



Broadening Participation in Computing in Utah: An Evaluation of the STEM Action Center's Computing Partnerships Grant Program, 2021-2022 School Year

Prepared by the Utah Education Policy Center
on behalf of the STEM Action Center

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

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

Ellen R. Altermatt, Ph.D., Assistant Director
ellen.altermatt@utah.edu

Follow us on Twitter: @UtahUEPC

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Introduction

Computing Partnerships Grant Program Overview

Senate Bill 190 (S.B. 190), which passed in the Utah State Legislature in 2017, created the Computing Partnerships Grant Program with the STEM Action Center (STEM AC). The grant program provides funding and support for “the design and implementation of comprehensive K-16 computing partnerships” (S.B. 190, lines 71-72). S.B. 190 indicates that computing partnerships are intended to enhance outreach and engagement, course content and design, work-based learning opportunities, student retention, professional learning, access, diversity, and equity, and institutional, industry, and community collaborations. The STEM AC Computing Partnerships Grant Program is among many state initiatives aimed at expanding computing opportunities for students and educators throughout Utah.

In 2020, the STEM AC, which has oversight for the current computing partnership grant program in consultation with the Utah State Board of Education (USBE) and Talent Ready Utah (TRU), released its most recent grant solicitation. Public PreK-12 districts and schools could apply for grants that “provide funding to Local Education Agencies (LEAs) and individual schools to support out-of-classroom pre-kindergarten to post-secondary (PreK-16) computing activities which align with student engagement and teacher retention strategies.” For the purposes of the current cycle, computing is a term used comprehensively to include computer science, information technology, information systems, computer and software engineering, cybersecurity, digital media, and gaming.

Grantees are encouraged, although not required to, partner with other LEAs and schools, post-secondary entities, community and cultural organizations, and industry for the implementation of the grant. Moreover, grantees are encouraged to maximize available resources for implementation where possible by utilizing resources provided by their LEA and/or other grant resources, such as those provided by the Utah State Board of Education. A central component of the Computing Partnership grant is to increase access to underserved populations and focus on activities that occur outside of the traditional classroom setting.¹ As noted in the grant guidelines, the primary goals for the current cycle of funding are to support programs that:

- Increase exposure to computing activities for PreK-16 students, with an emphasis on PreK-8 and authentic cross-curricular efforts.
- Engage industry partners in all activities, where appropriate.
- Integrate the use of promising or best practices in computing efforts, i.e., those that have preliminary data that demonstrate positive outcomes, and a high potential for scalability and sustainability.
- Enhance and support teacher externship opportunities.
- Promote awareness of computing education and career opportunities across a broad spectrum of stakeholders.

¹<https://stem.utah.gov/wp-content/uploads/2020/12/FY21-SB-190-Grant-Guidelines-01022020.pdf>

- Create systemic change that will last beyond the grant period by establishing partnerships, agreements, processes, and programs that better connect education, training, workforce, and employers to meet industry needs within the regional economy. This will be accomplished through alignment with the State’s Computer Science Education Master Plan.

The Utah Education Policy Center’s (UEPC) serves as the external evaluator for STEM AC’s portfolio of programs, including the Computing Partnerships Grant Program. The UEPC’s 2021-2022 evaluation of the Computing Partnerships Grant Program used a mixed-method design employing interviews, surveys, and secondary data sources to address research and evaluation questions about program implementation and program outcomes for grantees, educators, and students. A list of all evaluation questions is provided in Table 1.

A total of 17 projects were funded by the Computing Partnerships Grant Program during the 2021-2022 school year. Each of the grantees identified objectives, outcomes, and goals to guide their implementation. A summary of grantee program objectives, outcomes, and goals is provided in Appendix A. Although there were a range of topics captured in projects’ objectives and outcomes, projects primarily noted goals related to educator learning and training and partnerships and collaborations. Other common areas included afterschool activities, underserved student populations, and the creation of new learning spaces.

Relevant Literature

To inform the design and analysis of this evaluation, the UEPC reviewed relevant research on computing programs and partnerships. A review of research highlights the role of computing technologies and skills as both an economic imperative as well as a critical aspect of the future for STEM fields (Blikstein, 2018; President’s Council of Advisors on Science and Technology, 2012).

One avenue for addressing these needs in STEM fields is to promote earlier and more substantive computer science education in the K-12 educational environment (e.g., Joshi & Jain, 2018; Leyzberg & Moretti, 2017; Papini et al., 2017). The calls for increased computer science in K-12 have been met with both policy and practice solutions, including programs aimed at creating courses and lesson plans as well as those designed to increase the availability of computer science/programming lessons, coding competitions, job shadows, externships, and guest lectures by field experts (Sanzenbacher, 2013). Although recent efforts (e.g., Code for All initiatives, the introduction of computer science standards by state and national agencies and organizations have significantly expanded opportunities for students in computer science education, gaps in access and participation remain, particularly for girls, students of color, and students who may come from households with limited economic means, or students in rural areas (Google Inc. & Gallup Inc., 2015; Google Inc. & Gallup Inc., 2016; Qazi et al., 2020).

Recently, researchers have begun to address the pedagogies necessary to ensure that efforts to provide access to computer science (CS) for all actually create the access and equity intended. For instance, Ryoo (2019) highlighted three essential pedagogical practices to enhance student engagement and improve equity in this work. These pedagogical practices included: demystify

CS by showing its connections to everyday life; address real social issues impacting both CS and students' communities; and value students' voices and perspectives in the CS classroom (Ryoo, 2019). Despite the continued expansion of computer science programming and availability in K-12 schools, attention is needed to ensure that students have access to educators and education partners who have the requisite knowledge and skills to support their learning (Leyzberg & Moretti, 2017). For example, most CS teachers – including in the U.S. – do not hold a degree in computer science (Leyzberg & Moretti, 2017). To develop educators who have the knowledge, skills, and dispositions to support computer science instruction for student learning, additional professional learning, collaboration, and networking are needed (e.g., Lijun, Gillian, Bausch, Benjamin, 2021; Papini et al., 2017; Sanzenbacher, 2013). Student STEM identity, confidence, competence, and efficacy can grow for both students and teachers through opportunities for exploration, engagement, experiences, and programming (Carlone & Johnson, 2007; Herrera et al., 2012; Oyserman, 2015; Perez et al, 2014).

Methods

Research and Evaluation Questions

This mixed-methods evaluation used focus groups/interviews, educator surveys, student surveys, grantee surveys and secondary data sources to answer research and evaluation questions about the outcomes resulting from the Computing Partnerships Grant Program. We structured our research/evaluation questions and findings around four central topics – educators' experiences and competencies in computing, students' experiences and outcomes, LEA implementation and adaptations, and external support for program implementation. Table 1 contains a summary of the research/evaluation questions and data sources used to inform our analysis.

Table 1. Research and Evaluation Questions and Data Sources

Research and Evaluation Questions		Data Sources						
		STEM AC Personnel Interviews	Program Focus Groups	Partner Focus Groups*	Student Survey ²	Educator Survey	Grantee Survey	Secondary Data
Research Questions	Educators' Experiences and Competencies in Computing							
	What are the observable characteristics (e.g., race/ethnicity, gender, degree attainment) of educators who participated in the Computing Partnerships Grant Program?							✓
Evaluation Questions	How effective are Computing Partnerships Grant activities at increasing educator outcomes (e.g., computing competence – particularly with aligning curricula with CS standards, confidence, job attitudes/satisfaction, and value of computing)?	✓	✓			✓		
	What factors support and impede educators' computing competence (particularly with aligning curricula with CS standards), confidence, job attitudes/satisfaction, and value of computing?		✓	✓		✓		
	In what ways has programming adapted and evolved as a result of the COVID-19 pandemic?		✓			✓	✓	
	Students' Experiences and Outcomes							
	How effective are Computing Partnerships Grant activities at increasing student outcomes (i.e., computing self-efficacy, interest, engagement, skills – as aligned with Utah's CS standards, computational thinking, awareness of computing career opportunities, and intentions to pursue computing)?	✓	✓		✓	✓		
	LEA Implementation and Adaptations							
	How well were the program elements of the Computing Partnerships Grant implemented and adapted at each LEA to support student outcomes (e.g., computing self-efficacy, interest, engagement, skills – as aligned with		✓		✓	✓		

² The UEPC Student Computing Survey was newly constructed and piloted during the 2020-2021 school year to address implementation and outcomes for students. The 2021-2022 survey was administered across CP sites.

Research and Evaluation Questions		Data Sources						
		STEM AC Personnel Interviews	Program Focus Groups	Partner Focus Groups*	Student Survey ²	Educator Survey	Grantee Survey	Secondary Data
	Utah's CS standards, computational thinking, awareness of computing career opportunities, and intentions to pursue computing)?							
	To what degree has each LEA/school met its goals and objectives for the Computing Partnerships Grant?		✓				✓	
	External Support for Program Implementation							
	How effective are <i>post-secondary, industry, and community collaborations</i> at supporting program objective and goal attainment?		✓	✓				
	In what ways and to what extent has the STEM AC supported the development and expansion of computing for students in schools and out-of-classroom time (i.e., educator and school capacity, practice, and scaling up)?		✓	✓		✓	✓	

*Partners engaged with Program Participant Interviews

Data Sources & Analysis

UEPC Educator Computing Survey

Invitations to participate in the UEPC Educator Computing Survey were sent to 283 educators and instructors for the 2021-2022 year. Invitees were identified by STEM Action Center and Grantee contacts as individuals who had knowledge of and experience with the Computing Partnerships Grant Program. Invitees included both licensed educators and others who provided program delivery services but were not licensed as an educator in Utah. The survey was distributed via direct email with permission of the Computing Partnerships Grant Program Grantees.

The survey was designed to assess educators' perceptions of a) their own experiences and competencies, b) students' experiences and outcomes, c) program implementation, and d) the role of the STEM Action Center. Overall, survey participants received the same items throughout the survey. However, to further understand the experiences of participants relative to their own grant activities, participants were also routed to a subset of items specific to their grant

activities.³ For example, if a project engaged in Out-of-Classroom Experiences, Near-Peer Mentorship, and Work-Based Experiences, educators affiliated with that project only responded to survey items related to those activities.

A total of 116 educators completed the survey, representing a 41% response rate. This response rate is down 18 percentage points from the 2020-2021 reporting year (59%). Analysis of the UEPC Educator Computing Survey items included the generation and interpretation of descriptive summary statistics to identify common trends in responses across topics and inferential statistics (e.g., Analysis of Variance) to make comparisons across responses or groups. The three open-ended response options on the Educator Computing Survey allowed participants to offer explanations and additional context about their experiences. The open-ended response questions were coded using open-coding and were used in conjunction with the focus group and interview data to generate themes. Themes are reported as inserts in this report to provide attention to the rich, descriptive experiences of CP grantees and participants.

UEPC Student Computing Survey

A UEPC Student Computing Survey was piloted during the 2020-2021 school year and administered in full during the 2021-22 school year. For the 2021-22 year, 1136 students from Grantee sites participated in the UEPC Student Computing Survey.

The Student Computing Survey measures students' computing self-efficacy/self-confidence, computing interest, computing engagement, computational thinking (i.e., abstraction, algorithmic thinking, decomposition, pattern recognition, and evaluation), and computing identity (i.e., recognition, interest, performance/competence, and goal/outcome expectation). Each of these named constructs was measured using anywhere from nine to 15 survey items. Student were also asked to report on their demographics, the Computing Partnership (CP) activities they participated in, and when they participated in those activities (i.e., school year only, summer only, or both).

Analysis of the UEPC Educator Computing Survey items included the generation and interpretation of descriptive summary statistics to identify common trends in responses across topics and inferential statistics (e.g., Analysis of Variance) to make comparisons across responses or groups.

UEPC Grantee Survey

To support Program Administrator understanding of the status of program implementation, grantees from each of the 17 Computing Partnerships programs were requested to participate in a Fall 2021 and Spring 2022 UEPC Computing Grantee Survey. This questionnaire collected information from grantees about the numbers of participating students and educators, progress on program objectives, and feedback about their work with the STEM Action Center. Results from these surveys were provided to the STEM Action Center in the form of an interactive data

³ The seven Computing Partnerships Grant Program activities were: Innovation & Makerspaces, Out-of-Classroom Experiences, Integration of Out-of-Classroom Experiences and Classroom Instruction, Near-Peer Mentorship, Work-Based Learning Experiences, Professional Learning for Teachers and Staff, and Post-Secondary, Industry, and Community Collaborations.

dashboard to allow STEM AC personnel to view program results in a formative and accessible format. Grantees also received access to their own program responses along with aggregated responses for all programs. While the electronic dashboard is the primary format for sharing these data, this evaluation report provides a synthesis of select data from the UEPC Grantee Survey.

Focus Groups and Interviews

Focus groups and interviews were planned with a STEM Action Center representative, STEM Action Center partners, and educators. The purpose of these interviews was to gain a deeper and more nuanced understanding of how the Computing Partnership Grant Program was implemented from the perspective of those in the field. A semi-structured interview protocol was developed to gather information about participants' experiences with implementation (e.g., activities, partnerships, student experience and engagement, professional learning, role of STEM AC). Invitations to participate in a program-level focus group were sent to all 17 Grantees. Of those 17 grantees, only representatives from 10 Grantee programs ultimately responded and participated in the focus groups. In addition, the UEPC was able to interview one representative from the STEM Action Center, which provided additional context for the implementation of the CP program. Overall, interviews ranged from approximately 45 minutes to one hour. Focus Groups were conducted via zoom to maximize participation, and each was recorded and transcribed for analysis. Analysis of focus groups included the use of open-coding to generate themes (Saldaña, 2016), and included both confirming and disconfirming evidence where it existed.

Secondary Data

The UEPC used data, as permitted through the UEPC DSA with USBE, along with publicly available school data, to generate summary characteristics of Computing Partnerships Grant Program participants and sites. All characteristics were analyzed and presented in an aggregated format to protect the privacy of participants. These data allowed us to identify any differences in experiences with the program by educator characteristic or school setting.

Vignettes

A series of one-page vignettes are interspersed throughout the report to highlight key evaluation findings from the qualitative data sources. These vignettes (1) provide a summary of thematic findings and (2) include a sampling of representative quotes from focus groups and survey responses.



Educator's Experiences and Competencies in Computing

In this section of the report, we present findings related to the experiences and competencies of educators involved in the Computer Partnerships Grant Program. Specifically, we discuss 1) observable characteristics of participating educators, 2) educator outcomes, and 3) the impact of the COVID-19 pandemic. To address these topics, we utilized a variety of data sources, including data regarding teacher and school characteristics, survey data, and interview/focus group data.

Observable characteristics of participating educators

The observable characteristics of Computing Partnerships educators and instructors were available through a combination of survey responses and, when those were unavailable, from data available through a data sharing agreement between UEPC and the Utah State Board of Education⁴. Of the 116 individuals who participated in the educator survey, USBE records were available for 66. The remaining survey participants without USBE records included information technology staff, afterschool program providers, and paraprofessionals who were not listed in USBE educator records.

The summary of participant demographic information in Table 2 indicates that participants generally resembled Utah educators as a group. As shown in Table 2, individuals who participated in the UEPC Educator Computing Survey were primarily female (70%) and White (72%). Statewide, educators were primarily female (75%) and White (89%). Because of the high rate of unknown educational attainment among survey respondents, this characteristic is difficult to compare to Utah educators as a whole. However, if we use the percentages of those with *known* educational attainment, we find that 73% of survey respondents had a bachelor's degree and 27% had an advanced degree. These figures are similar to the distribution of known Utah educator degree attainment (67% and 31%, respectively). The high rate of unknown license type among survey respondents poses a similar problem. Considering only survey respondents with known license type, 82% held regular teaching licenses, 7% held LEA level educator licenses, and 11% were "underqualified" (a term provided by USBE to describe individuals with one of the following licensure types: student, para educator, alternative routes to licensure, temporary license, "C," or no license). This distribution is similar to the distribution of Utah educators with known license types, 90% of whom held a regular teaching license, 3% an LEA level educator license, and 7% of whom were "underqualified." Computing Partnerships educators were more likely to have more than five years of classroom experience: 48%, compared to only 32% for Utah educators as a whole.

⁴ This agreement permits UEPC to use USBE records for research and evaluation with the understanding that personally identifiable information is not disclosed.

Table 2. Observable Characteristics of Computing Partnerships Educators and All Utah Educators

Characteristic	CP Educators	All Utah Educators
Gender		
Female	70%	75%
Male	11%	24%
Unknown	19%	1%
Race/Ethnicity		
White	72%	89%
Other racial/ethnic group*	13%	6%
Unknown	15%	5%
Educational Attainment		
Bachelor's degree	45%	65%
Master's degree or higher	17%	30%
Other	0%	2%
Unknown	38%	3%
License Type		
Regular classroom level educator	43%	86%
LEA level educator	3%	3%
Underqualified**	6%	7%
Unknown	47%	5%
Educator Experience		
Five or fewer years	45%	53%
Six to ten years	20%	14%
More than ten years	28%	18%
Unknown	8%	15%

*To protect the identities of participants, groups of participants fewer than 10 individuals were aggregated together.

**Underqualified is a term provided by USBE to describe individuals with one of the following licensure types: student, para educator, alternative routes to licensure, temporary license, C, or no license.

Educator Outcomes

Educators' Perceived Competence (General)

As part of the UEPC Educator Computing Survey, all respondents were asked to rate their perceived competence in three general competency areas:

- Seeking ways to improve their professional practice,
- Computing/technological competence and practices, and
- Promoting diversity through inclusive practices.

Perceived competence in each of these areas was tapped by four to seven items. For reference, a sample item for each competency area is provided in Table 3.

Table 3. Items Tapping Educators' Perceived Competence in Three Broad Competency Areas

Competency Area	Number of Survey Items	Sample Items
Seeking Ways to Improve Professional Practice	5	<i>As an educator, I know how to learn to improve my teaching.</i>
Computing/Technological Competence and Practices	7	<i>I can adapt the use of technologies to different teaching activities.</i>
Promoting Diversity through Inclusive Practices	4	<i>I have a clear understanding of culturally responsive pedagogy.</i>

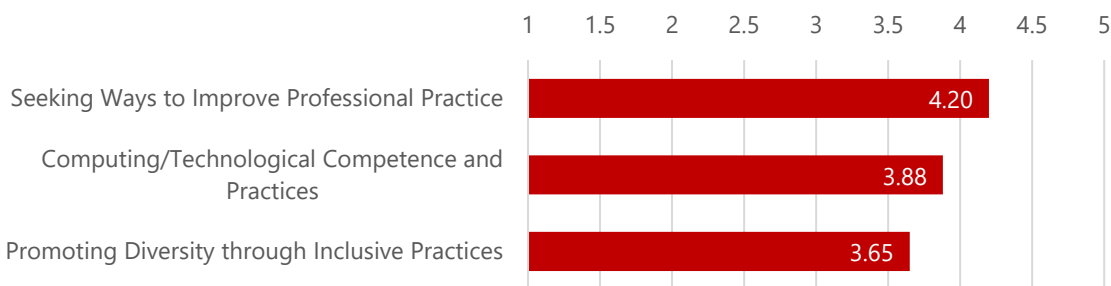
For each item, participants rated their perceived competence on a scale ranging from 1 (“not at all competent”) to 5 (“completely competent”). Mean ratings were computed by averaging ratings across items within each competency area.

As shown in Figure 1, survey respondents were most likely to rate themselves as competent in seeking ways to improve their professional practice by, for example, actively seeking out new teaching concepts and methods and sharing teaching problems with others. Mean ratings were between 4 (“quite competent”) and 5 (“completely competent”) on items tapping perceived competence in this area. In contrast, respondents were somewhat less likely to rate themselves as competent in effectively utilizing computing/technology and in promoting diversity through inclusive practices. In both cases, mean ratings were between 3 (“somewhat competent”) and 4 (“quite competent”). A repeated measures analysis of variance (ANOVA)⁵ indicated that ratings varied across competency areas, $F(2, 93) = 34.55, p < .001$.⁶ Pairwise comparisons confirmed that professional practices ratings were statistically higher than both computing/technology ratings and promoting diversity ratings. Importantly, this pattern of findings is similar to the pattern reported for data collected in 2020-2021.

⁵ A repeated measures ANOVA is used to determine whether the mean difference between three or more sets of measurements is zero.

⁶ A statistically significant result is one that is unlikely to occur by chance. When p values are less than .05, there is less than a 5% chance of finding a difference this large or larger if the null hypothesis is true. Here, the null hypothesis is that there are no differences in ratings by competency area. When p values are greater than .05, this chance is greater than 5% which is traditionally considered unacceptable for rejecting the null hypothesis.

Figure 1. Mean Perceived Competence Ratings in Three Broad Competency Areas



Note. Mean ratings are based on responses from 95 educators.

Educators' Perceived Competence in Areas Related to Grant Program Activities

The Computing Partnerships Grant Program was designed to build not only the general competencies of educators, but competencies in specific STEM-related activities as well. The grant program focuses on seven key activities:

- Innovation and Makerspaces
- Out-of-Classroom Experiences
- Integration of Out-of-Classroom Experiences with Classroom Instruction
- Near-Peer Mentorship
- Work-Based Experiences
- Professional Learning for Teachers and Staff
- Post-Secondary, Industry, and Community Collaborations

As shown in Table 4, most grant projects planned to focus on three to six of these seven activities.

Table 4. Grant Activities by LEA and Project

District	Project	Innovation and makerspaces	Out-of-classroom experiences	Integration of out-of-classroom experiences and classroom instruction	Near-peer mentorship	Work-based learning experiences	Professional learning for teachers and staff	Post-secondary, industry, and community collaborations
CUES	The Portable Universe of Computing, Computing Science, STEM and Coding	X✓	✓		✓		X	X
Duchesne District	Computer Science Experience for Underserved Students in Duchesne County Elementary Schools		X✓	X✓			X✓	
Entheos Academy/ Pacific Heritage Academy	Computing Expeditions Consortium	X✓	X✓	X✓	X✓		✓	X✓
Granite District (Kearns)	Coding in Kearns	X✓	X				X	X
Iron District	Code2Create Partnership Grant	X✓	X✓	X✓		✓	X	✓
Jordan District	Building a Computing Culture	X✓	✓	X✓	✓		✓	X✓
Juab District	Expanding Computational Thinking in Juab SD	✓		X			X✓	
Kane District	Expanding a Computer Science Pathway for Students in Kane County School District	X✓	X✓	X		X		
Murray District	Murray PowerPlay	X✓	X✓			X✓	✓	
Pinnacle Canyon Academy	Pinnacle Designs	X✓	X✓	X✓		X✓		✓

District	Project	Innovation and makerspaces	Out-of-classroom experiences	Integration of out-of-classroom experiences and classroom instruction	Near-peer mentorship	Work-based learning experiences	Professional learning for teachers and staff	Post-secondary, industry, and community collaborations
San Juan District	Code to Success, Elementary Coding, Computer Science Professional Development for Teachers, and Mobile Makerspace	X✓	X✓	✓			X✓	
SEDC	Work-Based Learning Internships and Certifications in 6 Rural Utah Districts					X✓		
South Sanpete District	COVE 21 (Maker Space/STEM Room)	X✓					X✓	X✓
Washington District	Hurricane Cone Site Pipeline for Computer Science	✓	X✓	✓	✓	X✓	X✓	X
Washington District (Hildale)	Establishing a Computer Science Pathway for Underserved Students in Hildale, Utah		X✓				X	
Weber District	CS Outreach and Retention Plan		X✓				X	
Weilenmann School of Learning	Project-Based Learning Makerspaces	X✓	✓	✓			X✓	X✓

Note: ✓ = noted by grantees in Spring 2022, X = noted by STEM Action Center

As part of the UEPC Educator Computing Survey, educators were asked to rate their perceived competence in each of the grant activities in which their project was involved. For example, educators were asked to answer items about Innovation and Makerspaces activities if they participated in those activities. Educators rated their own competencies in five of seven grant activities—Innovation & Makerspaces, Out-of-Classroom Experiences, Integration of Out-of-Classroom Experiences with Classroom Instruction, Professional Learning for Teachers and Staff, and Post-Secondary, Industry, and Community Collaborations. For the remaining two activities – Near-Peer Mentorship and Work-Based Experiences – educators were asked to reflect on their *students’* competencies rather than their own. Although items related to Near-Peer Mentorship and Work-Based Experiences focus on students’ experiences, we include them here to allow the reader to look across grant activities more easily.

For each item, participants rated their own – or their students’ – perceived competence on a scale ranging from 1 (“not at all competent”) to 5 (“completely competent”). Mean ratings were computed by averaging ratings across items within each area. A sample item for each competency area is provided in Table 5.

Table 5. Items Tapping Educators’ Perceived Competence and Educators’ Perceptions of Student Competence in Competency Areas Related to Grant Activities

Competency Area	Number of Survey Items	Sample Items
		Please rate your competence/your students’ competence to do the following ...
Innovation and Makerspaces	5	<i>Design questions to scaffold students in the making process</i>
Out-of-Classroom Experiences	3	<i>Use appropriate techniques and equipment</i>
Integration of Out-of-Classroom Experiences and Classroom Instruction	3	<i>Align curriculum and activities between out-of-classroom and in-classroom experiences</i>
Near-Peer Mentorship	2	<i>Demonstrate leadership skills through their work with younger students</i>
Work-Based Experiences	4	<i>Solve real-world problems</i>
Professional Learning for Teachers and Staff	3	<i>Use project-based, computational thinking pedagogy</i>
Post-Secondary, Industry, and Community Collaborations	4	<i>Identify who to contact if I have questions about our shared work to support student success in computing</i>



COMPUTING PARTNERSHIPS

BUILDING STUDENT CONFIDENCE, KNOWLEDGE, AND PROBLEM SOLVING SKILLS

Grantees described the multiple ways that the computing programs built student confidence in both themselves and the subject matter. Through scaffolded learning experiences, students were able to explore areas of interest while also building knowledge and skills (e.g., teamwork, communication skills, engineering design, and basic programming). For students who already showed aptitude for computing, their confidence grew as they expanded their understanding and also had opportunities to share their knowledge and skills through collaborative and near-peer experiences. For others, participants noted that student exposure and participation in computing often led students to seek additional learning and promoted greater exploration of more advanced opportunities.

Computational thinking centers problem solving processes. The CP grantees revealed how their programs promote students' exploration, engagement, and investment in their own learning. Learning activities designed by instructors and those that were sought by the students maximized opportunities for students to develop and exercise problem solving skills. As one participant explained, when something isn't working, students are encouraged to pursue the "why" it doesn't work. Challenges coupled with goals led students to engage in gaining new knowledge, engaging in collaborative activities with peers, strategizing, posing questions, testing ideas, and finding solutions. Ultimately, grantees believed that student engagement with computing led to the development and application of needed critical thinking skills.

Representative Quotes

These tools [different technologies and types of equipment] have helped my students learn the concepts of computing, such as coding. [The program] has helped my students gain confidence using various forms of technology. Students have increased their skills to collaborate with peers, problem solve, and decompose different problems and find solutions to complete activities. (Focus Group)

... It was exciting to see the students work together on a project to solve a problem. When they faced a problem, that didn't deter them. They were able to use strategies to figure it out and come up with a solution. They loved showcasing their project at a competition. This brought out their ability to talk with strangers about their project and explain in detail how they came up with their ideas and solutions to the problem. They gave credit to each other and were proud of their accomplishments. This built self-esteem and their ability to speak in public. (Open Ended Response)

Students were able to investigate and create a solution to a driving question revolving around our science standards and utilized technology to assist them in constructing a final product to provide a solution to their problem. (Open Ended Response)

I've seen students engaged, excited and ready to learn! It has been wonderful seeing how students can be problem solvers, critical thinkers, collaborators, and risk takers when they are engaged in computer science! (Open Ended Response)

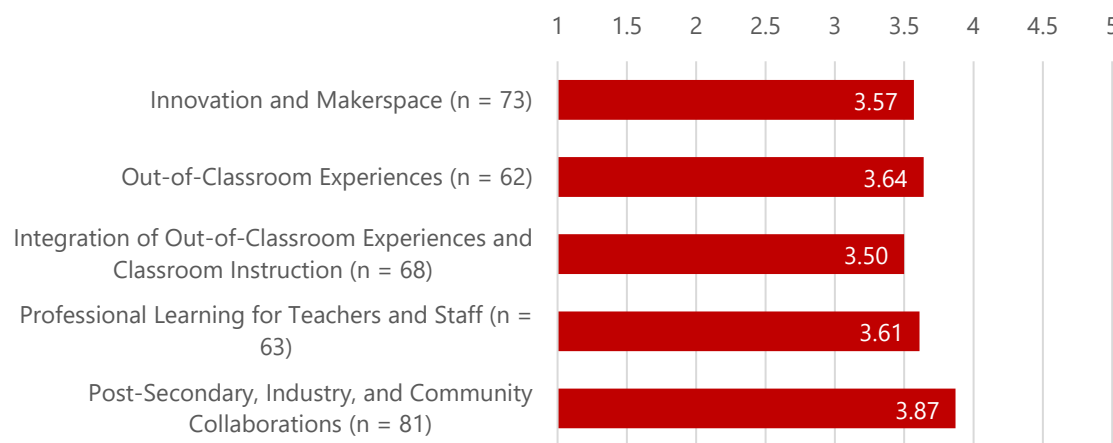
They feel like they're playing a game when they're actually learning and doing a lot of complex things. And they have a desire to know how their world works, I think. And once they realize that there's code behind all of the stuff and that they have the power to create their world, I think that is a huge, huge piece for the kids. (Open Ended Response)

I noticed a ton of students being immersed, so many loving technology days, begging for certain robots to come back. So much stuff that they love. I've seen a lot of students who already do some coding thrive on teaching their peers and having something assigned in class that they know well and are confident in. (Focus Group)

"Some students seem surprised at their abilities in new areas like coding. Even when they initially thought they would not like it, many kids show interest in having more tech tools at home." (Focus Group)

Figure 2 provides a summary of educators' ratings of their own competence in five competency areas related to grant activities. As shown, mean ratings were between 3 ("somewhat competent") and 4 ("quite competent") in all areas. Survey respondents were more likely to rate themselves as competent in Post-Secondary, Industry, and Community Collaborations than in other areas, with ratings just shy of "quite competent" on the five-point scale for this competency area. Dependent *t*-tests⁷ confirmed that collaboration ratings were statistically higher than ratings in the other four competency areas, $t_s(53 \text{ to } 68) > 2.83$, $p_s < .01$. Importantly, this pattern of findings is similar to the pattern reported for data collected in 2020-2021.

Figure 2. Mean Educator Ratings of their Own Competence in Competency Areas Related to Grant Activities



Note. Mean ratings are based on responses from between 62 and 81 educators. Sample sizes for each competency area noted in parentheses.

⁷ A dependent *t*-test is used to determine whether the mean difference between two sets of related measurements is zero.

COMPUTING PARTNERSHIPS

INTEGRATING COMPUTING INTO THE CURRICULUM

The integration of computational thinking and computing into the core academic day and beyond has begun at many sites. Focus group participants highlighted the positive impact of this integration for both students and educators/instructors. In part, this integration provides opportunities for creativity, tapping into student interest, expanded partnerships, and increased engagement for students and potential instructors. Participants viewed integration favorably and emphasized how it supported students learning in context. Moreover, as noted by participants, integration of computing into the curriculum is important as it removes the competition (e.g., time, material resources) between computing and other subjects, and creates equitable opportunities to learn for students.

Representative Quotes

The successes I have experienced this year because of the Computing Partnership Grant Program [include] that I have been exposed to some different technologies and how they work. The exposure has made me more aware of some ways to use technology in my classroom. I haven't implemented anything yet, but I have some ideas to develop. (Focus Group)

Some of our libraries in our schools are half the size that they used to be, because they've had to take the space just to use it for other programs and things. And a lot of us were hired under kinda old-school, "Library is about books, and that's what a library is, is a place to warehouse the books and try to get kids to read 'em." But to see the ways that they're starting to integrate [computing and technology] in and ways that they're using it to incentivize kids or to blend it into the lessons and stuff like that, it's been really, really cool. (Focus Group)

I have been able to engage students in a variety of the STEM fields by offering multiple types of clubs that students can participate in. Our Makers Club was new this year and we had great success that benefited our community where students used the Engineering Design process to create games for our school carnival. It was really successful because it helped to build community through creating something that others could participate in. I had a variety of students that participated in this after school program that required digital and non digital skills. I loved the integration of creating something digitally and then bringing it to life using recycled materials. (Focus Group)

So, we wanted to just make sure that when these kids were getting this stuff home, that they were actually doing it. And so, I sweetened the deal – pun intended – and we created – each one of those take-home curriculums is about four hours of programming so, each week, I – or for each lesson – we gave that background knowledge and then, some sort of a STEM or computational thinking activity. And then, my favorite – but also my least favorite one – is we did – the hot chocolate bombs were very popular at that time, and so, we created – they each got one of those and they decomposed – which is one of the steps of the computational thinking model – they decomposed and broke down what they thought the hot chocolate bomb was made like, and then, they have the opportunity to create an algorithm, and then, follow their algorithm and debug it to rebuild one. And so, just that idea that – who can resist a hot chocolate bomb? (Focus Group)

"We have had great success with using tech tools in our STEM classes and allowing students to experiment with them." (Focus Group)

Out-of-School time programming provides unique “opportunities to learn” for students to engage in computing activities, which “allow for different forms of learning and problem solving.” Many out-of-school time programs cited a focus on strengthening connections between in-school learning experiences and those in after-school programs by integrating, deepening, or extending core content area learning through computing activities. Participants noted that the benefits associated with this approach included both additional instructional time and opportunities for students to increase their knowledge, skill, and application of learning. Activities also led to students having “real-world, authentic experiences tied to their classroom instruction.” As noted by participants, this cultivated engagement, interest, and confidence in computing for many students. Moreover, participants explained that out-of-school time programs allowed grantees to reach more students.

Representative Quotes

We have reached over 60 students in grades 1 to 3 throughout this school year with our after school program. (Open Ended Response)

Out-of-classroom experiences were the most impactful to my students because they were able to grasp concepts that were difficult to understand during class. They were also able to improve their grades and relieve stress as a result. (Open Ended Response)

Students that sometimes struggle in other school subjects and settings are able to create and compete and feel like they are accomplishing something. (Open Ended Response)

The after-school program was all inclusive and students of all levels and backgrounds worked side by side to create their projects. Students worked through the design process, asked questions, solved problems, and built their cardboard carnival games. (Open Ended Response)

Out-of-classroom experiences has been most impactful to my students because it has given them multiple opportunities to learn about content that is not offered during regular classroom instruction. This has really helped to support the multiple intelligence of students and help them to feel successful at other things besides traditional curriculum such as math and reading. (Open Ended Response)

***"Out-of-classroom experiences were the most impactful to the small, struggling community. We are able to reach many students in a setting where they are more receptive to learning than they are during school."
(Open Ended Response)***

Innovation and Makerspace initiatives were lauded as one of the most significant CP opportunities. In part, participants highlighted the ability of students to engage in hands-on activities that draw on and capitalize on student interest and motivations. Grantee Makerspace programs provide generative and collaborative spaces for students to develop and apply new skills through exploration, examination, and innovation of projects through supplies and equipment (e.g., 3D printers, tablets for robots), and resources such as science, computer labs, technology, engineering, and art labs. The experientially-based program was cited as increasing student critical thinking and problem-solving skills, building collaborative skills, and sparking inquiry and creativity.

Representative Quotes

Innovation and makerspaces activities were most impactful for the students to expand their thinking beyond what they are used to doing. The answers and methods were not outlined requiring students to come up with their own solutions and ideas. (Open Ended Response)

Innovation and makerspace would be the most impactful to my students. They were given the opportunity to use many different tools that they may not be able to use at home. They were also able to learn and apply the engineering process and the scientific method. (Open Ended Response)

Innovation and makerspaces--our students don't get a lot of freedom to just be creative without all the confines. We of course have many rules they must follow but there are no perfect answers or one correct solution in STEM. We value all the students' ideas and creative abilities. (Open Ended Response)

...I think that the innovation and makerspace activities for students have been most impactful because I love seeing students make innovative, creative solutions for problems! Seeing their higher order thinking is incredible! (Open Ended Response)

I think kids grow their brains and learn when they are trying things out and tinkering. (Open Ended Response)

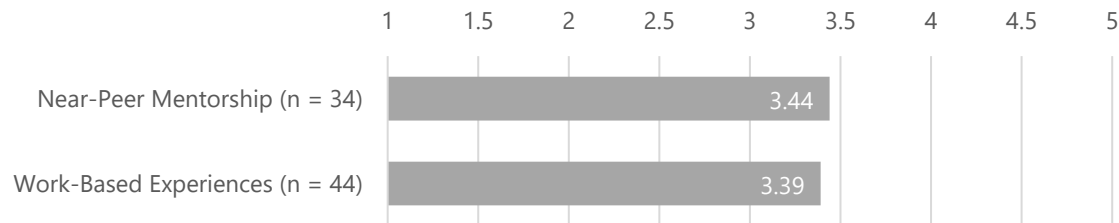
Innovation and makerspaces have been very impactful on me because of the opportunities that those rooms, their equipment, and their emphasis open up for my projects and my students' work. It is as though I have another perfectly structured room that has become an extension of my classroom and allows me to plan my projects with expansions, traditional building, and digital building. (Open Ended Response)

Innovation and makerspaces were most impactful because I see a high level of student engagement and involvement. Most all of the computing activities we provided were new experiences for the students. It was neat to see students try new things and gain confidence as they learn. Students who thought they did not like coding actually enjoyed the activities. Students who struggle in the regular classroom had opportunities to succeed with the computing activities. (Open Ended Response)

"Innovation and makerspaces activities were most impactful for the students to expand their thinking beyond what they are used to doing. The answers and methods were not outlined requiring students to come up with their own solutions and ideas." (Open Ended Response)

Figure 3 provides a summary of educators' perceptions of students' competence in the two remaining competency areas related to grant activities. As shown, survey responses indicated that educators perceived their students to be between "somewhat competent" and "quite competent" in engaging in near-peer mentorship and work-based experiences. These ratings were only slightly above the midpoint of the scale suggesting room for improvement.

Figure 3. Mean Educator Ratings of Student Competence in Competency Areas Related to Grant-Related Activities



Note. Sample sizes for each domain are noted in parentheses.



COMPUTING PARTNERSHIPS

BUILDING STUDENT CONFIDENCE, KNOWLEDGE, AND PROBLEM SOLVING SKILLS

Grantees described the multiple ways that the computing programs built student confidence in both themselves and the subject matter. Through scaffolded learning experiences, students were able to explore areas of interest while also building knowledge and skills (e.g., teamwork, communication skills, engineering design, and basic programming). For students who already showed aptitude for computing, their confidence grew as they expanded their understanding and also had opportunities to share their knowledge and skills through collaborative and near-peer experiences. For others, participants noted that student exposure and participation in computing often led students to seek additional learning and promoted greater exploration of more advanced opportunities.

Computational thinking centers problem solving processes. The CP grantees revealed how their programs promote students' exploration, engagement, and investment in their own learning. Learning activities designed by instructors and those that were sought by the students maximized opportunities for students to develop and exercise problem solving skills. As one participant explained, when something isn't working, students are encouraged to pursue the "why" it doesn't work. Challenges coupled with goals led students to engage in gaining new knowledge, engaging in collaborative activities with peers, strategizing, posing questions, testing ideas, and finding solutions. Ultimately, grantees believed that student engagement with computing led to the development and application of needed critical thinking skills.

Representative Quotes

These tools [different technologies and types of equipment] have helped my students learn the concepts of computing, such as coding. [The program] has helped my students gain confidence using various forms of technology. Students have increased their skills to collaborate with peers, problem solve, and decompose different problems and find solutions to complete activities. (Focus Group)

... It was exciting to see the students work together on a project to solve a problem. When they faced a problem, that didn't deter them. They were able to use strategies to figure it out and come up with a solution. They loved showcasing their project at a competition. This brought out their ability to talk with strangers about their project and explain in detail how they came up with their ideas and solutions to the problem. They gave credit to each other and were proud of their accomplishments. This built self-esteem and their ability to speak in public. (Open Ended Response)

Students were able to investigate and create a solution to a driving question revolving around our science standards and utilized technology to assist them in constructing a final product to provide a solution to their problem. (Open Ended Response)

I've seen students engaged, excited and ready to learn! It has been wonderful seeing how students can be problem solvers, critical thinkers, collaborators, and risk takers when they are engaged in computer science! (Open Ended Response)

They feel like they're playing a game when they're actually learning and doing a lot of complex things. And they have a desire to know how their world works, I think. And once they realize that there's code behind all of the stuff and that they have the power to create their world, I think that is a huge, huge piece for the kids. (Open Ended Response)

I noticed a ton of students being immersed, so many loving technology days, begging for certain robots to come back. So much stuff that they love. I've seen a lot of students who already do some coding thrive on teaching their peers and having something assigned in class that they know well and are confident in. (Focus Group)

"Some students seem surprised at their abilities in new areas like coding. Even when they initially thought they would not like it, many kids show interest in having more tech tools at home." (Focus Group)

Grantees explained that the near-peer mentoring has been positive for the program and individual students. There is both formally planned near-peer experiences and informal near-peer experiences. The formally planned near-peer experiences are structured opportunities while the informal near-peer experiences often grow from a student whose interest and engagement in computing activities has increased and then they begin mentoring and supporting their peers. Participants explain that the near-peer mentoring program offers a safe space for other students to explore and learn, risk not knowing the answers, engage in critical thinking and problem solving, and build confidence. For example, a focus group participant explained the changes over time for some students: "We have kids going from "I'm not even sure I want to participate" to where they're actually leading the activities." The near-peer mentoring program creates CP Ambassadors, or students who lead by example and demonstrate the value and possibilities associated with learning computing.

Representative Quotes

We gather a group of teens – 7th through 12th grade – who are trained on developmentally appropriate practices, and then, on content, that they can help with. And then, that's kind of our go-to team that comes and helps out, for example, with our Family STEM Night, or the event that I'm doing right now. They came in and they'll run some of the activities or the groups. And it's really fun to see, because the kids are there and the activities are all very hands-on and very fun so, they're great to do all of the activities, but when it's a 16-year-old leading the activity, it just adds a different element of cool than I can compete with. (Focus Group)

I feel that working with an older peer gave them confidence and the desire to try something new. (Open Ended Response)

...Our STEM tri-team ran a robotics camp for the kids, and we worked really hard on that tri-team to have a balance of mentors – both male and female – and it was really cool to see the girls that came to the camp, the way they connected with those tri-team members that were teenagers and went from kind of "I'm just here to be here" to "If she can be a programmer, I can be a programmer." And they would turn to those tri-team members that were female to get their guidance. That's who they were comfortable with, and they just were emulating them. And it was really cool to see. (Focus Group)

If those parents don't have a STEM identity, they're not gonna want to come if they have to help their kids code because they don't know how to code. But if we're like, "Don't worry about it. You just show up. We've got these teen mentors and that's what they do. They're super good at it." Then, it alleviates that concern for parents and it's more likely that we'll get parents who maybe have language barriers or less education and are uncomfortable with what they think might be expected to them. (Focus Group)

***"Near-Peer
mentorship was
impactful to my
students because I
feel it was
sometimes easier
for them to learn
from one another
and showed them
that they can have
an impact by
helping others."
(Open Ended
Response)***

Educators' Perceptions of the Value of Computing/Technology Integration, Confidence in Computing/Technology Skills, and Professional Satisfaction

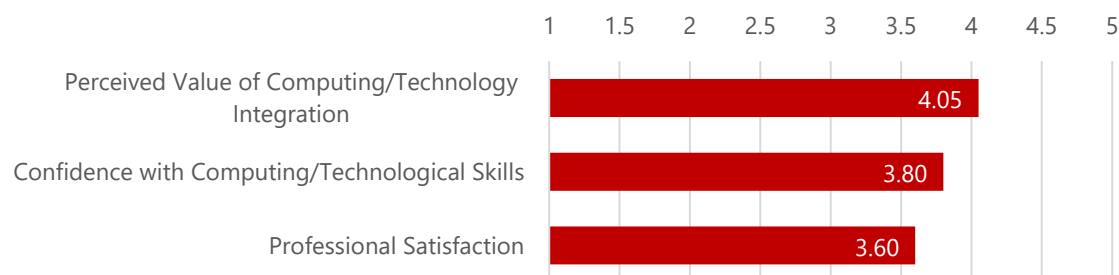
As part of the UEPC Educator Computing Survey, respondents were asked to rate their level of agreement with statements measuring beliefs about the value of computing/technological integration, confidence in their computing/technological skills, and professional satisfaction on a scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”). As shown in Table 6, educators responded to five to nine items in each area. Mean ratings were calculated by averaging responses across items with each area.

Table 6. Items Tapping Perceptions of Value of and Confidence in Computing/Technology and Professional Satisfaction

Subscale	Number of Survey Items	Sample Item
Perceived Value of Computing/Technology Integration	9	<i>Properly designed learning activities that integrate technology can promote students' active participation.</i>
Confidence with Computing/Technological Skills	6	<i>I know how to get students excited about computing.</i>
Professional Satisfaction	5	<i>My present conditions as an educator are excellent.</i>

Figure 4 provides a summary of educators' ratings across the three subscales. As shown, survey respondents were especially likely to agree with items tapping the value of computing/technology integration, with the mean rating just above of 4 (“agree”) on the five-point scale. A repeated measures ANOVA indicated that ratings were statistically different across subscales, $F(2, 89) = 15.97, p < .001$. Pairwise comparisons indicated that value ratings were statistically higher than both confidence ratings and professional satisfaction ratings, which both fell between 3 (“neither agree nor disagree”) and 4 (“agree”) on the five-point scale. Importantly, this same pattern of findings was reported for data collected in 2020-2021.

Figure 4. Mean Educator Ratings of Perceptions of Value of and Confidence in Computing/Technology and Professional Satisfaction

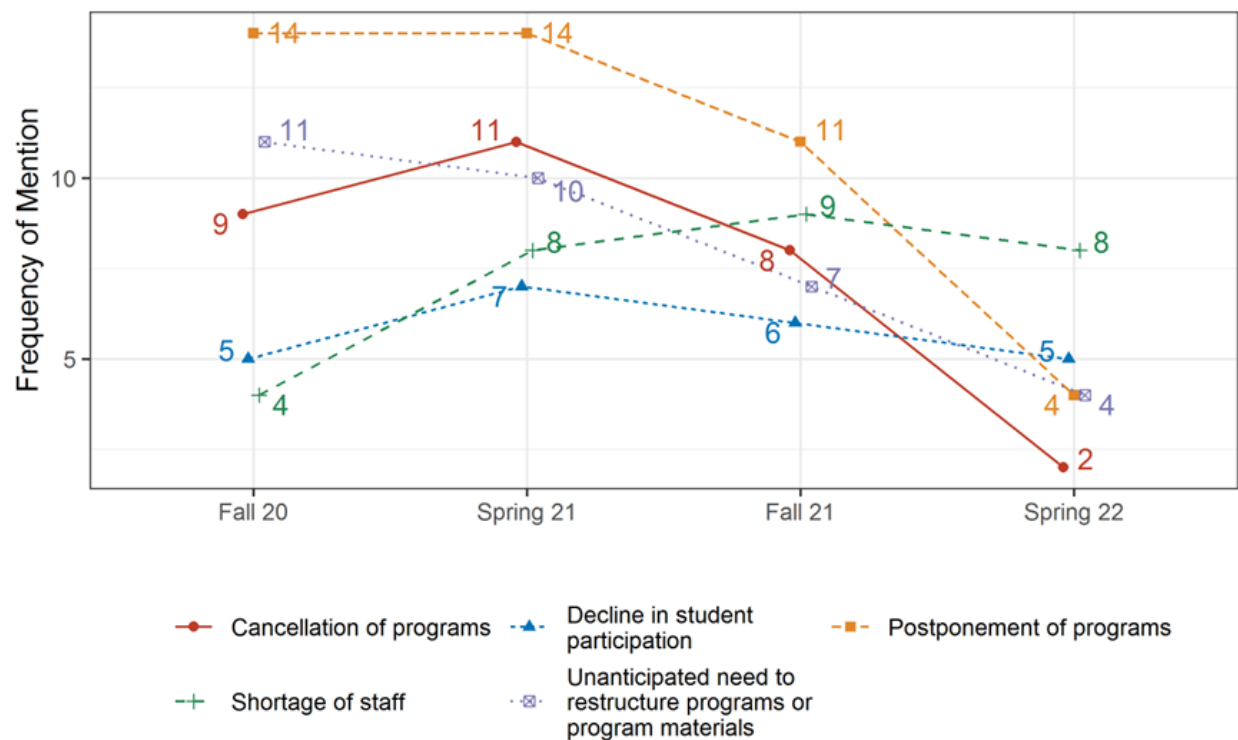


Note. Mean ratings are based on responses from 91 educators.

Findings from Grantee Survey

As part of the UEPC Grantee survey, grantees were asked to select from a list of five potential challenges – cancellation of programs, shortage of staff, declines in student participation, unanticipated need to restructure programs or program materials, and postponement of programs. These five challenges were identified based on LEA experiences implementing grant activities in the previous semester and particular obstacles that arose during the COVID-19 pandemic. As shown in Figure 5, comparisons of responses over time indicate that the effects of the COVID-19 pandemic are waning, but that they have not entirely abated. From Spring 2021 to Spring 2022, there has been a notable decrease in the number of grantees who have indicated that postponement or cancellation of programs has been a challenge. However, nearly half of programs ($n = 8$) reported that shortage of staff continues to pose challenges in Spring 2022.

Figure 5. Challenges to Implementing Grant Activities (Spring UEPC Grantee Survey Responses)



Students' Experiences and Outcomes

A key goal of the Computing Partnerships Grant Program is to improve student outcomes including computing self-efficacy/confidence, computing interest, computing engagement, computational thinking, and computing identity. To evaluate how effective the program is in doing so, we draw upon interviews, educator survey data, and student survey data. Findings in this section are organized by data source. Overall, we found that the Computing Partnerships Grant Program was associated with numerous positive student outcomes such as computing interest and computing identity.

Findings from Educator Surveys

Educators who participated in the UEPC Educator Computing Survey were asked to assess the role of Computing Partnership activities on students' outcomes in the areas of self-efficacy/confidence, interest, engagement, computational thinking, and computing identity. As shown in Table 7, educators' perceptions of student outcomes were tapped by nine to fifteen items per outcome area. A sample item for each outcome area is provided.

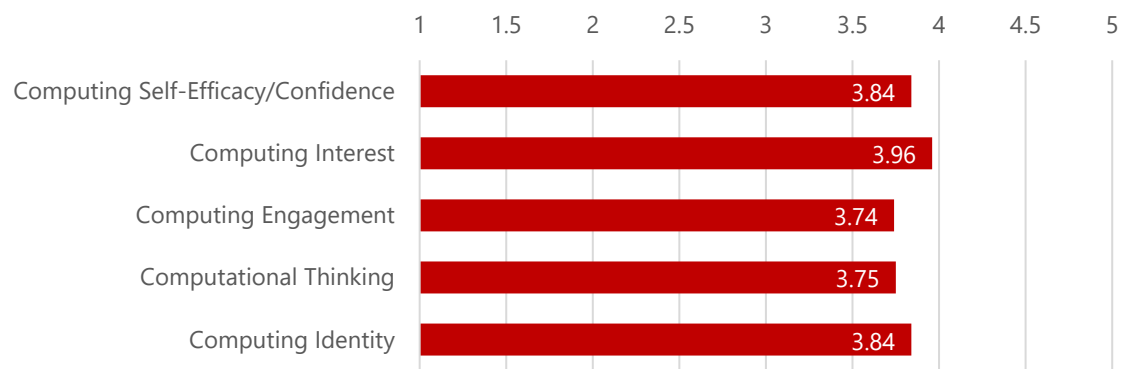
Table 7. Educators' Perceptions of the Impact of Computing Partnerships Activities on Student Outcomes

Outcome Area	Number of Survey Items	Sample Item Having participated in Computing Partnerships activities, my students
Computing Self-Efficacy/Confidence	9	<i>have a lot of self-confidence in using computers</i>
Computing Interest	11	<i>enjoy thinking up new ideas and examples to try out on a computer</i>
Computing Engagement	12	<i>usually welcome using a computer anytime they can</i>
Computational Thinking	15	<i>think about how to apply a solution to other problems</i>
Computing Identity	12	<i>think of themselves as computer-savvy</i>

For each item, educators were asked to rate their level of agreement on a five-point scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). Mean ratings were calculated by averaging responses across items with each outcome area.

As shown in Figure 6, educators' mean ratings of student outcomes were all above the midpoint of the scale, indicating that educators were more likely to agree than disagree that participation in Computing Partnership activities resulted in positive student outcomes. A repeated measures ANOVA indicated that ratings were statistically different across outcome areas, $F(4,51) = 4.21$, $p < .01$. Pairwise comparisons indicated that ratings of computing interest were statistically higher than ratings in the remaining four outcome areas. A similar pattern of findings emerged for data collected in 2021-2022.

Figure 6. Mean Educator Ratings of Student Outcomes



Note. The number of educator respondents ranged from 58 to 59 across outcome areas.



COMPUTING PARTNERSHIPS

STUDENT ENGAGEMENT WITH COMPUTING

Educators and instructors noted the importance of introducing computational thinking early (and often). Specifically, they noted that if one waits too long to introduce students to computational ideas and experiences, then students “self-opt out and it's really hard to get 'em back.” The STEM AC CP program has increased access to technology for both students and educators/instructors. This has included increasing the availability of the variety of technological tools that students can engage with during their in-school and out-of-school learning opportunities. As a result, students have had more hands-on opportunities to engage with computing.

Grantees found that student engagement in one activity led to increased interest and engagement in future activities. Grantees reported stories of students who were minimally engaged in school whose interest peaked and whose attendance at classes and events increased after exposure to computing experiences. One method of increasing student engagement was to scaffold student experiences to increase exposure, understanding, and engagement including starting computing in the earlier grades and tapping into their interest and other content areas such as literacy.

Representative Quotes

And they loved [read a book called Unplugged, and then, they did coding using cups] and, surprisingly, understood way more than I thought that they would. It took a little explaining in the beginning, but our teacher – she is great, and she used a lot of the vocabulary and all that kind of stuff, and those kids were, by the end of it, were giving their – you know, the algorithm and all of that kind of stuff – and they were using it and they were understanding it. And it was awesome. I think, so far, in all of that class, that was probably the one I was most impressed by because we had kindergarteners, first graders, and second graders who were coding using just plastic cups and how you stack them. And they themselves thought it was just fun, but they were using an awesome skill that is kind of more intended for, you would think, for the older ones, but they totally understood it. (Focus Group)

All of the students all the way down to kinder are being exposed to computer science, especially your students of color, your girls, they're going to be way more likely to stick with it as they get into secondary. I know we're in conversation right now to see how can we strengthen it into the middle school to ten continue to build those awesome CT options they have in high school and just keep that consistent so that we can see that career choice going up. (Focus Group)

For me, I do a lot of like, "I don't know how to do it. You see if you can figure it out. Let's put our heads together." And like yesterday, we were building the game Mouse Trap, and there's a thousand different parts, and I was like, "I don't know how to build Mouse Trap." And making them work together as a group, and like, "Wait, no, this part goes here. No, this is a better order. No, let's try this." And it's that problem solving and critical thinking that is so fun for them to watch. Because, yeah, I could go in and do it for them, but watching them struggle and want to give up – our biggest, our number one rule in our classroom is mistakes are cool, and I don't think our students get a lot of places to make mistakes. Their tests come back and that sort of thing, and for us it's like mistakes are cool. Okay, well, what didn't go right? How can we do it differently? And that's our number one rule in our classroom. (Focus Group)

And then working as a team and making them like, "I don't know. Can your neighbor figure it out? Can you ask your neighbor for help?" Whereas I don't always want to be the answer to the problem, and making them work together as a team. And then I watch them go across the room. "Wait, how did you guys do that? Wait, come help me." And so they're working – they could see that this table over here was able to make a kick thing work. "Oh, the rubber band's too big." Oh, well, it was just as simple as turning it in, folding it in half and almost making it like two rubber bands. But I didn't know how to do it, so they had to ask their peers. (Focus Group)

***"The students have come to understand the order things need to be coded and why. They understand what de-bugging is and how to do it."
(Focus Group)***

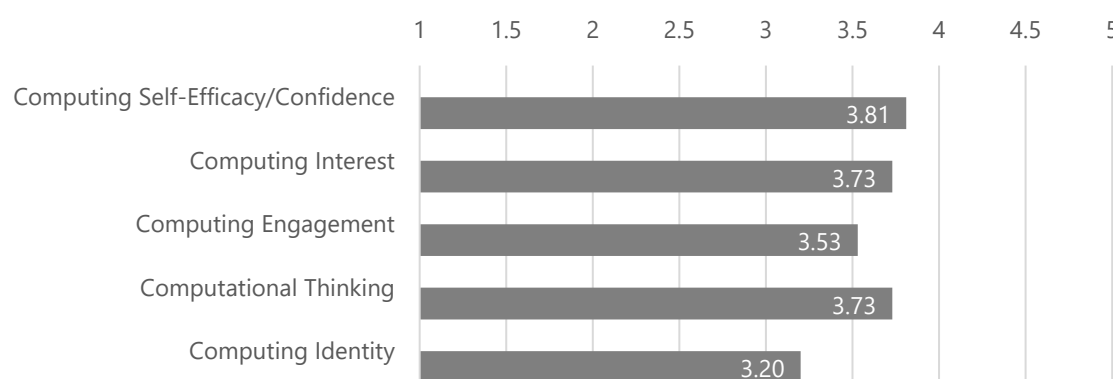
Findings from Student Surveys

During the 2021-2022 school year, students were asked to participate in a survey to assess their perceptions of their own computing outcomes. Students were asked to rate their agreement in the same five areas assessed in the educator survey: computing self-efficacy/confidence, computing interest, computing engagement, computational thinking, and computing identity. Item wording was nearly identical to item wording on the educator survey, allowing for comparisons.

Comparisons of Student Ratings Across Five Outcome Areas

As shown in Figure 7, student ratings on all five outcomes were above the midpoint of the scale indicating that students were more likely to agree than disagree that they were confident, interested, and engaged in computing, likely to engage in computational thinking, and likely to hold a computing identity. Student ratings were lowest for computing identity. This finding was supported by the results of a repeated measures ANOVA, which indicated that ratings were, indeed, statistically different across outcome areas, $F(4,1023) = 207.63$, $p < .001$. Pairwise comparisons confirmed that ratings of computing identity were statistically lower than ratings in the remaining four outcome areas.

Figure 7. Mean Student Ratings of Student Outcomes



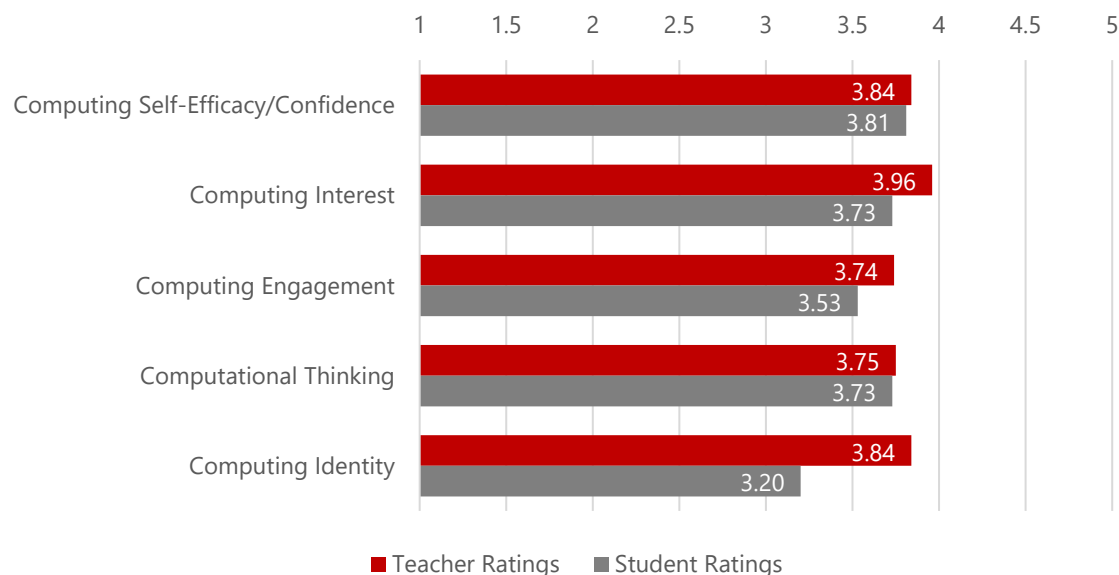
Note. The number of student responses ranged from 1033 to 1083 across outcome areas.

Comparisons of Educator and Student Ratings of Student Outcomes

In Figure 8, student ratings are presented in gray and educator ratings are provided in red. Independent t -tests⁸ were conducted to statistically compare educator and student ratings of student outcomes. These analyses indicated that educators perceived students to have greater computing interest, $t(1123) = 2.25$, $p < .05$, greater computing engagement, $t(1111) = 2.11$, $p < .05$, and greater computing identity, $t(1089) = 5.16$, $p < .001$, than students themselves did.

⁸ An independent t -test is used to determine whether the mean difference between two sets of related measurements is zero.

Figure 8. Mean Educator and Student Ratings of Student Outcomes



Note. The number of educator respondents ranged from 58 to 59 across outcome areas. The number of student responses ranged from 1033 to 1083 across outcome areas.

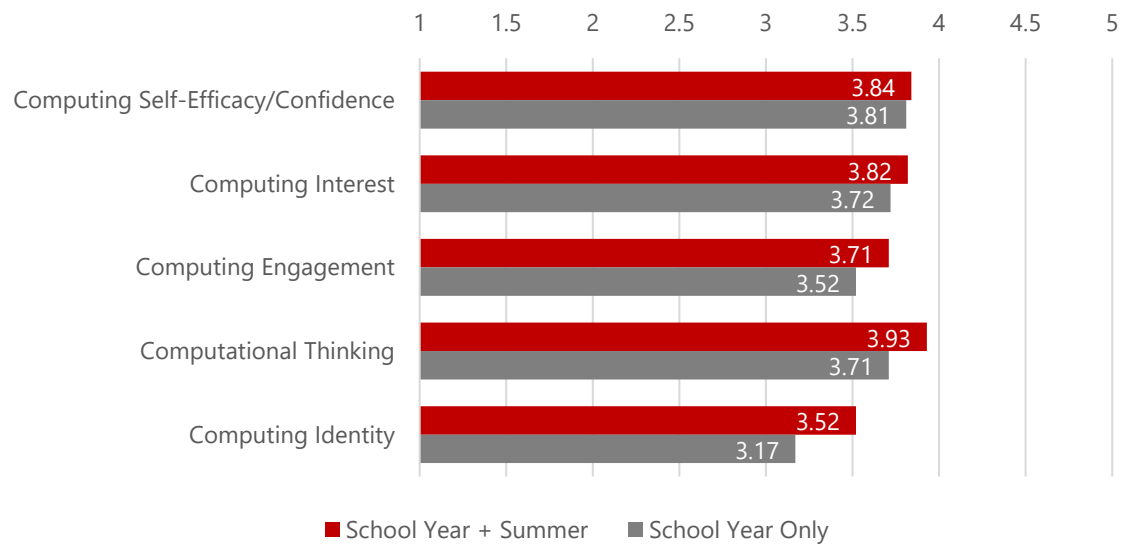
Comparisons in Student Outcomes by Summer Program Participation

Students were asked to indicate during what time period (i.e., summer only, school year only, or both school year and summer) they participated in Computing Partnerships activities. Only 11 respondents indicated that they participated in CP activities during the summer only.

Independent t -tests⁹ were conducted to statistically compare student outcomes for the other two groups. As shown in Figure 9, these analyses indicated that students who participated in activities during both the **school year and summer** had higher levels of computing engagement, $t(1040) = 2.30, p < .05$, perceived themselves as engage in more sophisticated computation thinking, $t(1024) = 2.78, p < .01$, and reported a stronger computing identity, $t(1019) = 3.58, p < .001$, than students who participated in activities during the **school year only**.

⁹ An independent t -test is used to determine whether the mean difference between two sets of related measurements is zero.

Figure 9. Mean Student Ratings of Student Outcomes by Participation Group



Note. The number of students who indicated that they participated in Computing Partnership activities during both the school year and summer ranged from 99 to 108 across outcome areas. The number of students who indicated that they participated in Computing Partnerships activities during the school year only ranged from 922 to 963 across outcome areas.



COMPUTING PARTNERSHIPS

DEVELOPING NEW PATHWAYS BY (RE)SHAPING EDUCATIONAL EXPERIENCES

The programs afforded through the CP Grants have both opened and expanded the academic and career pathways of students. Participants noted how students are coming with greater interest, familiarity, and skills as a result of exposure to these programs (e.g., out-of-school time, specific computational thinking or coding experiences). Students actively seek ways to expand their engagement with computing, including participating in additional courses, advanced classes, and even internships.

Representative Quotes

You know, we want them to grow up to be these adults. And we talk about that all the time in our club. And so we say to them, "Oh, you're so good at this. Oh, look at this." These are the kind of jobs you're going to want to really think about because these are the things that that leads to, and there are thousands of jobs that were never opened when we were kids. And we want them to have those jobs, so we talk about that all the time. And their parents will come back and they'll say things like to me like, "I hear you think my kids to grow up to be an aeronautics engineer." And I'll be like, "Oh yes, I do." But the kids are thinking about what kind of jobs are out there. And they're little. And so they're already setting some goals for themselves about who they're going to be. And it just doesn't get better than that for me. That's what I want for them. (Focus Group)

...Our school has seen the value of learning to code, and our computer tech specialist is now teaching coding to the students in our school. Our students have pushed into the secondary and now our High School is starting a coding class-the first ever. The goal that we had for our first students to have computing skills and occupations is finally on track! (Focus Group)

Students are engaged and excited to use the tech tools provided, become familiar with computer programming, and to establish solid bases to continue to improve in computer programming. (Open Ended Response)

One of the things that we found – especially if we want to grab underserved populations – if you look at research, research says underserved population – girls are more likely to get involved in STEM if it has a creative aspect. So, we've really tried to focus our things on creative aspect, and then, other underserved population – like Hispanic and African American kids – they like social justice. They like to see that they're making a change in the world. And so, we've written curriculum specifically trying to meet those needs, because if then – they're doing something they're already interested in, but then, as they go along, we introduce that, "Oh, you're so good at computational thinking" and we use computational thinking words, their attitudes toward the value of computing and their desire to do it more change. (Focus Group)

"... we can speak to the numbers on who has access to the computer science standards. ... And you can see that excitement in their face and you can feel that excitement. But that provides motivation for them. It opens doors for them." (Focus Group)

LEA Implementation and Adaptations

This section of the report explores the implementation of the Computing Partnerships Grant Program in participating LEAs. Using data from interviews, educator surveys, student surveys, and grantee surveys, this section addresses two evaluation questions:

1. How were the program elements of the Computing Partnerships Grant Program implemented and adapted at each LEA to support student outcomes?
2. To what degree has each LEA met its goals and objectives for the Computing Partnerships Grant Program?

Overall, we found that educators had mixed perceptions of program implementation. While progress was made on key grant objectives, data from interviews and surveys provide insights into areas where the program might be improved.

How were the program elements of the Computing Partnerships Grant implemented and adapted at each LEA/school to support student outcomes?

The implementation of the Computing Partnerships Grant Program varied across projects and contexts. Important contextual variables included the geographic and demographic characteristics of LEAs, the different objectives of each project, the unique partnerships established for each project, the characteristics of the educators and students who were involved, and the time period for implementation (i.e., during the school year versus during the summer).

Findings from Educator Surveys

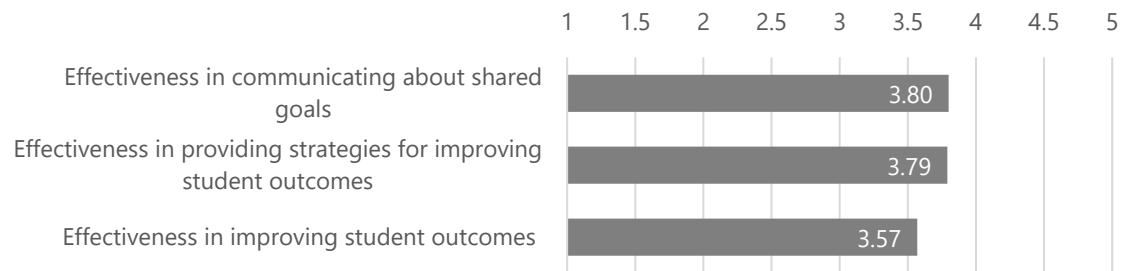
To understand implementation across projects, educators were asked to evaluate how well the Computing Partnerships Grant Program was implemented at their LEA to support student outcomes. Specifically, educators were asked to assess the degree to which the LEA was effective in

- communicating about shared goals
- providing strategies for improving student outcomes, and
- improving student outcomes.

Educators' perceptions of the effectiveness of their LEA in communicating about shared goals was assessed with five items (e.g., "I knew and understood our grant objectives"). Educators' perceptions of the effectiveness of the LEA in providing strategies for improving student outcomes and improving student outcomes were each assessed with five items tapping the five student outcomes highlighted throughout this report (i.e., computing self-efficacy/confidence, computing interest, computing engagement, computational thinking, and computing identity). Educators were asked to respond to all items on a scale ranging from 1 ("strongly disagree" or "not at all effective") to 5 ("strongly agree" or "extremely effective").

As shown in Figure 10, educators’ ratings of the effectiveness of LEAs in communicating about shared goals and in providing strategies for improving student outcomes were, on average, between 3 (“neither agree nor disagree”) and 4 (“agree”), indicating that educators were more likely to agree than disagree that LEAs were effective in these areas. Educators’ ratings of the effectiveness of LEAs in improving student outcomes was lower, but still above the midpoint of the scale. This suggests that, on average, educators’ perceived LEAs as being “moderately effective” to “highly effective” in improving student outcomes.

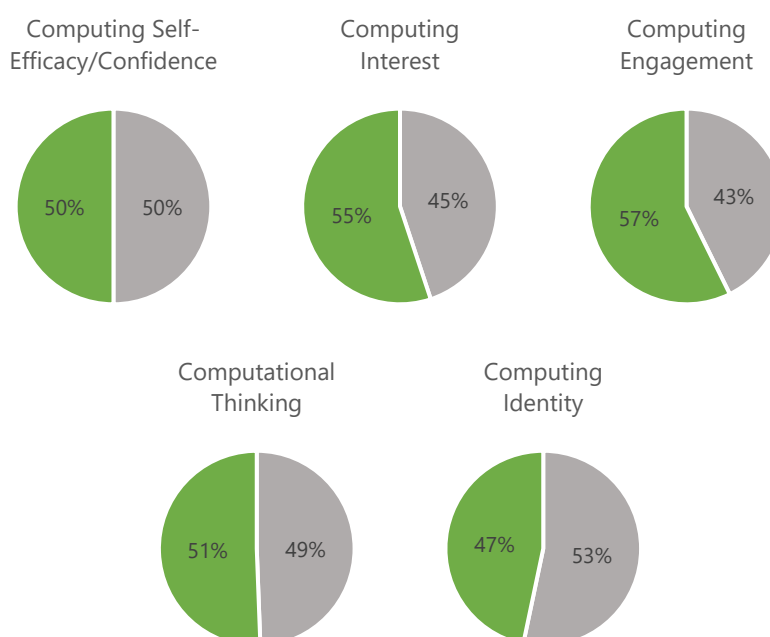
Figure 10. Educators' Perceptions of LEA Program Implementation



Note. The number of educator respondents ranged from 90 to 91 across outcome areas.

In Figure 11, educators’ ratings of the effectiveness of LEAs in improving student outcomes are broken down by outcome area. Numbers in green reflect the percentage of respondents who indicated that their LEA was “moderately effective,” “very effective,” or “extremely effective” in improving student outcomes. As shown in Figure 11, ratings of effectiveness in improving student outcomes were relatively similar across outcome areas, with educators most likely to report that LEAs were successful in improving students’ computing engagement and least likely to report that LEAs were successful in improving students’ computing identity.

Figure 11. Educators' Ratings of the Effectiveness of LEAs in Improving Student Outcomes



Note. The number of educator respondents ranged from 89 to 90 across outcome areas.

Findings from Students Surveys

Students were asked to rate their level agreement with the statement that “All computing activities I have participated in have been well organized” on a five-point scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”). Of the 928 students who responded, 58% agreed or strongly agreed that Computing Partnerships activities were organized well, resulting a mean rating of 3.57.

To what degree has each LEA/school met its goals and objectives for the Computing Partnerships Grant?

Full results pertaining to LEAs’ progress on grant goals and objectives are available on the electronic data dashboard that has been made available to STEM Action Center personnel and grantees based on the Grantee Survey responses completed in the fall and spring of the 2021-2022 school year. Here we provide a high-level summary of the progress made on grant objectives.

As depicted in Table 8, grantees reported substantial progress on grant objectives between fall and spring of the 2021-22 school year. Although only 41% of grant objectives were either “nearly completed” or “completed” in the fall, 59% reached this same status by the spring. Importantly, both percentages are markedly higher than in 2020-2021, when only 21% of grant

objectives were either “nearly completed” or “completed” in the fall and only 43% were nearly completed” or “completed” in the spring.

Table 8. Progress on Grant Objectives (from Fall and Spring Grantee Surveys)

Progress	Fall		Spring	
	Count	Pct.	Count	Pct.
Have not started	2	3%	2	3%
Started, but no progress	3	5%	3	5%
Some progress	31	51%	20	33%
Nearly completed	18	30%	14	23%
Completed	7	11%	22	36%
Total	61		61	

External Support for Program Implementation

How effective are *post-secondary, industry, and community collaborations* at supporting program objective and goal attainment?

Partnerships with community partners, industry partners, and post-secondary partners continued to play an important role in the development and delivery of the computing programs for students. Of the 17 LEAs who completed the 2022 Spring Grantee Survey, 15 grantees reported engaging in external partnerships during the 2021-22 school year. Out of those 15 grantees, ten had two or more external partners. Table 9 summarizes partners by organization type.

Table 9. Computing Partnerships Grant Program External Partners

Industry Partners	Higher Education Partners	Other Partners
ACT	Snow	Sevier CTE Center, Code
Aerospace, Space Dynamics	Southern Utah University	Changers, Fremont Indian
Lab	Utah State University	State Park, Richfield
Hill Air Force Base	Southwest Technical College	Residential Hall
Planetary Science Institute	Utah Valley University	Planetarium
Northrop Grumman	Dixie State University	4-H Lego League
Powerteq	Weber State University	High School Drone Club
Mindfire Technology		Jordan Ed Foundation
Swann Industries		GWC
InfiniD Learning		Digital Promise League of
Utah First		Innovative Schools
Douglas Space and Science		Code Ninja
Center		Future in Design
		Skill Structure
		Fremont Indian State Park

Some programs have extensive partnerships (e.g., community, business, and university-based partnerships) that facilitated more programming opportunities, engagement, expertise, and physical space. These partnerships have also aided, in part, the development and acquisition of certain assets (e.g., software programs, coding platforms, and training and professional learning). CP Grantees described both intentional and opportunistic efforts to increase collaboration and coordination within and between programs, including visiting other grantee programs (Makerspace), sharing resources, addressing how they notified students and parents about available experiences, and even working with their STEM AC partner for professional learning. In some cases, community collaborations are growing. For instance, some grantees report expanded participation by the community and community partners, including donation of material resources and time such as volunteering at STEM Night.

Increasingly, coordination is occurring within sites and across sites, as buy-in and engagement among educators is spreading. Collaborations with heightened coordination have led to increased available experiences for students, such as expanding curriculum and programming to after school. Participants, however, recognize that significantly more work is needed to increase participation and coordination with educators and to get computational thinking, and computing programs, embedded throughout the regular school day and curriculum. In some districts, a representative from the district serves as the coordinator. Collaborative efforts have given participants a sense of community and security, clarified expectations, and ensured common goals and vocabulary. Opportunities to learn from and with one another in the district settings increased confidence, unity, and exploration among educators.

Representative Quotes

But I don't think we need to small-scale that. I think that there can be a webinar, a lunch webinar, something like that, where to help improve the effectiveness of your partnership grant you can have a community come and speak to the people who receive the grants. (Focus Group)

We've done a lot of footwork as far as like recruiting volunteers and coaches and training and support and managing all of that, which has been intense and chaotic. But it's part of our approach to like include the community, right? So we have teachers that are coaches and we have parents and we've had businesses that have paid some of their people to be coaches. So it's been work time for them. (Focus Group)

Like, to me, because I'm not at those school sites unless I'm running programming, that has been, like, for me, the critical piece – that she'll make me aware of a need that they have – for example, the Family Night that we're doing on Wednesday – and "Hey, can you help out with that?" And then, she gets different educators to come and help out. Then, she'll help me out with different things as well to make sure that we're getting the opportunities out to all of the families and they'll all have that opportunity to participate. (Focus Group)

I think when we have so many different people that are working together from different places, it has made it a lot easier in that sense where we can take things from other people and tweak them to how they'll work for our program at our school or, how she said, doing it online or whatever. And so, that's extremely helpful and not so stressful that everything is weighing on you to create the curriculum and the idea and all that kind of stuff. (Focus Group)

Even though we're not at the schools together, there's still a way to reach out to somebody if you're stuck or learning. (Focus Group)

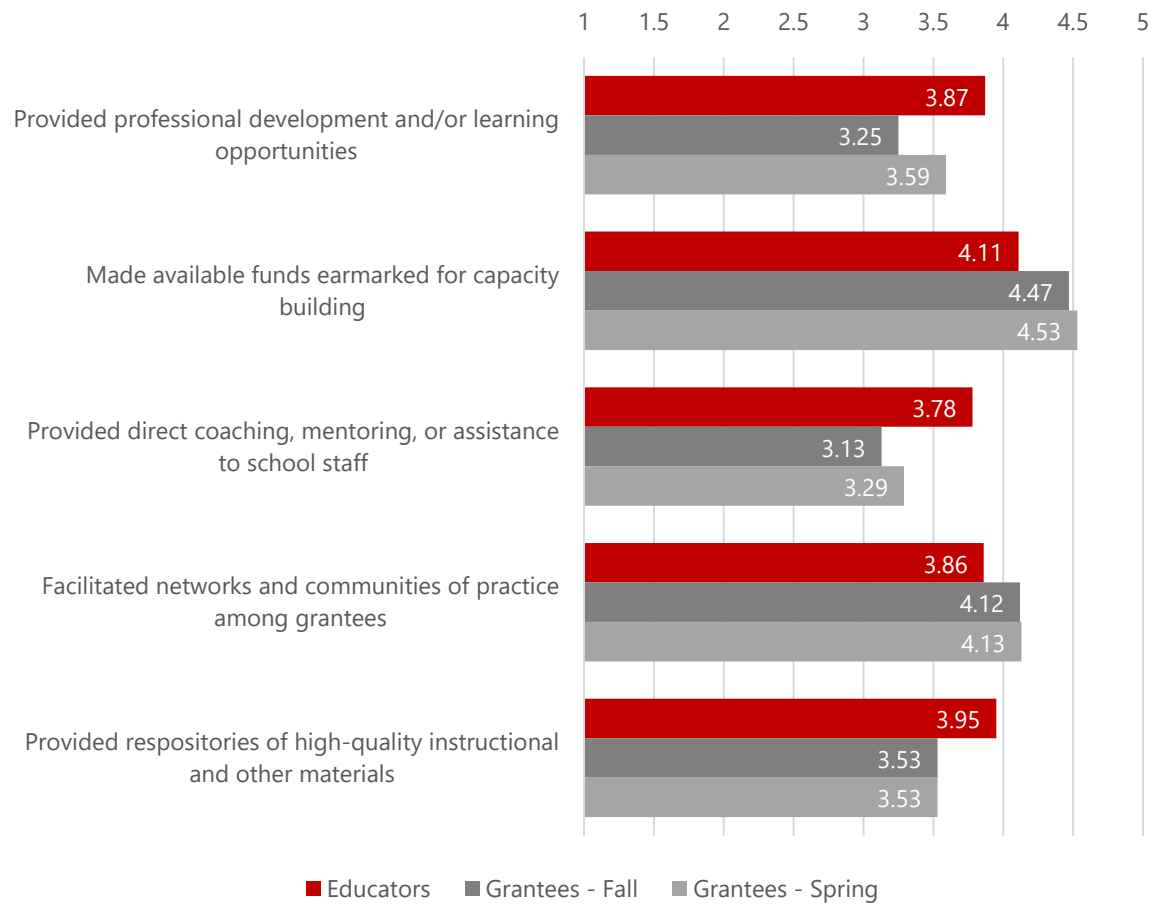
"It means a lot to students to see people from their own community. Students also are able to stretch their critical thinking in this class, which excites and interests them!"
(Open Ended Response)

In what ways and to what extent has the STEM AC supported the development and expansion of computing for students in schools and out-of-classroom time—educator and school capacity, practice, and scaling up?

As part of the UEPC Educator Computing Survey and both the Fall and Spring Grantee Surveys, participants were asked to rate the extent to which the STEM Action Center engaged in a number of activities to a) build the capacity and practice of school administrators and teachers involved in the Computing Partnerships Grant Program and b) support the scaling up of computing activities at LEAs. Educators responded to all items on a five-point scale ranging from 1 (“not at all”) to 5 (“to a very large extent”). Mean ratings are provided in Figure 12 (for items tapping capacity building) and Figure 13 (for items tapping support for scaling up).

As shown in Figure 12, mean ratings for most capacity-building items were between 3 (“to a moderate extent”) and 4 (“to a large extent”). The highest ratings for both educators and grantees emerged for the item tapping funding. Both educators and grantees indicated that the STEM Action center “made available funds that were earmarked for capacity building” either “to a large extent” or “to a very large extent.”

Figure 12. Mean Educator and Grantee Ratings of STEM Action Center Support for Building Capacity



Note. Mean ratings are based on responses from between 71 and 76 educators and between 16 and 17 grantee representatives.



COMPUTING PARTNERSHIPS

STEM AC AS AN INTERMEDIARY AND STEWARD FOR COMPUTING

The grant funding provided by the STEM Action Center has been a catalyst for expanding computing partnership programs throughout the state. Grants often included school sites and partner organizations such as universities, county/city agencies, and community organizations. Overall, grantees emphasized that the STEM AC, and Lynn Reichert in particular, offers unique and instrumental support and guidance in advancing a network among programs. In part, STEM AC's and Lynn's accessibility has been viewed as a major asset of the CP program. The STEM AC has served as convener and facilitator of collaboration and a community of practice among grantees. Grantees share successes, challenges, and even resources. Moreover, both Lynn and grantees provide critical feedback on program development and implementation, which has been viewed as a support for program improvement. Participants highlighted that the conversations, organization of meetings for grantees, and flexibility exhibited by STEM AC both during- and post-pandemic has been beneficial in ensuring that programs can engage students and promote educator development.

Representative Quotes

The grant has allowed me to expand the makerspace and engage students in ways I never thought possible with my regular program funding. It has been a great blessing. (Open Ended Response)

The strength of what we're doing is the consortium. We would not have the same effect if we were one organization doing it alone. The fact that we're able to work together really, really, adds to what is happening at each site. (Focus Group)

And so, one of the biggest things I think the STEM Action Center has done – besides provide the grant itself – is provide that collaboration piece where we can have discussions and learn from one another – especially through Covid. (Focus Group)

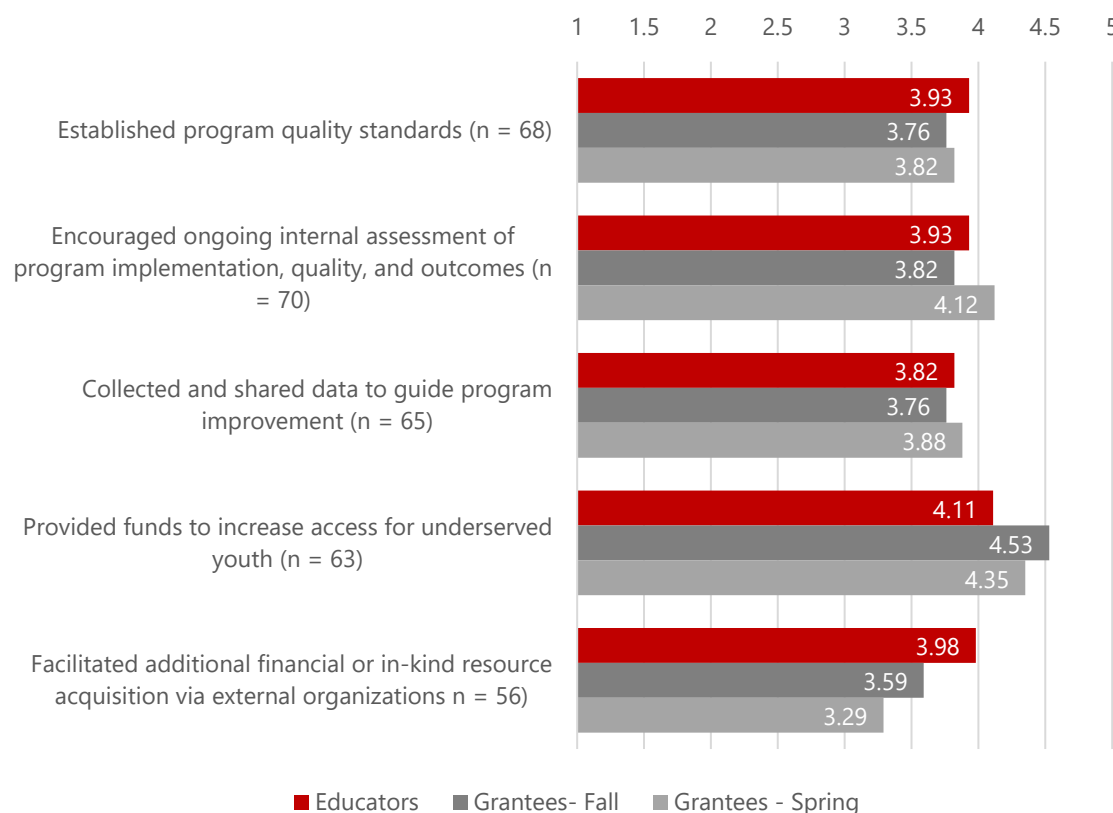
I have really appreciated Lynn's tenacity to get us together as a group to talk and to make sure that those conversations happen, because I am learning so much about what is capable in other districts that I went, "Oh, okay, so that is possible. I can do that here. I just need to figure out how to do it there." And the conversations we have as a group has been so powerful for me just kinda stepping into this role and stepping into managing this grant that that's been super helpful for me to see a vision and a possibility throughout the states. And so I've really appreciated that support and that willingness to bring other partners in and kind of help us think through different pieces of our grant goals. (Focus Group)

I work mostly with Lynn. She's incredibly accessible and available and engaged. Like she came down to STEM Night and saw what we were doing, and it's really nice to have a face on the other end of the phone when I have questions or concerns or want advice about something, that like I can text her and say, "Hey, do you have five minutes for a question on that?" And I've never had that experience in any other grant situation, that I felt like they cared about what was happening and not just the numbers that I was sending. (Focus Group)

"I think the only thing I would like to add is, honestly, I think it's amazing that the STEM Action Center gives this much money out, because this is something we could not do without them." (Focus Group)

As shown in Figure 13, mean ratings for most scaling up items were between 3 (“to a moderate extent”) and 4 (“to a large extent”). The highest ratings for both educators and grantees emerged for the item tapping funding. Both educators and grantees indicated that the STEM Action Center “provided funds to increase access for underserved youth” either “to a large extent” or “to a very large extent.”

Figure 13. Mean Educator Ratings of STEM Action Center Support for Scaling Up



Note. Mean ratings are based on responses from between 56 and 70 educators and between 17 grantee representatives.

Participants indicated that the grant funding has been essential to develop, implement, and even scale their computing programs. In some instances, the CP grant funds were combined with other resources by, as one participant described it, "braiding different grant programs together" to increase availability of programming and serve additional students. Grant resources were used in a myriad ways including to procure software (e.g., Photoshop, Autocad) and hardware (e.g., Chromebooks, tablets, Glowforge 3D Laser Printers), implement programs (e.g., CS First; SheTech; Ozobot; Sphero BOLT; Cyber Core; LEGO Mindstorms; First LEGO League; Scratch; VEX computer science curriculum; Makerspace Solutions; Code.org), and provide supplies and experiences to students and families (e.g., field trips, webinars, seminars, competitions), including activities that could be done at home.

Although participants were quick to recognize the value of the resources provided through the CP program, some noted that the resources are insufficient to meet the needs of all students (and educators/instructors). Some grantees, for instance, indicated that they have dedicated their own money and time to ensure the availability of CP opportunities. Additionally, some grantees highlighted how districts are not equal in the resources committed for the development, continuity, or scaling of CP programs, hardware, software, personnel, or time allocated. A few programs highlighted how they were using other personnel (e.g., paraeducators, other content teachers, school staff) to support the implementation and growth of CP programs. Some sites are expanding their efforts to involve other educators and community members in serving as instructors and/or integrating computational thinking into the academic core of the school day, which participants noted would support program growth and student opportunities.

Representative Quotes

The partnership grant wouldn't fund any of these programs on their own, but the brilliance that [district leader] brings as a grant specialist is that she braids them, like you just made the ultimate braiding. And so the partnership is one aspect of these, the coding K-12 is one aspect, and I think for some of this that might be where it's kind of confusing, 'cause we're not sure which grant is doing what there. But we're very grateful for not just having each of them individually, but with our braiding – the artistic braiding that [district leader] does we're able to perpetuate this, we're able to make this turn into hard skills. (Focus Group)

These experiences provide resources and other materials that teacher (normally) can't obtain, store, have on their own. (Open Ended Response)

There are great resources for teachers to draw from to incorporate computational thinking activities in the classroom. (Open Ended Response)

We get like, 3D printers and things like that to do this and so, it's not like we're buying a piece for Entheos Magna and then, they just use it and then it sits on a shelf and they're not using it. We've got it in a system where Salt Lake County 4-H, Entheos Kearns, Entheos Magna, and Pacific Heritage can all use the same equipment by checking it out for a period of eight weeks – or whatever their current session is. (Focus Group)

My budget for [the] year that I get to run my programming is \$1,500.00, so it's not a lot of money, and I definitely don't have money to go out and buy a bunch of 3D printers or all of these resources that we have. But because we have them available, I'm able to offer nights – like our Pixilation Night – because I have another source to get both the supplies and the equipment needed to give kids those opportunities. (Focus Group)

I'm thousands of dollars out of my pay or my own money into this program myself. And there's no way to write down for the grant that we match every bit of it or we're matching a great [deal] of it. But because the budget is inflexible, and there's no way to move money from one place to another, there isn't any good easy way to pay for the disaster. And you ...cannot foresee, for example, that the robot arms are going to break in the middle of a project where you're trying to lift a lunar lander. And then you've got to have some old robot arms, which we finally figured out how to buy, but needed a lot of money to buy several hundred dollars.... (Focus Group)

"These experiences provide resources and other materials that teachers (normally) can't obtain, store, [or] have on their own." (Open Ended Response)

Discussion

The STEM AC Computing Partnerships Grant Program has demonstrated its value in expanding meaningful learning programs for students to increase their exposure to and experiences in computing. Schools and districts continue to seek and expand partnerships, particularly with industry and higher education. The existing partnerships center the development of learning and instructional experiences that encourage student engagement and the pursuit of computational fields of study. As a group, educators involved in the Computing Partnership Grant Program reported that they value computing/technology integration and feel competent in carrying out key grant activities, including employing pedagogical strategies that bolster students' computational thinking and creating meaningful out-of-classroom experiences. Reflecting these strengths, educators agreed that Computing Partnerships activities positively impacted students' computing skills and attitudes including students' confidence and interest in computing. Students who participated in Computing Partnerships activities during both the school year and summer were especially likely to report positive attitudes toward computing, including a strong computing identity. Educators credited the STEM Action Center with providing critical support (including funding and network opportunities) for expanding computing opportunities for students in school and during outside-of-classroom time. Here, we summarize considerations that may inform the CP program's continuous improvement efforts.

Increase Opportunities for CP Staff to Expand their Computing and Technological Competence and Practice. While survey participants generally perceived themselves as strong in “seeking ways to improve their professional practice,” survey participants rated their computing/technological competence and practices less highly. Survey and focus group participants highlighted that additional opportunities are needed to expand knowledge of computing and to ensure the meaningful engagement of individuals who may not be traditionally trained in this area. Examples were offered of the difficulties in promoting engagement among instructors/educators, or potential instructors/educators, who already feel that students may know more about the area than they do. Participants recognized that preparation programs still do not focus on the integration of computing with core subject matter learning. Consequently, participants highlighted the importance of on-going professional learning, including creating communities of practice among instructor/educators (e.g., within and across sites) and even with external partners. To continue to extend and sustain the CP program, consideration could also be given to the creation of a professional learning series that offers differentiated learning experiences for instructors/educators, including those that address awareness, skill development, and skill enhancement at different levels. For instance, instructor/educators explained their desire to further integrate out-of-classroom experiences with core instruction during the day both as a way to extend in-class instruction and as a way to integrate computing with core subjects.

Expand Accessibility to Computing Experiences. Participants in this study highlighted the eagerness of students to engage in computing experiences. They also noted that increased engagement by educators has provided new opportunities and access for students to computing experiences. The STEM AC grant program continues to expand learning and engagement experiences for additional students, including those who would otherwise not have access. Given

the success of the CP program to date, there is increased interest and demand by participants across districts and communities to develop more core knowledge of computing and related skills for all students.

Deepen Opportunities for Developing Student Computing Identity. Findings from the current evaluation indicate that many students (and even their families) have begun to develop a computing identity. Interestingly, however, educators perceived students as having a stronger computing identity than students themselves did and reported relatively lower effectiveness of LEA support in this student outcome area. Taken together, these results suggest that additional efforts may be needed to bolster student perceptions and that LEAs might be able to play a more instrumental role in supporting students' computing identity. A strong computing identity can increase the pipeline of students into fields that centralize computing. To the degree that a strong computing identity leads students to seek out computing-related opportunities, students can also develop skill sets (e.g., problem solving and collaboration) that are transferable regardless of their educational and career pursuits. Thus, intentionally designed experiences that address student computing identity development would be beneficial, regardless of the number of experiences to which students are exposed.

Increase Capacity of LEA's to More Directly Support Student Learning. Local Education Agencies provide a unique source of support for educators who are interested or participate in the computing opportunities for students. In addition to providing additional, or supplementary, resources for programming, LEAs can further enhance the access to and effectiveness of Computing Partnerships programs by aligning the computing learning opportunities with district and school goals. Specifically, participants highlighted the potential for increased integration of school day core instruction with out-of-school time experiences and the integration of computing into other core areas throughout instruction during the day. LEAs may offer coordination support for these efforts. Coordination meetings facilitated by STEM AC provide support for LEAs to learn with and from one another, particularly learning about strategies for improving student access, program implementation, and outcomes. Given the success of the program to date, it would be especially beneficial to consider additional ways LEAs can partner with educators to more intentionally promote student's computing identity, self-efficacy/confidence, and computational thinking. Moreover, LEAs may consider how to further use existing resources to scale their computing efforts.

Build Upon and Sustain Support for Program Implementation. Grantees noted the importance of continuing to build and sustain increased buy-in among instructors/educators and partners. In addition to citing the role of preparation programs in increasing the capacity and confidence of educators, there were calls for how to actively identify and foster opportunities for collaboration within and between programs. Going forward, grantees may consider how community partnerships and associated activities might strengthen district partnerships to embed computational thinking in the regular school day and curriculum. Importantly, STEM Action Center serves a significant role in facilitating and supporting this capacity building. Future professional learning experiences may be beneficial, including the provision of additional direct coaching, mentoring, or assistance to school staff as well as the expansion of current repositories of high-quality instructional materials. Furthermore, the development of community

collaborations across sites provides an opportunity for grantees to consider how collaborative activities can be structured to promote key student outcomes – e.g., computing identity. Finally, evidence from the evaluation demonstrates positive perceptions of STEM AC support for scaling up computing programs and activities. Given the networking opportunities of the STEM AC, they may also be able to facilitate the acquisition of additional financial or in-kind resources from external organizations to supplement resources available to grantees to ensure sufficient resources across programs to meet the needs of all students.

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Appendix A: Project Objectives and Outcomes

Program	Program Objectives, Outcomes, and Goals
CUES	Objective A – Student Learning with Computing through a Mobile Innovation Space <u>Outcome:</u> Provide students with practical coding and other computing opportunities through the use of a mobile planetarium. <u>Goal #1:</u> Teachers identify and include coding and programming activities in a mobile planetarium by implementing best practices to ensure student learning and success. <u>Goal #2:</u> Educators to empower students to code, program, script, create apps, development websites, etc., during their planetarium experience. <u>Deliverables:</u> Teacher-created lesson plans for utilizing the planetarium and integrating computing experiences therein. Objective B- Training/Professional Development <u>Outcome:</u> CUES and at least one representative from each of our 7 school districts will receive an initial Digitalis Planetarium training on the hardware and software use, and be instructed on how to provide innovative learning experiences for students. <u>Goal # 1:</u> Gain confidence in planetarium use and implementation of coding, programming, and other computer activities with students. <u>Goal # 2:</u> Learn how to access additional resources and helps. <u>Deliverables:</u> Physical and digital training materials/handouts/resources distributed. Objective C – Community Partnerships and Collaboration <u>Outcome:</u> Establish partnerships with higher ed (<i>Snow College, SUU, USU</i>), industry (<i>ACT Aerospace, Space Dynamics Lab, Hill Air Force Base, Planetary Science Institute, Northrop Grumman</i>) and community (<i>Sevier CTE Center, CodeChangers, Fremont Indian State Park, Richfield Residential Hall</i>) entities. <u>Goal #1:</u> Communicate with Larry Smith at Snow College, Cameron Pace at SUU, and Deborah Ivie at USU to begin partnership conversations for collaboration and implementation. <u>Goal #2:</u> Meet with community and industry leaders to see how they can contribute to the planetarium computing experiences for our students, and how we can partner with them. <u>Deliverables:</u> Detailed plan on how CUES will utilize our community partners for professional development, teacher recruitment and retention, accessing resources, networking opportunities, and community outreach.
Duchesne	Objective A- Weekly after school 4-H Computer Science Club Meetings <u>Outcome-</u> Students consistently participate in CS club meetings. <u>Goal # 1-</u> Each school will have 1 after school CS club meeting each week. <u>Goal # 2-</u> Registered students will participate in 80 % of the after school club meetings each semester. <u>Deliverables-</u> Increased participation in Computer Science and computing activities. Objective B – Participation in an International Scratch Day Event <u>Outcome-</u> Students will understand the global nature of computer science. <u>Goal # 1-</u> All registered students will participate in one International Scratch Day event during the school year. <u>Deliverables-</u> Students will receive a certificate showing their participation in the Scratch Day event.

Program	Program Objectives, Outcomes, and Goals
	Objective C – Participation in a FIRST LEGO League Jr. Robotics Showcase Event <u>Outcome-</u> Teachers and students will participate in a FIRST LEGO League Jr. Robotics Showcase Event. <u>Goal #1-</u> All registered students and teachers will participate in a FIRST LEGO League Jr. Robotics Showcase Event in each school year. <u>Deliverables-</u> All students and teachers will receive a certificate showing their participation in the FIRST LEGO League event. Objective D – Summer 4-H Computer Science Summer Camps <u>Outcome-</u> Students and teachers will participate in a 4-H Computer Science Summer Camp each summer. <u>Goal #1-</u> Teachers will work with our 4-H Extension Agent, and produce a 20-hour 4-H Computer Science Summer Camp in June of each summer. (They may work as a separate school or in conjunction with other schools participating in the grant.) <u>Goal #2-</u> Registered students will attend the 20-hour 4-H Computer Science Summer Camp each summer. <u>Deliverables-</u> Each student will receive a certificate of participation in the 4-H Computer Science Summer Camp. Objective E – Teachers participate in one professional development activity per quarter/semester <u>Outcome-</u> Teachers will become more acquainted with Computer Science and will be able to incorporate PD activities in their Computer Science club meetings and will learn how to integrate Computer Science principles in other core curriculum. <u>Goal #1-</u> Teachers will participate in one professional development activity per semester and summer, for a total of 9 activities through the life of the grant. <u>Goal #2-</u> Teachers will develop a portfolio showing the content of the PD activities, and how the activities have been incorporated into the Computer Science club meetings. <u>Deliverables-</u> Teacher portfolio.
Entheos/Pacific Heritage	Objective 1 – Provide collaboration between afterschool programming and community/higher education experts in computing and experiential learning <u>Goal #1-</u> USU STEM Faculty will introduce National 4-H CS Pathways Curriculum each fall and hold quarterly meetings with consortium partners on implementation. <u>Goal #2-</u> USU STEM Faculty and alignment specialist will provide training on “Innovation Stations” in October, and hold quarterly zoom or in-person meetings on implementation. <u>Deliverables:-</u> • CS Pathways Training • Quarterly CS Pathways meetings with consortium partners • Quarterly Innovation Station (Maker) Implementation Objective 2- Enable out of school time educators to access curriculum and tools to better integrate learning with USBE K-12 Computer Science Framework and develop strong computing teaching skills <u>Goal # 1-</u> Provide annual training to afterschool faculty and staff from all consortium sites <u>Goal # 2-</u> Provide curriculum alignment specialist to directly mentor afterschool instructors <u>Deliverables-</u>

Program	Program Objectives, Outcomes, and Goals
	• Hire curriculum alignment specialist • Specialist to provide bi-weekly mentoring to staff of all consortium sites. • Provide annual CS for Informal Educators training each fall (September-October, depending on scheduling) Objective 3 – Provide afterschool engagement with computing from the earliest grades through middle school <u>Goal #1</u>-Each site will offer a minimum of 1 Afterschool Computing club per week per age group (K-2, 3-5, 6-8) <u>Goal #2</u>-Each site will offer open-ended afterschool “Innovation Station” Classes <u>Deliverables-</u> • Weekly CS related afterschool classes for all age groups • Weekly open-ended maker classes Objective 4 – Provide strong connection between the school day and after-school program <u>Goal #1</u>-Curriculum and integration specialist will work with afterschool leaders to align afterschool CS Pathways goals with daytime goals. <u>Deliverables-</u> • Monthly collaboration between afterschool and daytime school leaders • Weekly check in with afterschool staff by curriculum and integration specialist to refine alignment and resolve challenges in implementation of afterschool CS Programming. Objective 5 – Provide access to computing for all students, including students who are traditionally underserved in the field <u>Goal #1</u>- Actively recruit underserved populations for afterschool activities so that the student population participating in computing activities more closely resembles the demographics of the overall school population <u>Goal #2</u>-Provide afterschool maker activities teaching computational and algorithmic thinking through non-traditional topics in order to attract non-traditional CS participants. <u>Deliverables-</u> • Quarterly advertised afterschool clubs aimed at underserved populations, including/bilingual outreach. • Quarterly CS topics integrated in non-traditional afterschool clubs. • At least two CS family outreach events per site to help families support youth in CS education. Objective 6 – Use near-peer role models to encourage participation and increase the perception of belonging in computing <u>Goal #1</u>- Recruit and train near-peer mentor teams in leadership and CS topics. <u>Goal #2</u>- Hold at least one near-peer-led CS afterschool at each consortium site. <u>Deliverables-</u> • Near-peer mentor participation in annual TRY team training through 4-H. • Near peer mentors lead a minimum of one afterschool session per site. Objective 7 – Provide a strong experiential computing model that parallels and integrates with the learning models used in teaching all subjects <u>Goal #1</u>- All afterschool sessions will follow an open-ended experiential learning model with student input. <u>Goal #2</u>- Specialist will work with staff to evaluate implementation plans and adapt to experiential models, including open-ended Innovation Stations.

Program	Program Objectives, Outcomes, and Goals
	<u>Deliverables:</u> - Quarterly Report on open-ended innovation station participation and activities - Detailed afterschool class/club plans outlining CS objectives quarterly.
Granite/Kearns	Objective A- Create formalized pathways for students from underrepresented groups to learn coding and robotics in grades PreK-12th. <u>Goal # 1-</u> Out of school robotics and coding program and Lego League K-8 <u>Goal # 2-</u> High school drone club <u>Goal #3-</u> Maker spaces Objective B – Create Maker spaces <u>Goal # 1</u> – Establish maker spaces and provide needed materials for elementaries <u>Goal # 2</u> - Train teachers to utilize materials and technology integrated curriculum Objective C - Provide high quality professional development opportunities for teachers in order to improve teacher quality and retain highly qualified educators. <u>Goal# 1</u> – Yearly training for up to 15 teachers for technology endorsement
Iron	Objective A- Increase teacher training, support, and resources (including Makerspaces) to teach computing <u>Outcome-</u> 100% of Elementary Teachers and Middle School CS Teachers will be trained and have the resources they need to teach computing skills. <u>Goal # 1-</u> Provide training to all targeted teachers on integration of computing <u>Goal # 2-</u> Provide makerspace materials and training to all elementary and middle schools. <u>Goal #3-</u> Provide coding vendor visits to all 4-6 grade classrooms annually. <u>Deliverables-</u> # of Makerspaces at schools, # of CS micro-credentials earned by teachers. Objective B – Outreach to underrepresented students to integrate out of school and classroom training <u>Outcome-</u> Traditionally underrepresented students will increase representation in our computing events and programs by 10%. <u>Goal# 1-</u> Provide events and programs that are accessible to all, with no cost or other barriers for students <u>Goal # 2 -</u> Relentlessly contact and market to underrepresented students to help them engage in computing <u>Deliverables-</u> Attendance percentages by sub group, # of low barrier programs and events Objective C – Build and maintain a coalition of community partners to accomplish goals and provide pathways for students <u>Outcome-</u> Our partnerships and opportunities to engage with partners will increase by 100%. <u>Goal# 1</u> – Connect with partners who engage in student work to provide feedback and expertise. <u>Goal # 2 -</u> Increase opportunities and events for students to interact with a variety of mentors <u>Deliverables-</u> # of partnerships who engage with students, # of events for partner engagement.
Juab	Objective A-

Program	Program Objectives, Outcomes, and Goals
	<u>Outcome</u> - Increase the number of educators who show competency in Computational Thinking Practices and Pedagogies. <u>Goal #1</u> - Educators articulate and use computer science pedagogies and practices. <u>Goal #2</u> - Educators identify and curate high-quality projects that they integrate and use in their classroom. <u>Goal #3</u> - Educators increase confidence and success when using web-based computer science platforms, such as Scratch, with their students. <u>Deliverables</u> - # of educators who have earned computational thinking micro-credentials will increase each year. Objective B – <u>Outcome</u> - Increase the number of K-12 students who engage in Computational Thinking experiences. <u>Goal #1</u> - Students engage in computational thinking experiences that are integrated with and aligned with core subjects. <u>Goal #2</u> - Students complete high quality computational thinking projects. <u>Goal #3</u> - Students increase confidence and success when using web-based computer science platforms, such as Scratch in the classroom. <u>Deliverables</u> - # of educators who have earned computational thinking micro-credentials will increase each year; to earn a micro-credential, educators must use skills in their classrooms. By design, this will increase the number of students who engage in Computational Thinking experiences.
Jordan	Objective A – Increase teacher/specialist capacity and competency to facilitate the use of mobile computer science resources and school-based Makerspace development <u>Outcome</u>- Participating teachers/specialists have an awareness of resources and how to integrate and align them into the new Computer Science standards, cross-disciplinary into regular core standards, and expand into Makerspace and after-school programs. <u>Goal # 1</u>- Monthly PLCs/Trainings with selected school level teachers/specialists that participate in teaching existing tech tools available through the STEM & Digital Learning Center. <u>Goal # 2</u>- Monthly PLCs/Trainings with selected school level teachers/specialists that participate in teaching how to access and integrate additional free resources. <u>Goal #3</u>- Monthly PLCs/Trainings with selected school level teachers/specialists that participate in identifying cross-curricular activities and creating shared resources. <u>Deliverables</u>- Agenda of PLC’s, list of participants (year 1-10 schools, year 2-10 additional schools, year 3-remaining schools), shared examples of lesson and activity resources. Objective B – Outreach to underrepresented students to integrate out-of-school and classroom training into school-based makerspaces. <u>Outcome</u> - Participating teachers/specialists have developed best practices related to STEM/CS resources and how to integrate them into CS standards; this integration will allow delivery of resources to a wider audience of students and facilitate the development school-based makerspaces. <u>Goal# 1</u> - Identify best practices for school level STEM/CS programs that create a roadmap for success as we expand the program to additional selected schools, monthly PLC’s (year 1-10 schools, year 2-10 additional schools, year 3-remaining schools) will continue to be held and resources shared.

Program	Program Objectives, Outcomes, and Goals
	<u>Goal # 2</u> - Foster teachers/specialists from Year 1 to train new participating teachers/specialists; thereby increasing capacity in additional schools throughout the district at the school level. <u>Deliverables</u>- Agenda of PLC's, list of participants, development of a shared resource and onboarding program through a learning management system where new schools/teachers can join and access all resources. Objective C – Build and maintain a coalition of community partners to accomplish goals and provide pathways for students <u>Outcome</u>- Individual schools will build relationships and partners with businesses and industry partners in their local school community. <u>Goal# 1</u> – Participating teachers/specialists will be invited to attend industry site visit opportunities and develop public/private partnerships. <u>Goal # 2</u>- Participating teachers/specialists will be trained on how to reach out to industry partners in their local school area and help industry partners understand how to support programs and align their resources to specific school/demographic needs. <u>Deliverables</u>- Agenda of PLC's, list of participants, scripted outreach resources developed to build public/private relationships; shared through a learning management system where participating schools/teachers can join and access all resources.
Kane	Objective A- Increase student (and community) engagement in computing through the following hands-on, educational activities and events: • After school 4-H coding courses in elementary schools • Regular FIRST Lego League Club Meetings • Computer Science Week • FIRST LEGO League Robotics scrimmage • 4-H Summer STEM Camps • Annual Family STEM Night • Teacher professional development in STEM <u>Outcome</u> - Increased participation in computing activities throughout the County <u>Goal # 1</u>- Increase number of participants in 4-H CS activities <u>Goal # 2</u>- Increased number of students taking coding courses <u>Goal # 3</u>- Increased engagement in computing (as evidenced by participation in STEM Night, Lego League, Computer science week, and STEM training for teachers) <u>Deliverables</u>- Robotics and STEM Programing, activities and trainings throughout Kane County Objective B – Development of Maker Space <u>Outcome</u> – Increased use of Kane County 4-H Makerspace <u>Goal# 1</u> – Equip Makerspace with necessary tools and equipment <u>Goal # 2</u>- Partner with 4-H to have elementary aged field trips to Makerspace <u>Deliverables</u>- Functioning makerspace, STEM activities hosted in makerspace
Murray	Objective A — Increase the number of maker space structures at each elementary school and junior high over the course of the grant. <u>Outcome</u>- Increased number of K-9 students who are able to participate in a maker space to apply computing principles during after school activities. <u>Goal# 1</u>- Add maker spaces in 3 elementaries and I junior high each year <u>Goal # 2</u>- Create sustainability for maker space continuation after the life of the grant <u>Deliverables</u>- Maker space access and availability for all students to apply computing and robotic principles

Program	Program Objectives, Outcomes, and Goals
	Objective B- Increase the number of occurrences for PowerPlay interns to have access to internship opportunities with industry partners and provide experiences and skill enhancement in the workplace that lead to post-secondary employment <u>Outcome-</u> Increased number of students who choose computer science as a career <u>Goal # 1-</u> Provide at least quarterly tours and partnership opportunities with industry partners that lead to career exploration. <u>Goal # 2-</u> Provide much needed repair work for the PowerUp Program (1:1 devices) to serve as front line troubleshooting before and after school. <u>Goal #3-</u> Increase the number of students in underrepresented populations that take advanced Computer Science courses at the high school or in concurrent enrollment classes. <u>Deliverables-</u> Number of repairs of help desk tickets, student 1:1 computer repairs that are unsolvable or require warranty work at the local level to a minimum. Objective C — Increase the number of opportunities elementary students K-6 have access to the Computer Science Standards. <u>Outcome-</u> Increased number of K-6 students who are able to participate in an afterschool program using computer science. <u>Goal# 1 -</u> Code Ninjas will provide before/after school coding clubs at each of the schools to generate interest and excitement for students as they apply coding to science and engineering principles. <u>Goal # 2-</u> Code Ninjas will work with teachers to provide quality lessons in computer science standards for after school continuation. <u>Goal # 3 -</u> PowerPlay interns teach after school coding clubs alongside Code Ninja mentors. <u>Deliverables-</u> Lesson plan scope and sequence of Computer Science curriculum, after school computing program.
Pinnacle	Objective A- To provide outreach, student engagement and student retention to Pinnacle Canyon Academy (PCA) students. <u>Outcome-</u> Pinnacle will add computing activities for secondary students through the afterschool program and in the summer. The master schedule will reflect the change and the building will remain open until 6:00 p.m. nightly. <u>Goal # 1-</u> Provide fifty PCA students with instruction in computing activities, i.e., Science STEM activities, digital media, gaming, coding and videography. <u>Goal # 2-</u> Increase 50% of PCA student engagement in out of school activities through afterschool the formation of five STEM related clubs. <u>Goal #3-</u> Increase student retention at PCA by 10% per year. <u>Deliverables-</u> Pinnacle will provide attendance, pre and post tests and records that demonstrate attendance at clubs and competitions, gaming challenges etc. and an increase of student retention by 10% each year. Objective B - Create Maker Space <u>Outcome-</u> Pinnacle Canyon Academy will create a Maker space in the elementary for all students in elementary to access and use that will encourage youth to be creative, develop critical thinking skills, improve communication and increase collaboration. <u>Makerspace Student Goals</u> <u>Goal #1-</u> Use a wide range of idea creation techniques- such as brainstorming. <u>Goal #2-</u> Create new and worthwhile ideas- incremental and radical concepts. <u>Goal #3-</u> Develop, implement and communicate new ideas to other effectively.

Program	Program Objectives, Outcomes, and Goals
	<u>Goal #4</u>- Be open and responsive to new and diverse perspective; incorporate group input and feedback into the work. <u>Goal #5</u>- Demonstrate originality and inventiveness in work and understand the real-world limits to adopting new ideas. <u>Goal #6</u>- View failure as an opportunity to learn; understand that creativity and innovation are a longterm, cyclical process of small successes and frequent mistakes <u>Goal #7</u>- Implement innovations <u>Goal #8</u>- Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur <u>Deliverables</u>- Records will document the use of the makerspace by each elementary class on a daily basis. Objective C - Provide opportunities for relevant Industry Involvement <u>Outcome</u>- Pinnacle will provide buses for twelve field trips to visit work sites and develop twentyfive internship sites with Future IN Design for students to complete a paid internship. <u>Goal #1</u>- Provide twelve field trips annually to industries to tour their work sites. <u>Goal #2</u>- Provide internships for at least twenty-five students in industry partners' businesses. <u>Deliverables</u>- Pinnacle will provide documentation of mileage, bus driver wages, hotel receipts and meal receipts for field trips. Pinnacle will provide attendance sheets and pre and post tests for work site visits and a record of the volunteers and their hours at each site. Objective D- Provide Integration between out-of-school and classroom learning. <u>Outcome</u>- Students during the afterschool hours will practice and enrich their understanding of the curriculum they are taught during the school day. Students will have time to deeper dive into the content and experiment with the results. <u>Goal #1</u>- Involve four PCA teachers in teaching STEM activities in the afterschool program. <u>Goal #2</u>- Provide curriculum for every elementary teacher that provides tools to use the technology that is being taught and used in the afterschool program. <u>Deliverables</u>- Pinnacle will provide copies of the lesson plans from the school day and the alignment to the afterschool program. Pinnacle will produce time sheets for the four teachers teaching in the afterschool program and invite STEM staff members to a demonstration night of the STEM activities and programs the students have been practicing in afterschool and in the summer. Objective E- Equity and Access <u>Outcome</u>- More females and minorities will be involved in computing activities. <u>Goal #1</u>- Provide equity and access to the Pinnacle Designs program by enrolling no less than 25 girls per year. <u>Goal #2</u>- Provide equity and access to the Pinnacle Design program by enrolling over 30% are minorities. <u>Deliverables</u>- Pinnacle will provide data on all participants including race, gender, grade, and number of times they attended once, twice and multiple times to the program.
San Juan	Objective A- Expand high school summer program “Code to Success” <u>Outcome</u>: Code to Success is divided into three 120-hour online sessions and will result in a Coding Credential if a student satisfactorily completes all requirements of this 360-hour program. Code to Success will supplement and complement our CTE Computer Science classes and generate more interest in helping students complete a Computer Science pathway and possibly enter into a Computer Science career. It will

Program	Program Objectives, Outcomes, and Goals
	also help a student in earning other types of Computer Science credentials or certificates. As Computer Science pathway completers, students will be able to transition to Computer Science college programs or the Computer Science workforce prepared and with ease. <u>Goal # 1:</u> Provide “Code to Success” as an after school or home school online program in September 2020 (based on the conditions of the pandemic). Students will be required to complete 120 hours in year 1. We hope to have 20 students satisfactorily complete the requirements of this program. <u>Goal # 2:</u> Provide “Code to Success” as an after school or home school online program in September 2021. Students will be required to complete 120 hours in year 2. We will focus on recruiting 40 students into this program. 20 will do the 120 hour requirements of year 1 and 20 will complete the 120-hour requirements of year 2. Student will be able to accelerate their pace if desired. <u>Goal #3:</u> Provide “Code to Success” as an after school or home school online program in September 2020. Students will be required to complete 120 hours in year 3. Year 1 students who have completed 360 will be able to earn a Coding Certificate/Credential. Year 2 & 3 students will continue to work on the program. <u>Deliverables:</u> By 2023, we will: - Have 20 students who will receive a Code to Success Coding certificate - Have at least 15 who will receive a CTE Computer Science Pathway Completer Certificates - Continue this program annually based on student interest and support. Objective B – Conduct after-school coding activities in elementary schools with parents <u>Outcome:</u> Elementary students will participate in a variety of computing activities that will allow them to better understand computers and use them in all aspects of their school work and lives. Parents, stakeholders, and community partners shall be included in many of these activities. <u>Goal# 1:</u> Identify and schedule computing activities that include coding and robotics (September 2020). <u>Goal # 2:</u> Schedule a Family Code Night at least once per semester (Annually in September) <u>Goal #3:</u> Schedule weekly Computer Science activity as part of each schools’ after school program (Annually in September). <u>Deliverables:</u> All elementary students will be invited to participate in computing activities at their school. Based on the number of interested students, many may be schedule for specific dates and times. The ultimate goals will be to prepare elementary students to enter middle and high school with a basic understanding of computing and how to use their skills in all subject areas. Additionally, students will be better prepared to enter into a Computer Science Pathway and possibly earn a Computer Science and/or a Coding certificate or credential. Objective C – Provide professional development for our out-of-school K-5 teachers that supports integration of the K-5 CS Standards <u>Outcome:</u> All K-5 teacher will be able to integrate the K-5 CS Standards in all subject areas. <u>Goal# 1:</u> Provide Professional Development so that teachers are able to integrate the K-5 CS standards into their Science Lesson Plans (June 2021). <u>Goal # 2:</u> Provide Professional Development so that teachers are able to integrate K-5 CS standards into their Mathematics Lesson Plans (June 2022). <u>Goal # 3:</u> Provide Professional Development so that teachers are able to integrate K-5 CS standards into their Language Arts Lesson Plans (June 2023).

Program	Program Objectives, Outcomes, and Goals
	<u>Deliverables:</u> The K-5 CS standards will be fully integrated in all subject areas and lesson plans will reflect these standards and applications for Science, Math, and Language Arts lessons. Objective D – Create mobile makerspace so students will have equitable access to key materials and equipment <u>Outcome:</u> Maintain a mobile makerspace so that all students and schools have equitable access to specific materials and equipment that schools would otherwise (1) not be able to purchase, (2) maintain, or (3) have no space to store these materials and equipment. <u>Goal# 1:</u> Acquire or purchase a trailer (Done prior to grant performance period: we received an enclosed trailer and have access to a USU-Blanding trailer). <u>Goal # 2:</u> Design and setup trailer (December 2020) <u>Goal #3:</u> With input from all stakeholders, determine the contents of the trailer. This will most likely include (1) robot kits, (2) coding kits, (3) 3d printer, (4) engraver, (5) small CNC machine, etc. (December 2020). <u>Goals #4:</u> Advertise our mobile makerspace so that all schools and stakeholders know that this resource is available (June 2021). <u>Deliverables:</u> Provide a fully functional mobile makerspace for schools to check out based on their needs and interests.
SEDC	Objective A- Provide a framework for students at participating schools to develop IT-related career skills during high school <u>Outcomes-</u> Each LEA will employ at least one paid intern. Each paid intern will complete an IT certification course and certificate based on their job role. <u>Goal # 1-</u> Through this hands-on authentic work-based internship, participating students will develop their higher-order thinking abilities, troubleshooting skills, and technical expertise as they troubleshoot and support technology for their school/district office. <u>Goal # 2-</u> Students will continue on an IT Pathway. <u>Goal #3-</u> Each student internship will develop skills and earn at least one certification during the year that will serve them in a variety of IT professions. <u>Goal #4-</u> Participating schools will receive quality technology support from student internships to enhance district/school technology programs.
S Sanpete/Manti	Objective A- Develop a maker space that helps prepare all students for the workforce by developing computing, programming, and 21st Century skills. <u>Outcome-</u> Our desired outcome is to create a 21st Century Makerspace that provides all students, including underserved student populations, with access to high quality materials and instruction in order to develop computing, programming, and 21st Century skills. <u>Goal # 1-</u> Hire and train a makerspace specialist to manage the makerspace and provide quality instruction to students <u>Goal # 2-</u> Purchase quality equipment and supplies as outlined in the grant that will help students achieve the objective. <u>Goal #3-</u> Create an annual schedule that allows all students to access the resources within the makerspace and participate in meaningful lessons and activities during school hours. <u>Deliverables-</u> Provide elementary aged students with high quality access to computing and programming tools and instruction within our makerspace in order to give students a foundation in computing and programming and connect them to potential career pathways.

Program	Program Objectives, Outcomes, and Goals
	Objective B – Develop and implement high quality lessons and activities in areas of computing, programming, and STEM related topics within the maker space. <u>Outcome-</u> Provide high quality, age appropriate computing and programming activities to all students <u>Goal# 1-</u> Provide the specialist with a mentor teacher who will support and assist the specialist in lesson development and planning. <u>Goal # 2-</u> Seek professional development opportunities that will aid specialists and teachers in developing this type of activities. <u>Deliverables-</u> Provide meaningful and engaging on computing, programming, and 21st Century skills each day. These lessons and activities will be filed so they can be utilized and improved. Objective C – Increase the number of students who have access to computing and STEM activities including underrepresented groups of students. <u>Outcome-</u> Ensure that every student, including underrepresented student populations, at Manti Elementary are active participants in meaningful computing and programming lessons throughout the grant period within our makerspace. <u>Goal# 1-</u> Create an annual master schedule for the makerspace for each class to ensure that every student will have multiple and meaningful opportunities within the makerspace <u>Goal # 2-</u> Create an effective tracking mechanism to ensure our underrepresented groups are accessing computing and programming resources. <u>Deliverables-</u> Increase the number of all students, including underrepresented student populations, by creating a makerspace that provides student with access to computing and programming lessons and activities throughout each school year as outlined in the annual master schedule. Objective D – Provide students with real life problems that require innovative responses and solutions. <u>Outcome-</u> Students will develop critical thinking, collaboration skills and use their creativity in order to find innovative solutions to ‘real world’ problems on a quarterly basis. <u>Goal# 1-</u> Create an age appropriate bank of real world issues that our specialist can use when planning lessons and during lessons <u>Goal # 2-</u> Utilize makerspace resources to assist students in finding these innovative solutions. <u>Deliverables-</u> Provide quarterly real-world problems that allow students opportunities to develop and apply 21st Century skills (critical thinking, communication, creativity, and collaboration) in finding innovative solutions using computing and programming. Objective E – Support Core instruction through appropriate use of computing activities, STEM activities, and other appropriate activities <u>Outcome-</u> Lessons and activities in the makerspace will not only support but also enhance Core content in academic areas that include Language Arts, Mathematics, Science, and others. <u>Goal# 1-</u> Create opportunities for the specialist and regular education teachers to discuss Core Content needs of students and how makerspace lessons can support the needed areas. <u>Goal # 2-</u> Ensure that all makerspace lessons/activities (computing, programming, etc.) incorporate skills in other areas (reading, math, writing, etc.). <u>Deliverables-</u> High quality lessons and activities in our makerspace that not only develop computing, programming, and other related skills but also support Core Academic areas.

Program	Program Objectives, Outcomes, and Goals
	Objective F – Increase the number of teachers who access and use computing and STEM tools. <u>Outcome-</u> The desired outcome is that more teachers will use computing, programming, and STEM tools in their respective classrooms. <u>Goal# 1-</u> Plan for all teachers to be regular, active participants in the makerspace during their class’s scheduled time and other times as available. <u>Goal # 2-</u> Encourage teachers to teach a computing and/or programming related lesson each quarter. <u>Deliverables-</u> Create a survey that assesses how often teachers are accessing and using computing, programming, and STEM tools. Objective G – Provide Professional Development Opportunities to teachers, staff, and school leadership to increase proficiency in computing and STEM <u>Outcome-</u> Increase the number of school personnel that attend professional development trainings focused on computing, programming, and STEM tools and skills. <u>Goal# 1-</u> Seek out a minimum of two Professional Development Training as they become available for teachers, specialists, leadership, and other school staff. <u>Goal # 2-</u> Provide job embedded professional development opportunities to teachers by requiring teachers to attend the makerspace with their students, multiple times throughout the school year. <u>Deliverables-</u> Have all teachers and makerspace specialists attend at least one Professional Development Training during the grant period. Objective H – Maintain positive relationships with current and future partners through quality outreach and marketing strategies <u>Outcome-</u> Our outcome is to build and maintain positive relationships with our current and future partners to help ensure the sustainability of our program. <u>Goal# 1-</u> Maintain an active record with activities, photos, videos, displays, and other celebrations within the maker space. <u>Goal # 2-</u> When appropriate, share our successes with partners, potential partners, media outlets, and other parties using letters, emails, social media, campus visits, etc. throughout the school year. <u>Deliverables-</u> Send an annual ‘thank you’ to our current partners and a yearly ‘update’ to current and future partners. Objective I – Actively seek new partnerships with businesses, post-secondary institutions, community resources and other schools in supporting computing efforts. <u>Outcome-</u> We recognize that we cannot fully accomplish our objectives without maintaining and building new relationships. We hope to find new partnerships with numerous parties to ensure sustainability of the program and enhance what we can offer our students and partners. <u>Goal #1-</u> Hold a quarterly makerspace meeting to discuss strengths, weaknesses, opportunities, and threats of our makerspace and discuss partnerships (current and potential). <u>Goal# 2-</u> Seek new partnerships on multiple levels (local, State, regional, and possibly nationally) each school year through outreach (letters, emails, phone calls, personal visits, etc.). <u>Goal # 3-</u> Create a current and potential partnership directory that includes information such as names, phone numbers, email addresses, physical addresses, etc. to help us stay organized. <u>Deliverables-</u> Strive to establish at least one new partner each quarter.

Program	Program Objectives, Outcomes, and Goals
Washington	Objective A- Provide before/after school programs <u>Outcome-</u> Students will compete in the robotics competition and show proficiency in computing skills at code camps. <u>Goal # 1-</u> Weekly before/after computing club <u>Goal # 2-</u> Weekly before/after robotics club <u>Deliverables-</u> WeDo kits, Lego League Jr. kits, code.org, SCRATCH, CS First Objective B – Provide professional development for computing facilitators <u>Outcome-</u> Facilitators will gain greater computing skills <u>Goal# 1-</u> Monthly computing collaboration among schools <u>Goal # 2-</u> Work with community partners <u>Deliverables-</u> Professional development knowledge of computing skills Objective C – Collaborate with secondary education to provide mentorship/internship opportunities <u>Outcome-</u> Mentorship and internship hours for sterling scholarship applications <u>Goal# 1-</u> Work with the computing representatives of our district to collaborate with higher education. <u>Goal # 2-</u> Provide mentors for the elementary and intermediate students in the before/after school programs <u>Deliverables-</u> Volunteer hours and computer science knowledge to younger students
Washington/Hildale	Objective A- Establish a robust computing program with emphasis on computational thinking. <u>Outcome-</u> Computer science program is implemented and students are participating in offers. <u>Goal #1-</u> Project-based learning experiences through 4-H CS clubs and summer computing day camps. <u>Goal #2-</u> Lego League youth robotics program <u>Goal #3-</u> Coding events (SUU code camp, computer science showcase nights, county fair exhibits, etc.) Objective B – Professional development training for all teachers, paraprofessionals and volunteers organized by Dixie State University in collaboration with Utah State University Extension’s 4-H program. <u>Outcome-</u> Teachers are trained in computing and continuing to learn the art of computing. <u>Goal #1-</u> Build industry personnel relationships and collaboration with ongoing support and afterschool support. <u>Goal #2-</u> 4-H Computer Science Playbook use in afterschool programs and summer camps. <u>Goal #3-</u> Explore platforms, such as cs-first.com, exploringcs.com, codechangers.com, etc. Objective C – Implement curriculum on cs-first.com, exploringcs.com, codechangers.com, and code.org. <u>Outcome-</u> Teachers are implementing computing and students are seeing it used and relating to real world situations. <u>Goal #1-</u> Pilot after school clubs and summer camps.

Program	Program Objectives, Outcomes, and Goals
	<u>Goal #2</u>- Develop a curriculum like the 4-H “Discovering Computer Science & Programming through Scratch: Level 1 Youth Guide.” by the University of Illinois <u>Goal #3</u>- Develop offline activities that teach C through engaging games and puzzles, etc.
Weber	Objective A- Create Summer Camps and Teacher Training <u>Outcome</u>- Each year have 3 summer camps and 2 days of Programming training for coaches <u>Goal # 1</u>- Create an App Camp for girls to get more females interested in computing <u>Goal # 2</u>- Create a Robotics Camp and a Game Dev. Camp to get more kids interested in computing <u>Goal #3</u>- Properly train coaches to run clubs and program robotics to make them more effective <u>Deliverables</u>- An increase number of students participating in the summer camps as well as the after school clubs throughout the year. This will also lead to increased numbers in our CS classes across the district. Our coaches will also be more confident in their abilities. Objective B — Support After School Clubs <u>Outcome</u> — Help provide missing equipment, training, and pay coaches to run after school clubs. <u>Goal# 1</u> - Provide necessary robotics equipment for clubs in grades 4-9 to start robotics and to run district wide competitions. <u>Goal # 2</u> — Provide teachers with a reasonable stipend for their time and efforts. <u>Deliverables</u>- Increased number of students in after school clubs and better teacher retention.
Weilenmann	Objective A- WSD will create maker spaces over the course of the award years that will enable students to learn and apply computational knowledge, critical thinking, and authentic application. <u>Outcome</u>- Support of Implementation of K-8 Computer Science Standards at WSD <u>Goal # 1</u>- Professional Development for teachers and staff on standards, skills, concepts related to computer science and maker space tools. <u>Goal # 2</u>- Sufficient resources and trainers, both internal and external, for support of professional development and community use of resources. <u>Goal #3</u>- Time scheduled for application of Computer Science Standards in Maker Spaces. <u>Deliverables</u>- 100% of students will learn age and developmentally appropriate computer science standards at WSD. Objective B – WSD will increase equitable access to computing learning and application at the school and within the school community. <u>Outcome</u> – All students at the school will have access to maker spaces for learning of computer science standards and for equitable access to knowledge, skills, and application. <u>Goal# 1</u> – Each student will have scheduled times with their classrooms or small groups throughout the year to access traditional and technological maker spaces. <u>Goal # 2</u> – Each students will have the opportunity to learn, practice, and apply their computational and critical thinking knowledge within the maker space environment. <u>Deliverables</u>- 100% of WSD’s students will access and apply skills and understanding within the maker space environment in the course of the school year.

Program	Program Objectives, Outcomes, and Goals
	Objective C – WSD will establish community partnerships with experts for training and with parents and families for education and application of skills and knowledge. <u>Outcome</u> – Establishment of four, productive community partnerships related to computer science and traditional skills between the school and community. <u>Goal# 1</u> - WSD will establish partnerships with experts in traditional and computer-based maker space applications and tools. <u>Goal # 2</u> - WSD will sponsor in-person and virtual community meetings during which experts can train families on use of the maker space prior. <u>Goal #3</u> – Families and community partners will meet, as allowed, in the maker space for application and learning. <u>Deliverables</u>- WSD will sponsor a community/family training each term of the school year to allow families access to the computational and critical learning as well as application of this learning within the maker space environment.