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Annual Report for the 2024-25 Evaluation of the STEM Action Center's Professional Learning Grant Program

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THE UNIVERSITY OF UTAH
UTAH EDUCATION POLICY CENTER

The Utah Education Policy Center (UEPC) is an independent, non-partisan, not-for-profit research-based center at the University of Utah founded in the Department of Educational Leadership and Policy in 1990 and administered through the College of Education since 2007. The UEPC's mission is to bridge research, policy, and practice by conducting rigorous and comprehensive research and evaluations, and providing expert and research-informed technical assistance and professional learning. We empower educators, policymakers, and leaders to make research actionable and impactful to transform education across early childhood education, K-12 schools, and higher education.

We are committed to supporting the understanding of whether educationalpolicies, programs, and practices are being implemented as intended, whether they are effective and impactful, and how they may be improved and scaled-up and become sustainable.

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Executive Summary

Study Overview

The STEM Action Center's (STEM AC) Professional Learning (PL) Grant program has partnered with the Utah Education Policy Center (UEPC) since 2016 to evaluate the implementation of grant activities and associated program outcomes for educators and students. This year's formative evaluation provides information about the PL program's progress on implementation and outcomes in year one of a two-year grant award cycle. The following evaluation questions (EQ) guided the 2024-25 evaluation of the STEM AC's Professional Learning Grant program:

EQ1. Program Implementation. To what extent were grant activities implemented as planned and consistent with goals across participating sites (e.g., holding planned sessions, engaging educators initially targeted for participation, making progress towards planned goals or objectives)?

EQ2. Alignment with Program Expectations and Professional Learning Standards. How and to what extent were professional learning activities at participating sites aligned with program expectations and professional learning standards?

EQ3. STEM AC's Role as an Intermediary. In what ways and to what extent did STEM AC serve as an intermediary to support the implementation of the Professional Learning Grant program? How effective was STEM AC at facilitating collaboration opportunities and supporting the development of communities of practice among program leadership across participating sites to support implementation?

EQ4. Educator Outcomes. To what extent did participation in grant-supported STEM professional learning activities impact educators' STEM identity and interest, their STEM teaching self-efficacy, and their STEM planning and instructional practices?

The evaluation was designed to offer actionable insights for STEM AC. In addition to these evaluation questions, the UEPC also undertook research on scaling and sustainability efforts across CP grantee sites and the role of the STEM AC as an intermediary in the Computing Partnerships (CP) grant program. Briefs outlining the findings of these research studies were provided to the STEM AC team as a supplement to this year's report. Consistent with UEPC's approach to research and evaluation with partners, the UEPC research and evaluation team held regular meetings with the STEM AC program director to share ongoing feedback and promote continuous program improvement throughout this year's evaluation cycle.

Methods

To address the 2024-2025 evaluation questions, the UEPC used a mixed-methods approach to assess the implementation and outcomes of grant-supported STEM professional learning activities across 32 participating sites. Data collection included Site Leader Implementation Surveys administered mid- and end-of-year, semi-structured interviews, and focus groups with site leaders from 13 sites, and an Educator End-of-Year Survey completed by 1,035 educators from 29 sites. Additional evaluation data sources included educator focus groups with 81 participants across 11 sites and a comprehensive review of grant activity calendars and program attendance records from all participating sites.

Quantitative data were analyzed using descriptive and inferential statistics (i.e., tests of statistical significance for group differences, pairwise comparisons, pre/post comparisons, and effect size estimates) to examine program implementation, educator outcomes, and changes in STEM teaching self-efficacy, identity, and instructional practices. Qualitative data from interviews, focus groups, and open-ended survey responses were analyzed through a systematic multi-step hybrid thematic approach. In the first coding round, three UEPC evaluation team members applied deductively developed codes from the evaluation questions and related literature to a subset of transcripts, while remaining open to inductive codes emerging from the data. The team reconciled differences, clarified codes, and revised the codebook, which was then applied to the full qualitative dataset. This approach enabled the evaluation team to capture both the breadth of program implementation across sites and the depth of participant experiences with grant-supported professional learning activities.

Key Findings

Table 1 summarizes the UEPC's 2024-25 evaluation results and highlights program implementation and the educator outcomes of participating sites during 2024-25 (AY).

Table 1. Summary of Key Findings from the 2024-25 STEM AC PL Evaluation

Key Finding	Description
Grant-supported STEM professional learning was widely implemented and tailored to diverse site needs.	All participating sites delivered STEM-focused PL activities, with many implementing multiple offerings and hundreds of activity occurrences throughout the year. Activities reflected a range of content areas, with strong representation in math and science and increasing integration of STEM with other core subjects like English Language Arts.
Participating sites reported substantial progress toward their stated program goals.	Nearly two-thirds of program objectives were reported as complete or nearly complete by year's end. Site leaders described implementation as successful, often citing enthusiastic educator participation, high-quality facilitation, and alignment with educator needs.
Practical tools, sustained coaching, and collaboration drove successful implementation.	Ready-to-use materials, extended coaching relationships, and structured collaboration time were key factors that enabled sustained educator engagement in PL activities and supported changes in their instructional practices.
Persistent barriers included administrative support gaps, competing priorities, and limited time.	Challenges such as a lack of school and/or district leadership buy-in, new curriculum adoptions, and insufficient time for planning and collaboration limited successful implementation at some sites. These barriers were especially pronounced when STEM PL was perceived as separate from core instructional initiatives.
PL activities aligned well with professional learning standards, though	Participating educators reported that multiple dimensions of professional learning standards were well-reflected in their grant-supported PL experiences, particularly communication, learning

Key Finding	Description
opportunities remain to deepen data use.	design, and supportive culture. However, data use emerged as a weaker dimension, indicating an opportunity for improvement in data-driven practices.
Educators reported meaningful growth in STEM identity, self-efficacy, and instructional practice.	Participants reported significant and practically meaningful growth between the start and end of the year across all three educator outcomes. These gains were particularly strong among those who engaged in PL for over 40 hours or played a facilitation role.
The STEM Action Center was viewed as a strong, flexible intermediary partner.	Site leaders consistently rated STEM AC positively for grant management and implementation support. They praised its responsiveness, adaptability, and role in facilitating access to resources and cross-site learning opportunities.

Recommendations

Based on the evaluation key findings, the UEPC identified a set of recommendations to inform future directions and growth for the STEM AC PL grant program as shown in Figure 1. Taken together, these recommendations offer clear, actionable steps that program staff and participating sites can consider for program improvement, quality implementation, and maximal impact.

Figure 1. Recommendations to Inform Future Cycles of the STEM AC PL Grant Program

Support Sustained and Collaborative Learning Structures

- STEM PL structures that were both sustained and collaborative proved especially effective, as educators with over 40 hours of engagement and access to PLCs, peer observations, and coaching reported significantly stronger outcomes.

Support Buy-In and Alignment with Ongoing Initiatives

- Limited administrative buy-in and competing curriculum priorities were persistent barriers; building leadership-focused outreach and alignment strategies can help ensure STEM PL is integrated into core instructional goals rather than perceived as an "add-on."

Provide & Expand Access to Practical, Classroom-Ready Resources

- Educators valued ready-to-use instructional materials that saved time and increased confidence, but also identified gaps in math, secondary, special education, and informal education supports, highlighting the need for both continued investment and tailored expansion of available STEM PL resources.

Involve Educators in the Design and Faciliation of PL

- Educators who were meaningfully involved in facilitating PL reported higher ratings across all outcomes, showing that engaging teachers as co-designers and facilitators can build leadership capacity, strengthen collaboration, and amplify program impact.

Introduction

The STEM Action Center's (STEM AC) Professional Learning (PL) Grant program is one of many state-wide initiatives supported by the STEM AC, a division of the Utah Department of Cultural and Community Engagement. This program was established by House Bill 150 in 2014 to provide funding, resources, and programs to "*support teacher professional development and excite students with STEM opportunities by providing effective STEM education/digital learning tools to public K-12 classrooms*."[1] The STEM AC PL program is focused on strengthening the ability to integrate STEM (i.e., science, technology, engineering, and math) into other content areas (e.g., Social Studies, English Language Arts).

The nature and scope of the grant-supported PL activities (e.g., coaching, mentoring, professional learning communities), which are locally identified based on STEM-related instructional needs and capacity building, vary across grantee sites. The STEM AC PL grant program sets the expectation that participating sites align their implementation practices with Utah Professional Learning Standards (Utah Professional Learning Standards Toolkit, 2023; see Appendix A for details). STEM AC outcomes for the PL Grantee program are developing educators' STEM identity and interest; STEM knowledge, teaching self-efficacy and confidence; and STEM planning and instructional practices. The STEM AC supports grant management and capacity-building efforts and has actively promoted the creation of professional learning communities among leadership across sites to support the implementation and efficacy of STEM PL activities in these contexts.

Since 2016, the STEM AC partnered with the Utah Education Policy Center (UEPC), a research-based center at the University of Utah, to evaluate the current PL grant program. The current PL grant cycle began in July 2023 and ended in June 2025. This year's 2024-2025 evaluation report focuses on the current grant cycle's second and final year of implementation. As such, it provides key information about the outcomes of the grant-funded PL activities implemented at participating grantee sites. Additional information about the PL Grant Program background and the first year of implementation is included in the 2023-24 annual evaluation report.

The 2024-2025 UEPC annual evaluation report begins with an overview of relevant background literature, which expands upon the research reviewed in the 2023-2024 year's evaluation report to include new developments in STEM professional learning, additional information about how participating sites are expanding the reach of their PL activities, and the processes that support learning transfer and the application of STEM PL learnings to practice at participating schools and districts. The report continues with a section that outlines the evaluation and research questions that guided this year's study, followed by a summary of the data and methods used to address these questions. We then present the key findings in response to the evaluation questions alongside supporting results and evidence gathered during this year's study. The final section outlines specific considerations for future grant cycles based on the findings of the current evaluation.

[1] See STEM AC's history at: https://stem.utah.gov/about/

Relevant Literature

This review of relevant literature summarizes established insights from the initial review of literature for the 2023-24 evaluation of the STEM AC's PL Grant program, providing a foundation for understanding the research base on STEM professional learning. It then builds on this foundation by highlighting new contributions that have emerged over the past year, including recent meta-analyses, scoping reviews, and studies emphasizing leadership and stakeholder engagement.

Key Insights and Focus Areas

STEM education continues to be recognized as central to preparing students for postsecondary opportunities and workforce demands (Carnevale et al., 2011; Xie et al., 2015; Zhou et al., 2023). Previously reviewed studies emphasized the need for professional learning (PL) to enhance subject knowledge and content-specific instructional skills (Hill et al., 2005; Hossain & Robinson, 2012; Hudson et al., 2015). These findings remain consistent, and ongoing research continues to link effective PL to improved student outcomes, stronger teacher self-efficacy, and higher rates of teacher satisfaction and retention (Hasim et al., 2022; Lynch et al., 2019; Zhou et al., 2023).

Recent research continues to strengthen the evidence base on effective STEM professional learning. Specifically, more recent studies expand this foundation in important ways. A meta-analysis conducted by Zhang et al. (2023) found that interventions targeting the improvement of STEM education that are curriculum-based and professional development-focused had the strongest effects on improving teachers' STEM knowledge, in comparison to interventions that provide teaching aids (i.e., digital devices or other instructional materials). Additionally, a scoping review by MacDonald et al. (2024) draws attention to the limited research on STEM PL for early childhood educators, including educators working with students in early elementary school settings, despite growing interest in this group's participation in STEM PL opportunities (O'Neill et al., 2023). Another new thread in the literature emphasizes the role of leadership and stakeholder engagement, with studies highlighting how principals, school support staff (e.g., counselors), and other teacher leaders can actively engage in strengthening and sustaining STEM education initiatives and associated PL activities (Geiger et al., 2023; Martinovic & Milner-Bolotin, 2024; Ross et al., 2023).

Features of Effective STEM PL

The UEPC's prior review of the literature also underscored that impact PL must be sustained, reflective, and designed to promote authentic, hands-on learning (Darling-Hammond et al., 2017; Desimone, 2009; Rorrer et al., 2024). Additionally, collaborative approaches like professional learning communities (PLCs) remain valuable for fostering teacher self-efficacy and leadership (Gardner et al., 2019; Kelley et al., 2020).

Recent contributions to this body of literature build on this foundation by showing that effective PL is characterized not only by sustained engagement, but also by hands-on experiences combined with goal-oriented flexibility and cycles of reflection, including in hybrid and online formats (Bragg et al., 2021; Darling-Hammond et al., 2017; Desimone, 2009; Herbert et al., 2016; Rorrer et al., 2024). In addition, new studies show how PLCs and other collaborative learning models extend beyond

knowledge-sharing to support educators' self-efficacy, the application of their learning to practice, the cultivation of STEM leadership, and the improving student outcomes (Gardner et al., 2019; Kelley et al., 2020; Liu et al., 2024; Martinovic & Milner-Bolotin, 2024; Quaisley et al., 2023). More generally, current literature also highlights the role of communities of practice (CPs) as an important complement to more formal PL models. CPs create socially driven, iterative spaces where educators and leaders can collaborate around shared challenges or interests, drawing on collective expertise to pursue authentic, self-identified learning goals (Wenger, 2000; Wenger et al., 2002). Although empirical research on CPs in education remains limited, especially in leadership contexts, emerging studies suggest they can support equity-focused reflection, distributed leadership, and sustained professional growth (Eldeeb et al., 2025).

Persistent Barriers and Opportunities

Access to quality professional learning continues to be limited by funding, time, or availability of opportunities within particular contexts (Haug & Mork, 2021; Lavalley, 2018). These constraints remain a challenge, particularly in rural or under-resourced contexts, and continue to be notable barriers to ensuring widespread access to high-quality STEM professional learning opportunities.

Newly reviewed literature adds nuance to these challenges. Specifically, research on online and flexible PL opportunities, for example, highlights the importance of designing experiences that accommodate diverse learning needs and engagement styles in order to maximize effectiveness (Bragg et al., 2021). Furthermore, while momentum around STEM PL has grown, much of the research remains disproportionately focused on middle and secondary educators, with limited attention to early childhood educators, and non-teaching staff (e.g., counselors or support personnel). Yet, recent work suggests that these groups have an emerging role in advancing STEM pathways, highlighting a need for expanded research and investment in their professional development (MacDonald et al., 2024; O'Neill et al., 2023; Ross et al., 2023).

Evaluation and Research Design

This year's UEPC study was guided by both evaluation and research questions. As in the first-year evaluation of the PL Grant program, the evaluation questions examined program implementation, the alignment of grant-supported PL activities with program expectations and professional learning standards, participants' perceptions of STEM AC's role as an intermediary, and the outcomes of participating educators.

In addition to these evaluation questions, the UEPC posed two additional research questions of interest to inform the development of the STEM AC PL grant program. These questions focused on developing a better understanding of how participating sites have expanded the reach of their STEM PL activities or what facilitated or impeded participation in these activities, and the processes that support learning transfer and the application of STEM PL learnings to practice at participating schools and districts.

The evaluation questions are the focus of this annual evaluation report, while the findings and considerations related to the research questions are presented in separate research briefs.

Evaluation Questions

The following evaluation questions (EQs) guided the UEPC 2024-2025 evaluation of the STEM AC's Professional Learning (PL) Grant Program.

EQ1. Program Implementation. To what extent were grant activities implemented as planned and consistent with goals across participating sites (e.g., holding planned sessions, engaging educators initially targeted for participation, making progress towards planned goals or objectives)?

EQ2. Alignment with Program Expectations and Professional Learning Standards. How and to what extent were professional learning activities at participating sites aligned with program expectations and professional learning standards?

EQ3. STEM AC's Role as an Intermediary. In what ways and to what extent did STEM AC serve as an intermediary to support the implementation of the Professional Learning Grant program? How effective was STEM AC at facilitating collaboration opportunities and supporting the development of communities of practice among program leadership across participating sites to support implementation?

EQ4. Educator Outcomes. To what extent did participation in grant-supported STEM professional learning activities impact educators' STEM identity and interest, their STEM teaching self-efficacy, and their STEM planning and instructional practices?

Sample and Data Collection Methods

The UEPC evaluation team used a mixed methods approach to address the evaluation questions, leveraging both qualitative and quantitative methods to gather and analyze data about how grant-supported STEM PL activities were implemented across sites, the extent to which participating sites made progress towards their goals, and to better understand the effects of participation on educators across sites. Appendix B details how we used each data source to answer the questions guiding this year's evaluation.

Site Leader Implementation Surveys

Purpose & Process. The Site Leader Implementation Survey was administered at the middle and end of the academic year (i.e., December 2024 and April 2025) for the Fall 2024 and Spring 2025 reporting terms, consistent with the first year of the grant cycle. It consisted of the same five sections:

(1) Types of STEM Professional Learning Activities,

(2) Program Progress,

(3) Structure and Functioning of STEM PL,

(4) Supporting a Community of Practice for STEM PL, and

(5) STEM AC as an Intermediary Organization.

Like the 2023-24 academic year's (AY) administration of these surveys, the first section was only administered once during fall of the 2024-25 AY to gather information about activities occurring over

the year. The remaining four sections were included in both survey administrations. Appendix C provides additional details about the sections of the UEPC site leader surveys.

Sample. In total, 31 of 32 (96%) site leaders completed the mid-year administration of the Site Leader Implementation Survey, and 26 of 32 (81%) completed the 2024-2025 end-of-year administration. Site leaders from all 32 sites responded to at least one of the annual surveys. These site leaders held a variety of positions within their schools, districts, and organizations, including 28% who served as subject or content area specialists (e.g., Math, Science, or STEM Specialists), 22% worked as curriculum facilitators, 19% were district administrators, 19% were instructional coaches, and 13% were school administrators.

Site Leader Interviews or Focus Groups

Purpose & Process. Site leaders and selected individuals from their schools, districts, or organizations who were instrumental in leading the grant-supported PL activities during the 2024-25 AY were invited to participate in interviews/focus groups. These semi-structured interviews aimed to understand how sites expanded the reach of their offerings, how program activities intentionally supported the application of educators' learnings to practice, and how programs have interacted with STEM AC or others to support these efforts. PL site leaders provided recommendations to the evaluation team of additional site participants and supported logistical coordination for interviews. Site leader interviews and focus groups were held virtually via Zoom in January 2025, were 20 and 49 minutes in duration (with a median duration of 34 minutes), and were audio recorded for transcription and analysis.

Sample. In order to minimize the data collection burden on participating sites, the UEPC evaluation team invited site leaders from select sites to participate in site leader interviews. We used purposeful sampling based on the focus and scope of the STEM PL activities across these sites to select 19 sites that encompassed a broad representation of perspectives and experiences from various programs funded by the PL Grant program. In total, 17 site leaders from 13 sites participated in these interviews/focus groups (68% of the selected sites targeted for participation and 44% of the 32 sites participating in the PL grant program). The number of individuals in these sessions ranged from one to three. Those who participated were key leaders implementing grant-supported PL activities during the 2024-25 AY. Appendix D compares the participating sample of sites to the target sample and all programs participating in this academic year. The subset of participating sites slightly underrepresented sites with a technology and computer science focus (8% versus 22%), meaning that the variety of experiences at sites focusing on technology or computer science might not be fully represented in the data collected. Additionally, the subset of participating sites overrepresented programs including a focus on Special Education (46% versus 28%) and sites integrating English Language Arts (ELA) (38% versus 25%) relative to the pooled sample. The overrepresentation of these groups has the potential to result in more emphasis on Special Education and ELA integration in the findings than might be present across all participating sites.

Educator End-of-Year (EOY) Survey

Purpose & Process. The Educator End-of-Year (EOY) Survey was administered in April 2025 to educators to gather their perspectives about the grant-supported STEM PL activities they participated in during the 2024-25 AY. This survey mirrored the Educator EOY survey administered during the

evaluation of the first year of this grant cycle, including five sections that asked about: a) the nature and functioning of the PL activities they engaged in, b) their interactions with resources and individuals during these experiences, and c) their perceptions of the outcomes of their participation (i.e. STEM identity and interest, their STEM teaching self-efficacy, and their STEM planning and instructional practices). The median survey completion time was 32 minutes. Appendix E provides additional details about each section in the Educator EOY Survey.

Sample. A total of 1,035 educators representing 29% of eligible participants completed the Educator EOY Survey. Respondents came from 29 of the 32 participating sites and had engaged in at least one grant-supported PL activity during the 2024–25 academic year. Only surveys with completed or usable responses to the main section were included in the analysis. Appendix F includes a table of descriptive statistics for the Educator EOY survey.

Educator Focus Groups

Purpose & Process. The purpose of the educator focus groups was to provide additional context and nuance about experiences with grant-supported PL. Specifically, the focus groups explored activities aligned with educator PL needs, how these experiences supported educators' learning transfer and application to practice, and the impacts of these experiences on educator STEM identity and interest, STEM teaching self-efficacy, and STEM planning and instructional practices.

The UEPC team conducted educator focus groups via Zoom videoconference in December 2024 at sites with a subset of PL activities ending in Fall 2024, and again in March and April 2025 with all remaining sites that held activities through spring. The UEPC evaluation team worked with site leaders to identify educators to invite to these sessions and to identify available dates and times. The focus groups lasted between 21 and 46 minutes (median 32 min) and were audio recorded for transcription and analysis.

Sample. The UEPC team invited educators from the same select sample of 19 sites that were invited to participate in site leader interviews. As previously mentioned, sites were purposefully selected based on the focus and scope of the STEM PL activities across these sites to select sites to ensure a broad representation of perspectives and experiences from various programs funded by the PL Grant program. In total, 81 educators from 11 sites (58% of the selected sites targeted for participation and 34% of the 32 sites participating in the PL grant program) participated in one of 23 educator focus groups held during the 2024-25 academic year. Appendix D compares the participating sample of sites to the targeted sample and all programs participating in the PL program this academic year.

Program Data

Purpose & Process. The UEPC evaluation team used objectives outlined in the STEM AC PL site grant applications as the basis for assessing progress, consistent with the process from the first year of the grant cycle. Site leaders from all 32 sites completed a grant activity calendar to inform the evaluation team about the STEM AC PL-supported activities they intended to implement during the 2024-25 academic year (see Appendix G).

Additionally, site leaders provided the evaluation team with attendance records and a complete list of those who participated in their grant-supported STEM PL activities. To assist site leaders in this

process, the UEPC evaluation team created check-in links and QR codes that sites could use to track attendance if they didn't have their own pre-existing processes. These records were then combined with attendance records provided by site leaders for PL activities that did not use the UEPC-provided check-in links and QR codes to document participation during the 2024-25 AY. See Appendix H for the check-in link, Appendix H for the participant list template, and Appendix I for the attendance templates. The evaluation team coordinated with site leaders throughout the year to ensure these records were updated, and the final data pull for these materials occurred before the Educator EOY Survey was administered in April 2025.

Sample. All 32 programs or 100% provided grant activity planning calendars for the 2024-25 academic year. Additionally, 31 of the 32 (97%) programs provided educator lists with contact information solely for the purposes of use in this evaluation.

Data Analysis

This section describes the approaches used by the UEPC to analyze both qualitative and quantitative data collected for the evaluation. The first part describes how quantitative methods were applied to survey responses and program data, including how scale reliabilities and composite scores were calculated and compared across time points and how statistical and meaningful differences were operationalized for interpreting results. The second part describes the qualitative analysis process, which involved coding and synthesizing data from interviews, focus groups, and open-ended survey responses to identify themes aligned with the evaluation questions. Together, these complementary analyses provide a comprehensive understanding of how the PL program was implemented and its effects on participants.

Quantitative Data

The UEPC evaluation team applied descriptive and inferential statistical methods to analyze quantitative data from the Site Leader Implementation Surveys, the Educator EOY Survey, and program documents (i.e., activity and attendance records). The reliabilities of scales from the Educator EOY Survey were calculated and found to be adequate for interpretation (see Appendix J). To improve comparability between data sources, findings focus on the spring 2025 Site Leader Implementation Survey, which was administered in the same timeframe as the Educator EOY Survey.[2]

[2] Scale reliabilities are not reported for the Site Leader Implementation Surveys due to insufficient sample size (n = 31-32). Reliability estimates require larger samples to be stable and interpretable.

Consistent with prior years, the UEPC team calculated composite scores for outcomes for each respondent by averaging their ratings of all the items on each scale. Survey scale composite scores and reliabilities for respondents' end-of-year (current) and their retrospective ratings at the start of the academic year (i.e., before they participated in the grant-supported PL activities) were also calculated. We used descriptive statistical techniques to compare composite ratings across time points on the scales related to the structure and functioning of the PL activities and educator outcomes (i.e., STEM identity & interest, STEM teaching self-efficacy, and STEM planning & instructional practices scale ratings). Additional details about our analytic strategy specific to each aspect of the evaluation are woven within the relevant findings section.

Defining Statistical & Meaningful Quantitative Differences: Interpreting the Findings of this Report

Throughout the report, we identify both *statistically significant* and *meaningful differences* for evaluation outcomes. This approach supports interpretation so that readers can distinguish between changes that are statistically detectable and those that represent more meaningful changes or differences in participant outcomes.

- *Statistical significance* was assessed using an alpha level of 0.05, meaning that we only considered differences unlikely to have occurred by chance alone. To highlight the strength of statistical evidence, results with p-values less than 0.01 are noted separately throughout the report.
- *Meaningful differences* were defined as differences equal to or greater than 0.2 standard deviations. These represent substantive changes or differences within the STEM AC PL program.

Qualitative Data

The UEPC evaluation team gathered qualitative data via the PL Grant Manager Interview, Site Leader Interviews, Participant Focus Groups, and open-ended responses to the Site Leader Implementation Surveys and the Educator EOY Survey. Following data collection, UEPC evaluators used a multi-step qualitative analysis approach. First, we developed an initial codebook using deductive categories based on the inquiry's guiding questions and associated literature. Examples of these deductively identified codes included categories of accessibility, collaboration, leadership, and institutional support concerning expanding access to PL activities; categories of implementation support, curriculum alignment, and educator self-efficacy about learning application; categories of adaptation, sustainability, and long-term impact in relation to learning transfer.

During the first coding round, three UEPC evaluation team members applied the deductively developed codes to a selected subset of transcripts from site leader surveys, while remaining open to inductive codes that emerged from the data (Saldaña, 2016). This coding process included the UEPC team reconciling differences in codes, clarifying codes, and determining if new codes should be added to a revised version of the codebook to capture participant experiences better. Next, the UEPC team used the revised codebook, including deductively and inductively generated codes, to analyze the corpus of qualitative data collected during the evaluation.

Once the UEPC team had completed the coding of data collected from all qualitative data sources, the evaluation team identified themes using data from all sources in the context of the PL Grant program and the guiding questions of this inquiry. We present these themes, along with selected illustrative quotes, in the findings section of the report.

Findings

In the following sections, we discuss the findings of this UEPC evaluation as guided by the evaluation questions. First, we share key findings related to STEM AC PL program implementation, followed by a discussion of how grant-supported PL activities were aligned with program expectations and Utah PL standards, STEM AC's role as an intermediary in the PL grant program, and last, how participation STEM AC PL grant-supported activities was associated with educator outcomes of interest.

Program Implementation

To address the first research question, the UEPC team examined the extent to which PL sites implemented grant activities as planned and aligned with site goals and objectives. The analysis drew on program data collected throughout 2024-25, including grant activity calendars, calendar updates and comments, site leader reflections on goals and progress, and participating educators' reflections on their motivation for participation. Figure 2 offers an overview of these key findings regarding program implementation. This figure is followed by a more detailed discussion of STEM professional learning focus areas across sites, implementation scope, progress toward stated goals, and key factors that supported or hindered successful implementation during the 2024-25 academic year.

Figure 2. Overview of Key Findings for STEM AC PL Program Implementation

As intended, professional learning activities focused on specific STEM content areas and STEM integration with other content areas.

The STEM PL Grant program allows sites to implement professional learning activities in various ways according to local needs and priorities, which includes the subject area focus and the extent to which sites integrate STEM content with non-STEM content areas. Site leader responses to the 2024-25 Site Leader Implementation survey indicated that grantees focused their grant-supported activities on a variety of STEM and non-STEM content areas.[3] As shown in Table 2, the largest fraction of participating programs targeted math content (74%) as a part of their grant-supported activities. In comparison, more than half of the sites focused on science (65%). Several grant programs (*N* =12, 39%) focused on integrating STEM with non-STEM subjects. English Language Arts (ELA) was the most common non-STEM content area integrated into grant-supported PL activities, with 39% of sites including ELA components in their STEM PL activities. Despite the STEM AC's increased interest in providing more robust supports for educators working with particular student populations, only about one-quarter of sites reported focusing on Special Education and slightly fewer reported focusing on Career and Technical Education (19%) as a part of their STEM PL activities.

Table 2. Subject or Content Area Focus of Reporting PL Sites

Focus of PL Activities	Count	Percent of Reporting Sites
STEM Subject Areas	**31**	**100%**
Mathematics	23	74%
Science	20	65%
Engineering	10	32%
Technology and Computer Science	10	32%
Non-STEM Subject Areas	**12**	**39%**
English Language Arts (ELA)	12	39%
Social Studies	4	13%
Foreign Languages	2	6%
Fine Arts	5	16%
Foreign Languages	1	3%
Physical Education (PE)	1	3%
Other Focus Areas		
Special Education	8	26%
Career and Technical Education (CTE)	6	19%

Source: UEPC Fall 2024 Site Leader Implementation Survey

Note: N = 31. Since some sites reported focusing their PL activities on multiple content or focus areas and were counted multiple times, the percentage in the last column will not total to 100.

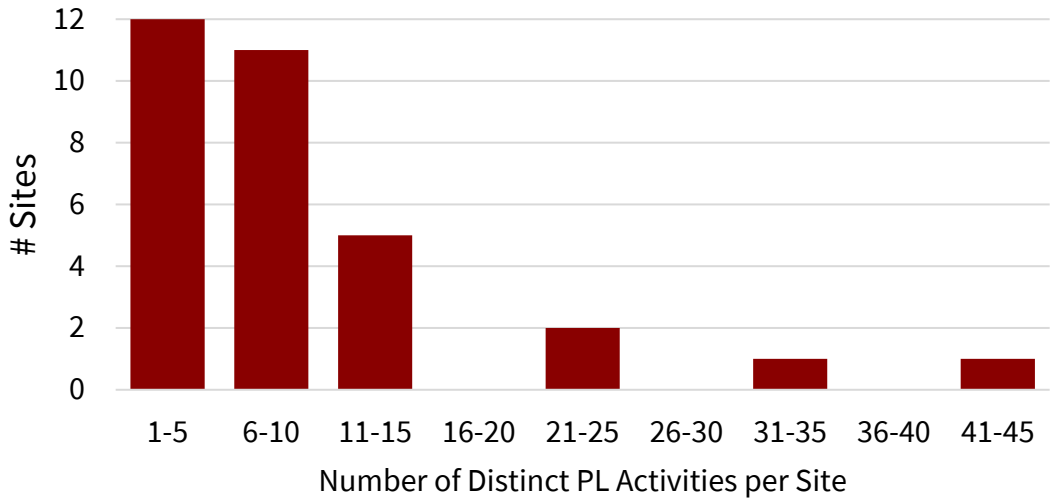
Grant Activity Calendars showed that STEM professional learning activities were successfully implemented broadly across sites, with sites implementing multiple activities with many occurrences during the 2024-25 AY.

Based on implementation data provided by site leaders on the Grant Activity Calendars for the 2024-25 AY, the 32 sites supported by the PL Grant program collectively planned 316 distinct professional learning activities during the 2024-25 AY. Since grant sites were implemented at sites of various sizes and with various needs, the number of activities per site varied widely, ranging from 1 to 41 and

[3] This information excludes one site that did not provide information.

averaging just under 10 activities per site (mean = 9.88). Figure 3 shows the distribution of sites by the number of distinct activities (e.g., workshops, trainings, mentoring programs) they offered during the 2024-25 AY.

Figure 3. Number of Sites by Range of Distinct PL Activities Offered (2024–25 AY)

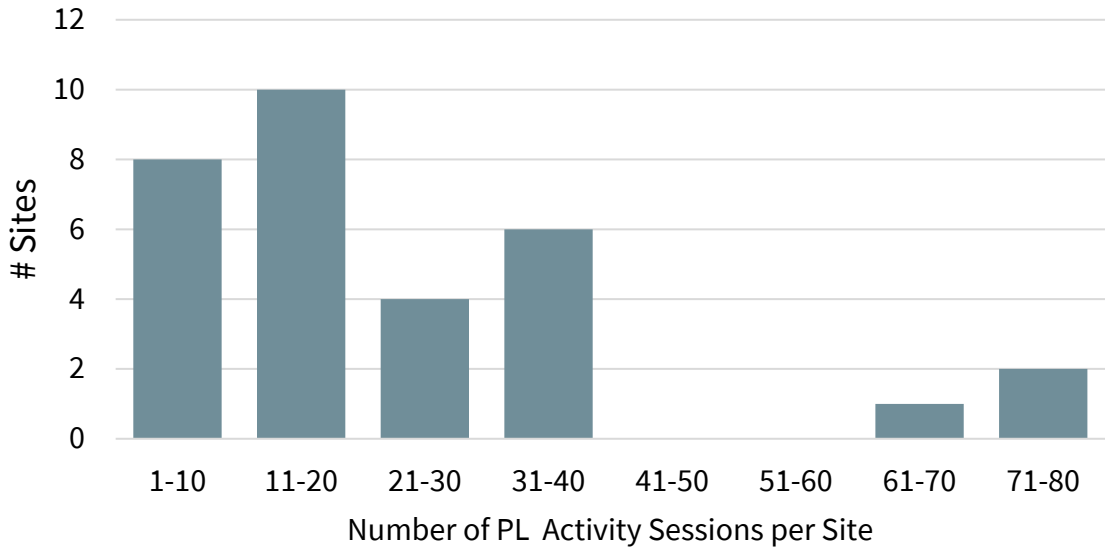


Source: Site grant activity planning calendars.

Note: N = 32.

Sites also provided data about the number of occurrences over the course of the academic year for each distinct grant-supported activity. In total, the PL grant program supported over 700 individual activity occurrences during the 2024-25 AY. Figure 4 shows the distribution of sites by the number of individual activity occurrences they held this academic year. Though the majority of programs held 40 or fewer PL activity occurrences, a few (N=3) held more than 60 PL activities throughout the 2024-25 AY. This reiterates the variation in the scope and intensity of programming across sites.

Figure 4. Number of Sites by Total Reported PL Activity Per Site Occurrences (2024–25 AY)



Source: Site grant activity planning calendars.

Note: N = 31.

In addition to the data site leaders provided in surveys, interviews, and primary data entry in the Grant Activity Calendars, a subset also provided additional open-ended comments regarding implementation progress and changes to planned implementation among their calendar updates. Site leaders from half of the participating sites (*N* = 16) provided these comments, offering additional insights into the extent to which implementation went as planned, feedback from participating educators, and comments on participation relative to expectation.

A majority of the site leaders (15 of the 16 who provided additional comments) reported that all or nearly all of the activities listed on their grant activity calendars had been implemented as planned. However, one site had planned a particularly large number of activities (32) and had to cancel about half of them, these were follow-up reflection sessions where they had not anticipated being unable to find a common time for staff to meet. Still, most site leaders also shared positive reflections about implementation with reports of activities having gone well or minimally, "*as expected*."

Many site leaders also made remarks about positive responses from teachers, commenting on their feedback being "*positive*" or even "*overwhelmingly positive*." Site leaders noticed participant enthusiasm and engagement in the activities, efforts to apply learning, increased confidence, and an appreciation for access to content knowledge and "classroom-ready materials."

Less often in the open-ended responses, site leaders commented directly on changes in participation, with no distinct patterns across sites. Generally, participation was as expected, with a few cases that exceeded expectations and a couple that were lower than expected due to challenges with sub coverage. In one case, a site had to drop an activity on math leadership observations due to changes in district leadership and the redirection of district efforts. In another instance, adjustments were planned for the future to use in-house presenters as the vendor-provided presenter "*was not as great as was promised*."

Site leaders reported that approximately two-thirds of the PL grant objectives were complete or nearly complete at the end of the second and final year of implementation.

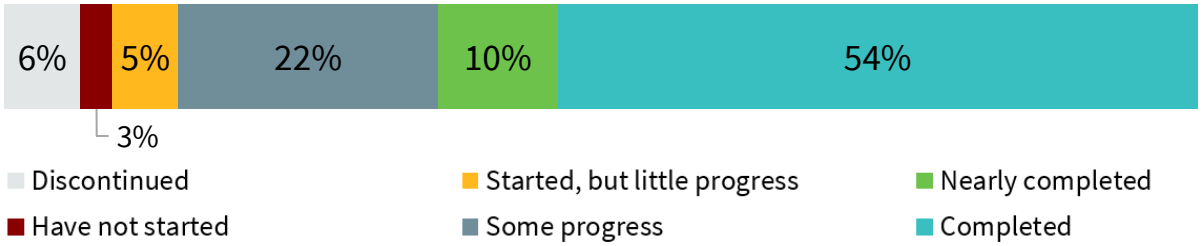
Site leaders reported the progress of the grantees toward their goals on the Site Leader Implementation Survey at the end of fall 2024 and again at the end of spring 2025.[4] Site leaders from all 32 participating grant programs provided this information at least once during the reporting periods. Participating sites reported progress on 110 goals, five of which were new this year. Each reporting site had set between one and eight goals to guide the implementation of its grant activities. The UEPC evaluation team used the most recent progress ratings from site leaders in reporting and analysis, meaning that if sites did not report their progress towards their objectives on the spring 2025 survey, we instead used their responses from the fall 2024 survey.

As shown in Figure 5, just over half of the objectives set by participating sites were complete as of Spring 2025 and another 10% were reported as nearly complete. We consider this progress towards nearly two-thirds of sites' objectives to be on par with expectations, given that sites often needed to revise these objectives, written at the beginning of their very first program year, as a part of ongoing

[4] The UEPC evaluation team used the most recent progress ratings from site leaders in reporting and analysis, meaning that if sites did not report their progress towards their objectives on the spring 2025 survey, we instead used their responses from the fall 2024 survey. A limitation of this approach is that sites could have made additional progress that is not represented in the findings.

adaptation and responsiveness to needs and resources availability. Programs also reported making some progress towards just under a fourth of their goals. Still, little to no progress was reported on approximately 14% of goals, including 5% with little progress, 3% that had yet to be started, and 6% that were discontinued due to challenges or shifts in priorities (i.e., data availability, sufficient educator progress to support next steps, new district literacy initiatives, teacher requests for other supports). In the interpretation of these findings, it is important to note that sites could have made additional progress that is not represented in the findings due to missing responses from six or about 19% of participating sites on the Spring 2025 implementation survey.

Figure 5. Reported Progress Towards Sites' PL Goals (2024-25 AY)



Source: Fall 2024 and Spring 2025 Site Leader Surveys
Note: N = 31 for fall 2024 and *N* = 26 for spring 2025.

Site leaders identified sustained support, practical resources, and opportunities for collaboration as key factors in successfully implementing their professional learning objectives.

In addition to providing ratings of progress toward their goals, site leaders responded to open-ended items about factors that supported completion or progress toward their PL objectives. Thirty sites provided open-ended responses. The UEPC team's analysis of these open-ended responses identified two key themes, which included the availability of practical, ready-to-use materials and resources for educators and ongoing support and coaching for PL participants. The following sections provide a more detailed description of the theme and representative examples of participant quotes that accompany each theme.

Access to Classroom-Ready Materials and Resources

Site leaders most consistently attributed their professional learning successes to providing teachers with immediately usable classroom materials and strategies, with several sites across both survey periods explicitly mentioning ready-to-use resources, concrete protocols, or practical tools as key to teacher engagement. Leaders reported that teachers appreciated when professional learning sessions equipped them with materials they could implement without extensive additional preparation time, including discussion protocols, mathematical tasks, hands-on science activities, and curriculum adaptation tools.

- *The model of providing teachers with concrete, ready-to-use materials that directly support student discourse has been highly effective. Teachers appreciate having access to quality tasks and discussion protocols that they can immediately implement in their classrooms (Fall 2024 Site Leader Survey)*
- *We have had steady participation in the professional learning so far, and that success has been driven by providing engaging, hands-on, in-person learning that provides practical strategies that educators can immediately implement in their classrooms with the resources provided (Fall 2024 Site Leader Survey)*

Ongoing Support and PL Opportunities

A second prominent pattern of survey responses involved providing ongoing support and coaching relationships that extended beyond initial training sessions. Multiple sites across both survey periods emphasized the importance of follow-up collaboration, opportunities to practice and reflect, and sustained coaching support to contribute to progressing toward PL goals.

Site leaders also described creating systems for ongoing professional learning rather than relying on isolated training events, including peer observation opportunities and collaborative reflection time. This theme appeared consistently across both survey periods, with leaders noting that sustained implementation required multiple touchpoints and ongoing relationship-building with participating teachers.

- *The power that has come from coaches attending with the teachers has opened the door to more coaching and collaboration amongst educators, so that results are having greater traction and impact (Fall 2024 Site Leader Survey)*
- *By providing multiple opportunities for teachers to observe, practice, and reflect on new strategies, we've seen consistent implementation across participating classrooms. Teachers report feeling more prepared and confident in facilitating student discourse (Spring 2025 Site Leader Survey)*
- *We've secured experienced professionals to provide hands-on training and coaching, and we are building time into our fall professional learning to scaffold these skills. Ongoing support and structured collaboration time will be essential as we transition from planning to classroom implementation (Spring 2025 Site Leader Survey)*

Some sites also mentioned building teacher confidence as a factor in their success. However, this appeared less frequently in the data and occurred primarily in specific contexts where sites also described working with teachers who initially hesitated about engaging in STEM instruction and professional learning.

Site leaders identified administrative support gaps, competing curriculum priorities, and time constraints as primary barriers to implementation.

In open-ended survey responses, the UEPC team asked site leaders to identify barriers to effective STEM AC PL grant activity implementation. We identified three themes with consistent evidence among survey responses: lack of understanding and support from school and district leadership, competing curriculum initiatives that diverted attention from STEM professional learning goals, and various time-related constraints that limited implementation capacity.

Lack of Support and Understanding from School and/or District Leaders

The most frequently cited barrier to making progress toward site objectives was school and district leadership's lack of understanding and support. Multiple site leaders across both survey periods explicitly described administrators who either did not understand the pedagogical goals of the grant-supported STEM PL activities, could not provide necessary systemic support, or actively undermined implementation efforts. This barrier appeared consistently from Fall 2024 through Spring 2025, suggesting it represents a more persistent challenge rather than a temporary implementation issue. Site leaders described administrators who lacked clarity about effective STEM instruction, viewed professional learning as an "add-on" rather than core instructional improvement, or failed to provide the autonomy and resources necessary for teachers to implement new practices. Notably, sites that described a lack of administrative buy-in often cited individualized successes, such as teacher use of TeachFX or other resources, suggesting that building the types of collaboration and ongoing support previously described as a key factor in success may not have occurred at these sites.

- *One challenge I had was that administrators believed this was an 'instructional coach' only goal and didn't do much to support it from the system/administrative level. While I appreciated being able to run with my ideas, it was a challenge not having their buy-in (Spring 2025 Site Leader Survey)*
- *We aren't really able to survey students. We also want to participate in research around effectiveness of our programs and our district leaders are resistant to any type of research involvement by teachers (Spring 2025 Site Leader Survey)*
- *One of the biggest challenges is the lack of administrator clarity on what effective mathematics teaching looks like in the classroom and how they can support teachers in making a shift in pedagogy (Fall 2024 Site Leader Survey)*

Competing Curriculum Initiatives

Competing curriculum initiatives were a commonly cited barrier across both survey periods. Site leaders consistently reported that new literacy and mathematics curriculum created demands on teacher time and attention that directly competed with STEM professional learning goals. Multiple sites explained that they abandoned their original professional learning objectives to focus on required and prioritized content curriculum implementation support. Some site leaders also described misalignment between existing curriculum and the strategies and resources being promoted in the professional learning sessions.

- *We found that our teachers wanted more support on our new curriculum and fluency. We shifted our focus to support those needs (Spring 2025 Site Leader Survey)*
- *We find it hard to get secondary folks to attend and when they do they are reluctant to implement. They still have a very traditional idea of what it means to have success with mathematics and a traditional approach to teaching. This is emphasized by lack of support from district and building leadership in promoting change (Fall 2024 Site Leader Survey)*
- *Our district has a new ELA curriculum this year so a lot of our PL is dedicated to unpacking*

modules and analyzing assessments with the teams (Fall 2024 Site Leader Survey)

Time Constraints

Time constraints represented a third major barrier to PL implementation. This barrier was mentioned across almost all sites but manifested in different ways. Leaders described challenges ranging from basic scheduling difficulties to deeper capacity issues with teachers feeling overwhelmed by competing demands. Logistical and curriculum challenges were mentioned even by sites who also described success in establishing ongoing support, collaborative structures, and practical tools to support implementation.

- *Teacher time is our greatest barrier. Time to plan, prepare and work new learning into their current schedule (Spring 2025 Site Leader Survey)*
- *The biggest challenge has been ensuring substitute coverage for teachers to ensure they are able to participate in the professional learning throughout the year (Spring 2025 Site Leader Survey)*

Alignment with Key Features of Effective PL Design

For the second evaluation question, the UEPC team collected and analyzed data to examine how grant-supported PL activities at participating sites were aligned with key features of effective PL design, which were informed by program expectations and the Utah professional learning standards (see Appendix A). Specifically, we collected and analyzed data around seven subscales representing key features captured in survey measures and elaborated upon with additional context through qualitative data analysis. These PL design features included a focus on professional learning and growth, respectful and effective communication, shared vision and responsibility, adherence to adult learning principles, supportive learning culture, effective learning design, and effective data use. Each of these dimensions of PL design and example items are provided in Table 3. Appendix K provides additional information about these scales and their associated reliabilities.

Table 3. Definitions and Example Items for Scales Measuring Dimensions of Effective PL Implementation

Features of Effective PL Design	Definition	Example Scale Item(s)
Focus on Professional Learning and Growth	Participants expanded their learning and strategies to address diverse student needs through scaffolded opportunities to apply learning.	■ *Participants were provided with sufficiently scaffolded opportunities to apply their learning to practice.*
Respectful and Effective Communication	Respect for diverse ideas, effective inquiry strategies for clarification, and mutual respect in interactions.	■ *Participants' interactions reflected mutual trust and respect.*
Shared Vision & Responsibility	Professional learning facilitators and participants share responsibility for student learning, vision of STEM professional learning, and creating high expectations for student STEM achievement.	■ *Professional learning facilitators and participants shared a vision for STEM professional learning that*

Features of Effective PL Design	Definition	Example Scale Item(s)
		focused on improving student learning.
Adherence to Adult Learning Principles	Consistency across sessions, knowledge of Utah standards, participant input on content, gradual introduction of new material, time to practice between meetings, addressing participant needs and interests, opportunities to exchange knowledge and views about STEM topics, and useful resources for application to practice.	■ *Gave participants the chance to inform the construction of its content.* ■ *Allocated sufficient time for participants to practice new skills between meetings.*
Supportive Learning Culture	Recognizing participant assets and contributions, promoting idea sharing and feedback, honoring professional experience, recognizing failure as part of professional practice, adapting to educators' professional learning needs and interests, and using technology to increase educator voice in professional learning.	■ *Actively promoted routine feedback - both seeking and receiving.* ■ *Honored professional expertise and experience.*
Effective Learning Design	Clear purpose of collaborative work, participation opportunities through flexible scheduling options, technology to expand access, dedicated time for collaboration, flexibility for spontaneous collaboration, structures and processes to organize collaboration, competence building, and structures for reciprocal accountability.	■ *Allocated sufficient time for collaboration.* ■ *Effectively leveraged technology to expand educator access to professional learning opportunities.*
Effective Data Use	Using data to prioritize vision of effective STEM professional learning, with participants individually and collaboratively examining student data to enhance STEM teaching and learning.	■ *Participants collaboratively examined data and analyzed student work to enhance STEM-related teaching and learning.*

The UEPC leveraged multiple data sources to assess how and in what ways participating PL grant sites demonstrated alignment with these effective features of professional learning design, including responses to both the Fall 2024 and Spring 2025 Site Leader Surveys ($N = 31$ and $N = 26$, respectively), responses to the end-of-year Educator Survey ($N = 1{,}035$), interviews with site leaders ($N = 17$), and educator focus groups ($N = 81$). The mixed methods approach to analyzing these data allowed the UEPC team to develop a more complete understanding of the ways in which PL activities were designed and experienced by participating educators and site leaders throughout the year. The following sections provide a detailed discussion of the key findings around how grant-supported PL activities were aligned with the features of effective PL from the perspectives of site leaders and educators.

Figure 6 offers an overview of key findings regarding the alignment of PL grant activities with key features of effective professional learning design. This figure is followed by a more detailed discussion of site leader and educator ratings of the extent to which their PL experiences exhibited these key features as well as additional insights from qualitative analyses of participant comments and reflections.

Figure 6. Overview of Key Findings for Alignment with Key Features of Effective PL Design

Site leader and educator ratings indicate moderate to strong agreement regarding the presence of key features of effective PL design in PL activities.

Participants and site leaders provided additional nuance and insights into how the seven key features of effective PL design were experienced by participating educators.

Site leader and educator ratings indicate moderate to strong agreement regarding the presence of key features of effective PL design in PL activities.

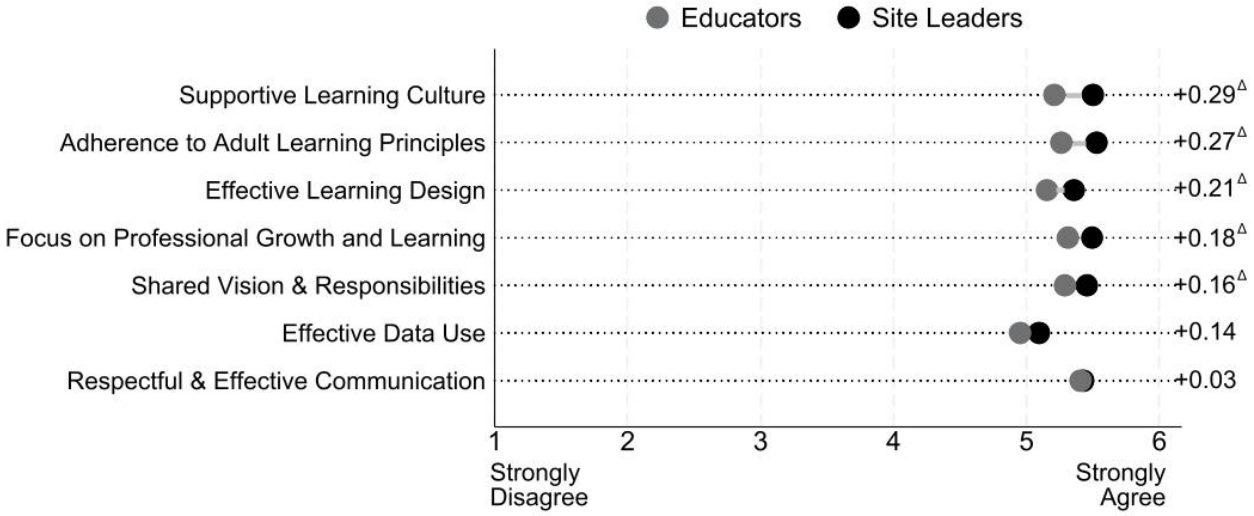
Site leaders rated the alignment of PL activities with key features of effective professional learning (see Table 3) on the Fall 2024 and Spring 2025 UEPC Implementation Surveys ($N = 30$ and 25, respectively). Similarly, the 2024-25 EOY Educator Survey asked participants about the extent to which the PL activities they engaged in aligned with these areas ($N = 913$ to $N = 964$ across items). Survey subscales contained 3 to 9 items each, with reliabilities ranging from 0.85 to 0.94, all exceeding acceptable thresholds (see Appendix K). To support a more valid comparison, we used the site leaders' survey responses from spring 2025, the same time frame during which the EOY Educator Survey was implemented.

Figure 7 displays the average ratings across items measuring the features of effective professional learning based on site leaders' and educators' spring 2025 survey responses and the differences in ratings between these groups. Overall, both educators and site leaders strongly agreed that PL experiences aligned with the features of effective PL implementation. Another notable pattern in the results is that site leaders consistently rated alignment of PL experiences with features of effective PL design higher than educators. Moreover, while none of these differences between site leaders and educators were statistically significant (distinguishable from zero), five were meaningfully different from each other (only differences between effective data use and respectful and effective communication were not meaningfully different). The lack of statistically significant differences may be more of a reflection of being underpowered to detect a difference due to the low sample size for site leaders rather than the true absence of a difference.

Follow-up analyses comparing differences in the ratings across the features showed no significant differences for site leaders. However, these analyses showed that educators rated the dimension of respectful and effective communication significantly higher than all other scales, suggesting that educators viewed this feature as a strength of the grant-supported activities they participated in.

Furthermore, educators rated the effective data use feature significantly lower than all other features, suggesting this area has an opportunity for improvement across grant programs.

Figure 7. Differences in Average Site Leader and Educator Ratings Across Features of Effective PL Design



***$p < .001$, **$p < .01$, *$p < .05$, Δ meaningful difference (≥0.2 SD) regardless of statistical significance
Sources: UEPC 2024-25 EOY Educator Survey, UEPC Spring 2025 Site Leader Implementation Survey

Participants and site leaders provided additional nuance and insights into how the seven key features of effective PL design were experienced by participating educators.

The UEPC also included qualitative data analysis to add depth to the understanding of the results of the quantitative analysis of PL implementation features presented in the previous sections. An open-ended response item from the Educator Survey included 239 substantive responses[5] (23% of the survey responses overall) to an item regarding their experiences interacting with people and materials as a part of the STEM AC-supported PL. These responses represented 29 of 32 sites with a range of 1 to 36 open-ended responses per site (average of 7.0).

Participants' responses provided additional context and nuance to understanding the seven features of effective Pl design (e.g., effective learning design, supportive learning culture, shared vision and responsibility, effective data use, focus on professional learning and growth, respectful and effective communication, and adherence to adult learning principles). However, the extent to which participants provided insights across these design features varied.

[5] We excluded 10 responses entered that were either generically positive or null (e.g., "*Thank you*", "*No comments*")

Effective Professional Learning Design

The greatest number of responses addressed effective learning design (*N* = 71 across 16 sites), with opportunities and support for collaboration emerging as the most prominent and well-developed feature. Participants consistently described and valued structured collaborative opportunities that spanned multiple organizational levels, from grade-level teams to district-wide networks. The PL experiences utilized technology to expand access and participation, with virtual sessions and digital tools enabling broader collaboration. Competence-building features, including hands-on experiences, lesson demonstrations, and opportunities to practice with materials before classroom implementation, were also highlighted. Additionally, regular scheduling provided valuable routine opportunities for collaboration.

- *Our facilitator was so incredibly informative and led us to so many resources. The conversations we had were so impactful and I feel like I was able to go back to my class feeling a lot more confident in STEM. (Educator, EOY Survey)*
- *Having a regularly scheduled time (PLCs and our instruction during lunch time) was invaluable! I knew that I had dedicated time to ask questions, refine plans, and clarify expectations. Being able to have immediate access to other teachers during this time helped with cross-curricular development, too! (Educator, EOY Survey)*
- *This was a great opportunity to improve my craft. We addressed WHAT to teach and heavily focused on HOW to teach it to allow maximum student engagement and independence. (Educator, EOY Survey)*
- *Having the time to collaborate with our STEAM teacher during PLC's has been an absolute game changer this year! She is able to see what we are teaching for that week and help us come up with ideas on how to integrate those learning tasks into her lessons that she is teaching as well. It has been AMAZING!! (Educator, EOY Survey)*

Supportive Learning Culture

Responses indicated strong evidence for a supportive learning culture, particularly around valuing and sharing professional experiences among educators. Educators consistently emphasized the importance of learning from sharing ideas, expertise, and feedback among colleagues. They described PL experiences as creating environments where teachers felt comfortable sharing their own practices while learning from others. Technology played a supportive role in enhancing educator voice, though its role in contributing to a supportive learning culture was emphasized to a lesser extent than its support for collaboration (mentioned in previous section). Respondents less often indicated that PL was adapted to meet individual educator needs and interests.

- *I'm all for learning from others and sharing together our knowledge because we're stronger together. (Educator, EOY Survey)*
- *Met with teachers on our specific grade level and got to share strategies and ideas relating to the standards we teach. It was great to collaborate with others. (Educator, EOY Survey)*
- *I enjoyed collaborating with other teachers in the iReady math classes. It improved my practices to hear how they encouraged student conversations in their math lessons. (Educator, EOY Survey)*
- *My experience was one-on-one with our district coach, rather than in a larger group. We focused on my goals, used tech and new strategies to reach my goals, and checked in with data collected during instruction time. (Educator, EOY Survey)*

Shared Vision and Responsibility

The responses provided more modest evidence for shared vision and responsibility, with educators demonstrating an emerging shared vision and commitment to STEM PL and instructional practices. This shared vision and responsibility is revealed, however, through more indirect or implicit statements rather than directly highlighted. Evidence of shared responsibility was most apparent in collaborative efforts to support implementation across organizational levels, such as leadership teams working on creating goals to help other teachers and collaborative work to become more aligned in approaches across grades or schools. Participant responses also demonstrated a shared sense of responsibility for student outcomes through discussions of learning outcomes and data, and collaborative work to improve outcomes.

- *I am an administrator and attended the Administrative STEM conference in Cedar City. It was very educational and helpful in showing me what the is needed to fully implement STEM in my school. We are just beginning to implement the core in our school and the majority of efforts were on teachers developing lessons for Science (Educator, EOY Survey)*
- *Our grade level team collaborated weekly. We also worked alongside our learning coach and other grade level teams to implement best practices and improve outcomes. (Educator, EOY Survey)*
- *As an educator interested in getting a special education math endorsement, I felt I got SO much out of these trainings. I have been empowered and will continue to share this expertise with my colleagues and promote enhanced learning with my students. (Educator, EOY Survey)*
- *We were able to meet as a Science Leadership team and work on creating goals to help the other teachers in our district with science. We worked all year on these goals and our end product was a science resource page, for fifth grade specifically, that houses all of the resources a fifth grade teacher would need. We know this is a living document and will continue to build and add as we go. (Educator, EOY Survey)*

Effective Data Use

A handful of participant comments (*N* = 13 across 9 sites) further informed how educators experienced effective data use in their PL experiences, the fewest of any implementation feature. The responses revealed focused but limited evidence for effective data use, with TeachFX emerging as the primary source of data educators were engaging with to drive improvement in their instruction. Participants described using TeachFX data to analyze and refine their teaching practices, with data use appearing to follow a systematic cycle of recording classroom discussions, analyzing results both individually and collaboratively with colleagues, and making targeted adjustments to instructional practices. There was limited discussion of the use of other forms of student data to improve STEM teaching and learning.

- *This was a highly collaborative effort within the school between teachers, administration, district personnel, and coaches. We used TeachFX to track data and enhance our teaching strategies. We used coaching cycles and lesson studies to push our teams to all teach at a higher level. (Educator, EOY Survey)*
- *I collaborated with teachers and coaches to improve math instruction using i-Ready Classroom Mathematics and TeachFX. i-Ready helped me assess student learning gaps, adjust lessons, and track progress, while TeachFX allowed me to analyze student vs. teacher talk time to encourage more student engagement in STEM discussions. (Educator, EOY Survey)*
- *We focused on my goals, used tech and new strategies to reach my goals, and checked in with data collected during instruction time. (Educator, EOY Survey)*
- *Collaborated with colleagues to analyze data and develop targeted interventions. (Educator, EOY Survey)*

Focus on Professional Learning and Growth

The responses often highlighted aspects of professional growth and learning as important components of participants experiences with PL. Educators frequently described meaningful expansion of their knowledge, strategies, and confidence for STEM instruction. Participants underscored the value of how much they learned from their PL experiences and the ways in which it supported their ability to apply their new knowledge and strategies to classroom practice. Many also highlighted how these new practices and resources supported student engagement in STEM lessons in their classrooms.

- *I learned so much about our science core and how to teach it. I was made aware of resources I had not previously known about. These courses helped me to better understand how to teach my science core and gave me the ability to do so this year. (Educator, EOY Survey)*
- *When we receive the supplies and lesson plans premade for us to teach a concept it is so time-saving and helpful. These lessons are always some of the favorites for students throughout the year. Watching the lessons in person how you would teach them, receiving the supplies then being able to go back to school to make the lesson fit with your students and time is great. (Educator, EOY Survey)*
- *I felt like this was a very valuable training as we seldom get grade level specific instruction (kindergarten) and also very seldom get support in science instruction. The activities and topics were current and applicable and taught in a way that we could take them back to our classrooms and incorporate them immediately. We were also given the supplies to carry out the activities and were not left with the burden of acquiring them ourselves. (Educator, EOY Survey)*

Respectful and Effective Communication

Participant responses included limited, indirect, but meaningful evidence for respectful and effective communication through their PL experiences. Educators' comments painted a picture of collaborative environments characterized by mutual learning and shared expertise. PL experiences appeared to foster inclusive communication practices where facilitators ensured all teachers were included and created opportunities for everyone to contribute their knowledge. Teachers appreciated hearing methods from experienced educators and felt comfortable sharing their own approaches, indicating respectful exchange of ideas and communication norms that valued diverse experiences and perspectives.

- *The presenter in one of my classes works all over the nation and was able to give us great ideas we hadn't seen yet in our district. We learned how to talk collaboratively and how to foster that in our classroom. (Educator, EOY Survey)*
- *She [facilitator] did an amazing job. She makes sure all teachers are included and gives opportunity for help and gaining knowledge so we can be better teachers. (Educator, EOY Survey)*
- *We had a chance to collaborate to share our own experiences. Then everybody saw the differences. (Educator, EOY Survey)*
- *Additionally, the camaraderie built during this process has been inspiring… Opportunities like this grant are essential for supporting educators in a challenging profession, as they provide priceless time for collaboration. I have learned so much from this experience. (Educator, EOY Survey)*

Adherence to Adult Learning Principles

Respondents indicated that several elements of adult learning principles were key features of their PL experiences. This offers encouraging evidence of the effectiveness of STEM AC as an intermediary and the responsiveness of site leaders in offering grant-supported PL that was characterized by these key features. There was a particularly strong emphasis on opportunities to exchange STEM knowledge and immediate practical application among participant responses. Educators emphasized the value of being able to take materials and lessons directly back to their classrooms for immediate application to practice. The collaborative nature of the STEM PL experiences also aligned well with adult learning principles, with teachers frequently highlighting the value of the opportunities to share knowledge and insights with colleagues in their schools and/or districts. In more limited examples, respondents highlighted the importance of having more individualized and incremental support as they adapt to new STEM concepts and technology for instruction.

- *It was a great training where we had time to discuss what we were hearing, apply it to our own grade level and make a plan on what to change before we even left. (Educator, EOY Survey)*
- *Teachers were able to have the chance to share their own experiences and ideas with each other at the Professional Learning. I got a bunch of great ideas of how to improve students' STEM learning in my classroom. (Educator, EOY Survey)*
- *I appreciate the individual attention that I have received from Geri Smith, our district tech support, who has helped me in increments as I learn new technology. (Educator, EOY Survey)*
- *Unpacking the standards with Monica Smith was a hands-on opportunity that taught me what to look for when planning out a unit. It guided me how to read the core guide and plan engaging lessons for my students (Educator, EOY Survey)*

STEM AC's Role as an Intermediary

Consistent with the overall evaluation method, the UEPC used a mixed methods approach to address the third evaluation question around how STEM AC serves as an intermediary in the PL grant program. The STEM AC's support for grant implementation and improvement was assessed quantitatively through the Fall 2024 and Spring 2025 Site Leader Implementation surveys ($N = 30$ and $N = 25$, respectively), while complementary qualitative analysis of site leader focus groups provided additional insights into understanding how grantees experience STEM AC as an intermediary.

Site Leader Implementation surveys included items asking site leaders to rate the STEM AC's role as grant managers and their support for continuous improvement. Table 4 defines these dimensions and provides selected example items. Appendix K provides additional information about these survey scales.[6]

Table 4. Definitions and Example Items for Scales Measuring STEM AC's Role as an Intermediary

Intermediary Role Subscale	Definition	Example Scale Item(s)
Supporting Continuous Improvement	The extent to which the STEM AC provided clear guidance, oversight, and resources to help grantees implement high-quality programs aligned with established standards and supported by data-informed improvement.	■ *Established clear program quality standards* ■ *Provided direct management support & assistance to grantee*

[6] Survey scale reliabilities were not calculated for these items due to insufficient sample sizes, which would have resulted in unreliable and unstable reliability estimates.

Intermediary Role Subscale	Definition	Example Scale Item(s)
Grant Management Support	The extent to which the STEM AC supported grantees in strengthening their programs through collaboration, access to resources, and structured opportunities for reflection and implementation planning.	■ *Provided grantees with useful materials and resources to improve program implementation* ■ *Provided opportunities for grantees to identify actionable steps for improving the implementation of their programs*

Figure 8 offers an overview of these key findings related to STEM AC's role as an intermediary. This figure is followed by a more detailed discussion of site leader ratings of how STEM AC supported continuous improvement and grant management s well as additional insights about the STEM AC's role from qualitative analyses of participant comments and reflections.

Figure 8. Overview of Key Findings for STEM AC's Role as an Intermediary

STEM AC successfully supported programs as a grant manager and partner in supporting continuous improvement and communities of practice.

Site leaders and participants provided additional insights into how the STEM AC provided implementation support, enabled access to funding and resources, and facilitated networking as an intermediary.

STEM AC successfully supported programs as a grant manager and partner in supporting continuous improvement and communities of practice.

As shown in Figure 9, on average, site leaders reported that STEM AC fulfilled their roles and responsibilities an intermediary to a large or very large extent. Across the year, site leaders' average ratings increased on most items in the scale, with the extent of agreement increasing modestly, but significantly, for the item related to STEM AC's efforts, encouraging ongoing internal assessment of program implementation, quality, and outcomes across participating sites.

Figure 9. PL Site Leaders' Average Ratings of STEM AC's Roles as an Intermediary

***p < .001, **p < .01, *p < .05, Δ meaningful difference (≥ 0.2 SD) regardless of statistical significance
Source: UEPC Fall 2023 & Spring 2024 Site Leader Implementation Surveys

Site leaders and participants provided additional insights into how the STEM AC provided implementation support, enabled access to funding and resources, and facilitated networking as an intermediary.

In addition to the quantitative survey findings presented above, the UEPC also included qualitative analysis of open-ended responses provided in the site leader surveys (fall 2024, spring 2025) and site leader interviews and educator focus groups to add context and depth to our understanding of how participants experienced working with STEM AC as an intermediary to support implementation of the PL grant.

The open-ended survey responses included comments from 28 of 32 site leaders that offered further detail on their experiences working with STEM AC as an intermediary who supported implementation of the PL grant. Though often limited in depth and detail, these comments revealed four main themes: support for implementation, access to funding and resources, and facilitation for network building, as described alongside selected participant excerpts.

Support

The greatest share of site leaders' comments revealed appreciation for the support they receive from STEM AC for implementation of the PL grant. This included an emphasis on the ways in which STEM AC provides support that feels personalized and flexible, providing guidance and regular check-ins so that site leaders knew they had reliable support when they needed it. Site leaders further highlighted how this support was beneficial for their schools, educators, and students.

- *You worked with me so well when I had extenuating circumstances or situations that needed a different approach due to size or such. It made me feel supported and seen. You made sure I knew what we were all aiming for, and I knew how to get there in my situation, and you valued that. Thank you! (Fall 2024 Site Leader Survey)*
- *This grant is fundamental to the quality of math instruction in [District] and we appreciate the amount of support we receive. We love the ability to alter our plan as we go so that we are doing what is best for our teachers and meeting them where they are at all times. (Fall 2024 Site Leader Survey)*
- *The STEM Action Center has been an invaluable partner in supporting our professional learning work. Their resources, funding support, and alignment with statewide STEM goals have made a world of difference. I feel supported and still growing in my own capacities through this year's meetings. (Spring 2025 Site Leader Survey)*

Funding & Resources

Site leaders' comments also suggest an appreciation for and perceived benefit from the funding and quality resources that STEM AC provides as the PL grant intermediary. Access to STEM AC funding and resources is viewed as central to ongoing efforts to provide quality PL that then supports effective instruction and student learning.

- *We could not support teachers' STEM identity and instruction even fractionally without access to the resources provided by the STEM Action Center. The professional development funding, access to tools like TeachFX, and opportunities for collaboration and coaching were instrumental in building teacher confidence and capacity around student-centered, three-dimensional STEM instruction. (Spring 2025 Site Leader Survey)*
- *The STEM Action Center is very supportive and collaborative in the execution of the grant funding and programming. (Spring 2025 Site Leader Survey)*
- *The STEM PL Grant funds changed math instruction in [District]. We provide quality PL, it is sustained and supported, and the data shows the PL is impacting student learning! (Fall 2024 Site Leader Survey)*

Facilitating Networks & Collaboration

More limited evidence also finds that some site leaders see STEM AC as playing an important role in facilitating collaboration and supporting networking among grant sites and with other external entities (e.g., state) to support implementation. In some cases, this is ongoing, in other sites they are anticipating in engaging further with STEM AC to build these networks.

- *They [STEM AC] have provided us with networking and collaboration opportunities where we have developed our ideas and plans. (Fall 2024 Site Leader Survey)*
- *We have done all of the planning and support for our grants but have had lots of opportunities to collaborate with other districts, state leaders, STEM AC, and informal educators. (Fall 2024 Site Leader Survey)*
- *[STEM AC] facilitated networks and communities of practice among grantees- we haven't done much of this yet- but we are working diligently on the foundation to launch this- hoping for March- April 2025 (Fall 2024 Site Leader Survey)*

Educator Outcomes

The UEPC evaluation team assessed three outcomes for educators who participated in grant-supported PL activities during the 2024-25 AY and completed the survey ($N = 815$) to address the final evaluation question. These three outcomes included educators':

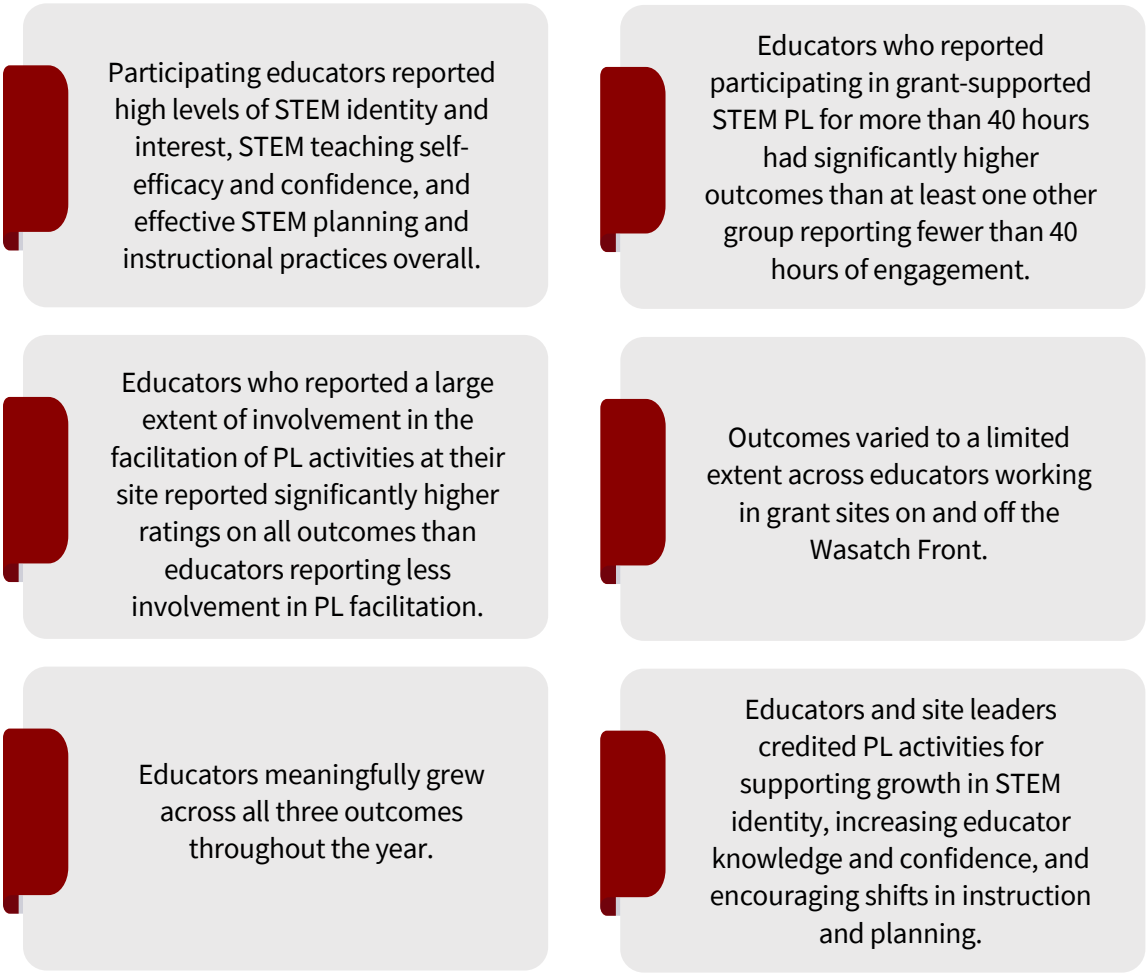
- STEM knowledge, teaching self-efficacy, and confidence
- STEM interest and identity
- STEM planning and instructional practices

Educators' ratings on groups of survey items to measure each outcome were used to construct composite scores at the start and the end of the academic year. These composite scores represent educators' average scores on items measuring the extent to which they agreed with items on a 6-point Likert scale ranging from (1) "*strongly disagree*" to (6) "*strongly agree*."[7] See Appendix K for details on the survey items in each scale and associated scale reliabilities.

Figure 10 offers an overview of the UEPC team's key findings about participating educators' outcomes. The following provides a description of the quantitative and qualitative findings for the study outcomes.

[7] Average composite scores reflect the unadjusted means of educators' end-of-year ratings. As a robustness check we also generated regression-adjusted means to account for educators' beginning of the year composite scores and unobservable site variation. There were negligible differences between unadjusted and regression-adjusted estimates, so we use the unadjusted means in these analyses as the more parsimonious approach.

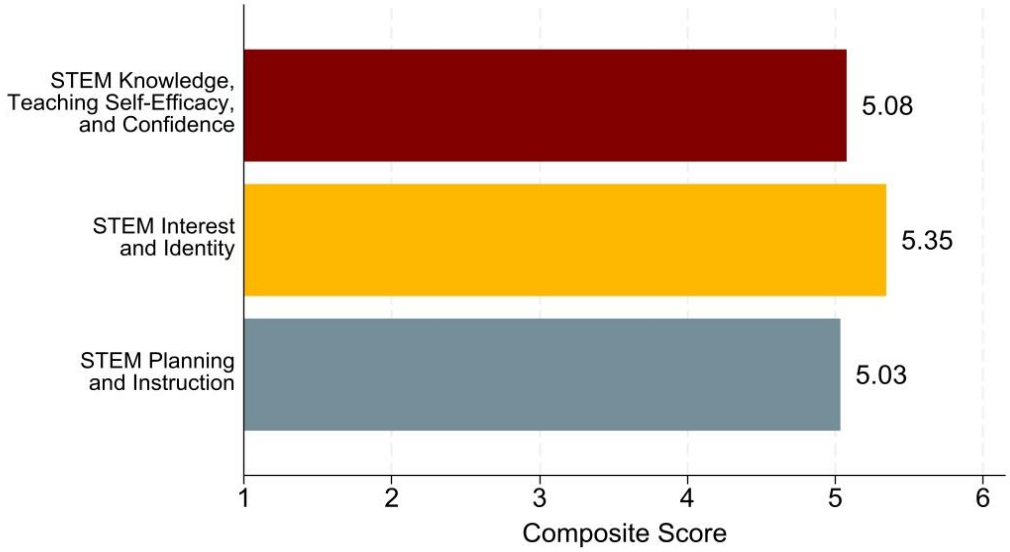
Figure 10. Overview of Key Findings for Participating Educators' Outcomes



Participating educators reported high levels of STEM identity and interest, STEM teaching self-efficacy and confidence, and effective STEM planning and instructional practices overall.

Participating educators across grant sites reported notably high ratings across all three educator outcome scales. Specifically, on average, educators agreed moderately to strongly with items measuring these outcomes. As shown in Figure 11, educators expressed the strongest level of agreement concerning their STEM interest and identity (average 5.35), followed by their STEM knowledge and teaching self-efficacy (5.08), and their effective STEM planning and instructional practices (5.03). All pairwise differences between these composite scores were statistically significant ($p < .001$), with meaningful differences between STEM identity and interest and each of the other two outcomes. This test shows us that each of the outcome areas differed from the others in a statistically reliable way. The most notable differences were between students' STEM identity and interest and the other outcomes, where the gaps were large enough to be both statistically significant and practically meaningful.

Figure 11. Educator Self-Ratings of Targeted PL Outcomes

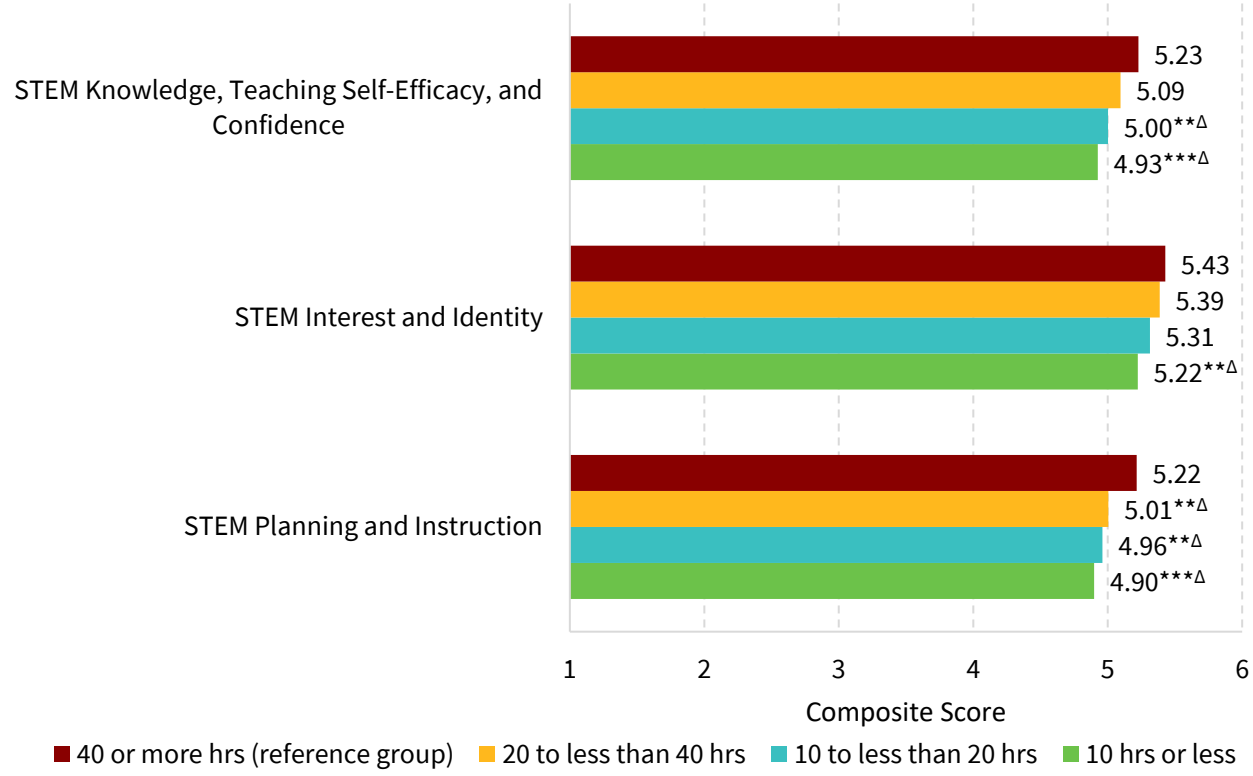


Source: Educator EOY Survey
Note. All pairwise differences between outcomes were statistically significant ($p < .001$). All pairwise differences between outcomes were meaningfully different except for the difference between STEM Knowledge, Teaching Self-Efficacy, and Confidence and STEM Planning and Instruction.

Educators who reported participating in grant-supported STEM PL for more than 40 hours had significantly higher outcomes than at least one other group reporting fewer than 40 hours of engagement.

The UEPC evaluation team also analyzed variation in educator outcomes according to how many hours participants reported engaging in grant-related STEM professional learning during the 2024-25 AY (Figure 12). All three educator outcomes rose steadily as educators engaged more, from less than 10 hours up to more than 40 hours. Furthermore, educators who participated in more than 40 hours of grant-supported PL activities had significantly higher STEM planning and instruction ratings than all other engagement groups. Significant and meaningful differences were also found for this high-engagement group in relation to STEM knowledge, teaching self-efficacy, and confidence ratings when compared to those who engaged in 10 to 20 hours of PL and those who engaged in less than 10 hours of PL. Comparisons between group ratings of STEM interest and identity only showed significant differences between those who participated in more than 40 hours of PL and those who participated in fewer than 10 hours of PL; other group comparisons were non-significant.

Figure 12. Variation in Educator Outcomes by Self-Reported Hours of Engagement in Grant-Related PL Activities

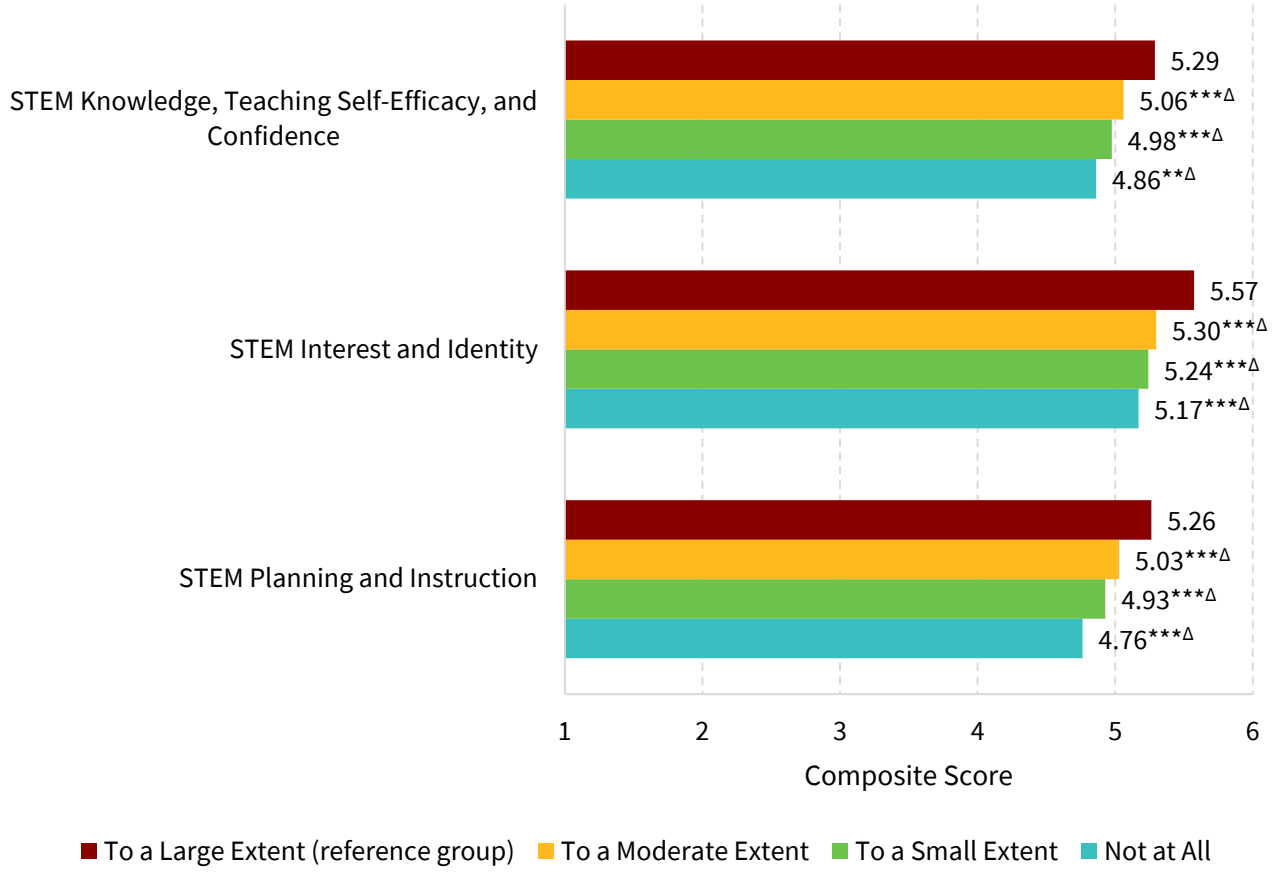


***$p < .001$, **$p < .01$, *$p < .05$, Δ meaningful difference (≥ 0.2 SD) regardless of statistical significance
Source: Educator EOY Survey

Educators who reported a large extent of involvement in the facilitation of PL activities at their site reported significantly higher ratings on all outcomes than educators reporting less involvement in PL facilitation.

Since prior research has highlighted the value of involving educators in the design and facilitation of PL activities, the UEPC evaluation team also investigated differences in outcomes based on the extent to which educators reported facilitating PL activities at their site (Figure 13). As with time spent engaging in PL activities, we observe a consistent increase in composite scores across outcomes with increasing levels of involvement in facilitating PL activities at grant sites. More specifically, these results suggested moderate differences on all outcomes between those who reported that they were involved in facilitation "*to a large extent*" when compared to those who reported no engagement in facilitation (i.e., "*none*"). The differences in outcomes between those who reported a large extent of engagement and those who reported a small or moderate extent of engagement were modest but statistically significant.

Figure 13. Variation in Educator Outcomes by Extent of Educator Involvement in PL Facilitation

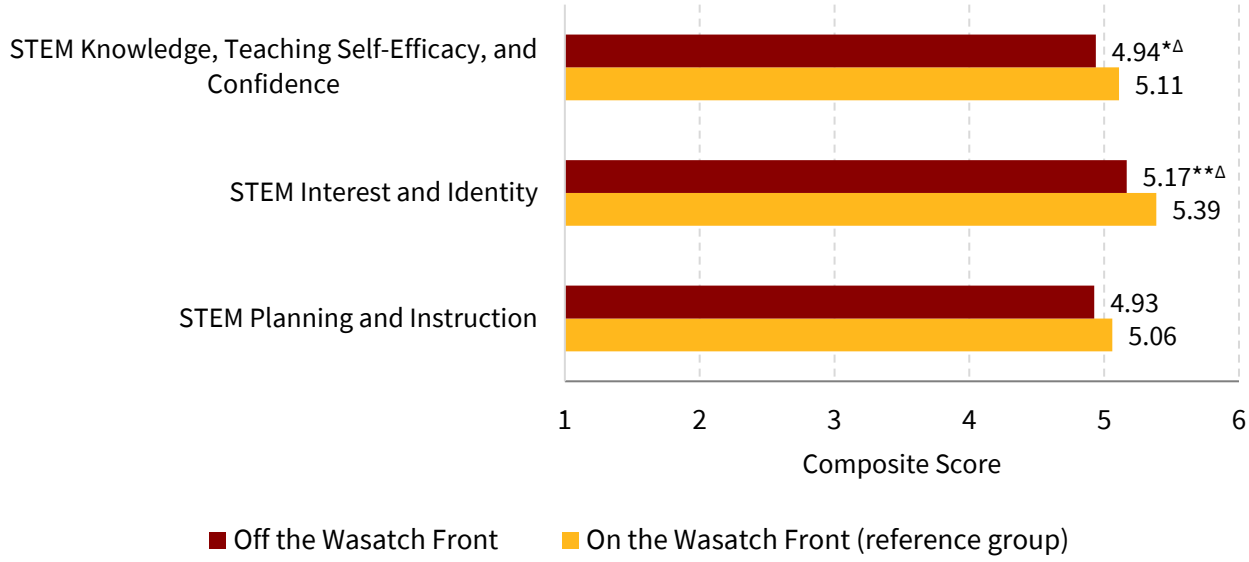


***$p < .001$, **$p < .01$, *$p < .05$, Δ meaningful difference (≥ 0.2 SD) regardless of statistical significance
Source: Educator EOY Survey

Outcomes varied to a limited extent across educators working in grant sites on and off the Wasatch Front.

Given that STEM AC supports sites in a variety of geographic locales in Utah, the UEPC team also assessed differences in educator outcomes by educator location at sites on or off the Wasatch Front (see Appendix L). We include analysis of differences by this site characteristic to examine whether systematic differences exist that may point to a need for different types or levels of resources or supports due to their greater distance from more centralized resources and more geographically remote locations. As shown in Figure 14, we observed limited differences in outcomes based on sites' location, with educators on the Wasatch Front reporting higher composite scores than those off the Wasatch Front (i.e., sites in more rural locations). There were small but significant and meaningful differences between educators' outcome composite scores on and off the Wasatch front for STEM identity and interest ($p < 0.1$) as well as their STEM knowledge, teaching self-efficacy ($p < 0.5$). We found no statistically significant or meaningful difference between educators on and off the Wasatch Front for STEM planning and instruction.

Figure 14. Variation in Educator PL Outcomes by Location on and Off the Wasatch Front

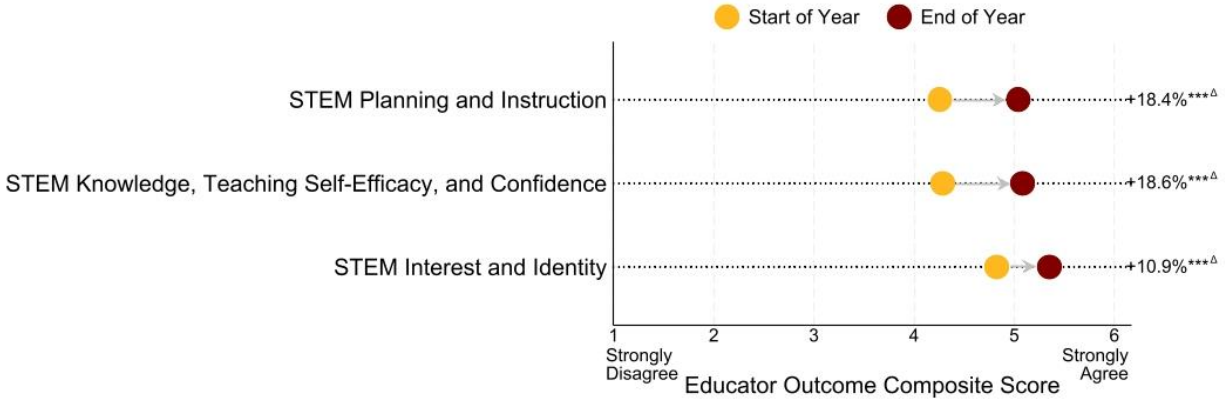


***p < .001, **p < .01, *p < .05, Δ meaningful difference (≥ 0.2 SD) regardless of statistical significance
Source: Educator EOY Survey

Educators meaningfully grew across all three outcomes throughout the year.

The UEPC team also assessed how much educators' self-ratings across each of the three outcomes changed throughout the 2024-25 AY and whether these changes differed across outcomes. As shown in Figure 15, educators reported growth for the three outcomes measured during the 2024-25 AY. All of these changes represented statistically significant (p<.001) and meaningful differences (≥ 0.2 SD) between the start and end of the AY. The difference for STEM identity and interest composite scores was significant but modest, representing approximately an 11% increase in educator ratings on this measure. The higher start-of-the-year ratings on this outcome may explain the relatively small change. Significant and moderate differences were found for STEM knowledge, self-efficacy, and confidence composite scores and STEM planning and instruction composite scores, representing approximately 18% increases on these measures between the start and end of the 2024-25 AY. Appendix L. Distributions of Educators' Outcome Composite Scores from the Start and End of the AY provides the distributions (i.e., kernel density plots) of educator composite scores at each outcome's start and end of the year.

Figure 15. Changes in Educator PL Outcomes between the Start and End of the Year (2024-25 AY)



***p < .001, **p < .01, *p < .05, Δ meaningful difference (≥ 0.2 SD) regardless of statistical significance
Source: Educator EOY Survey
Note: N = 784 for knowledge and confidence; N = 800 for interest and identity; N = 801 for planning and instruction.

Educators and site leaders credited PL activities for supporting growth in STEM identity, increasing educator knowledge and confidence, and encouraging shifts in instruction and planning.

In focus groups and interviews, the UEPC evaluation team asked site leaders and educators from PL sites to share examples of outcomes resulting from participation in STEM AC PL-supported professional learning, including growth in STEM identity and interest, increased STEM knowledge and confidence, and improvements in STEM planning and instruction. These site leader interviews included 17 site leaders from 13 sites, and the focus groups included 81 participants from 11 sites. Qualitative analysis of these conversations revealed additional depth and context to help better understand reported growth across the three educator outcomes.

Increasing STEM Knowledge and Confidence

The most prevalent outcome of participating in the STEM AC PL grant described in interviews and focus groups was increased teacher knowledge and confidence in STEM content and teaching. Site leaders consistently reported observing educators shift in mindset from uncertainty and anxiety about STEM instruction to demonstrating increased confidence and willingness to try new approaches.

Site leaders described PL as contributing to educators' self-efficacy through session activities and ongoing coaching and support, including facilitating peer observations where teachers could see successful STEM instruction in practice. Multiple site leaders noted success with programs that included peer observation components as a way to build educator confidence, where hesitant teachers could see colleagues successfully implementing STEM strategies before implementing them on their own. Educator focus groups also provided examples of increased knowledge, such as better preparation to facilitate student discussions in math, being more comfortable with inquiry-based science instruction, and developing the skills to help students engage in engineering design processes.

There was substantial evidence across sites and focus groups to suggest that PL supported development in teacher confidence and efficacy, and the following quotes provide examples of site

leader observations of teacher growth and educator descriptions of their increased ability to support student learning:

- *Well, the increase of access to resources, content knowledge and professional understanding of correct pedagogy for science and engineering instruction has led to a lot of increase in science instruction actually happening. But it also has allowed a lot of our teachers to identify as science STEM teachers, where in elementary world, that's something that is not as, it's not automatic default* (Site Leader, Interview)
- *I think initially they were a little concerned about how to go about teaching it. So what we did that first year is that we had the teachers sign up to observe other teachers with the task. So those teachers that may not have been as familiar or not quite sure how to do a task, they would sign up... and then they would get together and then once again, talk about what they saw, what they would do differently.* (Site Leader, Interview)
- *So this was me developing my confidence in teaching science, and I want to do it at the middle school level. And I don't think that had I not had this, I think that had I not had this coaching, that I wouldn't have done this. I wouldn't have felt confident enough to do this. So I know that I can go into a middle school setting and teach science.* (Educator, Focus Group)
- *I know when I started just TeachFX, I was unsure and I really lacked the confidence to be able to feel like I was going to do something worthwhile for the kids that would make a difference for them. And then as time went by, I was like, I'm doing a pretty good job. I'm actually learning how to do this. And I could definitely become better over time and practice. But yeah, my confidence has gone up a lot.* (Educator, Focus Group)
- *I actually felt [TeachFX] was one of the things that I did this year that helped me the most because I think you get doing your teaching and you don't even stop to think… I felt like it helped me probably one of the most things, the most that I did this year to help me reflect on what I was teaching or how I was teaching.* (Educator, Focus Group)

Developing STEM Identity and Interest

There was also evidence across focus groups and site leader interviews to suggest that STEM AC grant-supported PL contributed to growth in STEM identity and interest among participating educators. Site leaders and educators indicated several ways PL facilitated this growth, including collaborative experiences where teachers shared their successes and learned from peers, providing resources that made STEM instruction feel manageable, and ongoing support to help teachers align existing curriculum with what they learned from PL sessions. Site leaders explained that they had observed teachers signing up for after-school sessions, requesting additional resources, and expressing excitement about implementing new strategies. Educators directly expressed growth in confidence in identifying themselves as STEM educators and found increased enjoyment in teaching STEM content areas.

The following quotes illustrate both the initial challenges educators faced in developing a STEM identity and the specific ways professional learning helped them embrace STEM instruction, including site leader observations of teacher transformation and educator descriptions of their own identity development:

- *[Educators] imagine [STEM] to be something more than just this collection of skills in these content areas. And in our elementary setting, that's what it's, we double down on the standards for those*

content areas and then we grow culture and collaboration around it... Your math standards are STEM. Your science standards are STEM. When you teach your kids to collaborate, that's STEM when you're working on problem solving, that's STEM. (Site Leader, Interview)

- *I mean, it's built my confidence and my understanding of the content, and I think that it's been a stepping point. It's been just like a launching point for me to see myself as a STEM person and yeah, absolutely building my confidence.* (Educator, Focus Group)
- *Watching myself as well as teachers just have these aha moments has been so powerful and their knowledge of math content, which then I think increases their STEM identity because they have that greater confidence now in what they're teaching to support their students in learning the conceptual as well as the abstract ideas of mathematics* (Educator, Focus Group)

Shifts in STEM Instruction and Planning

Finally, site leaders and educators provided numerous examples of how PL activities led to shifts in educators' instructional planning and practices. Examples of changes in instruction included teachers moving from traditional, teacher-centered instructional models to more student-centered, inquiry-driven approaches that emphasized discourse, collaboration, and authentic problem-solving. Many educators reported increased confidence in facilitating student thinking rather than simply delivering content. Some also began implementing specific research-based strategies like task-based learning, number talks, and structured classroom discussions that promoted student engagement and mathematical reasoning.

In some cases, participation in STEM AC grant-supported PL also substantially changed how educators approached instructional planning and viewed their content areas. While examples of shifts in planning were not as prevalent across the data, some teachers described moving from isolated lesson planning to more integrated, unit-based planning that connected learning across multiple sessions and subjects. As noted throughout this report, some of the key characteristics of PL that educators and site leaders attributed to educator outcomes included experiential learning and modeling, alignment with existing curriculum, and implementation support structures beyond one-time workshops. The following quotes provide examples of how teachers applied PL content in their instruction and planning:

- *The thing that… I've seen is now [teachers] are looking for student responses that are student generated, not just in math, not just in science, but we're seeing it in literacy as well. Some of that explanation, well, why did you choose that as your evidence and how does that support your claim? And it's really that need to explain and articulate what you're thinking.* (Site Leader, Interview)
- *I think when you talk about planning, we help them. We know that planning looks different when you're going to have a discussion and when you're really going to engage in a thinking lesson than when you're just going to show some examples and then have kids mimic what you've shown them. So, there's a lot of thinking around your planning around how kids are going to react, the ways that kids are going to think, how you might connect the ideas and stuff. And so as they make that a practice for their planning in mathematics, they tend to make that a practice for planning in all content.* (Site Leader, Interview)
- *The pedagogical practices to be shifted about what it is to learn mathematics and then for the students to learn ways to develop that mathematical thinking and what we social mathematical norms like disagree appropriately prove your thinking and making sure that we're switching the learning and the talking and the involvement from teacher to a student. So, the teacher really facilitates more so mean as you know, that sounds great, but the nuts and bolts of making that*

happen, it's not easy. It requires a mentality shift but also requires tools to do it effectively. (Site Leader, Interview)

- *How I used to teach STEM was more like, here's a cool activity and here's a cool activity and let, let's do this here and let's do this here and this is really neat. Let's do this here. And it relates to our standard as opposed to tying it all together like, okay, I need to start here with my standards and I'm going to work through it this way. So where my planning is concerned, the whole cycle has made me link everything together and make it more of that big unit.* (Educator, Focus Group)

Recommendations

The UEPC team developed a set of recommendations to support the ongoing work of STEM AC in the PL grant program by leveraging the key findings from this year's evaluation. Consistent with the mission of the UEPC, the UEPC evaluation team generated a set of recommendations to be actionable and to support continuous improvement of the STEM AC PL program amid its record of success.

Notably, several of this year's recommendations echo themes from last year's evaluation, underscoring persistent trends in strengths and challenges across the implementation of this grant cycle. This consistency further highlights the importance of addressing key challenges to ensure long-term program success as the STEM AC's PL Grant program prepares to fund a new cycle of grant programs starting next year. For example, the need for strong alignment with school and district leadership and initiatives, expanded access to practical resources, sustained and collaborative engagement, and educator involvement in facilitation.

At the same time, this year's findings provide sharper evidence and expanded insight into recurring themes, leading to recommendations with a new emphasis on broadening the availability of tailored resources for diverse educator groups and strengthening the call to intentionally involve educators in the design and facilitation of PL activities. These additions reflect both progress made and new insights into how STEM PL can more effectively foster educator growth, collaboration, and ownership.

Support Sustained and Collaborative Learning Structures

Across sites, STEM professional learning that was both sustained and collaborative proved especially effective. Educators who engaged in more than 40 hours of grant-supported STEM PL reported significantly higher outcomes in STEM planning, instructional practices, and confidence compared to those reporting less engagement. Furthermore, sustained and collaborative learning structures (e.g., PLCs, peer observations, and coaching) were described by site leaders and educators as being key facilitators of success, with some even describing these as "game changers" in their practice.

This finding is consistent with last year's emphasis on supporting educator's regular and active engagement in PL, including involvement in professional learning communities (PLCs). The persistence of this theme highlights the importance of not only providing collaborative opportunities for participants, but also ensuring that they are sufficiently intensive to meaningfully impact practice. Continuing to invest in grant programs that design their STEM PL activities around collaboration and sustained engagement can support program success and lasting changes in participating educators' practices.

Support Buy-In & Alignment with Ongoing Initiatives

A commonly cited barrier to implementation was limited administrative understanding and buy-in, with site leaders and educators describing a perception that STEM PL was treated as an 'add-on'

rather than as central to instructional improvement. Furthermore, competing initiatives, particularly new literacy and math curricula, were also described as diverting attention and resources away from STEM PL efforts. Future cycles may benefit from building leadership-focused outreach and onboarding materials to assist in aligning STEM PL goals with broader instructional priorities at participating schools and districts.

This recommendation builds on last year's call to strategically align PL activities with school, district, and educator needs. While last year's evaluation stressed the importance of alignment to reduce being viewed as "another initiative," this year's findings provide additional evidence that some educators continue to perceive STEM PL as peripheral to their work and priorities, especially when not championed by leadership. The persistence of this barrier underscores the critical need for STEM AC and grantees in future grant cycles to more directly engage administrators at participating sites. This could include supporting sites in offering additional onboarding, leadership-specific sessions, or implementation planning tools for administration to help ensure consistent and strategic support throughout implementation.

Provide and Expand Access to Practical, Classroom-Ready Resources

Site leaders and educators highlighted the value of including ready-to-use instructional materials, protocols, and strategies in their professional learning experiences. Teachers emphasized that these resources were immediately implementable and saved valuable preparation time. At the same time, however, some educators noted gaps in the availability and balance of resources across particular subjects and grade levels, with requests for more math-focused content as well as tailored materials for specific groups of educators (i.e., secondary educators, special educators, and educators working with students in informal education settings).

This echoes last year's recommendation to enhance resource availability, communication, and relevance, which also highlighted gaps in awareness and use of the STEM AC's Resource Library. The recurrence of this theme suggests that while progress has been made, continued attention is needed to ensure equitable access to high-quality resources across educator groups and subject areas. This year's findings go further by identifying specific needs for tailoring (e.g., secondary education, special education, informal education), pointing to particular opportunities to expand depth and inclusivity of resources. Continued investment in high-quality, standards-aligned curriculum and instructional materials, while prioritizing these perceived gaps, could help expand and sustain the successes experienced this year. Furthermore, we recommend considering new ways to support sites in consolidating and sharing resources could be beneficial. As a part of this process, we encourage continuing efforts to facilitate access to and use of the existing STEM AC's STEM Resource Library among educators.

Involve Educators in the Design and Facilitation of Professional Learning

Findings showed that educators who reported being involved in facilitating PL activities at their site had significantly higher ratings across all measured outcomes (i.e., STEM knowledge and confidence, STEM identity and interest, and STEM planning and instructional practices) than those with little or no involvement in facilitation. As such, opportunities to promote shared responsibility and peer-to-peer learning among educators. Funding STEM PL initiatives that include explicit structures that intentionally involve educators in planning, facilitating, and reflecting on PL can simultaneously build

leadership capacity and foster a stronger culture of collaboration, continuous improvement, and sustainability across grant-supported sites.

This recommendation builds directly on last year's call to support educators' regular and active engagement in PL activities, including facilitation. The recurrence of this recommendation demonstrates that educator leadership and involvement remain central to effective STEM PL. However, this year's evaluation strengthens the case with additional outcome data showing significantly higher ratings among educators who facilitated PL activities. The STEM AC should continue to communicate this promising practice to grant-supported programs and to encourage them to find new ways to involve participating educators in the design and facilitation of STEM PL activities.

Conclusion

The UEPC's 2024-25 evaluation of the STEM AC's PL grant program provides important insights into program implementation, alignment with PL standards, the STEM AC's role as an intermediary, and educator outcomes. Findings highlight the scope and reach of grant-supported STEM PL and demonstrate evidence of successful implementation and educator growth across key outcome measures.

As in last year's evaluation, educators reported statistically significant and meaningful growth in STEM identity and interest, teaching self-efficacy, and instructional practices. Participants also continued to emphasize the importance of sustained engagement, collaboration, and access to practical, ready-to-use instructional resources as central to success. The persistence of these findings across the life of this grant cycle makes it clear that ongoing structures for collaboration and broad access to practical resources should be encouraged during future grant cycles.

Consistent with last year, site leaders continued to view the STEM AC positively in their role as an intermediary, describing it as responsive, flexible, and supportive in providing resources, guidance, and opportunities for collaboration. However, persistent barriers, including challenges stemming from limited administrative buy-in, competing curricular priorities, and time constraints, were also noted again this year. This highlights the continued need and ongoing importance of strategic leadership engagement and alignment of grant activities with ongoing systemic priorities.

Taken together, these findings reaffirm the value of sustained, standards-aligned, and well-supported PL in advancing high-quality STEM education. They also highlight specific areas where the STEM AC PL grant program can deepen its impact, including strengthening alignment with school and district leadership, expanding access to more specific practical resources, sustaining collaborative learning structures, and maintaining program flexibility to meet local needs. By building on recurring lessons and acting on the stronger and more nuanced evidence provided this year, STEM AC can continue to support the successful implementation of STEM PL across funded sites to support educators' growth and maximize the impact of PL on student learning outcomes across Utah.

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Appendices

Appendix A. Utah State Board of Education (USBE) Professional Learning Standards

The Utah State Board of Education (USBE) has established standards for high-quality professional learning (PL) that guide the design and implementation of grant-funded activities. These standards are aligned with the USBE's definition of professional learning as a "*comprehensive, sustained, and evidence-based approach to improving teachers' and principals' effectiveness and raising student achievement*" (Utah Professional Learning Standards Toolkit, 2023, p.1). These eight research-based standards include the following:

1. Establishing learning communities that have shared goals and foster continuous improvement.
2. Developing skillful leaders who advocate and support professional learning efforts.
3. Prioritizing and coordinating resources for educator learning.
4. Aligning professional learning with educator and student performance standards and outcomes.
5. Integrating research and theories about human learning into the design of professional learning activities
6. Engaging in research to sustain implementation improvements and support long-term change
7. Utilizing diverse data sources to plan, assess, and evaluate professional learning activities
8. Effectively incorporating technology in professional learning activities.

Appendix B. Map of Data Sources Used to Answer Each Evaluation Question

Table 5. Evaluation Questions and Data Sources

Evaluation Questions	Data Collection Methods			
	Site Leaders		Participating Educators	
	Fall & Spring Surveys	Interviews	End-of-Year Survey	Focus Groups
Program Implementation				
EQ1. To what extent were grant activities implemented as planned and consistent with goals across participating sites (e.g., holding planned sessions, engaging educators initially targeted for participation, making progress towards planned goals)?	✓	✓		
Alignment of PL Activities with Program Expectations & PL Standards				
EQ2: How and to what extent were professional learning activities at participating sites aligned with program expectations and professional learning standards?	✓		✓	✓
STEM AC's Role as an Intermediary				
EQ3. In what ways and to what extent did STEM AC serve as an intermediary to support the implementation of the Professional Learning Grant program? • How effective was STEM AC at facilitating collaboration opportunities and supporting the development of communities of practice among program leadership across participating sites to support implementation?	✓	✓		
Educator Outcomes				
EQ4. To what extent did educators identify as a STEM educator, feel competent in their own STEM-related knowledge and skills, feel confident in their STEM instructional skills, and engage in STEM planning and integration activities (i.e., the educator outcomes of interest for the STEM AC PL Grant Program)? • To what extent did educator outcomes **change** as a result of their participation in grant activities? • To what extent did **changes** in educator outcomes **differ** based on the extent and nature of engagement in grant activities?		✓	✓	✓

Appendix C. Sections in the Site Leader Implementation Surveys

1. **Types of STEM Professional Learning Activities.** The survey asked site leaders to share specific information about their PL activities during the 23-24 AY. This included the PL content area, participant interactions, PL facilitators, frequency and length of PL experience, and types of PL activities (e.g., PLCs, in-person workshops, virtual workshops, coaching activities).
2. **Program Progress.** This section asked site leaders to reflect on their goals for their STEM PL grant activities and participating educators by providing progress updates for the reporting period and including key successes and challenges experienced.
3. **Structure and Functioning of STEM PL.** The survey asked site leaders to provide details about the structure and functioning of grant-supported STEM-related professional learning activities at their site. This included a set of seven factors associated with quality PL, which included adherence to adult learning principles, respectful and effective communication, effective data use, focus on professional growth and learning, effective learning design, supportive learning culture, and shared visions and responsibilities.[8]
4. **Supporting a Community of Practice for STEM PL.** This section asked site leaders to report on how they and those participating in grant-related activities at their school, district, or agency supported establishing a community of practice through collaboration and interactions related to grant-supported STEM professional learning activities throughout the reporting period. This included two sets of questions about (1) collaborative practices and (2) the nature and frequency of participant interactions with resources and individuals.
5. **STEM AC as an Intermediary Organization.** This section asked site leaders to report on how the STEM AC fulfilled its role as an intermediary organization in supporting the implementation of grant activities at their school, district, or agency during the reporting period.

[8] These factors were constructed using items from UEPC's Collaborative Self-Assessment (CSA) and other previously administered items for the STEM PL Grant program, which were refined based on the results of factor analyses, crosswalks with Utah's PL Standards and program-specific expectations for grant programs, and discussions with the Grant Manager to ensure adequate coverage of the key implementation features of interest.

Appendix D. Sample Selection for the Site Leadership Interviews

Due to the large number of programs funded by the STEM Action Center's STEM Professional Learning Grant program during the 2024-25 academic year (AY) and the wide variation in the focus and scope of these activities across sites, the decision was made to focus qualitative data collection activities on a smaller, representative sample of participating sites. The goal of these discussions with site leadership was to gather context-specific data about the implementation and outcomes that would provide a richer understanding of the impacts of grant-supported activities across participating sites.

To maintain consistency with last year's evaluation, the same sample selected for qualitative analyses during the 2023-24 evaluation were invited to participate in the site leader surveys during this year's evaluation. These 20 sites were selected last year based on input from the Program Manager as well as data about the approximate program size and the following results from the Fall 2023 Site Leader Survey:

- **Progress towards site goals** – i.e., relative completion, average progress ratings, whether goals were discontinued or added,
- **Subject area focus(es) of their PL activities** – i.e., single focus or multiple focuses, STEM content focuses, non-STEM content focuses, Career and Technical Education and Special Education focuses,
- **Delivery mode of PL activities** – i.e., all in-person, hybrid with more in-person time than virtual time, hybrid with more virtual time than in-person time, all virtual time)

Two of the 20 sites targeted for participation last year discontinued their participation in the program this year. The evaluation team also extended recruitment to sites with grant-supported activities ending in December 2024, to support the inclusion of the perspectives of educators who participated in grant-supported programs that did not last the full 2024-25 year. As a result, 19 sites in total were invited to participate in site leader interviews and/or educator focus groups during the 2024-25 evaluation.

In total, site leaders or PL participants from 16 sites participated in the additional qualitative data collection during the 2024-25 AY. This included 13 site leader interviews/focus groups as well as focus groups with educators from 11 sites. The following tables compare PL programs' final sample, target sample, and overall characteristics during the 2024-25 academic year.

Program Size	Final Sample		Target Sample		All Programs		Diff. (Final – All)
	Count	%	Count	%	Count	%	%
Large Program (50+ Educators)	7	44%	7	37%	13	41%	-3%
Small Program (<50 Educators)	9	56%	12	67%	19	59%	3%

Number of Content Focus Areas	Final Sample		Target Sample		All Programs		Diff. (Final – All)
	Count	%	Count	%	Count	%	%
Single STEM Content Area	8	50%	10	53%	16	50%	0%
Multiple STEM Content Areas	8	50%	9	47%	16	50%	0%

Content Area Focus	Final Sample		Target Sample		All Programs		Diff. (Final – All)
	Count	%	Count	%	Count	%	%
STEM							
Science	11	69%	12	63%	18	56%	13%
Technology and Computer Science	3	19%	5	26%	7	22%	-3%
Engineering	6	38%	6	32%	8	25%	13%
Mathematics	11	69%	13	68%	23	72%	-3%
Unknown (Missing Data)	0	0%	0	0%	0	0%	0%
Non-STEM							
English Language Arts (ELA)	6	38%	7	37%	8	25%	13%
Social Studies	2	13%	3	16%	3	9%	4%
Foreign Languages	1	6%	2	11%	2	6%	0%
Fine Arts	1	6%	2	11%	2	6%	0%
Physical Education (PE)	0	0%	1	5%	1	3%	-3%
Health Education	0	0%	0	0%	0	0%	0%
Unknown (Missing Data)	2	13%	2	11%	5	16%	-3%
Other							
Career and Technical Education (CTE)	4	25%	5	26%	6	19%	6%
Special Education	7	44%	8	42%	9	28%	16%
Unknown (Missing Data)	2	13%	2	11%	5	16%	-3%

Group	# of Sites with Ratings	Avg. In-Progress Goal Rating
Final Sample	12	3.2
Target Sample	15	3.1
All Programs	25	3.0

PL Delivery Mode	Final Sample		Target Sample		All Programs		Diff. (Final – All)
	Count	%	Count	%	Count	%	%
All In-Person	6	38%	7	37%	14	44%	-6%
Hybrid: More In-Person Time	4	25%	5	26%	8	25%	0%
Hybrid: Same In-Person and Virtual Time	1	6%	1	5%	1	3%	3%
Hybrid: More Virtual Time	3	19%	3	16%	3	9%	10%
All Virtual	0	0%	1	5%	1	3%	-3%
Unknown (Missing Data)	2	13%	1	5%	5	16%	-3%

Appendix E. Sections in the Educator EOY Survey

1. **Type of STEM PL Activities They Participated in Over the Course of the 2023-24 Academic Year.** Participants were asked to share information about the grade level and content area focus of the PL activities they participated in and the approximate frequency and amount of time they spent engaging in specific activities.
2. **PL Structure and Functioning of STEM PL.** This section asked participants to rate the PL activities they participated in in relation to the seven factors associated with quality PL (i.e., adherence to adult learning principles, respectful and effective communication, effective data use, focus on professional growth and learning, effective learning design, supportive learning culture, and shared visions and responsibilities).
3. **Supporting a Community of Practice for STEM PL.** This section asked educators to share information about their collaborative practices and the nature and frequency of their interaction with individuals and resources throughout the year.
4. **Educator Outcomes.** This section was unique to the educator survey and focused on three areas: (1) STEM teaching self-efficacy and confidence; (2) STEM identity and interest; and (3) STEM planning and instruction. For each area, educators were asked to rate the extent to which they agreed with statements now and at the start of this academic year. When providing these ratings, educators were asked to keep in mind the STEM concepts and instructional practices the grant-related PL activities they participated in focused on and their impact on these target outcomes.

Appendix F. EOY Educator Survey Sample Descriptives

Educator Role	EOY Educator Survey Respondents	
	Count	Percent
Classroom Educator	663	82%
Curriculum Facilitator or Coordinator	6	1%
District- or LEA-Level Support Staff	7	1%
Instructional Coach	50	6%
School Administrator	5	1%
Special Education Educator	29	4%
Subject Specialist/Content Expert (e.g., Computer Science or STEM Specialist)	9	1%
Paraeducators	17	2%
Other (e.g., Tech Coach, Media Specialist, Out-of-School-Time Educator, DEEP Specialist)	26	3%

Appendix G. Grant Activity Calendar Template

Sheet 1: Planning and Actual Calendar

Note: To the extent possible, please align with content area definitions in the third tab of this workbook (i.e.,"Content Area Descriptions")

Note: To the extent possible, please align with educator roles defined in second tab of this workbook (i.e.,"Educator Role Descriptions")

Planning Calendar (Complete by September 30th)											
Activity Name	Estimated # of Occurences	Activity Date or Range of Dates (August 1, 2024 through May 15th, 2025)	Target Subject(s) or Content Area(s)	Target Grade Level(s)	Target Audience (e.g., classroom teachers, district instructional coaches, school administration, paraeducators)	Mode of Delivery (i.e., In-person, Virtual, or Hybrid)	Expected Duration (Round to the nearest half-hour)	Expected Number of Participants	How will participants reflect and follow-up after learning opportunity?	Facilitator(s) (Will be added to Box folder so they can access the check-in form for their session(s).)	
										Name(s)	Email(s)

(Continued)

Participant Check-In Form (Will be provided by the evaluation team)		Implementation Information (Complete by May 16th)		
Link	QR Code	Actual Number of Participants	How did it go?	Notes about Changes to Planned Activity

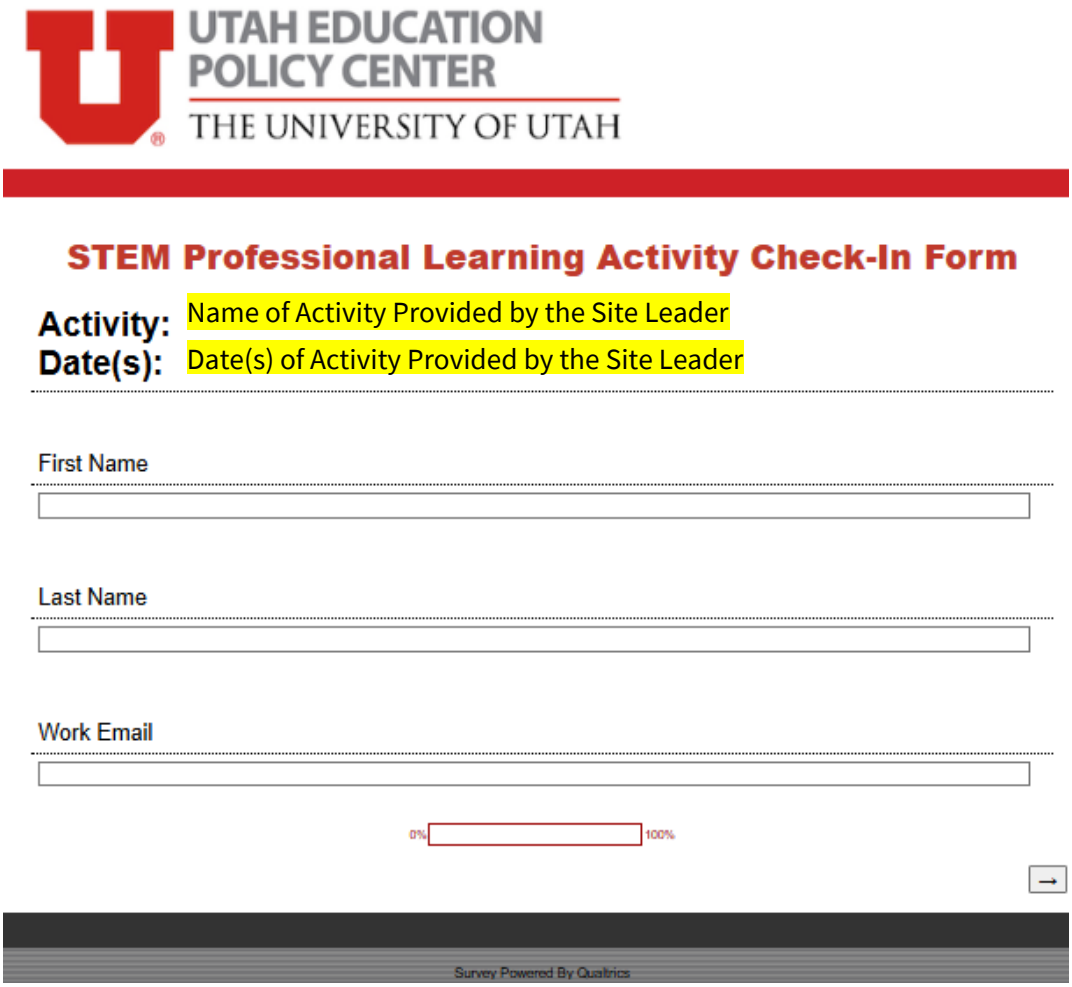
Sheet 2: Educator Role Descriptions

	A	B
1	Role	Description
2	Classroom Teacher	This includes teachers who work directly with students in a classroom setting, delivering lessons, and facilitating learning.
3	School Administrator	Principals, vice-principals, and other administrative staff who oversee the school's operations and manage teachers and students.
4	Instructional Coach	School or district staff who work collaboratively with teachers to improve instructional strategies, curriculum implementation, and classroom management techniques.
5	School Support Staff	or other personnel who provide additional support to classroom teachers.
6	Out of School Educator	Individuals supporting out of school activities.
7	Special Education Teacher	Teachers who work with students who have learning disabilities or special needs, providing specialized instruction and support.
8	Media Specialist or Librarian	Staff who manage and support access to educational resources in school libraries, media centers, or other learning environments.
9	Subject Specialist/Content Expert	Educators who focus on teaching a specific subject or discipline, such as math, science, language arts, interventionists, etc.
10	Curriculum Faciliator or Coordinator	Staff who collaborate with teachers, administrators, and other stakeholders to design and update curriculum materials that align with state standards and district goals.
11	Education Administrator (Non-School Level)	Individuals who hold administrative roles at the district, state, or national level in education.
12	School Counselor	Counselors who offer guidance and support to students regarding academic, social, and personal issues.
13	School Psychologist	Psychologists who assess and address students' mental and emotional well-being.
14	Education Consultant	Experts who provide advice and guidance to educational institutions or organizations.

Sheet 3: Content Area Descriptions

	A	B
1	Content Area	Description
2	Science	Science education includes subjects like biology, chemistry, physics, earth science, and environmental science. It aims to foster scientific inquiry and understanding of the natural world.
3	Technology and Computer Science	Technology education introduces students to digital literacy, computer programming, and other technology-related skills.
4	Engineering	thinking, and hands-on projects that simulate real-world engineering challenges.
5	Mathematics	statistics, and calculus. It aims to develop students' problem-solving and critical thinking skills.
6	Career and Technical Education (CTE)	career pathways, such as culinary arts, automotive technology, cosmetology, etc.
7	Special Education	Special education focuses on providing individualized instruction and support for students with disabilities or special needs.
8	English Language Arts (ELA)	focuses on developing students' communication abilities and understanding of literature.
9	Social Studies	economics, and sociology. It aims to help students understand society, culture, and global issues.
10	Foreign Languages	Many schools offer foreign language courses, such as Spanish, French, German, Mandarin, etc., to promote cross-cultural understanding and communication.
11	Fine Arts	Fine arts education includes subjects like visual arts (painting, drawing, sculpture), music (instrumental and vocal), drama, and dance.
12	Physical Education (PE)	PE classes focus on physical fitness, sports, and health-related topics, promoting active and healthy lifestyles.
13	Health Education	Health education covers topics related to nutrition, personal wellness, mental health, and sexual education.

Appendix H. Check in Link Form



UTAH EDUCATION POLICY CENTER
THE UNIVERSITY OF UTAH

STEM Professional Learning Activity Check-In Form

Activity: Name of Activity Provided by the Site Leader
Date(s): Date(s) of Activity Provided by the Site Leader

First Name

Last Name

Work Email

0% 100%

→

Survey Powered By Qualtrics

Appendix I. Participant List Template

Sheet 1: Planning and Actual Calendar

	A	B	C	D	E	F
1	First Name	Last Name	Email	CACTUS ID	Primary Educator Role	Other Role (Please Specify)
2	Julianne	Zemaitis	julianne.zemaitis@utah.ed	00000112345678	Classroom Teacher	
3	Amy	Reynolds	a.reynolds@utah.edu	00000334567897	Curriculum Faciliator or Coordinator	
4	Kellie	Yates	kellieyates@utah.gov	00000777789101	Other	Librarian

(Continued)

	G	H	I	J
	Primary Grade Level Taught or Supported	Other Grade Level or Grade Spans (Please Specify)	Primary Content Area Taught or Supported	Other Content Area Taught or Supported (Please Specify)
	10		Mathematics	
	Other	PK-5	Mathematics	
	Other	PK-5	Other	STEM

Sheet 2: Educator Role Descriptions

	A	B
1	Roles	Description
2	Classroom Teacher	This includes teachers who work directly with students in a classroom setting, delivering lessons, and facilitating learning.
3	School Administrator	Principals, vice-principals, and other administrative staff who oversee the school's operations and manage teachers and students.
4	Instructional Coach	School or district staff who work collaboratively with teachers to improve instructional strategies, curriculum implementation, and classroom management techniques.
5	School Support Staff	This category may include paraeducators, teaching assistants, teacher aides, or other personnel who provide additional support to classroom teachers.
6	Out of School Educator	Individuals supporting out of school activities.
7	Special Education Teacher	Teachers who work with students who have learning disabilities or special needs, providing specialized instruction and support.
8	Media Specialist or Librarian	Staff who manage and support access to educational resources in school libraries, media centers, or other learning environments.
9	Subject Specialist/Content Expert	Educators who focus on teaching a specific subject or discipline, such as math, science, language arts, interventionists, etc.
10	Curriculum Faciliator or Coordinator	Staff who collaborate with teachers, administrators, and other stakeholders to design and update curriculum materials that align with state standards and district goals.
11	Education Administrator (Non-School Level)	Individuals who hold administrative roles at the district, state, or national level in education.
12	School Counselor	Counselors who offer guidance and support to students regarding academic, social, and personal issues.
13	School Psychologist	Psychologists who assess and address students' mental and emotional well-being.
14	Education Consultant	Experts who provide advice and guidance to educational institutions or organizations.
15	Other	Please provide a description in Column F.

Sheet 3: Content Area Descriptions

	A	B
1	**Content Area**	**Description**
2	Elementary	This category is for elementary educators who proide instruction related to a variety of content areas, including Reading and Language Arts, Mathematics, Social Studies, and Science.
3	Science	Science education includes subjects like biology, chemistry, physics, earth science, and environmental science. It aims to foster scientific inquiry and understanding of the natural world.
4	Technology and Computer Science	Technology education introduces students to digital literacy, computer programming, and other technology-related skills.
5	Engineering	Engineering education introduces students to engineering principles, design thinking, and hands-on projects that simulate real-world engineering challenges.
6	Mathematics	Mathematics education covers topics such as arithmetic, algebra, geometry, statistics, and calculus. It aims to develop students' problem-solving and critical thinking skills.
7	Career and Technical Education (CTE)	CTE programs provide students with practical skills and knowledge for various career pathways, such as culinary arts, automotive technology, cosmetology, etc.
8	Special Education	Special education focuses on providing individualized instruction and support for students with disabilities or special needs.
9	English Language Arts (ELA)	This includes reading, writing, speaking, listening, and language skills. ELA focuses on developing students' communication abilities and understanding of literature.
10	Social Studies	Social studies covers a range of disciplines, including history, geography, civics, economics, and sociology. It aims to help students understand society, culture, and global issues.
11	Foreign Languages	Many schools offer foreign language courses, such as Spanish, French, German, Mandarin, etc., to promote cross-cultural understanding and communication.
12	Fine Arts	Fine arts education includes subjects like visual arts (painting, drawing, sculpture), music (instrumental and vocal), drama, and dance.
13	Physical Education (PE)	PE classes focus on physical fitness, sports, and health-related topics, promoting active and healthy lifestyles.
14	Health Education	Health education covers topics related to nutrition, personal wellness, mental health, and sexual education.
15	Other	Please provide a description in Column J.

Appendix J. Prior Attendance Templates

Option 1: PL_Prior Activity Attendance Template 1.xlsx (Example[9])

	A	B	C	D	E
1	First Name	Last Name	Email	Activity	Date
2	Julia	Thompson	julia.thompson@utahsd.edu	Aug. TeachFX PLC Session	8/1/2024
3	Ahmed	Khan	ahmed.khan@utahsd.edu	Aug. TeachFX PLC Session	8/1/2024
4	Susan	Smith	julia.thompson@utahsd.edu	Aug. TeachFX PLC Session	8/1/2024
5	Ayesha	Robinson	ahmed.khan@utahsd.edu	Aug. TeachFX PLC Session	8/1/2024
6	Julia	Thompson	susan.smith@utahsd.edu	Sept. TeachFX PLC Session	9/5/2024
7	Ahmed	Khan	ayesha.robinson@utahsd.edu	Sept. TeachFX PLC Session	9/5/2024

Option 2: PL_Prior Activity Attendance Template 2.xlsx (Example)

	A	B	C	D	E
1	First Nam	Last Nam	Email	Aug. TeachFX PLC Session - 8/1/2024	Sept. TeachFX PLC Session - 9/5/2024
2	Julia	Thompson	julia.thompson@utahsd.edu	1	1
3	Ahmed	Khan	ayesha.robinson@utahsd.edu	1	1
4	Susan	Smith	julia.thompson@utahsd.edu		1
5	Ayesha	Robinson	ahmed.khan@utahsd.edu		1

[9] Note that these are not real names and emails and were fabricated for demonstration purposes.

Appendix K. Scale Reliabilities & Lists of Items

Table 6. Reliability Estimates for Response Scales

Scale	Respondents	# Items	# Valid Responses	Cronbach's Alpha
STEM Teaching Self-Efficacy				
Start of Year Ratings	Educators	10	780	0.967
End of Year Ratings	Educators	10	786	0.955
STEM Identity and Interest				
Start of Year Ratings	Educators	5	797	0.919
End of Year Ratings	Educators	5	804	0.896
STEM Planning and Instruction				
Start of Year Ratings	Educators	9	799	0.969
End of Year Ratings	Educators	9	806	0.958
PL Implementation				
Effective Learning Design				
End of Year Ratings	Educators	9	958	0.916
Start of Year Ratings	Site Leaders	9	30	--
End of Year Ratings	Site Leaders	9	25	--
Supportive Learning Culture				
End of Year Ratings	Educators	9	960	0.937
Start of Year Ratings	Site Leaders	9	30	--
End of Year Ratings	Site Leaders	9	25	--
Effective Data Use				
End of Year Ratings	Educators	3	913	0.899
Start of Year Ratings	Site Leaders	3	30	--
End of Year Ratings	Site Leaders	3	25	--
Respectful & Effective Communication				
End of Year Ratings	Educators	3	914	0.877
Start of Year Ratings	Site Leaders	3	30	--
End of Year Ratings	Site Leaders	3	25	--
Shared Vision and Responsibility				
End of Year Ratings	Educators	3	912	0.853
Start of Year Ratings	Site Leaders	3	30	--
End of Year Ratings	Site Leaders	3	25	--
Focus on Professional Growth and Learning				
End of Year Ratings	Educators	3	914	0.865
Start of Year Ratings	Site Leaders	3	30	--
End of Year Ratings	Site Leaders	3	25	--
Adherence to Adult Learning Principles				
End of Year Ratings	Educators	9	911	0.937
Start of Year Ratings	Site Leaders	9	30	--
End of Year Ratings	Site Leaders	9	25	--
STEM AC Grant Management				
Fall 2023	Site Leaders	6	30	--
Spring 2024	Site Leaders	6	25	--
STEM AC's Role Supporting Continuous Improvement				
Fall 2023	Site Leaders	7	30	--
Spring 2024	Site Leaders	7	25	--

-- indicates insufficient sample size for reliable calculation

Table 7. Educator Survey Scales Item and Response Summary: Educator Outcomes

Item	Start of Year (Retrospective)			End of Year (Current)		
	N	Mean	SD	N	Mean	SD
STEM Knowledge, Teaching Self-Efficacy, and Confidence						
I have adequate knowledge about relevant STEM concepts.	788	4.34	1.25	795	5.10	0.92
I have an in-depth understanding of the STEM concepts I teach.	785	4.40	1.26	794	5.19	0.90
I am able to address the common misconceptions my students have for relevant STEM concepts.	786	4.27	1.24	792	5.08	0.93
I am able to guide my students to use suitable learning strategies to understand STEM concepts.	786	4.30	1.20	793	5.15	0.90
I am able to use a variety of ways to help students understand STEM concepts.	786	4.30	1.23	794	5.17	0.93
I find it easy to explain STEM concepts to students.	780	4.28	1.26	786	5.02	0.96
I am comfortable addressing students' questions about STEM concepts.	780	4.36	1.28	790	5.13	0.94
I am confident in my ability to teach or integrate STEM concepts into my instruction effectively.	783	4.30	1.30	793	5.10	0.98
I continually find better ways to teach or integrate STEM concepts into my instruction.	784	4.40	1.30	791	5.21	0.98
I am willing to be observed by others while teaching STEM concepts.	786	3.93	1.58	792	4.62	1.42
COMPOSITE SCORE	**787**	**4.29**	**1.14**	**793**	**5.08**	**0.84**
STEM Interest and Identity						
I enjoy the subject matter of STEM.	799	5.09	1.16	806	5.53	0.80
I make the time to be actively involved in professional learning that involves teaching or integrating STEM content.	798	4.68	1.28	804	5.23	0.97
I feel part of a community of teachers who teach or integrate STEM content.	798	4.34	1.36	805	5.00	1.12
I enjoy scientific ways of thinking.	797	4.94	1.22	804	5.40	0.89
I want to continue teaching or integrating STEM content in my instruction.	799	5.08	1.15	805	5.57	0.79
COMPOSITE SCORE	**801**	**4.83**	**1.07**	**806**	**5.35**	**0.77**
STEM Planning and Instruction						
I can plan STEM lessons based on each student's learning level.	802	4.12	1.30	807	4.90	1.04
I can gauge student comprehension of the STEM materials I have taught.	802	4.31	1.21	808	5.12	0.92
I can help students apply their STEM knowledge to real-world situations.	800	4.39	1.19	807	5.16	0.90
I can ask thought-provoking questions during instruction on STEM concepts.	800	4.29	1.22	806	5.12	0.93
I can effectively incorporate the Utah Core standards in my STEM planning and instruction.	802	4.50	1.25	808	5.28	0.94
I integrate and show interrelationships of ideas and information across STEM areas.	800	4.22	1.24	809	4.98	0.95
I adjust STEM content for different student developmental levels and learning needs.	800	4.19	1.22	808	4.94	0.97
I plan STEM instruction using students' backgrounds and interests.	799	4.09	1.23	807	4.84	1.02
I establish challenging and attainable STEM learning goals for all students.	802	4.22	1.26	808	4.98	1.00
COMPOSITE SCORE	**803**	**4.26**	**1.10**	**808**	**5.03**	**0.83**

Table 8. Site Leader Survey Scales Item and Response Summary: STEM AC Intermediary Role

Item	Fall 2024			Spring 2025		
	N	Mean	SD	N	Mean	SD
Grant Management Support						
Provided funding support for local capacity building efforts	30	4.77	0.626	25	4.48	0.918
Encouraged ongoing internal assessment of program implementation, quality, and outcomes	30	4.70	0.535	25	4.68	0.557
Established clear program quality standards	30	4.43	0.626	25	4.48	0.714
Supported alignment to program quality standards	30	4.57	0.626	25	4.56	0.712
Provided direct management support and assistance to grantees	30	4.47	0.860	25	4.24	0.926
Collected and shared data to guide program improvement	30	4.30	0.837	25	4.32	0.852
COMPOSITE SCORE	**30**	**4.54**	**0.548**	**25**	**4.46**	**0.626**
Supporting Continuous Improvement						
Provided grantees with opportunities to share challenges/concerns and/or request implementation support and resources	30	4.43	0.817	25	4.52	0.770
Facilitated networks and communities of practice among grantees	30	4.33	0.994	25	4.44	0.917
Provided opportunities for grantees to identify actionable steps for improving the implementation of their programs	30	4.53	0.730	25	4.36	0.860
Provided opportunities for grantees to reflect on the implementation of their programs	30	4.60	0.724	25	4.52	0.714
Provided grantees with useful materials and resources to improve program implementation	30	4.47	0.860	25	4.32	0.988
Provided information about additional opportunities through the STEM AC and their partners to supplement professional learning activities	30	4.40	0.855	25	4.28	0.980
Provided repositories of high-quality instructional and other materials for grantees to distribute to educators supporting grant activities at their site	30	4.40	0.968	25	4.16	1.028
COMPOSITE SCORE	**30**	**4.45**	**0.678**	**25**	**4.37**	**0.787**

Table 9. Site Leader and Educator Survey Scales Item and Response Summary: Dimensions of Effective PL Implementation

Item	Site Leaders						Educators		
	Fall 2024			Spring 2025			24-25 EOY Survey		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
Effective Learning Design									
Clarified the purpose of our collaborative work.	30	5.60	0.621	25	5.44	0.712	963	5.22	0.950
Provided equal opportunity to participate by providing multiple sessions, series, or scheduling options.	30	5.13	1.252	25	5.60	0.764	963	5.20	1.028
Effectively leveraged technology to expand educator access to professional learning opportunities.	30	5.20	1.126	25	5.08	0.862	964	5.10	1.020
Allocated sufficient time for collaboration.	30	5.07	0.740	25	5.04	1.274	963	5.16	0.969
Provided flexibility to support spontaneous collaborations among participants.	30	5.20	0.761	25	5.24	0.970	963	5.07	1.021
Ensured structures or processes were in place to allow participants to choose when, where, and with whom to collaborate.	30	4.97	0.718	25	5.00	1.080	964	4.90	1.144
Focused on building the competence of all participants.	30	5.70	0.651	25	5.68	1.030	962	5.43	0.819
Intentionally developed participant skills for successful collaboration.	30	5.23	0.817	25	5.36	0.952	962	5.23	0.925
Provided effective structures for reciprocal accountability.	30	4.70	0.877	25	4.84	1.434	962	5.08	0.944
COMPOSITE SCORE	**30**	**5.20**	**0.481**	**25**	**5.25**	**0.735**	**964**	**5.15**	**0.767**
Supportive Learning Culture									
Regularly recognized participant contributions.	30	5.13	1.008	25	5.16	1.106	964	5.18	0.938
Regularly recognized the assets of each participant.	30	5.40	0.770	25	5.28	1.100	963	5.05	1.000
Actively promoted idea sharing.	30	5.67	0.802	25	5.56	1.044	964	5.44	0.847
Actively promoted routine feedback - both seeking and receiving.	30	5.07	1.081	25	5.20	1.118	964	5.23	0.938
Viewed failure as part of professional practice.	30	5.53	0.776	25	5.48	0.770	963	5.15	0.980
Honored professional expertise and experience.	30	5.53	0.900	25	5.72	0.542	964	5.35	0.925
Regarded all participants as developing or emerging leaders.	30	5.40	0.855	25	5.52	0.714	962	5.29	0.893
Adapted to educators' professional learning needs and desired areas of growth.	30	5.40	0.855	25	5.52	0.586	963	5.19	0.988
Effectively leveraged technology to increase educator agency and voice in professional learning activities.	30	4.93	1.202	25	5.12	0.881	963	5.03	1.062
COMPOSITE SCORE	**30**	**5.34**	**0.589**	**25**	**5.40**	**0.636**	**964**	**5.21**	**0.784**

Table 9 (continued)

Item	Site Leaders						Educators		
	Fall 2024			Spring 2025			24-25 EOY Survey		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
Effective Data Use									
Data was used to prioritize actions to reach a shared vision of high-quality STEM professional learning.	30	5.27	1.081	25	5.20	1.258	914	4.99	1.078
Participants individually examined data and analyzed student work to enhance STEM-related teaching and learning.	30	5.00	0.830	25	5.04	1.338	914	4.99	1.111
Participants collaboratively examined data and analyzed student work to enhance STEM-related teaching and learning.	30	4.87	0.900	25	5.04	1.457	913	4.88	1.172
COMPOSITE SCORE	**30**	**5.04**	**0.767**	**25**	**5.09**	**1.242**	**914**	**4.95**	**1.023**
Respectful & Effective Communication									
Participants engaged in dialogue that reflected a respect for diverse ideas.	30	5.57	0.626	25	5.48	1.159	914	5.38	0.840
Participants used effective inquiry strategies to seek clarification and/or expand on each other's ideas.	30	5.60	0.498	25	5.36	1.075	914	5.32	0.894
Participants' interactions reflected mutual trust and respect.	30	5.57	0.626	25	5.44	1.083	914	5.51	0.778
COMPOSITE SCORE	**30**	**5.58**	**0.446**	**25**	**5.43**	**1.007**	**914**	**5.40**	**0.751**
Shared Vision and Responsibility									
Professional learning facilitators and participants shared responsibility for student learning.	30	5.63	0.490	25	5.44	1.121	913	5.19	0.977
Professional learning facilitators and participants shared a vision for STEM professional learning that focused on improving student learning.	30	5.77	0.430	25	5.48	0.714	913	5.43	0.812
Participants were actively involved in creating high expectations to increase students' STEM-related achievement.	30	5.17	0.834	25	5.44	1.083	913	5.25	0.951
COMPOSITE SCORE	**30**	**5.52**	**0.408**	**25**	**5.45**	**0.844**	**913**	**5.29**	**0.805**
Focus on Professional Learning and Growth									
Participants expanded their learning (i.e. knowledge, skills, and strategies).	30	5.73	0.521	25	5.60	1.041	914	5.51	0.786
Participants learned strategies to address diverse student needs.	30	5.47	0.730	25	5.48	1.085	914	5.24	0.966
Participants were provided with sufficiently scaffolded opportunities to apply their learning to practice.	30	5.47	0.681	25	5.40	1.080	914	5.19	0.978
COMPOSITE SCORE	**30**	**5.56**	**0.505**	**25**	**5.49**	**1.028**	**914**	**5.31**	**0.812**

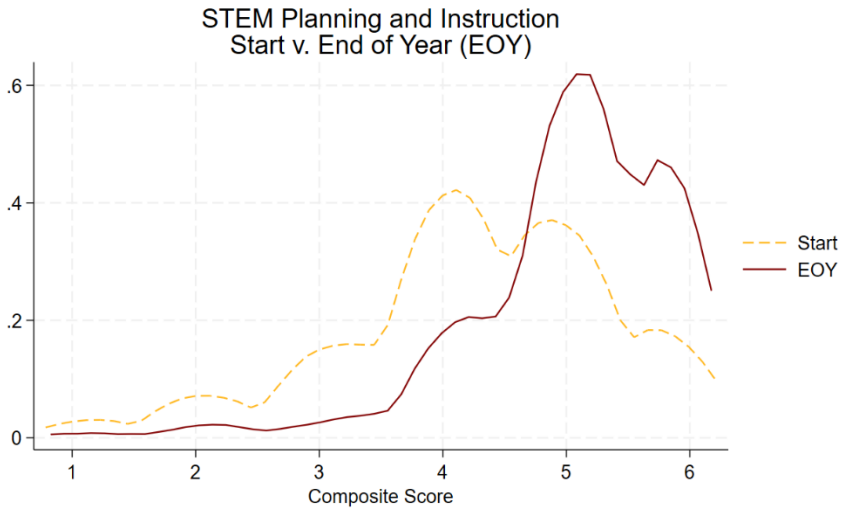
Table 9 (continued)

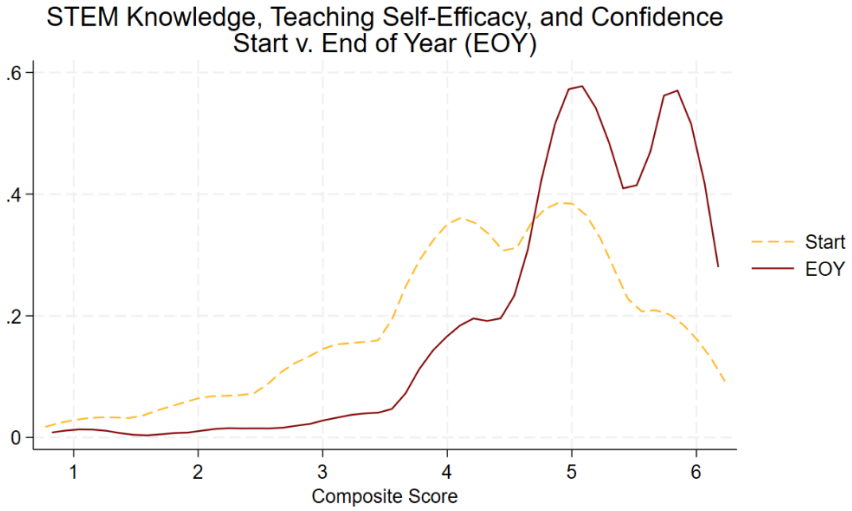
Item	Site Leaders						Educators		
	Fall 2024			Spring 2025			24-25 EOY Survey		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
Adherence to Adult Learning Principles									
Were designed to ensure consistency between the different sessions and issues or topics addressed.	30	5.63	0.669	25	5.56	1.083	913	5.32	0.888
Were designed to deepen educators' understanding of Utah Core Standards.	30	5.33	1.124	25	5.36	0.952	915	5.19	1.030
Were designed to regularly integrate and/or align STEM professional learning activities and goals with Utah Core Standards.	30	5.37	1.033	25	5.52	0.653	914	5.30	0.935
Gave participants the chance to inform the construction of its content.	30	4.80	1.126	25	5.24	1.091	913	5.00	1.136
Gradually introduced new material to allow for deeper engagement and understanding.	30	5.37	0.765	25	5.24	1.300	912	5.26	0.959
Allocated sufficient time for participants to practice new skills between meetings.	30	5.37	0.809	25	5.20	1.258	913	5.29	0.990
Routinely ensured that individual participants' needs and interests were addressed.	30	5.40	0.675	25	5.44	1.083	915	5.24	0.966
Offered sufficient opportunities for participants to exchange their views, knowledge, and experiences on STEM-related topics.	30	5.30	0.837	25	5.32	1.108	915	5.32	0.902
Offered useful suggestions and resources for immediate application to practice.	30	5.80	0.407	25	5.48	1.085	915	5.44	0.864
COMPOSITE SCORE	**30**	**5.37**	**0.525**	**25**	**5.37**	**0.887**	**915**	**5.26**	**0.792**

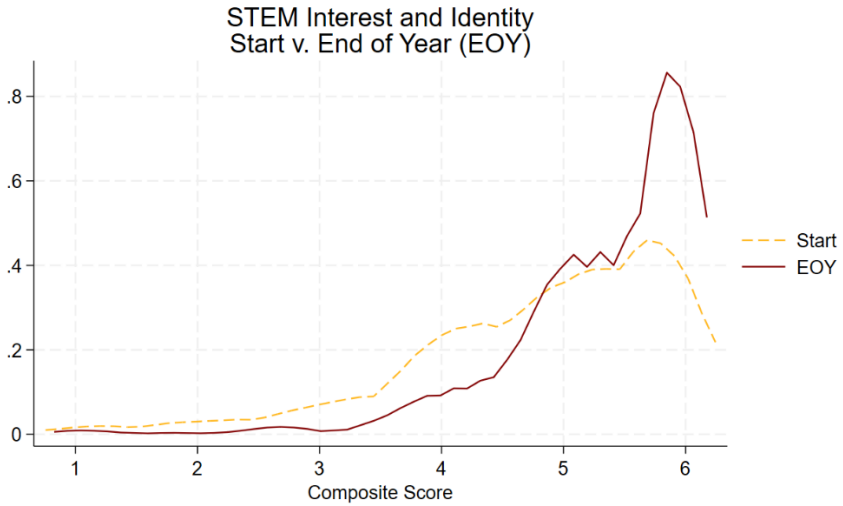
Appendix L. List of Professional Learning Sites on and off the Wasatch Front

Sites On the Wasatch Front		Sites Off the Wasatch Front
Alpine Elementary Science	Hawthorn STEM	Cache
Alpine Secondary Math & Science	Hogle Zoo	Diamond Valley
Altara Elementary	Jordan PREP	Iron
Brighton High	Mountain Point	Juab
Canyons	Mountainville	Nebo
Canyons SALTA Program	Murray	Pinnacle
Davis- Elementary Science	Murray Math	Washington Ele Math
Davis- Math	Odyssey	
Davis- Secondary Science	Salt Lake City SD Math	
Entheos	Salt Lake City SD Science	
Entrada	South Clearfield	
Granite Math	Trailside Elementary	
Granite Science		

Appendix M. Distributions of Educators' Outcome Composite Scores from the Start and End of the AY







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