more confident in math or more competent users of personalized math software as a result of the program.

One interpretation of the lower ratings for student competence in using personalized math software is that this software was used inconsistently across days and classrooms, as evidenced by mentor responses to both interview and survey questions. For example,

> "Sometimes we would only spend one hour with kids on [software because students had] other courses to attend to throughout the day. We would also be present for math courses, but [software] wouldn't be utilized."

> "Some teachers liked to use [the software] as little as possible …. [Because] my role is meant to be [software] focused, it can limit my role. I think that it is good to not have [the software] running the show."

Importantly, written "success stories" collected directly from mentors by STEM Action Center staff also speak to the potential for high-dosage math mentoring to significantly impact student outcomes. For example:

> "I first recognized [student name] needed … attention during class as the teacher was teaching math concepts … He would tell me he didn't understand, so then I would proceed to begin teaching him how to do long division (with big numbers). He would follow the steps, but he would never be able to do it on his own. He needed more practice. Then after a couple days when they were done learning division, I called him into my groups for [math software name]. I also noticed he had barely attempted 1 lesson and passed zero lessons on [math software]. So, I called him in to get caught up. One of his lessons was long division. I noticed he was still having trouble dividing, so I was able to teach him how to properly divide including all the steps. Once he kept practicing, he got really excited and happy that he was finally able to understand the concepts. He thanked me and explained that out of all the times they worked on this in class he never really got it, but now he did. Then he continued on with his lesson and he felt good about himself. This made me so happy."

> "Throughout this month, I've given most of my attention to [two students] …. [Their] goal was to pass 15 lessons and they were able to achieve it within a month. They knew they had to keep working with me until they passed. They felt excited and relieved when they finally finished …. I

thought that this achievement was super exciting for them. I felt like they learned a lot and they also were able to show me that they were learning ….. adding and subtracting fractions. This was a topic most of the students struggled with, so I would be able to teach them and give them practice the longer I worked with them. [They] were among the students who had got comfortable with this topic and passed it as their last lessons. I felt really proud and I'm sure they did too, because they began working on the problem themselves and I would just watch them solve it. Fractions was a topic that took a few days because there were multiple topics in fractions like adding, subtracting, estimating, and mixed numbers. So it was challenging for them, but I felt like I was able to provide them that service and practice by coming in each day this month and even staying after my normal hours because I was available. I also felt motivated to because I felt like they needed the extra support."

4 | Recommendations

Drawing upon knowledge gained in both its consultative and evaluation roles, 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-impact tutoring and mentoring programs both in general and in STEM fields (see Table 1). Recommendations should be evaluated by STEM Action Center personnel in light of historical and local constraints, including constraints associated with recruiting and retaining mentors and establishing strong connections with participating schools.

1. *Brainstorm, monitor, and evaluate strategies for mentor recruitment.* Mentor recruitment was a significant challenge during the 2021-2022 pilot year. STEM Action Center personnel have created a strategic plan that identifies a new strategy for recruiting mentors by engaging schools in the recruitment process and expanding recruitment efforts to schools throughout the state of Utah. Specifically, the STEM Action Center proposes that 50% of mentors will be recruited directly by schools in Year 1 (2022-2023) and 95% of mentors will be recruited directly by schools in Year 2 (2023-2024). There are several potential benefits of engaging schools in recruitment efforts including that mentors recruited from the local community may have community-specific competencies (e.g., bilingualism or familiarity with the challenges that students and families in the community face; National Student Support Accelerator, 2021). Moreover, schools may be more invested in supporting and supervising mentoring activities if they were involved in recruiting efforts. However, it is possible that school administrators may have difficulty identifying personnel with the time or inclination to recruit mentors with the appropriate skills, including some level of math subject-level expertise.[4] It is also likely that providing training and support to mentors placed in multiple schools in multiple districts and evaluating the impact of mentor activities in all of these schools and districts will prove formidable. Early Summer 2022 will be a critical time period for STEM Action Center personnel to begin to gauge the likelihood that schools will be successful in recruiting mentors, to gauge whether the STEM Action Center has the staff necessary to train and support mentoring activities at multiple sites, and to consider alternative recruitment strategies. To aid in recruitment efforts, the National Student Support Accelerator recommends ensuring that recruitment materials effectively target potential recruits and that application materials are accessible and easy to complete. STEM Action Center personnel might ask for input from current members as they work to create and revise these materials. The National Student Support Accelerator also recommends getting input from the local community on where and how to recruit mentors.

2. *Consider program modifications – including increasing the number of AmeriCorps members who can serve as mentors or decreasing the number of students served – that will ensure that all participating students have access to "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. Tutoring appears to be most effective when it is conducted one-on-one or in very small groups and when it occurs for at least three sessions per week at 30 to 60 minutes per session

[4] Research on design principles for high-dosage tutoring indicates that "Tutoring programs that employ [volunteers] often require tutors to pass a subject-related exam, as well as undergo trainings focused on instructional techniques, social-emotional learning, and cultural competency. While completely unpaid volunteers have not historically performed well as tutors, "paid volunteers" like paid employees of local businesses whose time is donated and college students on work-study programs show promise" (Robinson et al., 2021).

(Robinson et al., 2021). Smaller student:teacher ratios – of no more than three students for every one mentor – are often recommended, especially when tutors are not experienced classroom teachers or master tutors (National Student Support Accelerator, 2021).[5] Smaller ratios are also recommended when tutoring requires strong content knowledge and when program goals include building strong mentor-like relationships between tutors and students (Robinson et al., 2021). As currently designed, the AmeriCorps Math Mentors Program can provide mentoring to 1,410 students for 90 minutes per week with a student:mentor ratio of 4:1. Although recruiting volunteers to assist mentors may be helpful in reducing the student:mentor ratio or increasing the number of minutes of mentoring that can be provided to each student, it is likely that recruiting volunteers and providing adequate training and support for volunteers will prove challenging. Indeed, one mentor lamented the expectation that mentors should recruit volunteers noting that "It's really hard to get volunteers here …. We live somewhere where parents go to work every day and there's hardly anybody in the community to volunteer to come in." Particularly in the early years of program implementation, STEM Action Center staff might consider increasing the number of AmeriCorps members who can serve as mentors or decreasing the number of students served. Prior research shows that after a tutoring program is well-established and demonstrates success with smaller numbers of students, it can successfully be scaled up and still improve student learning outcomes (see Robinson et al., 2021).

3. *Prioritize training and support opportunities that will ensure that all mentors have the tools they need to engage in "high impact" tutoring*. Prior research indicates that AmeriCorps members and volunteers 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 impact" tutoring. These features include a) building sustained and strong relationships with students, b) ensuring that there is 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 AmeriCorps Math Mentors program personnel makes clear that both training and support are priorities. For example, by Year 2 (2023-2024), 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 these program elements, it will be important to develop a system for monitoring attendance and gathering feedback on training and support efforts. A draft pre-service training schedule – with links to Exit Surveys – is included in Appendix C. Although the SAGA Coach training modules are fully developed, STEM Action Center personnel have indicated that they will need to create or revise pre-service orientation materials and in-service training materials for implementation in Year 1 (2022-2023). If the goal is to replace SAGA Coach materials with customized training materials by Year 3 (2024-2025) as outlined in the strategic plan, these materials will also need to be developed. Before doing so, a careful review of relevant data collected from mentor surveys and/or interviews would be prudent to understand if and how the SAGA modules are or are not meeting program or mentor needs.

4. *Prioritize data collection and use*. During the 2021-2022 pilot year, UEPC staff worked to develop a variety of tools – including exit surveys, "pulse" surveys, and pre/post surveys – that are designed to collect information from mentors and students regarding their

[5] https://ies.ed.gov/ncee/edlabs/regions/west/relwestFiles/pdf/4-2-50_Tutoring_Webinar_2_Participant_Slides_508c.pdf

experiences with and perceptions of the impact of the AmeriCorps Math Mentors program. In addition, STEM Action Center personnel worked to develop processes for tracking administrative data (e.g., # of hours of mentoring per student) and software-generated usage and assessment data. 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 each of three sets of SAGA Coach modules). "Pulse" surveys are designed to be administered periodically (e.g., at least once per month) during the academic year. While findings from exit surveys, "pulse" surveys, and software-generated usage reports are helpful in making necessary adjustments to program elements and mentor activities in real time, pre/post surveys, administrative data, and software-generated assessment data can be useful in understanding implementation fidelity and quantifying end-of-year impact (see National Student Support Accelerator, 2021, for more information). Given other demands on mentors, it will be important to familiarize mentors with the data collection tools they will be using during pre-service training and 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 (which began in Spring 2022) may be an optimal time to provide this training and support. To aid these efforts, UEPC staff are committed to providing formative assessment data in a timely manner and to participating in weekly check-in meetings to offer guidance on how (and why) to use data for continuous improvement.

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Appendix A

STEM AC AmeriCorps Math Mentors Program (AAMP)
Working Strategic Plan

Areas of Focus:

- Students
- Mentors
- Schools
- Infrastructure

Inputs, Outputs, and Outcomes [LOGIC MODEL OVERVIEW]:

- Students
  - INPUTS:
    - Student tracking sheet
    - Evaluation surveys
  - OUTPUTS:
    - The number of student participants (1410 in logic model)
    - The change in the number of students reaching grade level proficiency
    - The average of student change in grade level proficiency
    - The average change in self-reported confidence of students in math (evaluation metrics)
    - The number of hours of student participation per year (70,000 in logic model)
  - OUTCOMES:
    - Self-reported increases in interests in and confidence with math
    - Increased math proficiency in students
- Mentors
  - INPUTS:
    - Members
    - Math Software
    - Evaluation Surveys
    - Training materials
  - OUTPUTS:
    - Number of mentor hours
    - Number of mentors recruited and trained (at least 22 per year)
    - Average change in self-reported confidence of mentors in mentoring
    - Survey response completion rate
  - OUTCOMES:
    - Increase in self-reported confidence of mentors in math, mentoring ability, and community engagement

- Schools
    - INPUTS:
        - Site supervisors
        - Administrators (schools, principals, and HR)
        - Math software
        - Educators
        - Foundation Board
        - Industry partners
        - Evaluation surveys
    - OUTPUTS:
        - Change in number of schools recruiting their own mentors
        - Number of partners and volunteers in schools
        - Survey response completion rate
        - Average self-reported change in site supervisor confidence about program
    - OUTCOMES:
        - Strong relationships between the STEM AC and teachers/administrators
- Infrastructure
    - INPUTS:
        - Hiring processes
        - Documentation
        - Strategic Plan
        - Logic Model
        - Program budget
        - Management systems (IPT, Google Classrooms, etc.)
    - OUTPUTS:
        - Changes in program funding levels
        - Increase number of mentors recruited and trained
    - OUTCOMES:
        - A low-maintenance, sustainable program

Activity Categories:

- Students
    - Evaluation
- Mentors
    - Recruitment & Onboarding
    - Training
    - Supervision
    - Evaluation
    - Collaboration
    - Service
- Schools
    - Onboarding
    - Supervision
    - Training
    - Volunteering
    - Evaluation
    - Recruitment
- Infrastructure
    - UServe
    - Budget

- Documentation
- Strategic Planning
- Management Systems

Activity Goals:

- Students
  - Evaluation
    - Achieve 60% survey completion rates (Y1)
    - Average self-reported increase in confidence of served students by 10% (Y1)
    - Achieve 75% survey completion rates (Y2)
    - Average self-reported increase in confidence of served students by 20% (Y2)
    - Achieve 90% survey completion rates (Y3)
    - Average self-reported increase in confidence of served students by 30% (Y3)
    - Measure 20% average grade-level proficiency increase in served students (Y1)
    - Measure 25% of served students reaching grade-level proficiency (Y1)
    - Measure 50% average grade-level proficiency increase in served students (Y2)
    - Measure 40% of served students reaching grade-level proficiency (Y2)
    - Measure 65% of served students reaching grade-level proficiency (Y3)
    - Measure 70% average grade-level proficiency increase in served students (Y3)
- Mentors
  - Recruitment & Onboarding
    - Recruited 75% mentor cohort for beginning Y2 (Y1)
    - Recruited 50% of mentors through third party for Y2 (Y2)
    - Recruited 95% mentor cohort for Y3 (Y2)
    - Recruited 95% of mentors through third parties for Y3 (Y3)
    - Onboarding Time down to 4 weeks for Y2 (Y1)
    - Onboarding time down to 3 weeks for Y3 (Y2)
  - Training
    - Complete transition from SAGA to customized training (Y3)
    - Average 65% survey rating for pre-service orientation (Y3)
    - Average 65% survey rating for ongoing training materials (Y3)
    - Host 6 training events for 6 vendors 2 weeks before school starts (Y1 & Y2)
    - Members consistently engaging in 30 minutes of weekly training (Y2)
    - Monthly training/collaboration with other mentors established (Y1)
      - Attendance rate of 80% (Y2)
      - Attendance rate of 95% (Y3)
    - Site visit trainings created (Y3)
    - Lead mentors assisting with monthly training (Y3)
  - Supervision
    - All mentors have non-principal site supervisor by beginning of year (Y1 & Y2)
    - Weekly meeting between mentors and site supervisors happening with 75% of cohort (Y2)
    - Weekly meeting between mentors and site supervisors happening with 95% of cohort (Y3)
    - Lead Mentor responsibilities established and assigned (Y2)
    - Weekly check-ins have 75% of mentor cohorting in regular attendance (Y2)
    - Weekly meetings occurring between mentors and lead mentors with 75% of mentor cohort in regular attendance (Y3)
    - Weekly meetings between STEM AC and lead mentors (Y3)
    - Staff members visiting 75% of sites 1x throughout the year (Y2)
    - Staff members visiting 95% of sites 1x throughout the year (Y3)

- Evaluation
  - Achieve 60% survey completion rates (Y1)
  - Achieve 75% survey completion rates (Y2)
  - Achieve 90% survey completion rates (Y3)
  - Average 10% increase in self-reported confidence of mentors (Y1)
  - Average 20% increase in self-reported confidence of mentors (Y2)
  - Average 30% increase in self-reported confidence of mentors (Y3)
- Collaboration
  - Monthly training/collaboration with other mentors established (Y1)
    - Attendance rate of 80% (Y2)
    - Attendance rate of 95% (Y3)
  - Incorporation of group discussions into weekly training (Y1)
    - Participation rate of 50% (Y2)
    - Participation rate of 75% (Y3)
- Service
  - All mentors participate in MLK & 9/11 Days of Service (Y2 & Y3)
  - All mentors plan their own MLK Day of Service Activity (Y3)
  - Days of service hours total 350 (Y2 & Y3)
  - Grant proposal modified (Y1)

- Schools
  - Onboarding
    - All mentors have non-principal site supervisor by beginning of year (Y1 & Y2)
    - All participating schools have math licenses and training 1 month before school starts (Y1 & Y2)
    - Memorandum of Understanding (MOUs) signed 1 month before start of school year for 75% of participating schools (Y1)
    - Memorandum of Understanding (MOUs) signed 1 month before start of school year for 95% of participating schools (Y2)
    - Establish 1 active point of contact in every corresponding school district (Y3)
    - Ensure HR signs off on program 1 month before school year starts (Y1 & Y2)
  - Supervision
    - Staff members visiting 75% of sites 1x throughout the year (Y2)
    - Staff members visiting 95% of sites 1x throughout the year (Y3)
    - Establish quarterly site supervisor meetings (Y1)
    - Quarterly site supervisor meeting 25% average attendance (Y2)
    - Quarterly site supervisor meeting 50% average attendance (Y3)
    - Weekly meeting between mentors and site supervisors happening with 75% of cohort (Y2)
    - Weekly meeting between mentors and site supervisors happening with 95% of cohort (Y3)
  - Training
    - Establish site supervisor beginning year training (Y1)
    - Beginning year training 75% participation rate (Y2)
    - Beginning year training 95% participation rate (Y3)
    - Invite all site supervisors to math vendor trainings (Y1 & Y2)
    - Math vendor training 50% site supervisor attendance rate (Y1)
    - Math vendor training 75% site supervisor attendance rate (Y2)
  - Volunteering
    - Semi-regular volunteer activities at 50% of participating schools (Y3)
  - Evaluation
    - Achieve 75% survey completion rates for site supervisors (Y2)

        - Achieve 95% survey completion rates for site supervisors (Y3)
        - Average increase in confidence of 10 % (Y1)
        - Average increase in confidence of 20% (Y2)
        - Average increase in confidence of 30% (Y3)
    - Recruitment
        - Accrue a pool of 40 schools actively interested in participating in the program (Y3)
        - Establish working relationships with all corresponding school districts (Y3)
        - Recruit 1 community partner organization for each school (overlap is allowed) (Y3)
        - Recruit 50 volunteers per active school per year (Y2 & Y3)
- Infrastructure
    - UServe
        - UServe pre-contract documents made available by June 1 (Y1 & Y2)
        - Establish biweekly meeting with program staff at UServe (Y2)
    - Budget
        - Pre-designate cost breakdowns and distribution on itemized budget (Y2)
        - Return Foundations floated money for Y1 + have enough MSY to cover incomes Y2 (Y2)
        - Create set request from math funds for itemized program costs (Y3)
        - Cost sources include:
            - Background checks
            - Ogden District contract
            - Payroll for mentors
            - Teacher stipends
            - Potential incentive programs
            - AmeriCorps and STEM AC swag
            - Travel (hotel and reimbursements)
            - Math licenses
    - Documentation
        - Create staff process document/document master sheet/program manual (Y3)
        - Compile custom training materials for site supervisors and mentors (Y3)
        - Create mentor onboarding process document (for mentors and for staff) (Y1)
        - Complete recruitment/onboarding tracking sheet for schools and mentors (Y1)
        - Complete functional program Gantt chart (Y1)
        - Update Gantt chart quarterly
        - Create comprehensive logic model (Y1)
        - Create and maintain detailed budget document/tracking sheet for mentors (Y1)
    - Strategic Planning
        - Create working program strategic plan (Y1)
        - Meet to discuss strategic plan quarterly
    - Management Systems
        - Put member management software in place (Google Classroom?)(Y1)
        - Condense onboarding to one application on government website with two background checks (Y2)
        - Google suite files organized and navigable (Y2)
        - Create email templates and automated process for mentor onboarding, tracking, and updates (Y3)

Appendix B

INTRODUCTION

Saga Coach is a free, self-paced online training portal to deliver the essential components of effective tutoring for all pre-service tutors. Saga Coach is grade and subject agnostic, and can help organizations to scale their tutoring programs. This training is based on Saga's experience as a proven implementer of high-dosage, high-impact tutoring programs serving thousands of students in major U.S. school districts like New York City, Washington D.C., Chicago and more.

Saga Coach's interactive training draws on Saga's experience providing more than 2 million hours of tutoring. The online program offers 18 modules of self-paced training on key areas that make tutors successful, including building relationships with students and structuring an effective tutorial. Saga's modules focus on three core topics essential for effective tutoring: relationship, ratio, and rigor.

Saga Coach is freely available, and can be accessed here.

RELATIONSHIPS

The Relationships unit dives into tutors' own educational journey and how it informs their practice. The modules in this unit include:

What Does it Mean to be a Tutor?
5 VIDEOS, 3 REFLECTIONS, 1 QUIZ
10 minutes
What does it mean to be a tutor? Tutors will hear from Saga staff and students on what it means to be a tutor. They'll also examine what motivates them to be a tutor and what they hope to accomplish in the role. Key to this module is the introduction of the 5 guiding principles of high quality tutors: high expectations, share the spotlight, take accountability, act with urgency, and never give up.

Your Education Experience
3 VIDEOS, 4 REFLECTIONS, 1 QUIZ, 2 ARTICLES
10 minutes
Understanding one's own educational experience is central to being an effective tutor. One's lived experience influences how they show up in the world and for their students. Insight into these influences will make it possible for tutors to create a culture of inclusion and equity in their tutorials. This includes the ability to honor the ways in which they are both different from, and similar to, their students.
This module reviews the 5 Core Practices of effective educators. The heart of these practices is learning how to show up with love and support for students as they strive to meet tutors' high expectations.

Implicit Bias
4 VIDEOS, 1 REFLECTION, 1 QUIZ, 2 ARTICLE
10 minutes
What is implicit bias? Why is understanding one's own biases important to tutoring? What can we do to become more aware of them? Here we dive into these topics and provide a wealth of additional resources to help tutors on their own journey. Recognizing implicit biases and actively working to address them helps to ensure that they see the enormous capacity in all of their students.

Growth Mindset
5 VIDEOS, 6 REFLECTIONS, 6 QUIZZES
20 minutes
This module is about how to cultivate a growth mindset in students and tutors, and why that is critical to tapping into each person's capacity to learn. Here tutors will examine the hallmarks of a fixed mindset versus those of a growth mindset. Moreover, they will learn to identify the actions, beliefs and assumptions that might be holding their students back - and even holding themselves back. Last, tutors will learn how to recognize when a fixed mindset shows up when responding to feedback.

Tools for Tutoring Part 1
2 VIDEOS, 2 QUIZZES
5 minutes
It can be challenging to be a great tutor; there are so many things to balance, while also keeping the students front and center. This module introduces tutors to 7 Tools for Tutoring techniques. These are strategies designed to help them on their journey to become a great tutor.

Joy Factor
8 VIDEOS, 6 REFLECTIONS, 2 QUIZZES
20 minutes
Who wants to be an engaging tutor? All tutors do, and this module is here to help. Tutors will look at what Joy Factor means and how it relates to joyful learning. They will also experience scenarios that highlight what Joy Factor looks like done poorly, and what it looks like done well. Last, tutors will identify some concrete ideas that they can use on Day 1 to engage their students' hearts and minds.

Right Relationships Part 1
8 VIDEOS, 7 REFLECTIONS, 6 QUIZZES
15 minutes
At Saga, we believe relationships are at the heart of learning. In this module, we do a deep dive into what that means in the role of a tutor. We discuss how to identify the many varied opportunities tutors have for fostering a strong relationship with their students. We also cover 5 Key Beliefs that will inform tutors' work with students and that they will strive to always convey to their students.

Right Relationships Part 2
9 VIDEOS, 6 REFLECTIONS, 4 QUIZZES, 1 ARTICLE
20 minutes
In the second part of Right Relationships, we explore tools to help build relationships with students. As part of this, we look at the role of a tutor, and how that role provides a lens to help work through challenges and still maintain high expectations. Tutors will also learn a framework for responding to tough situations in a constructive way, as well as strategies for handling specific behaviors and avoiding common pitfalls. Using this knowledge, they will then get to practice these skills using real tutoring scenarios.

RATIO

The Ratio unit shines a light on what a high-quality tutorial looks like. Key to this is the ratio of the amount of work that student is doing to the amount the tutor is doing. The modules in this unit include:

Tools for Tutoring Part 2
2 VIDEOS, 2 QUIZZES
5 minutes
We kick off the Ratio Unit by introducing 7 more Tools for Tutoring techniques. These strategies are specific to delivering a high-quality lesson and making the most of every tutoring session.

What Makes a High Quality Tutorial?
9 VIDEOS, 8 REFLECTIONS, 5 QUIZZES
25 minutes
In this meaty module, we examine what a high quality tutorial looks like. We investigate the tutoring practices that are most effective at helping students learn. After reviewing these foundations, we explore some of the most important components of effective tutoring, including the ratio for the amount of time a tutor speaks to the amount of time students talk and think. In a high quality tutorial, tutors make students the star.

Checks for Understanding
7 VIDEOS, 8 REFLECTIONS, 2 QUIZZES
15 minutes
Checks for understanding (CFUs) are a key strategy for assessing a student's mastery in real-time. Once tutors complete this module, they will understand how to implement CFUs to ask the right questions at the right time. With the data they gather, they will be able to proactively assess the students' understanding and then adjust their instruction based on that insight. This is key to ensuring that tutors make every moment of the tutorial count. It also ensures that they are focusing the content of the session where it can most benefit the student.

Collaborative Learning
4 VIDEOS, 6 REFLECTIONS, 8 QUIZZES
10 minutes
Collaborative learning is not only fun, but students learn more. A win win! We dive into the how of collaborative learning, and provide tutors with practical tips for managing the classroom, to ensure everyone is participating and maximizing their experience in the tutorials.

Differentiation and ZPD
8 VIDEOS, 5 REFLECTIONS, 6 QUIZZES, 1 ARTICLE
15 minutes
Differentiation is a powerful strategy for helping all students make progress. The Zone of Proximal Development (ZPD) is where tutors want their students to be, balancing that fine line of challenging, but not to the point of frustrating. In this module, tutors learn how to use these two strategies together to ensure they know how to best help all students maximize their learning in tutorials.

RIGOR

The Rigor unit explores topics like lesson planning, analyzing student work and more. The modules in this unit include:

Tools for Tutoring - High Expectations
4 VIDEOS, 4 QUIZZES
5 minutes
We all want students to reach their highest potential, but what strategies can tutors use to help them achieve it? During this module, we introduce 9 different Tools for Tutoring strategies to keep a high level of rigor, and not settle for less than students' best, all designed to help them succeed and grow in every tutorial.

Rigor
6 VIDEOS, 7 REFLECTIONS, 4 QUIZZES, 2 ARTICLES
15 minutes
Let's get students really flexing their brain muscles! Rigor is all about encouraging students to think and learn at a higher level. This module seeks to help tutors increase the rigor of their tutorials by understanding the key elements of rigor, as well as learning some Mastery Moves.

Intentional Lesson Planning
10 VIDEOS, 3 REFLECTIONS, 5 QUIZZES, 1 RESOURCES
15 minutes
If those who are new to tutoring, they might be wondering how to structure their tutorials. Well, have no fear. In this module, we introduce tutors to some great resources to help with lesson planning. We guide them through the lesson planning steps, including setting an objective, developing an assessment, creating a warm-up, instruction, and practice tasks.

Analyzing Student Work
11 VIDEOS, 4 REFLECTIONS, 9 QUIZZES
15 minutes

Curious to know what the students know? How do tutors figure out students' misconceptions? One approach is to analyze their work during the tutorial, which can help tutors determine student understandings or missteps. We believe that learning students' strengths, and celebrating those while also continually stretching them will help them to achieve their best, and we discuss this asset-based approach in more detail in the module.

High Expectations
5 VIDEOS, 6 REFLECTIONS, 8 QUIZZES
10 minutes
Tutoring can definitely be a juggling act, and this can sometimes cause tutors to inadvertently lower their expectations of students, or let them opt out. In order to prevent this from happening, wel look at how to maintain high expectations, and highlight some common challenges that tutors might face in their tutorials. We introduce four leadership styles that tutors adopt, and help them to identify when they are in each role. Finally, we challenge tutors to find the balance of high challenge and high support which is just what students need to grow and succeed.

Source.
https://static1.squarespace.com/static/5c44ea9771069967effbe11d/t/61438aabd4faa428d2f17729/1631816363729/Saga+Coach+Scope+%26+Sequence.pdf

Appendix C

STEM AC AmeriCorps Math Mentors Program (AAMP)
Pre-Service Training Schedule

Event/Module	Topic	Time (in minutes)	Task	Date (Time)
1. AAMP Kick-Off Meeting	AmeriCorps training and AAMP training	**120**	Join us at [Zoom link]. Complete "exit ticket" [here].	
2. Strong Relationships	What does it mean to be a tutor?	10		
	Your education experiences	10		
	Implicit bias	10		
	Growth mindset	20		
	Tools for tutoring Part 1	5		
	Joy factor	20		
	Right relationships Part 1	15		
	Right relationships Part 2	20		
	TOTAL	**110**	Complete these online modules here. Complete "exit ticket" [here].	
3. High-Impact Tutoring	Tools for tutoring Part 2	5		
	What makes a high-quality tutorial?	25		
	Checks for understanding	15		
	Collaborative learning	10		
	Differentiation and ZPD	15		
	TOTAL	**70**	Complete these online modules here. Complete "exit ticket" [here].	

4. Planning and Using Data	Tools for tutoring – high expectations	5	
	Rigor	15	
	Intentional lesson planning	15	
	Analyzing student work	15	
	High expectations	10	
	TOTAL	**60**	Complete these online modules here. Complete "exit ticket" [here].
5. On-Site Training	On-Site Training	**90**	Meet at school site. Complete "exit ticket" [here].
6. Intro to Math Software	Vendor-provided training	**90**	Join us at [Zoom link]. Complete "exit ticket" [here].
7. AAMP Pre-Service Training Debriefing Meeting	Debriefing and introduction to in-service support	**90**	Join us at [Zoom link]. Complete "exit ticket" [here].

Appendix D

UTAH EDUCATION POLICY CENTER
THE UNIVERSITY OF UTAH

STEM AC AmeriCorps Math Mentors Program (AAMP)
Training "Exit Survey" for Mentors

1. Please use the dropdown menu to select the training event or training resource that you are evaluating.

▼ Session 1. AMMP Kick-Off Training (Day 1) . . . Session 8. AMMP Pre-Service Training Debriefing Meeting (8)

2. Please provide a rating for each of the following.

	Poor (1)	Fair (2)	Good (3)	Very Good (4)	Excellent (5)
Overall **quality** of the training.	○	○	○	○	○
Usefulness of the training.	○	○	○	○	○
Design of the training (e.g., materials, organization, format, pacing).	○	○	○	○	○
Relevance of the training.	○	○	○	○	○
Your understanding of the topic(s) **before** you participated in the training.	○	○	○	○	○
Your understanding of the topic(s) **now** that you have participated in the session.	○	○	○	○	○

3. What aspect(s) of this training did you find most valuable in supporting the work you will do as a mentor in the AmeriCorps Math Mentors Program?

4. How might this training be improved to better support the work you will do as a mentor in the AmeriCorps Math Mentors Program?

Sources. Adapted from studentsupportaccelerator.org and informed by Robinson, C. D., Kraft, M.A., Loeb, S., & Schueler, B. E. (2021). Accelerating student learning with high-dosage tutoring. *EdResearch For Recovery: Design Principles Series.* Annenberg Institute at Brown University and Results for America.

Appendix E

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STEM AC AmeriCorps Math Mentors Program (AAMP)
"Pulse" and Pre/Post Surveys for Mentors

"Pulse" Survey for Mentors

Thank you for taking the time to tell us how you are feeling about your experiences as a mentor. Please respond to each of the following questions.

How confident are you that you can help your students understand the material in a mentoring session?	Not confident at all	Slightly confident	Somewhat confident	Quite confident	Extremely confident
How much do you enjoy your tutoring sessions?	Do not enjoy at all	Enjoy a little bit	Enjoy somewhat	Enjoy quite a bit	Enjoy a tremendous amount
How much do you think your students learn from you?	Almost nothing	A little bit	Some	Quite a bit	A tremendous amount
How confident are you that your students can improve their grade in math?	Not confident at all	Slightly confident	Somewhat confident	Quite confident	Extremely confident
How confident are you that you can effectively teach math?	Not confident at all	Slightly confident	Somewhat confident	Quite confident	Extremely confident
How positive are the relationships with your students?	Not positive at all	Slightly positive	Somewhat positive	Quite positive	Extremely positive

On most days, how enthusiastic are the students about mentoring?	Not enthusiastic at all	Slightly enthusiastic	Somewhat enthusiastic	Quite enthusiastic	Extremely enthusiastic
How positive is your working environment?	Not positive at all	Slightly positive	Somewhat positive	Quite positive	Extremely positive
How much support do you receive to be a successful mentor?	Almost no support	A little bit of support	Some support	Quite a bit of support	A tremendous amount of support

Pre/Post Survey for Mentors

Please mark the answer that best describes how confident you are in supporting students' math learning.

How confident are you that you can help your students improve their grade in math?	Not confident at all	Slightly confident	Somewhat confident	Quite confident	Extremely confident
How confident are you that you can effectively use math personalized learning software to support student learning in math?	Not confident at all	Slightly confident	Somewhat confident	Quite confident	Extremely confident
How confident are you that you can engage students who typically are not motivated?	Not confident at all	Slightly confident	Somewhat confident	Quite confident	Extremely confident

When complicated ideas are presented in their math class, how confident are you that you can help students understand them?	Not confident at all	Slightly confident	Somewhat confident	Quite confident	Extremely confident
How confident are you that you can help your students who are facing the biggest challenges learn?	Not confident at all	Slightly confident	Somewhat confident	Quite confident	Extremely confident

Please use the space below to explain any of your responses.

_____

_____

_____

_____

What additional training or resources might the program provide/have provided to improve your confidence in supporting students' math learning?

_____

_____

_____

_____

Please mark the answer that best describes how confident you are about mentoring.

How confident are you that you can build positive relationships with all your students?	Not confident at all	Slightly confident	Somewhat confident	Quite confident	Extremely confident
How confident are you that you can support your students emotionally?	Not confident at all	Slightly confident	Somewhat confident	Quite confident	Extremely confident
How much can you do to make your students enjoy coming to school?	Almost nothing	A little bit	A moderate amount	Quite a bit	A great deal
How much can you do to get your students to trust you?	Almost nothing	A little bit	A moderate amount	Quite a bit	A great deal
To what extent do you feel capable of designing relationship building activities for your tutoring sessions?	Not capable at all	Slightly capable	Somewhat capable	Quite capable	Extremely capable
If a relationship with a student starts out poorly, how confident are you that you can improve that relationship later in the year?	Not confident at all	Slightly confident	Somewhat confident	Quite confident	Extremely confident
How much can you do to cultivate a positive relationship with students who are not performing well?	Almost nothing	A little bit	A moderate amount	Quite a bit	A great deal

How confident are you that you can build positive relationships with students who come from different backgrounds than you?	Not confident at all	Slightly confident	Somewhat confident	Quite confident	Extremely confident

Please use the space below to explain any of your responses.

_____

What additional training or other resources might the program provide/have provided to improve your confidence in mentoring?

_____

NATIONAL STUDENT SUPPORT ACCELERATOR

equalizing access to quality tutoring

Sources. Adapted from materials provided by the National Student Support Accelerator at studentsupportaccelerator.org and informed by Robinson, C. D., Kraft, M.A., Loeb, S., & Schueler, B. E. (2021). Accelerating student learning with high-dosage tutoring. *EdResearch For Recovery: Design Principles Series.* Annenberg Institute at Brown University and Results for America.

Appendix F

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STEM AC AmeriCorps Math Mentors Program (AAMP)
"Pulse" and Pre/Post Survey for Students

"Pulse" Survey for Students

Please mark the answer that best describes how you are feeling.

How confident are you that you can complete the hardest work that is assigned in your math class?	Not confident at all	Slightly confident	Somewhat confident	Quite confident	Extremely confident
How much effort do you put into your homework for your math class?	Almost no effort	A little bit of effort	Some effort	Quite a bit of effort	A great deal of effort
How interesting do you find the things you learn in your math class?	Not interesting at all	Slightly interesting	Somewhat interesting	Quite interesting	Extremely interesting
How confident are you that you can improve your grade in math?	Not confident at all	Slightly confident	Somewhat confident	Quite confident	Extremely confident

How much do you matter to others at your school?	Do not matter at all	Matter a little bit	Matter somewhat	Matter quite a bit	Matter a lot

Please mark the answer that best describes how you are feeling about your mentoring sessions.

How confident are you that you can understand the material in your mentoring sessions?	Not confident at all	Slightly confident	Somewhat confident	Quite confident	Extremely confident
How much do you enjoy your mentoring sessions?	Do not enjoy at all	Enjoy a little bit	Enjoy somewhat	Enjoy quite a bit	Enjoy a lot
Does you mentor make it easier for you to understand your classwork?	Not at all	A little bit	Somewhat	Quite a bit	A lot
How positive is your relationship with your mentor?	Not positive at all	Slightly positive	Somewhat positive	Quite positive	Extremely positive
How caring is your mentor toward you?	Not caring at all	Slightly caring	Somewhat caring	Quite caring	Extremely caring

Pre/Post Survey for Students

Please mark the answer that best describes how confident you are about math.

How confident are you that you can complete all the work that is assigned in your math class?	Not confident at all	Slightly confident	Somewhat confident	Quite confident	Extremely confident
When complicated ideas are presented in your math class, how confident are you that you can understand them?	Not confident at all	Slightly confident	Somewhat confident	Quite confident	Extremely confident
How confident are you that you can learn all the material presented in your math class?	Not confident at all	Slightly confident	Somewhat confident	Quite confident	Extremely confident
How confident are you that you can do the hardest work that is assigned in your math class?	Not confident at all	Slightly confident	Somewhat confident	Quite confident	Extremely confident
How confident are you that you will remember what you learned in your current math class next year?	Not confident at all	Slightly confident	Somewhat confident	Quite confident	Extremely confident

Please mark the answer that best describes the level of effort you put into your math class.

How much effort do you put into getting involved in discussions during your math class?	Almost no effort	A little bit of effort	Some effort	Quite a bit of effort	A great deal of effort
When your math teacher is speaking, how much effort do you put into trying to pay attention?	Almost no effort	A little bit of effort	Some effort	Quite a bit of effort	A great deal of effort
How much effort do you put into your homework for your math class?	Almost no effort	A little bit of effort	Some effort	Quite a bit of effort	A great deal of effort
Overall, how much effort do you put forth during your math class?	Almost no effort	A little bit of effort	Some effort	Quite a bit of effort	A great deal of effort
How much effort do you put into learning all the material for your math class?	Almost no effort	A little bit of effort	Some effort	Quite a bit of effort	A great deal of effort

Please mark the answer that best describes how you feel about math.

How interesting do you find the things you learn in your math class?	Not interesting at all	Slightly interesting	Somewhat interesting	Quite interesting	Extremely interesting
How often do you use ideas from your math class in your daily life?	Almost never	Once in a while	Sometimes	Frequently	Almost always
How important is it to you to do well in your math class?	Not important at all	Slightly important	Somewhat important	Quite important	Extremely important
How much do you see yourself as a person who does well in math?	Not at all	A little bit	Somewhat	Quite a bit	A lot
How useful do you think your math class will be to you in the future?	Not useful at all	Slightly useful	Somewhat useful	Quite useful	Extremely useful

Please mark the answer that best describes how you feel about school.

How well do people at your school understand you as a person?	Do not understand at all	Understand a little	Understand somewhat	Understand quite a bit	Completely understand
How connected do you feel to the adults at your school?	Not connected at all	Slightly connected	Somewhat connected	Quite connected	Extremely connected
How much respect do students in your school show you?	No respect at all	A little bit of respect	Some respect	Quite a bit of respect	A lot of respect
How much do you matter to others at this school?	Do not matter at all	Matter a little bit	Matter somewhat	Matter quite a bit	Matter a lot
Overall, how much do you feel like you belong at your school?	Do not belong at all	Belong a little bit	Belong somewhat	Belong quite a bit	Completely belong

Sources. Adapted from materials provided by the National Student Support Accelerator at studentsupportaccelerator.org and informed by Robinson, C. D., Kraft, M.A., Loeb, S., & Schueler, B. E. (2021). Accelerating student learning with high-dosage tutoring. *EdResearch For Recovery: Design Principles Series.* Annenberg Institute at Brown University and Results for America.

Appendix G

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STEM AC AmeriCorps Math Mentors Program (AAMP)
Recommendations for Structuring Tutoring Sessions

Prior to each tutoring session, be sure to …

- set a clear learning objective for the session that is based on data (e.g., from math software) and informed by communications with the teacher, parent, and/or student.
- write out talking points for explaining key concepts and addressing misconceptions.
- ensure that all necessary materials (examples, practice problems, digital resources, etc.) are ready.

Step 1. Relationship-Building

Take some time to build a strong tutor-student relationship (e.g., check-in about the student's day or have a conversation about the student's interests).

Step 2. Taking Stock

Reflect on the previous session and administer a brief "entrance ticket" that assesses the student's ***mastery of*** and ***confidence in*** either a skill they learned in a previous session or a new skill they will work on in today's session. If necessary, use this time to remediate any unfinished learning that the student will need for today's session.

Step 3. Overview

Provide an overview of today's planned activities. Clearly state the session's learning objective.

Step 4. Mini Lesson & Explicit Modeling

Using one or more examples, explicitly model the step-by-step process that the student will use to master the skill(s) or concept(s) needed to achieve the learning objective for today's session.

Step 5. Independent Practice

Provide sufficient time for students to practice the skill(s) or concept(s) needed to achieve the learning objective for today's session. Practice should allow for multiple "at bats" and be as independent as possible. If the student struggles to master a skill or concept, ***do*** ask guiding questions but ***do not*** provide answers.

Step 6. Formative Assessment

Reflect on today's session and administer a brief "exit ticket" that assesses the student's ***mastery of*** and ***confidence in*** the new skill they worked on today.

Sources. Adapted from materials provided by the National Student Support Accelerator at studentsupportaccelerator.org and informed by Robinson, C. D., Kraft, M.A., Loeb, S., & Schueler, B. E. (2021). Accelerating student learning with high-dosage tutoring. *EdResearch For Recovery: Design Principles Series.* Annenberg Institute at Brown University and Results for America.

Appendix H

UTAH EDUCATION POLICY CENTER
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STEM AC AmeriCorps Math Mentors Program (AAMP)
Mentor Interview Protocol

Interviewees: up to 7 AMMP mentors

Timeline: 45-minute interviews to be completed in mid- to late- April 2022

Introduction **(3 minutes)**	Thank you for taking the time to meet with me today. The purpose of this interview is to learn more about your experiences with the AmeriCorps Math Mentors Program. Your responses will be important in learning more about how program activities are being implemented and will be used to support continuous improvement. The interview should take no more than 45 minutes. All responses will be kept confidential. This means that the UEPC research and evaluation team will ensure that any information we include in our report does not identify you as the respondent. You don't have to answer any question you don't want to answer, and you may end the interview at any time. Are you willing to participate in this interview? With your permission, I would like to audio-record the session so that I don't miss any of your comments. Do I have your permission to do so? Do you have any questions before we begin?
Questions **(30 minutes)** • Recruitment and selection • Onboarding and preservice training • Inservice support (e.g., training, coaching, or feedback) • Instruction • Data Use	1. Why did you choose to become a mentor for this program? • What experiences, skills, or characteristics do you bring to the program? • What experiences, skills, or characteristics do you hope to gain from the program? 2. Can you describe your onboarding experiences, including any training you were provided <u>before</u> you began to work with students? • Who provided the training? In what context? • What about the onboarding process and/or training has been most valuable to you? • How would you improve the onboarding experience and/or training?

	3. Can you describe what types of support (e.g., training, coaching, or feedback) you have received or are receiving now (i.e., now that you are working directly with students)? • Who is providing this support? How often? [Prompt: SAGA] • Are you having weekly meetings with your site supervisor? If so, can you describe what those meetings are like? • Are you satisfied with the level and quality of support you are receiving? If so, why? If not, why not? • What additional support would be most helpful to you as you continue to work with students? 4. Can you describe your experience in working with students? • Is there a "typical" session? What does that look like? For example, are you working with a single student or a group of students? Do you work with the same students or different students from session to session? How often do you meet? • What strategies and resources do you use to plan for tutoring? • What strategies and resources do you use while tutoring? • Do you use digital math software? Which program? How often? How do you use it? • How much of your time is spent tutoring vs. building relationships with students? What strategies, if any, do you employ to build relationships? • To what degree is your tutoring or mentoring guided by information provided by teachers, other school personnel, or parents? 5. Can you describe your experience with providing, collecting, and using data to improve the program? Specifically … • What has been your experience in being asked to complete surveys (e.g., about the training)? How can we improve this process? • Have you collected or been provided with any data to help you gauge student interest, skills, or progress (e.g., student grades, test scores, vendor assessments)? Would you find this information useful? Why or why not? • What additional types of data would you find most useful?
Closing: **(5 minutes)**	Is there anything more you would like to add? Thank you for your time.