

Utah STEM Action Center

Annual Report FY2018



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UTAH STEM ACTION CENTER | AT A GLANCE

Mission:

The STEM Action Center is Utah’s leader in promoting science, technology, engineering and math through best practices in education to ensure connection with industry and Utah’s long-term economic prosperity.

Vision:

- Produce a STEM-competitive workforce to ensure Utah’s continued economic success in the global marketplace
- Catalyze student experience, community engagement and industry alignment by identifying and implementing the public- and higher-education best practices that will transform workforce development
- Identify and implement STEM education best practices that will help to transform STEM education and workforce development
- Increase equity and access to all Utah students, including those in rural communities



FY18 | AT A GLANCE

Utah STEM Bus

⚙️ The Utah STEM Bus (USB)  impacted 8,437 students within 20 school districts in FY18

⚙️ Thus far in FY19, the USB has reached 4,021 students in 21 schools across nine different districts

pp. 5-7, 14-17, 33

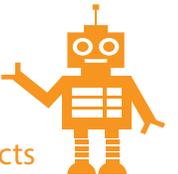


Professional Learning

 58 new grants were awarded, directly impacting 5,592 educators

pp. 29-37

CS4Utah



- 📍 296 schools in 21 school districts
- 📍 58% off the Wasatch Front
- 📍 15,000+ students impacted

pp. 17, 36-46

STEM Foundation

🔧 Cash donations for FY18: more than \$811,000

🔧 In-kind donations for FY18: more than \$65,000

pp. 7-8



Micro-Grants

Classroom Grants:  19,000+ students

Competition Grants:  800+ students

Organization Grants:  80,000+ students

Sponsorships:  278,000+ students

pp. 8-14, 18-24

K-12 Math Personalized Learning

🧠 In FY18, 550 schools from 33 districts and 15 charters used software to support math learning

🧠 More than 134,000 students had access to Math Personalized Learning software

🧠 Students, teachers, and administrators said software positively impacted student performance and increased confidence in math

pp. 16-18, 32-34, 46-48



Elementary STEM Endorsement

🌱 FY18 gained a cohort of 435 elementary school educators

pp. 16, 33-34



STEM Action Center Annual Report to the Education Interim Committee November 20, 2018

The following report is being submitted to the Education Interim Committee by the STEM Action Center (STEM AC). The report contains the following requested information:

(1) The Board shall report the progress of the STEM Action Center, including the information described in Subsection (2), to the following groups once each year:

(2) The report described in Subsection (1) shall include information that demonstrates the effectiveness of the program, including:

(a) the number of educators receiving high quality professional development;

(b) the number of students receiving services from the STEM Action Center;

(c) a list of the providers selected pursuant to this part;

(d) a report on the STEM Action Center's fulfillment of its duties described in Subsection 63M-1-3204; and

(e) student performance of students participating in a STEM Action Center program as collected in Subsection 63M-1-3204(4).

The numbers of educators receiving high quality professional development from the STEM AC are as follows:

The STEM Action Center (STEM AC) oversees two projects that support high quality professional development: (1) the professional learning (PL) grant program that supports locally identified STEM-related professional learning needs and solutions with activities such as coaching, mentoring, self-reflection, off-contract work, and effective professional learning communities (PLCs) and the (2) elementary STEM endorsement. The STEM AC also provides professional development to support teachers that are participating in other programs such as the K-12 Math Personalized Learning program and the CS4Utah grant program.

Within the PL grant program, 58 grants were awarded, directly impacting 5,592 educators. Program design varies greatly within this grant, and includes solutions to locally identified issues with compensation for off-contract work, scheduled time within a teacher's work day for lesson study in a PLC, substitutes allowing teachers to observe exemplars within their community, and videos to be used for self-and peer-reflection. Additionally, 435 elementary educators started their elementary STEM endorsement

programs in a second statewide cohort. Based on previous and current participant feedback, program leaders in partnership with the Utah State Board of Education (USBE) will be refining the program's course offerings and requirements beginning in the fall of 2019 to have a larger focus on developing content knowledge for educators.

A total of 69 educators received professional development for Computer Science Discoveries, and Advanced Placement Computer Science Principles. There were 108 elementary teachers who participated in the Computer Science Fundamentals workshop. The funding for professional learning opportunities in computing was provided by an industry partner grant.

Teachers and administrators from more than 550 schools received professional learning for the use of the K-12 Math Personalized Learning tools as part of the contracts with the product providers.

The number of students that accessed resources from the STEM AC are as follows:

- Classroom grants: more than 19,000
- Competition Grants: more than 800
- K-12 Math Personalized Learning Program: 134,616

5,592 Educators participated in Professional Learning

- STEM Fest: More than 22,000 students attended Utah STEM Fest, which took place October 3-4, 2017.
- Organization grants: approximately 80,000
- Sponsorship: The STEM Action Center exhibited at 30 STEM events it helped fund, and 21 received in-kind sponsorships, collectively impacting more than 278,000 students, parents, educators, administrators, community and industry partners.
- STEM Magic Show Assemblies: more than 14,000
- Utah STEM Bus (USB): 8,347

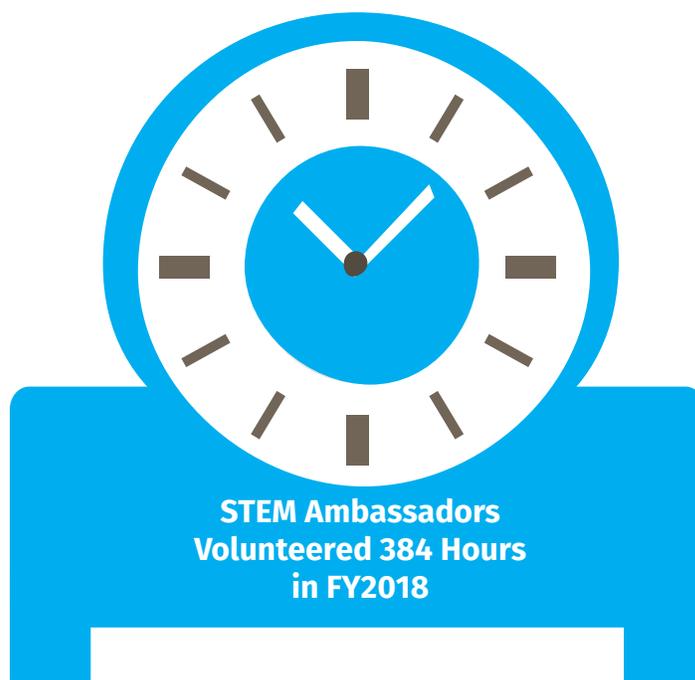
For a list of providers selected pursuant to this bill: See [Appendix A](#).

STEM Action Center (STEM AC) Staff and Roles (63M-1-3204; 1(a), (c)i)

The STEM Action Center (STEM AC) consists of the **Executive Advisory Board**, an Executive Director (Tami Goetz), Program Director (Sue Redington), Outreach and Engagement Specialists (Kellie Yates and Clarence Ames), an Administrative Assistant (Melanie Shepherd) and a Marketing and Communication Manager (Katherine Kireiev). The STEM Action Center also works collaboratively with several other state agencies to support STEM education and workforce and economic development. These collaborations result in an additional shared staff member: the Utah

Department of Workforce Services (DWS; Lynn Purdin). Kellie Yates also serves as a liaison with the Utah State Board of Education (USBE). A part-time Director for the Utah STEM Foundation added in May 2017 (Allison Spencer), along with a foundation board. The STEM AC received several grants that provided for staff to implement and oversee the grant projects. There are currently 3 team members on the STEM AC for the Utah STEM Bus (Molly Bock, Becca Robison and Colleen Fisher), which is funded from a corporate grant. The STEM AC has been working with the University of Utah to hire undergraduate interns to help with several projects. This fits well with the mission and vision of the STEM AC to mentor students. We have had a part time intern to help with the bus the past year, as well as a third year mechanical engineering student help with the the computing and math programs.

In addition to full- and part-time staff, the STEM AC works with



high school juniors and seniors, as well as undergraduates as **STEM Ambassadors**. The STEM Ambassadors help with events at the STEM tables, calling schools for STEM Fest, and building content on the STEM website. The ambassadors commit to serving a minimum of 20 hours each year and upon completion of their “ambassadorship” they receive a certificate and award. There were 24 STEM Ambassadors in FY18, an increase of six over the number of STEM Ambassadors for FY17.

The STEM AC reports to the STEM Action Center Executive Advisory Board, with its membership and duties defined by statute. This model has worked well, with the Board providing tremendous financial and in-kind support. The ability of the Board to have a strong role in the direction of the STEM AC has led to considerable buy in from industry and the USBE. The Board has strong representation from industry, the Utah State Board of Education, the Utah System of Higher Education, the Utah System of Technical Colleges as well as various state agencies. Industry board members have included Orbital ATK, Goldman Sachs and Adobe, Nelson Labs. Recently added board members represent Dell EMC, Oracle, BAE Systems, Chevron and Intermountain Healthcare.

Private entity engagement (63M-1-3204; 1(d); 2 (e))

Private entity support has been a strong component of the STEM AC, with contributions being provided in a variety of ways including cash donations, grants and sponsorships, program collaborations and in-kind contributions.

The **Utah STEM Foundation** became official on May 10, 2017, having received the Letter of Determination from the Internal Revenue Service. It includes an advisory board with industry support from Andeavor (formerly Tesoro), Boeing, Carbonite, Comcast, IM Flash, Intermountain Medical Group, LSI, Lockheed Martin, MHTN Architects, Microsoft, and US Synthetic. A part-time director (Allison Spencer) oversees the function and activities of the Utah STEM Foundation Board, as well as the receipt of all donations from corporate partners.

The Utah STEM Foundation Board continues to develop and expand on many new and existing community partners and donors who are in turn increasing their donation each year.

CASH DONATIONS FOR FISCAL YEAR 2018:

Adobe—\$12,500
 Barr Engineering—\$1,210
 Boeing—\$10,000
 Carbonite—\$25,000
 CenturyLink—\$20,000
 Comcast—\$5,000
 Dominion Energy—\$10,000
 Larry H. & Gail Miller Family Foundation—\$50,000
 Andeavor Foundation—\$368,200
 Hill Air Force Base—\$368,200
 Wells Fargo Foundation—\$5,000
 Fidelity Investments—\$5,000

IN-KIND CONTRIBUTIONS FOR

FISCAL YEAR 2018: Vybe Socks, Walmart, and Woven Pear donated to our annual sock drive for the homeless population; Sphero and Lakeshore Learning donated educational kits to be used on the Utah STEM Bus; and CenturyLink, Chevron Fuel Your School, Clark Planetarium, Curriculum Associates, Deer Valley, DoTerra,

FanX, FuzePlay, Hale Centre Theatre, Hogle Zoo, IKOS, IM Flash, Imagine Learning, Minky Couture, Natural History Museum of Utah, Orbit Irrigation Products, Inc, Nu Skin, Pluralsight, Red Butte Gardens, Ruby Snap, Scentsy, Svaha Clothing, ST Math, Swire Coca-Cola, Thanksgiving Point, Traeger Grill, and Zermatt Resort donated prize drawings or food items for teachers at our Best Practices Conference, held on June 20, 2018.

STEM BEST PRACTICES DONATIONS

It was incredible to see such an immense outpouring of generosity toward educators at the **STEM Best Practices Conference**. The total estimated in-kind value of fiscal 2018 is: \$65,838 (see preceding paragraph for companies that donated).

DONOR HIGHLIGHTS

- *Hill Air Force Base* has worked closely with the Utah STEM Action Center and Utah STEM Foundation to allocate funding to teachers, schools, and other organizations that are providing STEM opportunities.
- *Comcast* has been a champion by assisting to fund programs, STEM events, as well as create and distribute communication materials to promote awareness for STEM.
- *Andeavor (formerly Tesoro)* played an integral role in the establishment of the Utah STEM Foundation by granting \$1.5 million dollars over a 5-year period for the Utah STEM Bus Program (USB).
- *Carbonite* has championed an effort to support The Girls Who Code with an Entrepreneurship Challenge program coming in the Spring of 2019.
- *The Larry H. & Gail Miller Family Foundation* has also played an integral role in bringing STEM to the masses with the Utah STEM Bus Program.

FOUNDATION FUNDING HIGHLIGHTS

\$2,500 was generously donated to the American Indian Services (AIS) Prep Program for Native American students six week summer intensive camp. Funding was used to enhance their curriculum and improve the quality of their experience.

GRANT FUNDING

The following new grants were secured during the fiscal year 2018: Hill Air Force Base: \$15,000 for computing perception studies; \$30,000 professional training for teachers in Code.org activities, \$20,000 for Utah STEM Bus school grants and \$1,300 to go toward the Utah STEM Fest.

Sponsored Events

The following list includes examples of programs and events that received STEM Action Center sponsorship funding in FY18:

STEM SCHOOL ASSEMBLY

The STEM AC has received numerous requests for STEM activities for school assemblies. A number of options were explored as a sustainable approach to student engagement. The STEM AC launched the STEM School Assembly program fiscal year 2016, in partnership with a local magician Paul Brewer and with the support of funding from CenturyLink. Paul Brewer works with the STEM AC team to create an innovative version of a magic show that incorporates STEM themes with a high tech format for delivery. CenturyLink funding allowed for 21 visits to schools, impacting 11 school districts and more than 14,000 students. There are currently 64 schools on the list to be visited by Paul Brewer and his STEM Show.

NORTHERN UTAH STEM EXPO

The STEM AC remains committed to supporting regional STEM outreach and engagement opportunities. The Davis, Weber, Ogden and Morgan school districts again hosted the Northern Utah STEM College and Career Exposition, on November 6, 2017, at the Davis Conference Center. Two sessions comprised the event: a high school session and a community STEM Family Night. Just under 1,000 high school students, about 60 teachers, 16 industry presenters, and 60 companies participating as exhibitors attended during our high school session. A Family STEM Exposition ran from 5:00 - 9:00 p.m. and was open to parents, junior high students and elementary students of Davis, Weber, Morgan and Ogden school districts. There were approximately 5,000 in attendance. The STEM AC sponsored this event at \$5,000 and helped promote it to the public through the STEM AC Newsletter, social media platforms, and the website.

UTAH ENGINEERS COUNCIL

It is critical for the STEM AC to partner with Utah industry trade organizations, especially around funding scholarships for STEM students. Trade organizations are an essential link to Utah companies and have been very supportive of the STEM AC since its inception in helping to promote and support STEM education in Utah. The Utah Engineers Council (UEC) is an umbrella organization of 15 different local chapters and sections of engineering societies. The members of the council are the local sections and chapters. The purpose of the UEC is to advance the art and science of engineering and to provide a forum for communication between the varying engineering societies. The UEC held an awards event on February 24, 2018,

during which outstanding engineering educators, professionals and students were honored. Close to 200 STEM stakeholders attended the banquet, which the STEM AC sponsored in the form of a \$1,500 scholarship that was awarded by GOED Executive Director Val Hale to Southern Utah University student Victoria Krull.

UTAH MULTICULTURAL YOUTH LEADERSHIP SUMMIT

The STEM AC believes that it is important to engage underrepresented populations in STEM by promoting universal accessibility of STEM careers across all levels of post-secondary education. The Utah Office of Multicultural Affairs held a youth leadership summit for middle-school students on October 16, 2017, with approximately 45 percent Latino turnout. The event promoted STEM career opportunities to students whose socioeconomic reality often serves as a barrier to pursuing STEM careers. Information on lesser known pathways was disseminated. More than 1,000 students attended this event in addition to representatives from industry and education. The STEM AC awarded \$2,500 in sponsorship funding.

CRAFT LAKE CITY FESTIVAL

The STEM AC is committed to supporting STEM education and believes that the arts and humanities are critical to supporting the creativity that elevates STEM. Craft Lake City, held at the Gallivan Center from August 11-13, 2017, hosted a STEM Building where the STEM AC interacted with students, parents and industry for three days. More than 20,000 community members attended the event, which the STEM AC sponsored at \$1,500.

SOUTHERN UTAH STEAM FESTIVAL

Again, the STEM AC searches

out opportunities to support cross-disciplinary events for students to explore the creative side with STEAM. The Southern Utah University Center for STEM Teaching and Learning, the Orchestra of Southern Utah, Cedar City Library in the Park, Iron County School District, and Southern Utah Sustainable Operations Partnership collaborated to plan a two-day STEAM festival in early 2016. They invited STEM organizations, art organizations, and businesses from across the state to set up booths on Southern Utah University's campus for two days of hands on learning from October 28-29, 2016. There were

more than 2,200 attendees from the community. The STEM AC sponsored this event at \$5,000.

SHETECH

SheTech is one of our most impactful partnerships with a trade organization. This event represents the STEM AC's commitment to reaching out to girls to encourage and support them in pursuing STEM interests and careers. SheTech Explorer Day is a conference for high school girls in 9th through 12th grade. More than 2,000 girls attended this event at Mountain America Expo Center on March 1, 2018. Students

ADDITIONAL SPONSORED EVENTS:

Event	Funding Amount	Students Reached	Location	Date
High Impact Technology Conference	\$1,200	500	Grand America Hotel	7/19-20/17
Utah Council of Teachers of Mathematics Conference	\$150	300	Ogden Eccles Convention Center	8/1/17
Canyon Kids Days	\$500	370	Solitude Nordic Center	8/4/17
PhysX	\$500	50	Utah State University	9/13/17
Jump Start Conference	\$1,000	600	Ogden Eccles Convention Center	10/13/17
Pathways to Professions	\$150	10,000	Mountain America Expo Center	10/25-26/17
Southern Utah Code Camp	\$1,000	266	Southern Utah University	11/7/17
Mountainville Academy STEM Fest	\$500	500	Mountainville Academy	11/19/17
Elementary Family Engineering Night	\$500	250	Oakwood Elementary	12/4/17
Utah Regional Rube Goldberg Machine Contest	\$1,000	300	Weber State University	1/19/18
Beehive Science Academy STEM Expo	\$500	8,000	Mountain America Expo Center	1/27/18
Franklin Discovery Science & Engineering Fair	\$500	8,000	Franklin Discovery Academy	2/2/18
Wizardsing Dayz	\$500	8,000	Mountain America Expo Center	2/24-25/18
Nebo Advanced Learning Center Jr. High Tech Fair	\$500	700	Nebo Advanced Learning Center	3/1/18
Super Science Night	\$500	700	Windridge Elementary	3/12/18
Science Palooza	\$1,000	16,000	Provo Community Rec Center	3/17/18
Underwater Robotics Competition	\$1,000	250	Brigham Young University	3/22/18
Mountainland Code Camp	\$500	100	Mountainland Technical College	4/13/18
St. George Science Palooza	\$1,000	1,500	St. George Community Rec Center	4/14/18
Diamond Valley Elementary STEAM Family Night	\$500	270	Diamond Valley Elementary	4/26/18
BATC Career Days	\$500	4,300	Bridgerland Applied Technology Center	5/2-3/18
DTC Career Days	\$500	2,500	Davis Technical College	5/4/18
JATC & SLCC Biotech Symposium	\$1,000	100	Salt Lake Community College -Jordan	5/18/18
Rosamond Elementary STEM Camp	\$300	80	Rosamond Elementary School	6/11/18

interacted with different companies that have technology at their core to see if it is a right fit for them. This day-long event included hands on activities in science, technology, engineering and math (STEM). The STEM AC sponsored this event at \$5,000 total.

UTAH PUBLIC ASSOCIATION OF CHARTER SCHOOLS

The STEM AC continues building relationships with school boards and parent associations. Charter schools are an important stakeholder group and the STEM AC strives to engage with them to understand the needs of their students. Utah's largest gathering of charter school leaders and educators, approximately 550, came together on June 13, 2018, at the Davis Conference Center. The STEM AC had a booth and the opportunity to network during meals and work on future collaborations with the Charter Schools to increase STEM awareness. The STEM AC sponsored this event at \$650.

NEBO INVITATIONAL SCIENCE OLYMPIAD

This competition underscores a statewide and regional trend among high school students exploring applied STEM in collaborative efforts to deliver project-based learning outcomes in an exciting and challenging forum. Maple Mountain High School hosted close to 300 9th-12th grade students from area schools at a competitive science symposium. The event took place on February 3, 2018, and involved students showcasing their projects spanning life sciences, math, engineering, and computer science for judging, culminating in a medals ceremony. The STEM AC provided \$500 in funding.

LASSONDE INSTITUTE HIGH SCHOOL ENTREPRENEUR CHALLENGE

The STEM AC supports higher education institutions in encouraging innovation that addresses existing real world problems. The intent is to promote problem-solving through applied scientific methodology. The Lassonde Institute at the University of Utah David Eccles School of Business held an entrepreneurial challenge calling for ideas and inventions from high school students statewide. More than 20,000 business proposals from Utah students were submitted. Finalists pitched their ideas to academic and industry professionals in a manner similar to the format of the "Shark Tank" TV program. The STEM AC provided a judge, selected a categorical winner, and provided \$1,000 in scholarship funding. The winner was Copper Hills High School senior Andrew Rich, who developed a simple, cost-effective robot named "Seymour" to provide individuals with severe physical limitations the ability to feed themselves.

Utah STEM Fest

The STEM AC together with companies representing Utah's STEM industries showcased an exciting myriad of STEM career paths in our third **statewide STEM Fest**, which took place October 3rd & 4th, 2017, at the South Towne Expo Center. The event opened with a general public night which drew approximately 3,500 Utahns, including professionals, post-secondary students, families, and children of all ages. More than 85 sponsors from industry, government and higher education offered hands-on learning exhibits and nearly 22,000 students from schools statewide attended during the school-group sessions over the 3rd and 4th. This event was managed in partnership

with Utah Media Group (UMG), who coordinated and collected all corporate donations to cover the costs associated with renting the exposition space. Additionally, UMG created and placed event advertisements, produced and supplied all printed materials such as flyers and event signage, and provided partial bussing scholarships that facilitated equal opportunities for participation from schools outside the Wasatch Front. Some schools came from towns more than 300 miles away to attend, such as Duchesne and St. George.

STEM Best Practices

The STEM AC held the fourth annual **STEM Best Practices Conference: Amp It Up!** on June 20, 2018, at the Davis Conference Center. The conference was decidedly different from past years, based on participant feedback and suggestions. There were 777 registered participants, covering the entire state. Strands of sessions were designed for specific grade bands, with presenters required to share hands-on activities for teachers to experience and then take back to their classrooms. Additionally, there were strands for administrators and specific grant participants, as well as discussion sessions to gather information about challenges affecting varying populations across the state. Attendees were offered five sessions, and the conference offered 52 distinct breakouts overall.

Booths featured 30 industry and community partners:

- Accelerant BSP
- AT&T
- Because Learning
- Bottega
- Brackitz

- SpyHop
- Brackitz
- Chevron: Fuel Your School
- Clark Planetarium
- DoTerra
- FanX
- FuzePlay
- HawkWatch International
- Hill Air Force Base
- Hogle Zoo
- Ikos
- Immersive VR Education
- InfiniD Learning
- Lakeshore Learning
- Loveland Living Planet Aquarium
- Natural History Museum of Utah
- Neumont University
- NuSkin
- Red Butte Garden
- Sphero
- SpyHop
- STEM Partners Foundation
- Talent Ready Utah
- Thanksgiving Point
- Utah Afterschool Network
- Utah Agriculture in the Classroom
- Utah Division of State History

Intentional efforts were made to shift the culture of the conference to one of educators as professionals seeking additional learning opportunities. Feedback about the conference includes statements such as:

“This was not just the best education I’ve ever attended, it was the best conference I’ve ever attended period.”

“I loved the Keynote [Dr. Ainissa Ramirez]. She was a great speaker and very accomplished. I loved that she was a woman and a minority, too.”

“I loved the session presenter’s ideas and examples of project-based learning. I am inspired to use this approach in my earth sciences unit (and probably others)!”

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As part of the Best Practices: Amp It Up! Conference, nine Utah schools were recognized with STEM School Designations.

A lunch panel moderated by Lieutenant Governor Spencer Cox was comprised of STEM stakeholders from education and industry sectors: Eric Pope/US Synthetic; Pat Jones/Women’s Leadership Institute; Kathleen Riebe/Utah State Board of Education; Reid Newey/Davis School District; and Susan Johnson/Futura Industries.

These leaders discussed the future of STEM education in Utah and state STEM industry needs. They addressed the urgency of better aligning education with industry needs, both emerging and anticipated.

STEM INNOVATION AWARDS

This sponsorship represents another way in which the STEM AC partners with trade organizations to leverage resources in an effort to promote and recognize accomplishment for students, teachers, counselors, administrators and mentors in STEM education.

The STEM AC held the fourth STEM Innovation Awards in partnership with Utah Technology Council (UTC) at their annual Utah Innovation Awards luncheon on April 26, 2018. More than 400 industry leaders attended the award luncheon. The **STEM Innovation Awards** are an opportunity to recognize a student, teacher, counselor, principal and mentor in Utah who excel in science, technology, engineering and math (STEM). Nominations were open to the general public from February to March 2018.

The STEM AC team and the STEM AC Board, through a rigorous process, selected this year’s honorees:

Cassandra Ivie, Copper Hills High School student
Todd Monson, Oquirrh Hills Middle School 8th grade science teacher
Spencer Holmgren, Hillcrest Elementary School Principal
Kevin Reeve, co-founder of Cache Makers and volunteer mentor
Rachel Fletcher, Salt Lake Center for Science Education

CenturyLink & Utah Jazz STEM Recognition

This partnership represents an opportunity to recognize student achievement in STEM. The Utah Jazz, in partnership with CenturyLink and the STEM AC, presented six awards to outstanding STEM students during the 2017-2018 basketball season.

The students were nominated by a teacher and selected by the STEM AC staff to receive a customized Jazz jersey during half-time at a Jazz game. The following students were recognized:

*November 2017:
Caleb McDonald
Welby Elementary – 6th grade*

*December 2017:
Joseph Huff
Provo High School – 9th grade*

*January 2018:
Grace Ivers
West Jordan Middle School –
8th grade*

*February 2018:
LeRoy Monson
North Summit High School –
11th grade*

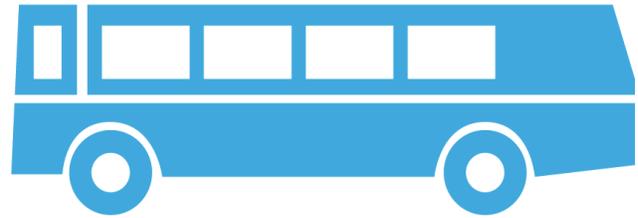
*March 2018:
Anau Mouna
West High School – 9th grade*

*April 2018:
Hayley Tankersley
Copper Hills High School –
10th grade*

CenturyLink donated \$10,000 to the STEM AC during halftime at the season's final game. This donation supported the STEM Magic Show Assemblies program.

Utah STEM Bus (USB)

The **Utah STEM Bus (USB)** is a mobile classroom that is bringing exciting STEM activities and resources to schools and communities all across Utah. The outcomes for the USB include: increased student engagement and enthusiasm for STEM activities, increased teacher awareness of STEM



STEM Bus Stops in FY18: 53 schools | 20 districts

education, and increased industry investment in STEM. The USB currently uses STEM curriculum that provides hands-on, real world, project based learning opportunities for students. The program also ties classroom learning experiences to STEM AC classroom grants to help teachers get the resources they need to continue the lessons after the USB has left. The team has been working close with Utah State Board of Education (USBE) to make sure all curricula are aligned to Utah core standards and have career pathways tied to local Utah companies.

The STEM AC received a grant for \$1.5 million in 2016 from Andeavor (formerly Tesoro) to fund the design, purchase, retrofitting, and operation of a mobile classroom. The Utah Transit Authority (UTA) donated two, 40-foot buses and a ten person van to the STEM AC. The first bus has been completed and had its debut on August 16, 2017, at the Utah Capitol, with Governor Herbert doing the honor of cutting the ribbon. The van, nicknamed the “Micro USB,” has been outfitted and is in the process of being wrapped to help deliver programs around the state alongside the USB.

The USB has been actively engaged in partnering with local companies to expand the program selection every year. We will also rotate programs in and out year to year depending on

teacher interest to keep programs exciting for teachers and students. Currently, the program options are 30 minute classes for grades K-3, or 2 hour classes for grades 4-12.

The current curriculum includes:

- Robotics – BeeBot (grades K-1)
- Engineering (grades K-3)
- Spatial Math (grades K-3)
- Power Up! Introduction to Circuits (grades K-3)
- Rockets (grades K-3)
- 3D Modeling (grades K-3 and 4-12)
- Robotics – Lego Mindstorm EV3 (grades 4-12)
- Renewable Energy (grades 4-12)
- Computer Programming (grades 4-12)
- Video Game Design (grades 4-12)
- Senses and the Brain (grades 4-12)
- Physics of Speed (grades 4-12)
- Texas Instruments Nspire Programming (grades 6-12)

Additional courses are being developed in the areas of:

- Teeth First (grades K-3)
- Robotics – Sphero (grades 2-3)
- Fuze play Codeable Frisbee (grades 4-8)

The USB team, during the pilot period of December 2016–June 2017, taught in 19 schools within nine Utah counties and had direct teaching experiences with 3,281 K-12 students.

From July 2017-June 2018 the USB team taught in 53 schools within 20 Utah school districts, two Wyoming school districts, and had direct teaching experiences with 8,347 K-12 students.

The USB team has also appeared at a variety of public and private events reaching 44,165 people throughout the state. Notable events include the Hill Air Force Base Airshow, STEM Fest, Ogden Pioneer Day Parade, Junior Achievement Career Fair in the Navajo Nation, and Utah Educators Association Conference.

STEM Mentor Exchange (STEM MX)

The STEM AC has also been working with industry (specifically Comcast, Dell EMC, Adobe and Boeing) to build a resource called **STEM Mentor Exchange** (STEM MX).

The STEM MX app is modeled after the matching services that exist in the public domain that utilize a profile-based submission platform. An algorithm then takes the profiles for “need” and matches them to the profiles submitted for “supply” and determines the best matches based upon keywords and phrases. This resource gives educators, counselors, and parents an effective and easy way to connect to industry mentors and resources in the STEM community. Educators will be able to access industry mentors for help with STEM-related projects (e.g., helping to teach a difficult STEM subject in the classroom, soliciting industry participation in STEM

Utah STEM Bus

8,347
K-12 Students
Reached

events, fairs and competitions, etc.). Counselors will have the ability to submit a profile that describes certain careers and STEM areas in which they are deficient in their knowledge and find an industry mentor to educate them. Parents will be able to submit a profile that can help them find resources such as summer camps, scholarships or STEM-related programs or events.

This platform solves the problem of exhausting or overtaxing industry partners. It allows for an industry mentor to toggle between active and inactive for their profile depending upon their current or projected workload. It is anticipated that this control over volunteering will be attractive to industry partners and encourage participation. This match-based platform also facilitates a more targeted approach to finding information. An issue that arises with keyword or phrase searches in a traditional website is that you only get information based upon what you know about the topic. A profile-based option allows for a user to be completely lacking in content knowledge in an area and still find useful resources and mentors.

STEM MX is partnering with Neumont University to have students complete the technical development of the resource as part of their class projects. The platform will be piloted during the 2018-19 school year with five school districts.

R&D Role of STEM AC (63M-1-3204; 2(a)-(c); (f))

The STEM AC is unique in its ability to work closely with Local Education Agencies (LEAs; school districts and charter schools), the Utah State Board of Education (USBE), companies,

informal education partners and other state agencies. This enables the STEM AC to explore new and innovative ways to support students and teachers through data-driven practices.

The STEM AC continues to integrate third party evaluation for most of its projects, including the K-12 Math Personalized Learning program, the K-12 Professional Learning grant program, the K-16 CS4Utah and the Elementary STEM Endorsement. The STEM AC has a contract for third party evaluation with the Utah Education Policy Center (UEPC) at the University of Utah.

An additional R&D function was added to the K-12 Math Personalized Learning program this past year. The STEM AC worked with the State Procurement Office to create a process whereby new math personalized learning programs designed for K-12 students can be piloted in Utah schools.

Product providers who wish to participate must meet all of the requirements of the original RFP, be approved by a review team, and demonstrate that they are willing and able to provide licenses at no cost to a minimum of 1,000 Utah students for one full school year. Providers are responsible for finding schools that are willing to pilot their product. If they meet all of the requirements, the impacts of their program will be evaluated by the STEM AC's third party evaluation team. Outcomes from new products will be compared to products currently under contract. If the performance of students using a new product meets or exceeds the average performance of students using other personalized learning products, that product will be added to an approved vendor list.

The parameters of the evaluation (such as metrics and data that is to be collected) are defined by the requirements of the STEM AC's statute, and recommendations by the third party evaluator, the Utah State Board of Education (USBE), and LEA partners. The STEM AC is working to focus on several areas of assessment including a longitudinal data study that indicates increased, and ongoing, access to STEM activities can make a difference in student choices and success in STEM. The STEM AC is working with Qualtrics on several specific perception studies including attitudes and behavior pertaining to computing education and careers and overall perceptions of STEM. The STEM AC will also focus the next year on evaluating employment and job trends in STEM. The goal is to determine if companies are finding talent easier, or finding employees that are better prepared to succeed in their companies, thus resulting in higher retention. It is likely that the overall numbers of open STEM-related jobs will not have decreased perceptibly due to the continued growth in jobs.

The STEM AC also works with LEAs to design, implement and oversee grant programs in key areas of STEM education and talent development. Grant programs include the recently initiated K-16 CS4Utah and the classroom and organization grants.

The STEM AC will focus on improving the assessment of the classroom grants which will address one of the findings in the legislative audit conducted in FY17 (see page 35). The Utah STEM Bus has also been working to create surveys and other qualitative assessments to determine if access and exposure to hands on engaging STEM activities increases student

interest in STEM. The STEM AC has been working with Qualtrics to build out an ongoing survey project to begin to look at stakeholder perceptions regarding STEM education and careers. There has been national data collected regarding interest in STEM, but the STEM AC is establishing the ability to monitor strategically responses to programs and marketing and communications efforts.

Review and acquire STEM education related technology 63M-1-3204 2 (c)

A core function of the STEM AC is the review and evaluation of STEM education materials and products. Working with the State Procurement Office the STEM Action Center was able to pilot and review two new programs in FY18.

The new K-16 CS4Utah has provided new opportunities to review resources that support coding and other areas of computing. There were several programs and products included in awarded grants that the STEM AC will work with the LEAs to evaluate for impact. These include BootUp, 4-H Extension Code Playbook, Codechangers, and Google coding.

Use resources to bring the latest STEM education learning tools into the classroom 63M-1-3204 2 (f)

The STEM AC works closely with education partners to identify new STEM education learning tools. The annual STEM Best Practices conference has the main goal of bringing together Utah STEM (and non-

STEM) teachers to showcase the latest learning tools in the classroom. This provides an opportunity to share ideas and promote the use of the latest in STEM resources. The focus on bringing collaborative grants (e.g., the Carnegie Mellon University, Code.org and STEM Equity Pipeline grants) increases the STEM AC's ability to bring new and innovative tools to Utah classrooms at no cost.

Again, the new mechanism that was recently launched for the K-12 Math Personalized Learning program is a good example of how the STEM AC works to identify and assess the best resources for STEM instruction.

The following grant programs help to support STEM education learning tools in the classroom:

(1) The STEM AC provides classroom grants to teachers that provide funding to support the design and implementation of new STEM activities in the classroom. This grant program is discussed in detail in following sections.

(2) The new K-16 CS4Utah grant program provides numerous best practices in K-12 computing education. Grant applicants can apply for funding to access these resources (e.g., the Carnegie Mellon University STEAM programs, Code.org professional learning workshops and STEM Equity Pipeline resources for micro-messaging and root cause analysis). These resources are discussed in greater detail in other sections.

Support of STEM-related competitions, fairs and camps, and STEM education activities (63M-1-3204; 2 (d))

The STEM AC funds and oversees

three micro-grant programs: (1) Student Competition grants, (2) Classroom grants, and (3) Organization grants. These three grant programs are funded from the STEM AC's operational budget.

Competition Grants

The STEM Competition Grant is intended to support K-12 students participation in STEM competitions. Applications must be completed by a school-level representative on behalf of the students benefiting from the grant. The school-level representative will oversee the funding and be responsible for reporting outcomes. Competition grants cover costs for supplies, registration, and other expenses related to participation in STEM fairs, camps, and competitions. Schools may request up to \$100 per participating student, and receive funding based on the strength of their application. Scores are generated by a review team made up of other grant applicants and focus on sustainable student impact. Students are required to apply for a grant requesting funds from their school, and student projects are funded pulling from the overall school award.

Before the end of the school year, each awarded school must submit detailed receipts and project completion reports showcasing what students accomplished. During the year, representatives from the STEM AC went out to as many sites as possible to help judge events, talk to teachers and students, and get a feel for what schools are doing around the state.

On one site visit, the mother of a participating student approached the STEM AC representative with tears of gratitude and expressed how drastically this opportunity had

changed her son. Until he became involved in the STEM competition, he had hated school, he had very few friends, and he was always in trouble. She said that this grant had allowed their school to become involved in this STEM competition and allowed him to participate. It became apparent that he had an aptitude for coding and all things technical, and almost overnight his attitudes began to change. He stopped getting in trouble. He started to make friends. He was elected as the team leader, because everyone would come to him with questions, and his grade went up in every subject.

The grant program is popular and for the 2017-18 school year grants were awarded to 44 schools. In their project completion reports, teachers and students focused primarily on how much participation in these opportunities positively impacted their confidence in STEM subjects, and on the important interpersonal skills students gained through participation.

Classroom Grants

Recognizing that innovation developed by successful teachers needs to be replicated and spread as widely as possible, grants are used to fund approaches to STEM education that enable teachers to implement innovative STEM ideas.

Lesson plans and other materials are collected from participants in order to facilitate increased access to and involvement in innovative STEM curricula throughout Utah. Grant awardees are expected to complete a final project report at the completion of their grant project. This final report is also made available to teachers looking for exemplars to replicate in their classrooms, allowing educators across

Educator opinions on FY18 classroom grants

“We haven’t had much hands-on science in our grade. That. Is. Going. To. Change. This was such a thought-provoking, interesting, challenging — dare I say fun? — activity that my littles will remember what they learned from it for a long time.”

“Students are actually engaged in learning how to do something new. ...It was interesting to note that students actually found out more information than what I was equipped with, so now we are all learning together which is helping to build relationships and trust.”

the state to learn from the efforts of others without replicating what didn’t work. These final reports are pivotal when it comes to increasing access to STEM activities for teachers and students.

Responses were clearly influenced by the proposed activity for the grant, but several overall themes emerged in teachers’ answers, including increased risk taking by both teachers and students in relation to STEM activities, and increased focus on 21st century skills.

Below are examples of teacher responses to a survey administered to classroom grant recipients:

Question: What worked? Which aspects of the project worked well? If you were to do it again, what would you keep in place?

Responses:

“I wouldn’t necessarily change anything but as far as giving advice I would say ‘don’t be too helpful and be ok with a little bit of chaos.’ I think it helps me to take that step back and let the kids figure things out. Sometimes we tend to hurry them along to much to get things done quicker and are doing a huge disservice to the kids.”

“The parts that worked well were giving students time to problem solve. They enjoyed all the activities even if their circuit didn’t work every time. Many kept trying until they got it. They worked on persistence.”

Question: What didn’t work? Which components of this project did not work as you thought, or as intended?

Responses:

“Better, more relevant assessment.”

“Start smaller! Don’t have a lot of aspects. to the activity. Go slow and enjoy the journey.”

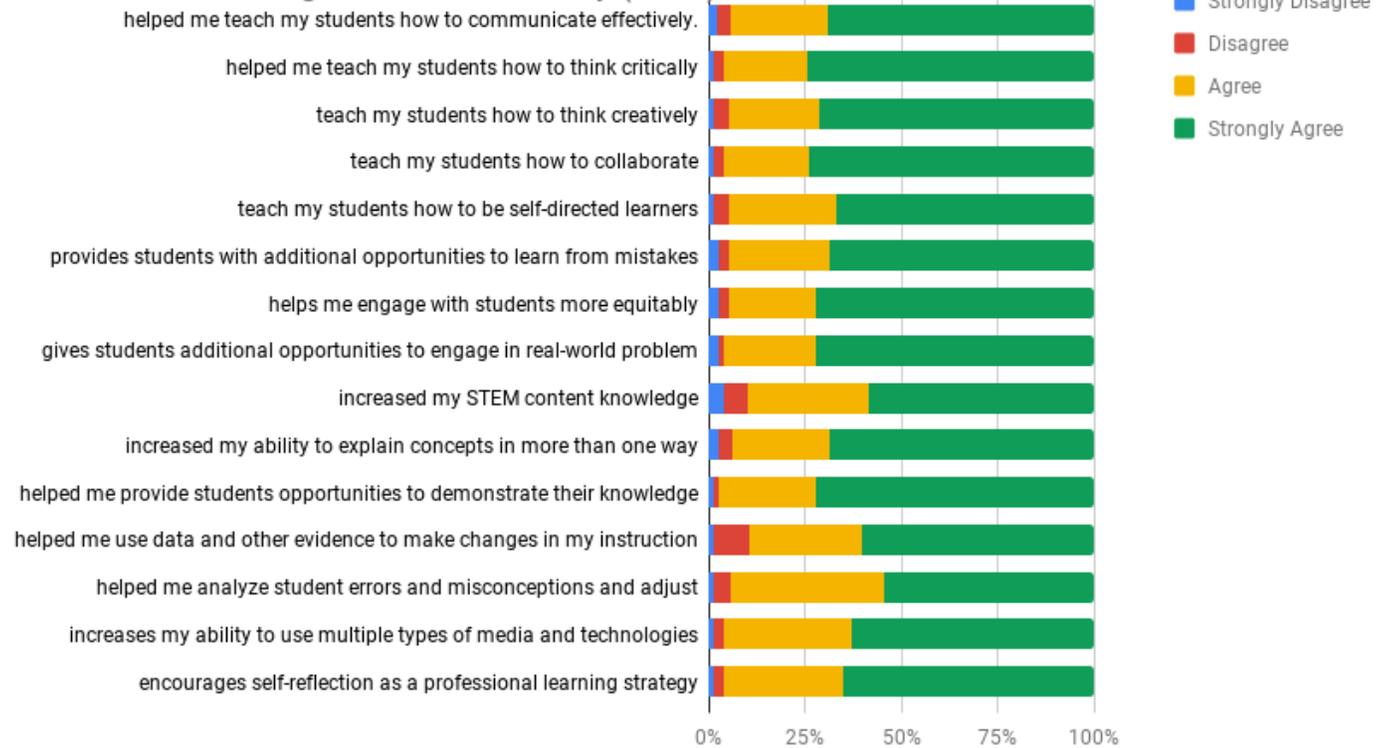
Question: Explain how this grant helped you as an educator.

Responses:

“It helped me to move out of my comfort zone... This my first year teaching a new core curriculum with an emphasis on physics. I had not appreciated how engaging physics can be because it explains how and why everyday things work. It’s easy to hook students and activate their prior knowledge.”

“Because of this project, I realized, that the students need more time on a

Chart 1 Classroom grant teacher survey (n=79)



computer and building things. I want to plan more where students can work on concrete objects. I asked my students which of the projects they most liked during the year and most said this project because they could really make something, and it was fun/challenging.”

“I did better with my own understanding of circuits but also was better at asking questions and letting students create models and not just reading about it.”

“We haven’t had much hands-on science in our grade. That. Is. Going. To. Change. This was such a thought-provoking, interesting, challenging — dare I say fun? —activity that my littles will remember what they learned from it for a long time. Watching my students try method after method after method, some successful, some not, made me realize how inventive and synergistic they can be when they’re set free. I had intended to have them watch a video and try to reproduce its results, but I’m surely glad I didn’t. Our success rate was not what I’d anticipated--if we had repeated the video, everyone probably would have done that one method perfectly--but oh! what a variety of other great ideas we conceived. Even our failures were interesting. This is the biggest take-away I had as a teacher: when children DO science, rather than just read about it, their learning is profound, relevant, and permanent. It’s my job to create a class culture with this built in as an expectation.”

“Students are actually engaged in learning how to do something new. They have advanced a lot faster than I thought that they would. It was interesting to note that students actually found out more information than what I was equipped with, so now we are all learning together which is helping to build relationships and trust.

Question: Describe how this project was effective in enhancing STUDENT STEM learning.

Responses:

“Our school has almost 1,000 students, but we currently only have one computers teacher. He is in charge of teaching every student Computer Basics, a required CTE course, and he only has time in his schedule for one computer programming class. It is such a problem in this school. We desperately need to expose these students to programming. I feel that this project is able to do that for my 120 physics students as well as my robotics and engineering club members, who also use this equipment for projects.”

“My class this year has far too many students who don’t even want to try because they fear failure. Yet they approached this experiment with little hesitancy and a complete lack of giving up when what they tried didn’t work. They just picked up their materials and tried something else. They learned the valuable lesson that they are more resilient than they knew. They discovered that failures are a normal part of the process in STEM education and do NOT mean the child her/himself is a failure. They saw that there are multiple right ways to do something, and that finding one solution doesn’t mean they’re done. They realized that working as a team shares the workload and provides inspiration. They proved that STEM work is fun for girls as well as boys.”

Feedback for program improvement focused on the payment process. Discussions were held with district and charter school leadership, as well as the individuals at USBE who oversee grant finances and disbursement to assist in smoothing the payment

process. Changes have been made to the STEM AC's payment formats and procedures to better reflect what LEAs are accustomed to in an effort to simplify this process. These changes will take effect for the 2018-19 academic year.

In the 2017-18 academic year classroom grants were funded for just under \$230,000 from the operational budget. This provided funding for over 180 innovative STEM ideas, directly impacting more than 19,000 students statewide. A summary of the districts, grades, number of students and brief project descriptions is included as [Appendix B](#).

Teachers and students have expressed their excitement about what they were able to accomplish with these grants. Teachers have indicated that they were able to provide resources and involve students in STEM projects that would not have been possible any other way, and students have indicated increased desire to pursue STEM education and STEM careers. Regardless of project topic or type, one consistent theme found in participant feedback focuses on the development of a risk-taking culture for both teachers and students. Supporting this shift, in a survey given to classroom grant participants in January of 2018, 95% (n=79) of respondents agreed or strongly agreed that participating in STEM activities financially supported by the STEM AC had "helped me teach my students how to be self-directed learners". In the same survey, 96% of respondents agreed or strongly agreed the STEM classroom grant project participants were able to "provide students with additional opportunities to learn from mistakes" (See Chart 1). Other program strengths include supporting

21st century skills, known as the 4 Cs- critical thinking, creative thinking, collaboration and communication.

Organization Grants

The STEM AC funded 53 Organization Grants that impacted over 80,000 students, with \$220,939 allocated from the operational budget. Examples of these organizations include: Utah State University, Utah VEX Robotics, Dixie State University, FIRST Utah Robotics, Alliance for Innovative Education, University of Utah, Edgemont Elementary School, InfiniD Learning, Southern Utah University, Davis School District, Utah Valley STEM Foundation, Ogden Weber Learners Society, Nebo School District, Weber State University, Utah Valley University, Sunrise Elementary School, Box Elder County 4-H Program, Boys and Girls Clubs of Greater Salt Lake, Community Education Partnership of West Valley City, Dixie State University, Red Butte Garden, Neighborhood House Association. A few of the STEM Organization Grant awardees are listed below in more detail, with a summary of all Organization Grants in [Appendix C](#):

- **Cache Makers 4-H Club, Girls Space Science**, was founded in 2013 to get more youth on a path to a STEM career by providing engaging and hands-on activities focused on STEM. Cache Makers recruits adult volunteers from local industry who mentor youth and lead the activities. This winning program has reached just under 1000 youth in the past two years, and has worked hard to reach out to minorities and girls, two underrepresented populations in Utah's STEM workforce. The focus is primarily on youth ages 10-17. Girls Space Science focuses on

air quality, aviation and creating experiments that will fly on high altitude balloons. Girls learn about Utah's air, sensors, inversions, and recording and interpreting data. Activities include building sensor data logging devices, programming and interfacing sensors to Arduino microcontrollers, deploying them at home, and collecting data. Another project/group focuses on creating experiments to fly on high-altitude balloons up to 110,000 feet. Another project gives girls exposure to STEM careers in the aviation industry. College students who are part of the Women in Aviation and their advisor (a USU Faculty member) are mentors for this 6-week project, and teach girls about airplanes, aviation weather, navigation, and flying. Girls get the opportunity to fly in a pilot-training simulator, and then fly in an actual plane with an experienced pilot. They get to sit in the cockpit of a plane in flight and are given the opportunity to pilot the plane.

- **Davis School District, Exploratory STEM Clubs**, has adopted the Exploratory MESA program. The mission of the program is to engage students in grades four through six in meaningful STEM experiences in after school programs where they have time and opportunities to experience enrichment activities to guide future courses, interests, and goals. Students in upper elementary school need to be exposed to STEM learning and activities so they can make good elective choices in junior and senior high school. Many of the courses available in secondary schools allow students additional

training and insight as they prepare for careers in the STEM workforce. When students are taught with STEM best practices and understand the opportunities in STEM fields they are better prepared to make choices in STEM careers.

- **Dixie State University, Dixie PREP**, provides three summers of rigorous academic instruction, educational hands-on projects, challenging homework assignments, and daily career awareness for 7th, 8th, and 9th grade students who have an interest and aptitude in Science, Technology, Engineering, and/or Mathematics fields. Dixie PREP strives to provide opportunities for high achieving students to pursue STEM studies and careers. Underrepresented and first generation students are encouraged to apply.
- **FutureINDesign (FIND)** is a 501(c)3 STEAM career development program for underserved, low to moderate-income, young adults. Their mission is to narrow the digital literacy gap in Utah, through hands-on training in key technology areas and functional life skills. FIND will reduce the constraints of intergenerational poverty, and create a pipeline of talent for Utah's growing technology workforce. FIND offers young adults (ages 16-20 years old) the opportunity to engage in a comprehensive and experiential workforce development training program. Participants are hired as Junior Designers and participate in a three-phase program. Junior

Designers will develop job market ready skills, including: graphic design, web development and coding. FIND will provide critical and professional experience that will decrease significant barriers and increase education and employment opportunities, becoming less susceptible harsh rise and falls of economic cycles. FIND leverages the ability for Junior Designers to develop a professional portfolio of work by providing Utah's nonprofits, startup companies, and established businesses with design services on a sliding fee scale. Offering a path to a career in a high skilled field, participants will increase skill levels, and obtain higher levels of education leading to a career.

- **Spy Hop Productions Inc., Digital Pathways Program**, a digital media education center, provides a unique and valuable job training experience to youth in the Greater Salt Lake area, while giving youth the safety and support to explore their interests. This year, the STEM Action Centers' Organization Grant helped support Spy Hop's Digital Pathways Program. Students in this program are immersed in a project-based student-driven learning environment in either film, audio, or digital design that infuses STEM applied learning and promotes the development of 21st century skills necessary for career and college readiness. Through the program youth are given access to workshops and classes that start at the foundational level and lead to an advanced intensive program. As students graduate, they will be placed in internships at local businesses and given scholarships

and priority work-study at partner higher education institutions.

- **Utah Valley University (UVU), Math Adventure Camp**: Research shows that negative attitudes towards mathematics leads to math avoidance. Those who avoid mathematics courses will not pursue careers in STEM fields. Therefore, the UVU Developmental Math Department created a week-long math adventure camp to positively influence campers' math attitudes through exposure of math in an active-learning environment. Hopefully, students with a better math attitude will be more likely to take more math classes and choose STEM careers. Research also shows that math attitudes are fixed by the age of nine. The math adventure camp focuses on elementary-age students in order to influence their math attitude for the better in hopes of having a lasting impression.
- **YMCA of Northern Utah, STEM Summer Day Camp** provides many opportunities for campers to experiment, engineer, and explore all while receiving a well-rounded camp experience focused on achievement, relationship, and belonging. The Y brings in specialized instructors to provide unique, hands-on activities and demonstrations, offering campers more in-depth exposure to STEM topics.

Identification of best practices being used outside the state and learning tools for K-12 classrooms (63M-1-3204 2 (h and i))

The STEM AC team continues to reach out to other states to explore best practices and position the State of Utah as a leader in STEM education and talent development. Annual attendance at the Midwest STEM Director's Forum continues to be a valuable opportunity to learn about best practices in multiple states such as Kansas, Indiana, Iowa, Missouri and Wisconsin. The STEM AC has been one of several states that was invited to work with the Office of Science and Technology Policy at the White House to review and update the federal strategic plan for STEM education. The original plan was completed in 2013 and the updated plan should be available by the end of December 2018.

The STEM AC been a member of STEMx for the past two years. The STEMx network is a multistate STEM network developed for states, by states. The STEMx network consists of 21 states and has created an accessible platform that is shared by member states.

This platform allows for access to data and tools that can be used to support STEM efforts. The STEM AC team is re-evaluating membership with STEMx. There is new leadership at STEMx, and while membership has been valuable for the past two years, the consensus is that it is wise to sit out a year and see how the new leadership will restructure STEMx services.

The STEM AC continues to participate in the CS4All and Code.org national events and efforts. This engagement has allowed Utah to learn from other states and their initiatives. Additionally, the STEM AC continues to work with the Education Commission of the States to contribute to national reports.

Provide a Utah best practices database (63M-1-3204, 2 (j))

The Curiosity Unleashed (stem.utah.gov) website provides access to Utah best practices and content that targets students, parents, educators, and industry partners. The website is being redesigned to better serve the STEM education community. The new website will provide a repository of STEM content, showcasing innovative STEM ideas for use in the classroom and at home. This resource will allow teachers to submit resources of their own, rate the resources provided by peers, provide feedback, and connect with other Utah teachers.

Information on best practices for STEM in Utah and links to high quality STEM resources hosted by other websites will also be featured. The new website will include information regarding STEM events and activities across the State; a description of these events, along with dates, locations, and a point of contact are included. All of this will inform the annual STEM Best Practices Conference, allowing us to provide more targeted, robust opportunities for teachers.

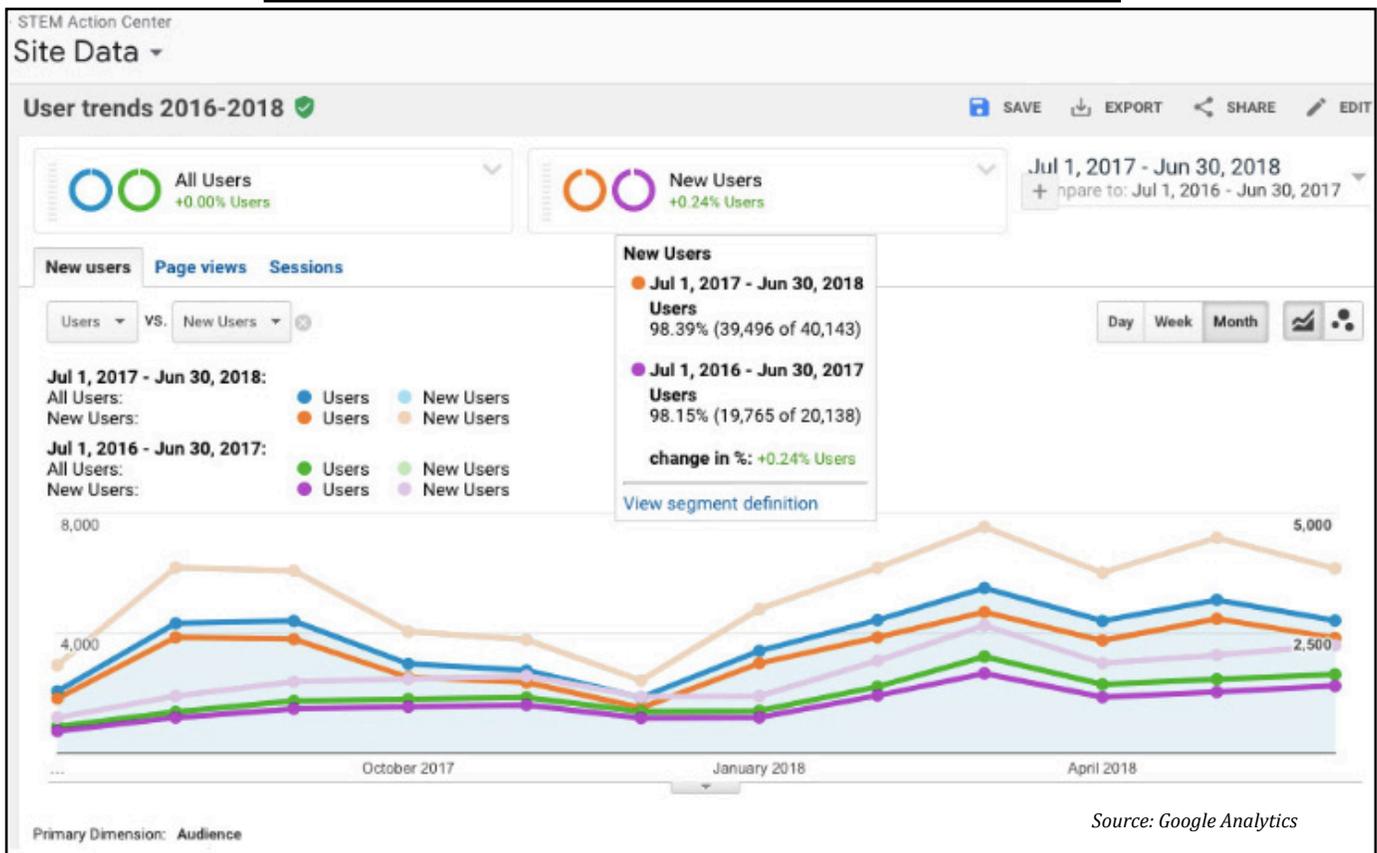
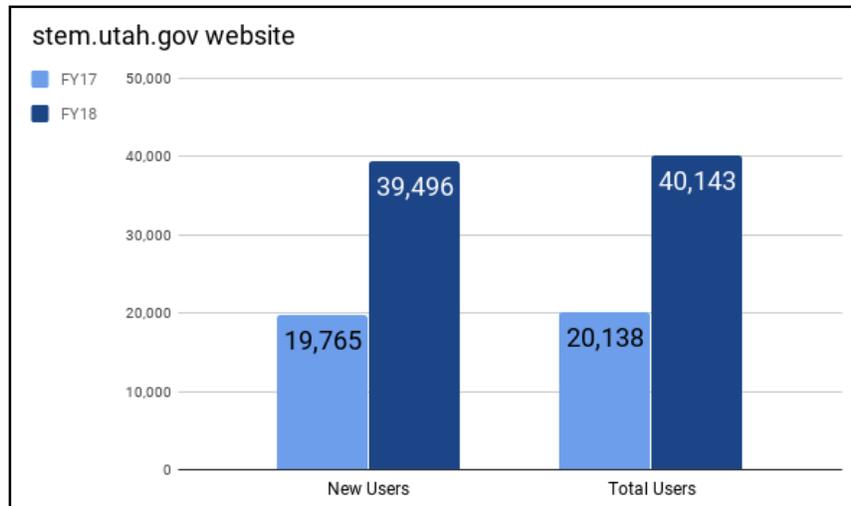
A new Communities of Innovation (COI) is being established within grantee cohorts and other special interest groups. These COIs will provide promising and best practices, community performance progress, and a forum for input from stakeholders regarding STEM AC programs. Networking among the COI members will be emphasized to build information and support communication by implementers. The COI will be piloted with the CS4Utah community to begin to build a CS/IT ecosystem in Utah.

Keep track of how the best practices database is being used and how many are using it 63M-1-3204 2 (k) i and ii

During FY18 the STEM AC website continued its upward trend of site traffic, nearly doubling its new-user flow to

39,496 compared to 19,765 in FY17, and seeing an almost parallel increase in overall users, with 40,143 total users in FY18 vs. 20,138 in FY17.

A total 53.1% of new traffic was organic (Google search), 34.7% was direct (url: stem.utah.gov), and the remainder of traffic originated from social media links.

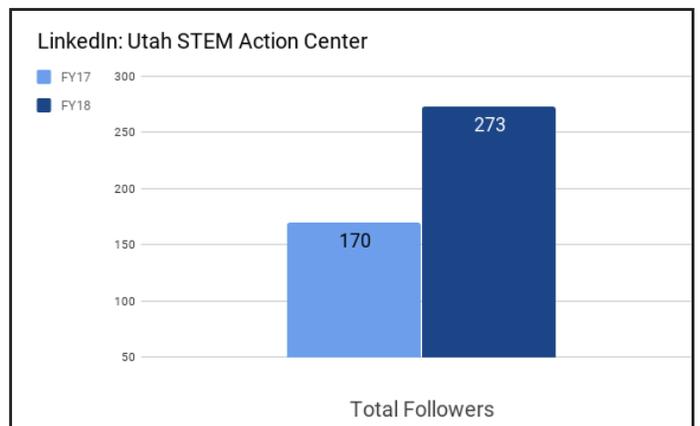
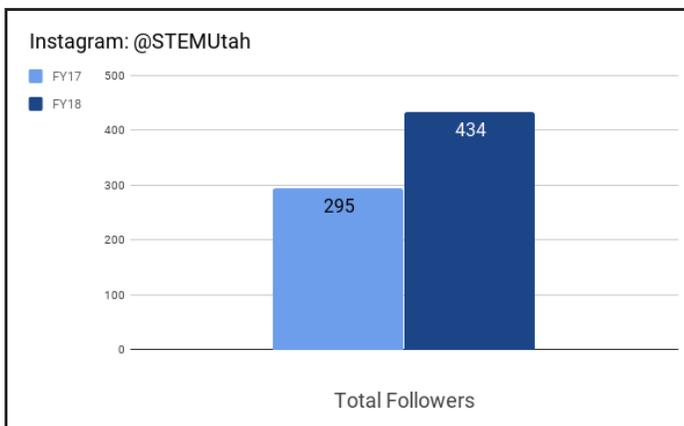
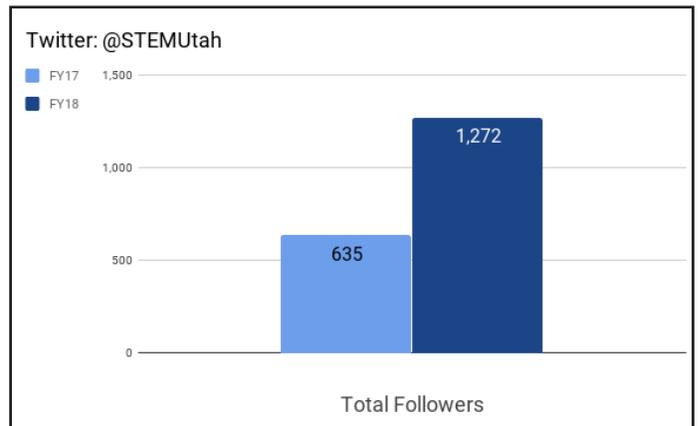
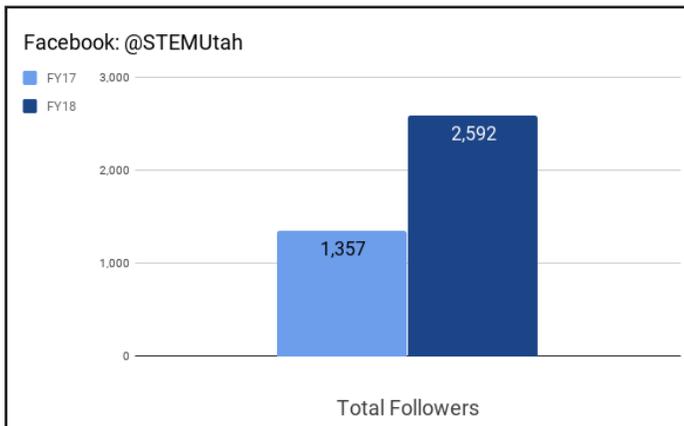


The site realized a 49.47% increase in page views: 124,244 vs. 83,130 (FY18 vs. FY17).

The STEM AC social media accounts also realized substantial gains in FY 2018: Facebook followers total 2,192 (vs. 1,357 followers/FY17); Twitter followers total 1,272 (vs. 635 followers/ FY17); Instagram followers total 434 (295 followers/FY17); LinkedIn followers total 273 (vs. 170 followers/ FY17).

The objective in maintaining our web assets is to post and promote STEM opportunities to all stakeholders in the spirit of fostering an online network dedicated to STEM education and, ultimately, economic growth in related industries through the cultivation of a future-focused STEM-savvy

workforce. Critical to our dissemination of impactful, compelling content, our social media accounts drive traffic to our main website, stem.utah.gov. We also utilize our platforms to create reciprocal relationships with higher-profile organizations by engaging with their content and attracting followers from their audience bases, helping call attention to our own social impacts as well as STEM AC events and related websites such as stembestpractices.com and stemfest.com. Social media is an exceptionally valuable tool for promoting stakeholder engagement; patterns demonstrate spikes in traffic around our events, granted that a majority of individuals rely on social media for information. Using the STEM Best Practices Conference as anecdotal evidence, we find stakeholder reach increases by an



average 4,300 people in both the month prior to the hallmark educator conference, as well as subsequent months (surges of engagement patterns are observed with respect to events we promote in the weeks that immediately follow).

The STEM AC distributes a monthly newsletter with a reach of 7,104 Utahns, yielding more than 3,200 unique signups via stem.utah.gov in the past year alone. The newsletter averages a 53.8% open rate.

Join and participate in a national STEM network (63M-1-3204 2(l))

The STEM AC joined STEMx, a national level organization that has evolved to be more service-oriented, with less focus on membership (thus, less overpriced membership dues). This organization is also led by states and their STEM initiatives, which is more appropriate for the STEM AC. The STEM AC frequently participates in webinars with STEMx and has learned about some successful practices in other states.

Leadership at STEMx has changed in the past few months and the STEM AC is waiting, and observing, before joining to see if this change of leadership will negatively impact the quality of services from STEMx.

The STEM AC continues to engage with other national organizations such as STEMConnector, but not on a membership basis.

STEM School Designation (63M-1-3204, 2 (n))

The STEM AC, working with the Utah State Board of Education (USBE), generated a comprehensive plan for a **STEM School Designation** program which was included in the FY15 annual report. The USBE and the STEM AC Executive Board approved the criteria in FY15.

Over the course of applying for designation, schools complete a self-evaluation on 10 overarching dimensions, which break down into 37 elements. Each element is evaluated by the applicant school, and scores are supported with narrative and artifact evidence submitted to the review committee.

The review committee is comprised of STEM AC and USBE staff, as well as administrators planning to apply the following school year, in addition to each applying school providing a reviewer as well. This year was the first year the program had volunteer reviewers from the general public, which had signed up in order to have a greater understanding of STEM across the state. In discussion with USBE staff associated with Dual Language Immersion (DLI) schools, it was determined this year that schools that are pursuing both DLI curricula as well as STEM School Designation would complete the same application as any other school aspiring to STEM designation status, a shift from previous years. This change was positively received by all administration at current DLI STEM schools. It was also well received by the Utah State Board of Education Standards and Assessments committee when discussed in March 2018.



It is important to note the application to become a designated STEM school is not easy. It takes time and considerable thought and strategy. Despite the level of work required to complete an application there has been considerable excitement.

The first solicitation for applications was released in early September of 2015, with 19 schools awarded a designation at one of the four designation levels in FY16. An additional 12 Dual Language Immersion schools were also granted STEM School Designations, starting with their 1st grade teachers and students to intentionally implement STEM into their school days. In FY17, seven additional schools were awarded new designations, with an additional school applying for a higher level of designation from that awarded the previous year. Nine schools were awarded designations in June 2018, three of which were existing awardees that had applied for an increase in designation level, resulting in 43 STEM

School designations across the state of Utah. Designations are recognized for five years, requiring a school to reapply at the end of that time to maintain designation. For schools that use reviewer feedback to create and implement improvements within those five years, a modified application process is used to increase designation level. A summary of the awardees is included as [Appendix D](#).

Support best methods of high quality professional development for K-12 STEM Education (63M-1-3204 2 (o))

The STEM AC has been working with the USBE to support effective professional learning associated with STEM, resulting in the **Professional Learning Program**. This year we were pleased to see a decrease in the number of teachers indicating they did not teach any STEM (only 9%), based on survey results from Utah Education Policy Center (UEPC). This data is encouraging, as it implies a more complete understanding of STEM and STEM education throughout the state. Future surveys will look into this in more depth to gauge perceptions associated with STEM and STEM integration. Historically, this program has been associated with the use of professional learning platforms supporting video reflection. All projects funded under this program were required to use a designated platform, support STEM learning opportunities for educators, and require all participants to use video as a form of self-reflection. For the 17-18 academic year, changes were made to the program to leverage resources already in use by LEAs. The changes that have been made to the Professional Learning Program

(**Appendix E**), in response to formative and summative evaluation work, has been incorporated into a continuous improvement cycle that allows for responsive and effective changes for continued improvement. The requirements associated with STEM and video reflection were maintained, but LEAs were able to choose a platform to store and share video reflections.

Of the 58 projects across the state, 29 chose to use a STEM AC-procured product, Edivate, with a total of 2,500 purchased licenses. Other projects used systems such as Canvas and Google drive, already available to teachers through other LEA initiatives. In a survey of administrators, 100% stated they had encouraged teachers to video themselves teaching for reflection purposes, though 19% stated they did not actually use self-reflection for professional learning. 8% of administrator respondents felt video reflection was somewhat ineffective, which has led to information about using video reflection for professional growth to be shared with all project administrators for the 18-19 school year.

The STEM AC worked with LEAs prior to the state of the 17-18 school year to determine why the video-based, online platform used in previous years was not being adopted at higher usage rates. It was determined that not having a product or system in place from the beginning of the school year greatly reduced the likelihood of that product being used regularly. The STEM AC used this feedback to change the application timeline for participating schools to ensure grants were awarded in early May, and required participant lists, used to create product accounts,

by mid-July to ensure all participants had accounts in place before the school year started.

The majority of sites using Edivate were rural districts and charter schools. Prior to the 17-18 academic year, implementation and intervention plans were developed between the STEM AC and product provider. These sites were much more effective than the larger groups in past years, due in part to the localized control these groups have in comparison to very large districts. Start-of-year implementation was significantly easier than in the past, with all schools receiving training and start-up support by the end of September, as required by STEM AC project management. Quarterly check-ins, by both product provider and STEM AC staff were effective to address any problems that may arise before the problem became unmanageable. This led to a significantly higher amount of teachers, 58% meeting or exceeding usage expectations. It also led to a decrease in the number of teachers and administrators feeling they did not have enough training to use video reflection effectively (12% total). Edivate was acquired by another provider, Frontline, with different implementation methods, so the 18-19 academic year will be managed differently.

Changes to the project application were also made, requiring participating LEAs to provide a month-by-month calendar of professional learning opportunities, ensuring a consistent, year-long effort to improve teacher learning of STEM. Applicants were encouraged to use their Digital Teaching and Learning plans, submitted previously to USBE, to create plans that fit into what they had already planned for other state

initiatives. This was well received and encouraged applicants to develop a more streamlined view of professional learning at their site. The majority of survey respondents, both teachers and administrators, agreed that STEM related professional learning had a positive impact on advancing teachers STEM instruction, including content knowledge and instruction practice. Teacher respondents also perceived an impact with student learning and quality of their own teaching associated with STEM professional learning they engaged in, specifically in engaging with students more equitably (91%).

Grant funds are used for a variety of purposes, primarily off-contract time, incentives for completing additional work off-contract, substitutes for work-day efforts, recording devices, conference transportation and registration (within the state of Utah), as well as locally designed and supported STEM learning opportunities. Applicants can apply for either a one-year or three-year grant. Of the 58 projects, 30 were three year grants. Anecdotally, these three-year grants have increased teacher participation as they demonstrate a long-term focus on improving STEM within a school or LEA.

Regardless of video-sharing strategy, all project leaders were required to complete quarterly phone calls and quarterly reports over the course of the school year. Phone calls were scheduled in 15 minute blocks, and provided time for participants and program specialists to discuss concerns and successes on a regular basis. Quarterly reports were used to drive discussion as needed. This change in program oversight allowed for more shared information about project

timelines, successes, and barriers. Identified barriers were acknowledged and addressed sooner than in the past, which led to greater success in meeting locally set goals for project participants.

Over the course of the year, it became clear that other professional learning platforms without contracts in the state were of interest to a variety of LEAs. In order to ascertain the effectiveness of the products in relation to STEM professional learning needs, a pilot program was developed. In January of 2018, a Request for Service Qualifications was completed, with three providers being identified from the applicants as ready to participate in a no-cost pilot for the following school year. Ultimately these products, and others as they choose to apply and participate, will be assessed for effectiveness and potentially placed on an approved vendor list for use by LEAs for STEM professional learning.

With the move away from any specific platform, assessment of the program has shifted significantly. In past years, focus was placed on appropriate amounts of product usage. As implementation plans now vary widely, program effectiveness is assessed with participants completing a pre and post survey regarding a participant's professional development as aligned to the Utah Effective Teaching Standards (UETS), specifically standards 3: Learning Environments, 4: Content Knowledge, 5: Assessment, 7: Instructional Strategies, and 8: Reflection and Growth. These standards were developed by the USBE and are in effect for all public education institutions. Platforms participating in the pilot will be assessed using the same instruments. A summary of the current grants being supported can

be found in [Appendix F](#). For more information and additional data, see the full report by Utah Education Policy Center in [Appendix J](#).

Recognize a high school student's achievement in STEM Fairs, Camps and Competitions (63M-1-3204, 2 (p))

The Fairs, Camps and Competitions (FCC) program was on hold during FY17 in order to re-evaluate the award process. It was relaunched as the STEM AC Competition Grant program during FY18 with the following changes.

- (1) Applications must be completed by a school-level representative on behalf of the students benefiting from the grant. The school-level representative will oversee the funding and be responsible for reporting outcomes. Schools may request up to \$100 per participating student, and receive funding based on the strength of their application.
- (2) Students are required to apply for a grant and requesting funds from their school, and student projects are funded pulling from the overall school award.
- (3) Before the end of the school year, each awarded school must submit detailed receipts, and project completion reports showcasing what students accomplished. During the year, representatives from the STEM AC went out to as many sites as possible to help judge events, talk to teachers and students, and get a feel for what schools are doing around the state.

The grant program is popular and for the 2017-18 school year grants

were awarded to 44 schools. In their project completion reports, teachers and students focused primarily on how much participation in these opportunities positively impacted their confidence in STEM subjects, and on the important interpersonal skills students gained through participation.

The STEM AC has worked with KUTV on nine STEM stories over the 2018 fiscal year ranging from student achievements, standout STEM schools, emerging education trends, and STEM company spotlights. You can find these features on the KUTV website at <http://kutv.com/features/stem>.

The Spotlight program provides an opportunity to share stories about Utah students, teachers and companies. The STEM AC reaches out to districts, schools, teachers, students, parents and even companies to showcase innovative efforts in STEM. The Spotlights are sent to educators, businesses and legislators to highlight the great things are going on in their communities. The current portfolio of Spotlights can be found at <https://stem.utah.gov/weeklyspotlights/>.

Develop and distribute STEM information to parents of students being served by the STEM AC (63M-1-3204, 2 (r))

The STEM MX platform, previously discussed, will provide access to resources for parents. This resource is being piloted in five school districts during the 2018-19 school year, as previously discussed. The STEM AC also reaches out to parents when they attend student STEM events, such as the DIY fair. Parents are encouraged to sign up for the newsletter and to follow

the STEM AC on social media, where they can find out about STEM events across the state and student grant opportunities. The third annual STEM Fest attracted more than 3,500 family participants on open family night.

A specific section on the website is dedicated to students, where parents and students both can learn the significance of STEM and also keep up to speed on the latest events.

The Utah STEM Bus goes to STEM nights at various elementary schools throughout the year, and opens the bus up to parents and their children to interact with our teaching materials and learn more ways to get involved in STEM.

More than a quarter of teachers with access to K-12 Math Personalized Learning technology reported that the software increased parent engagement (see [Appendix J](#)). One father reached out to the STEM Action Center directly to express gratitude for the way these programs have allowed him stay involved in his son's education. He indicated that his son had been falling behind in math, and no one really knew what to do about it. Since their school started using the math software, he has been able to see exactly where his son is struggling and work through things with him. He said that the parent involvement facilitated by software access has helped his son quickly move through material, catch up, and continue to stay on target.

Support targeted high quality professional development for improved instruction in education, including improved instructional materials that are dynamic and engaging and the use of applied instruction (63M-1-3204, 2(s) i - iii)

The STEM AC strives to align all professional development work the criteria that define high quality professional development that are defined in statute. The STEM AC continues to work in partnership with the math and science specialists at the USBE, as well as partners in higher education, to implement an Elementary STEM Endorsement. This endorsement consists of a sequence of six courses that will provide elementary educators with a more in depth understanding of critical STEM topics and innovative ways to implement applied or hands on instruction in their classrooms. The focus of the endorsement is the use of technology or engineering-based applications for science and math. The endorsement program completed its first 2 year cohort cycle in May of 2017.

The second cohort of 435 teachers participating in the Elementary STEM Endorsement started in Fall 2017, and will complete all coursework by summer 2019. Prior to starting their endorsement program, nearly half of participants stated in a survey they taught less than 30 minutes of STEM content per week. Whether this is true or due to a narrow definition of STEM is unclear, and will be further assessed as the cohort continues. Regardless, teacher participants report beginning the program for intrinsic reasons,

including interest in the course content covered. After one year, attrition remains under 10%. In addition to cohorts working regionally with higher education partners, this cohort has seen the addition of distance education courses offered by the Central Utah Education Services (CUES) office, and year-round course offerings from Utah Science Teachers Association (UtSTA). Based on previous and current participant feedback, program leaders in partnership with the Utah State Board of Education (USBE) will be refining the program's course offerings and requirements beginning in January of 2019 to have a larger focus on developing content knowledge for educators. Additional data regarding new participant expectations and concerns, see [Appendix J](#).

In the 2017-18 school year, teachers and administrators from over 550 schools received professional learning for the use of the K-12 Math Personalized Learning tools as part of the contracts with the product providers. Working with our third-party evaluation team, we strive to identify best practices and target professional learning opportunities to meet the needs of teachers.

The STEM AC team conducted its third annual multi-week "road trip" across the state to provide additional professional learning to teachers for the use of the math personalized learning tools. The **STEM Roadshow** consisted of five events around the State of Utah during the last week of July and the first week of August 2018. These events were designed to get the year off on the right foot, providing teachers with opportunities to collaborate, share successes, find solutions to challenges, and receive professional development

related to products provided by the STEM Action Center. Across all five locations (Cedar City, Richfield, Springville, Layton, and North Logan), 391 participants from 177 schools in 30 districts and 21 charters attended.

Based on lessons learned from the first two years, we made logistical adjustments, including changes to the on site registration process, and limits for session sizes. We received positive feedback from teachers about these improvements. Several teachers exchanged contact information so that they can continue to collaborate and work together to use technology more effectively.

Finally, the STEM AC is working with local education leaders to determine needs and potential solutions regarding STEM professional learning needs for K-12 STEM educators. During FY18, over 5,000 teachers were directly impacted. The professional learning project is discussed in detail in previous sections.

Ensure that an online college readiness assessment tool be accessible by public education students and higher education students. (63M-1-3204, 2 (t) i and ii)

The STEM AC, working in partnership with the USBE and Utah Education Network, determined that EdReady did not meet Utah's college readiness assessment needs. LEAs' interest in using EdReady was also insufficient to justify renewing the contract. The math personalized learning tool ALEKS, a McGraw-Hill product, is designed to help students prepare for college

math and shows to be a promising supplemental tool in helping students gain greater proficiency in their college math skills.

ALEKS assesses grade level proficiency in high school students. These assessments provide students with a clear understanding of what they have mastered, and what they still need to learn.

These results can easily be compared to college proficiency standards to determine if they are at performance levels in math that meet admission requirements. ALEKS also gives students access to developmental math curriculum online that allows them to improve in areas that have been identified as deficient for college admission.

The Board may prescribe other duties for the STEM AC in addition to the responsibilities described in this section (63M-1-3204, 3)

The STEM AC has been involved in additional activities that include the following:

STEM AC STRATEGIC PLANNING

The STEM AC, working with its Executive Advisory Board, spent four months during FY17 to develop a 3-year strategic plan for the STEM AC. The strategic plan addresses statutory requirements connected to the funding and the actions that the STEM AC has taken to align with statutory requirements. It also includes impact and outcomes data that will be tracked for the next three years for all projects, including those not supported by

legislative funds. The 3-year **strategic plan** is included as **Appendix I**.

The Effectiveness and Accountability matrices for each project, along with logic models, are included in the strategic plan. The STEM AC team will be spending considerable time during FY19 to review and update the strategic plan to ensure that it continues to be effective at guiding the STEM AC and its efforts.

LEGISLATIVE AUDIT

The Office of Legislative Auditors General (OLAG) conducted an audit of the STEM AC beginning in December of 2016 and ending June 14, 2017. The audit looked at process (financial and procurement) and program effectiveness. The audit report summarized the following findings:

- While performance measures have improved, the STEM AC needs better coordination of its measures and lacks the ability to measure long-term success.
- Most of the STEM AC's funding directly benefited students in 2016. Through visits with teachers and district administrators, we found that schools are doing things with STEM subjects that were previously unavailable to them.
- Statutory requirements may inhibit the STEM AC's effectiveness by requiring programs that lack either end user utility or impact.
- Financial controls over vendor procurements appear appropriate.
- The STEM AC's financial reporting has improved.

The following recommendations were made:

- The STEM AC consult with its third-party evaluator to make clear data requirements for vendors to ensure valid data for measuring program effectiveness is obtained.
- The STEM AC provide annual public performance reports, based on performance goals and measures, to the Legislature.
- The STEM AC utilize future longitudinal data from the Department of Workforce Services in measuring STEM AC impact in higher education and in STEM industries.
- The STEM AC develop measures for its classroom grants initiative and all other future initiatives to better determine the effect of its funding.
- The STEM AC provide programs and products with proven track records and buy-in from the teachers who will be using it.
- The STEM AC not require its own professional development software vendor be used for LEAS to qualify for other professional development resources. This recommendation is consistent with legislative changes from the recently passed HB426.

The report noted several areas where the STEM AC had been proactive in correcting several areas of weakness. This was due to an internal audit that the STEM AC conducted almost two years ago. The STEM AC is confident that the performance measures are improving and will continue to improve over the next year.

The STEM AC has created a corrective actions document for the legislative audit. The Center continues its work

to apply corrective actions to those findings. The intent is to complete all corrective actions by the end of FY19.

The STEM AC initiated an internal audit in June 2018 of the Utah STEM Foundation. The purpose of the internal audit is to be proactive in identifying any weaknesses in the operation of the Foundation. It was felt that the Foundation has been in operation a sufficient period of time to allow for an internal audit to identify areas in need of improvement. We anticipate an internal report in early January 2019.

K-16 CS4UTAH

Overview

The STEM AC, in partnership with USBE, recognized in 2015 that there was a serious lack of access in Utah schools to computer science and information technology (CS/IT) opportunities for students. They spent the next two years working to secure funding for increased resources to LEA's. They secured \$400,000 in 2015 (SB93) for support of teachers to pursue and acquire their endorsement. The following year, 2016, with strong support from industry they secured \$1.255M to launch the first computing grant initiative in Utah (SB190) which is now known as **CS4Utah**.

There are two synergistic approaches to growing Utah's CS/IT talent: (1) meet short-term needs with accelerated training or "up skilling" and (2) a long-term sustainable approach working with education and business partners to build programs in computing. The CS4Utah initiative is focusing on the long-term investment for Utah schools and students.

The STEM AC, working with partners from USBE, industry, Utah DWS,

LEAs, the Computer Science Teachers Association (CSTA), the Utah State Superintendents Association (USSA), community and cultural organizations, and higher education institutions built out a strategy to support the creation of articulated computing programs, beginning in K-6 and seamlessly transferring through secondary and post-secondary. The results were two key strategic actions: (1) support an industry-led effort to secure legislative funds for funding LEAs in the form of a competitive grant program and (2) an industry-led collaboration to develop an apprenticeship program in computing.

K-16 CS4UTAH

The STEM AC worked with K-16 education partners to identify the resource gaps that are preventing LEAs from offering comprehensive computing programs in K-12. Input from partners helped to inform funding requests and define the criteria for the grant framework and proposal activities.

The activities, as defined in the Request for Grants (RFG), include:

- innovative outreach, engagement and awareness activities with a focus on equity and access for all Utah students
- robust and industry-relevant content for courses
- increasing the number of middle and high schools with CS/IT courses (e.g, ECS, Creative Coding, AP CSP, AP CS, Programming I and II etc.)
- integration of coding, with a focus on computational thinking, for elementary classrooms
- classroom engagement with industry partners (e.g., support in elementary classroom

activities, instruction in secondary courses etc.)

- professional learning opportunities to increase the number of qualified teachers (e.g, workshops for elementary teachers such as Computer Science Fundamentals, support of endorsement work for secondary teachers such as AP Computer Science Principles or Level 1 or 2 CS endorsement courses etc.)
- work-based learning opportunities
- effective articulation with post-secondary partners that increases retention of students in undergraduate programs
- increased industry advocacy (e.g., classroom engagement, funding of programs, legislative advocacy, grant partnerships etc.)
- effective evaluation and assessment of existing and new activities

Grants were solicited through two formal, competitive Requests for Grant (RFG) solicitations, with external review of all submissions. Applicants submitted grant requests for 2-3 years of funding and the first solicitation was closed late 2017, with 24 applications and 10 grant awards. The second solicitation was opened in early 2018, with 23 grant applications completed and 19 grants awarded.

CS4Utah Grants –

Awarded in Fall 2017 and Spring 2018

The following table offers a brief description of grants that were awarded with the initial funding.

Appendix H provides greater detail for each grant.

CS4Utah Grant Project	Description
Three Falls Elementary School	After-school and summer programs, teacher professional learning (PL).
Provo SD	K-6 CS program teacher PL, curriculum development.
Coral Canyon Elementary	After-school and summer programs, teacher PL.
Iron County SD	Increase secondary course offerings, add K-16 coding, teacher PL.
Entheos Academy	After-school clubs, increase course offerings, add K-6 coding.
Bryant MS	After school and summer programs, PL and course additions.
Kearns Jr High	After-school and summer programs, new courses.
Davis School District	PL, new course addition, coding in elementary.
Success Academy	“Fast track” advanced collegiate pathway, mentoring, summer programs.
Juab/South Sanpete/North Sanpete Consortium	CS pathway from elementary to high school, after school and summer programs, increase class offerings.
Delta Middle	Add classes, summer camps and after school clubs, sponsor student project showcase.
Kane County School District	Develop after-school 4-H CS clubs, FIRST Lego Leagues, and summer camps.
Delta Middle School	K-16 coding, add offerings in secondary, add distance learning
Ogden City School District	Expand CS in elementary schools, starting with New Bridge. Lab Monitors will be trained to teach CS in all grade. BootUp to provide PL and incentives to teachers.
San Juan School District	Create 9-week summer coding boot camp, supported by peer mentors and weekly speakers.
Alpine School District	Write CS standards for elementary schools, with coding central to the curriculum. PL provided by BootUp. K-2 to use blockly programming. Introduce grades 3-6 to creative coding with Scratch.
Washington County School District	Provide after-school programs with 4-H coding clubs, weeklong summer coding camps, robotics and FIRST Lego leagues for all grades. Create teacher PL in CS and coding.
Juab School District	Deliver professional learning for all elementary teachers in partnership with BootUp. Integrate CS into 4-6 grade classes, expansion to 3rd grade. Coding to be taught through Scratch.
InTech Collegiate High School	Increase CS course offerings and teacher PL. Buy IT certification tests and student test prep.
Garfield SD	Teacher PL, add secondary courses, career fair.
Cache County School District	Add courses, teacher PL, after school programs.
Itineris	Develop career readiness program for students.
Tooele County School District	Add industry CS/IT certifications and increase course offerings at community learning center, open to all high school students.
Lindon Elementary	Add online classes, teacher PL.
Pinnacle Canyon Academy	Add coding to K-8 and secondary, add high school internships.
Nebo School District	After-school program, 6th grade curriculum, digital design labs teacher PL.
Tabiona Elementary	After-school and summer programs.
Duchesne Elementary	After-school and summer programs.
Emery County School District	After-school clubs in all elementary schools, add courses in middle and high school.

The following metrics are included in the third party assessment:

Metric or Outcome	Description
Number of new courses offered in middle and high schools	Number of new courses offered, number of pre-existing courses to establish baseline
Student enrollments	Enrollment numbers for new and pre-existing computing courses
Student completion	Completion numbers for all computing courses and aggregate grades of scores for all completers; in addition, information that describes reasons for non-completion
Advanced Placement (AP) test data	Test scores for AP courses (i.e., AP CS and AP CSP)
Participation in outreach and engagement activities	Number and description of new activities offered, number and description of pre-existing activities to establish baseline, number of participants in new and pre-existing activities (including traditionally underrepresented students), pre- and post-surveys for participant feedback
Participants in work-based learning (WBL) opportunities	Number and description of new and pre-existing WBL opportunities, number of student participants in WBL; in addition, describes pre- and post-surveys for student and industry mentors or sponsors
Industry participation	Number of new companies recruited, number of hours contributed, any financial contributions and/or supplies donated
Participation in professional learning opportunities	District and school participation, numbers of teachers participating in professional learning workshops, conferences, near peer mentoring and liaison activities and pre- and post- surveys
Credentials	Number and type of all credentials (e.g., non-credit post-secondary certifications, industry certifications, 2-year and 4-year degrees)
Participation of underrepresented student populations	Where applicable, provide numbers of underrepresented students participating in the above efforts

Initial qualitative data is being collected from the first cohort of grants (10 in total) that were awarded in November of 2017. The remaining grants (19 in total), which were awarded in Spring of 2018, will be providing data at the end of the 2018/19 school year. The initial feedback is positive and provides formative guidance on how to improve the program and identify future, additional needs. Overall feedback, as well as student and teacher outcome feedback, is shared in the following sample survey responses.

Overall feedback:

“These resources have been invaluable for this effort to strengthen Computer Science offerings in our rural tri-district area. The electronic curriculum has been a tremendous benefit to both new and seasoned Computer Science instructors. Post-secondary guidance has been provided in our pathway efforts.”

“Due to funding from the STEM Action Center, we have been able to train employees to teach coding to

all students at elementary schools throughout the district. We are building the confidence in these teachers needed to facilitate coding instruction throughout the school day to students who rotate into their classes for computer time each week.”

“This has been such a great opportunity for our school. Most of us came into this with little or no experience in computer science, robotics, coding etc. After this first year we have gained much knowledge, resources, and a greater capacity to facilitate STEM education. One thing I would like to implement more is professional development for all teachers on how they can integrate STEM into what they are doing already. But overall we have LOVED having this grant.”

“The teachers in our program understand CS curriculum in a way that they never have before. They are empowered to try new things with their students. The students in the classrooms are highly engaged in their activities. And, many students that are not as successful with traditional instructional strategies have been given a chance to share their skills.”

“Without the Computing Partnership funding we would not have been able to hold the clubs at all. Because of the funding we were able to provide experience in computer science to 36 students. We have been able to take them to camps around the district, have a summer camp, and provide materials for them to create, explore, test, and share their ideas. Because of this funding we have also developed partnerships within our community that would not have happened. We have also been able to provide professional development to teachers in our school.

Ten teachers from Three Falls got to go to a conference and learn how they can incorporate STEM activities into their classroom. This funding has increased the capacity of what we can offer our students. We are reaching many students for years to come.”

Feedback on Student Outcomes:

“Excitement. Students are excited about Computer Science and STEM. So many students ask “when is our next CS meeting?” or Hey can I do code camp this year?”

“Teachers are creating success criteria and clear performance of understandings this year. However, one of the best stories came from a kindergarten teacher last spring. She started teaching her students some coding between our training sessions. When we met she said that there was a girl in her class that was at the bottom of every performance indicator in reading, writing, and math. But, when they did their coding lesson she was the star of the class. She understood, engaged with the work, and helped other students. The teacher said it was the first time she had been successful all year. We need to give most students opportunities like this.”

“We finally have the opportunity for students to explore the world of coding and robotics. Students are very excited about this opportunity. Engagement in these activities is very high. These opportunities have helped students build confidence in their abilities and has opened their eyes to potential career opportunities that they did not know about. The piece of information I find most interesting is that over half of our students wanted to be in the coding class. While we did not have the

capacity to meet that need this year it is information that will help us plan for the future.”

“All students from participating schools have gained coding knowledge. Students have gained new skills such as problem solving, critical thinking, cooperation, perseverance, as well as how to code.”

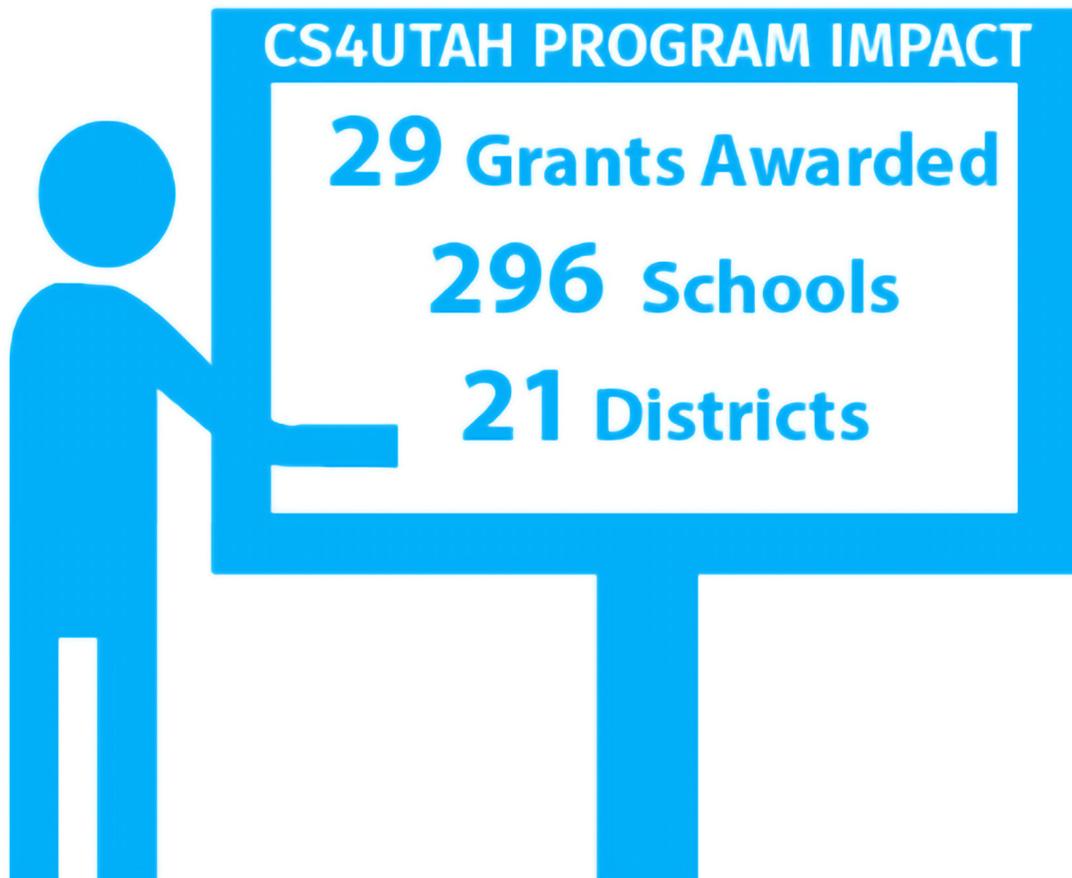
Feedback on Teacher Outcomes:

“The main teacher outcomes from our grant funding have been to increase exposure and familiarity with tools that teachers can use to work with their students in coding in their classes. Additionally certain teachers have learned how to coach students in their coding pursuits outside of school to help run after school programs.”

“Teacher attitudes have shifted regarding coding at their schools. They are developing the confidence to branch out on their own and develop lessons for themselves.”

“Our one teacher that is teaching the coding class is seeing the enthusiasm that the students are bringing. From conversations with him I know that he sees that there is a greater need (and interest) for coding.”

“I had 26 faculty from my school attend our CS conference. Leaving, we were all excited to take next steps to implementation in classes. There were so many “unplugged” activities that our faculty have been excited about.”
The initial feedback also identified additional areas of need that include increased support from higher



education partners, more connections with local industry, creating a “local hub” for in person convening to share ideas and resources, a lending library of shared technology resources, regional workshops provided by the STEM AC and USBE and an online community for sharing ideas and resources that can align and synergize with a possible “local hub” model.

Additional resources are leveraged into the CS4Utah program, including **Code.org** professional development for teachers and **Girls Who Code Club Network**. The STEM AC provides professional learning endorsement workshops through a partnership with Code.org, and in collaboration with the USBE. The STEM AC, using Code.org resources, works with key industry partners to provide ongoing educator professional learning for specific courses in the computing pathway, including: Computer Science Discoveries (CSD; 6th through 10th grade), and AP Computer Science Principles (AP CSP; 11th or 12th grade). An expanded agreement with Code.org is providing for elementary teacher professional development through Computer Science Fundamentals (CSF) workshops. A total of 24 elementary teachers were supported directly by the STEM AC, in addition to 91 teachers supported by other partners. Hill Air Force Base and in-kind donations from Dell EMC supported professional learning efforts with Code.org and the STEM AC. The funding supported participation by 43 middle school teachers (CSD) and 26 high school teachers (AP CSP).

The STEM AC collaborates with Girls Who Code (GWC) to support the creation and facilitation of GWC Clubs across Utah. In November of 2017

there were five GWC Clubs in Utah. The STEM AC’s Foundation, working with GWC, Carbonite and Comcast, have helped to grow the clubs to a total of 62. Carbonite and Comcast have made cash and in kind donations to support a “shark tank” competition for Clubs at the end of the school year in April of 2019.

The STEM AC is one of 17 member states in the national Expanding Computing Education Pathways (ECEP) Alliance. The CS4Utah coalition received a grant from ECEP to complete a **statewide CS/IT landscape analysis**. The landscape analysis is nearly complete and provides data that describes the current status of CS/IT in school districts. It also provides qualitative data regarding educator and administrator input for needed resources, significant challenges to building and sustaining comprehensive K-16 computing program. The information collected as part of the landscape analysis will augment the data collected from the third party assessment of the CS4Utah grants.

Finally, the STEM AC, in partnership with USBE, the Utah Education Network (UEN), CS4Utah grant awardees (listed in the previous table) industry partners (listed below) and post-secondary partners are close to launching the **CS4Utah Community of Innovation Network**. This network will be a blended community of practice that allows for online sharing of promising and best practices in CS/IT education and career development, as well as supports a series of face to face regional symposia. These will be supported through a “spoke and hub” model with the STEM AC supporting the CS4Utah collaborative

partners. The Community of Innovation Network aligns with and addresses a need that has been identified in the initial feedback from CS4Utah grant awardees, previously discussed.

THE UTAH COMPUTING APPRENTICESHIP CONSORTIUM (UCAC)

There are many Utah companies that support a variety of internship opportunities for students. However, company partners have indicated that there are gaps in the process for which they could use resources to improve their early employment opportunities.

The STEM AC has been working with the Utah DWS and industry partners to create the first computing apprenticeship program. Computing is defined as computer science, information technology, cybersecurity, software development and engineering, data analytics and artificial intelligence. This is an industry-led project and will support opportunities for students to be hired as apprentices, in an “earn while you learn” model. This project originated in November of 2018 with the support of Senator Hatch’s office. The intent was to submit an H1B visa grant to the US Department of Labor (DOL), in partnership with the Utah Technology Council (UTC) and educational institutions. The release of the DOL grant solicitation was delayed, prompting the apprenticeship planning team to look for other opportunities to pilot the apprenticeship program.

The UTC was awarded a Talent Ready Utah grant for \$245,000, which will provide pilot funding to launch the Utah Computing Apprenticeship Consortium (UCAC). The UCAC will facilitate the profiling of industry positions, matching of applicants to tech skills

and culture, identification of skill gaps and training needs, and placement into apprenticeship programs and full employment. The UTC will act as intermediary between industry apprenticeship sites and the US Bureau of Apprenticeship.

The DOL released the solicitation for the H1B apprenticeship grant program in early August 2018. Weber State University has taken the lead, in partnership with Salt Lake Community College, the LDS-Business College, Davis Technical College, Ogden-Weber Technical College, the Utah DWS and the STEM AC with a proposal that was recently submitted. The grant awards should be announced in January of 2019 in anticipation of a February 2019 start date.

Utah companies have been engaged in the apprenticeship project for the past year, as well as the CS4Utah program. These companies include Adobe, 3M, Ivanti, Comcast, Ancestry.com, Vivint, Microsoft, Google, Oracle, IM Flash, Goldman Sachs, eBay, Hill Air Force Base, AT&T, Inside Sales, OC Tanner, Utah Technology Council, Women’s Tech Council, Silicon Slopes, BAE Systems, Intermountain Healthcare, Domo, Health Equity, Instructure and Orbital ATK.

COMMUNICATION AND OUTREACH STRATEGY

The success of the K-16 computing efforts relies on an effective communication and outreach strategy. Computing programs are part of the Career and Technical Education (CTE) portfolio. It has been recognized in Utah, as well as in many other states, that CTE programs suffer from a myriad of negative misperceptions. In order to ensure that any efforts with CTE

programs realize their full potential for participation, the stigma that plagues CTE programs needs to be addressed.

The STEM AC and partners from higher education, the USBE, several LEAs and the Utah DWS, submitted a proposal to the National Science Foundation's Advanced Technology Education (ATE) program. The focus of this grant is to work collaboratively to create a new communication and outreach strategy for Career and Technical Education (CTE) programs, which would include Computer Science and Information Technology (CS/IT). The opportunity was a "Workshop and Conference" grant for an 18-month duration and \$100,000. The grant was reviewed and the reviewers recommended that the grant be funded, but be extended to a project grant for three years and an expanded scope and budget. The grant was funded on April 1, 2018 for three years and a total of \$766,364.

HIGHER EDUCATION COLLABORATION

The STEM AC has been working strategically with higher education partners on several projects, including the STEM Equity Pipeline and most recently STEM Ecosystems.

(1) STEM Equity Pipeline: A key focus of the STEM AC is to promote and support equity and access to all students. The STEM AC initiated the **STEM Equity Pipeline** in 2014, in partnership with Utah Valley University, the National Alliance for Partnerships in Equity (NAPE) and Park City School District. The pilot was funded by the National Science Foundation and been a huge success. The overarching purpose of the STEM Equity Pipeline project is to use root cause analysis to determine the reasons why enrollments

for underrepresented populations are unacceptably low in STEM education and career pathways. A pilot was conducted with Park City School District (PCSD) in their middle, junior, and high schools. The first year of root cause analysis was followed by data-driven changes during year two. Year three enrollments for girls in select STEM courses increased dramatically. Data is being collected for Hispanic and Latino students for year four enrollments. The data from this project is available upon request.

The STEM Equity Pipeline root cause analysis work has been scaled to Ogden School Districts with support from a grant from Hill Air Force Base. Ogden School District requested an extension of their work due to staffing turnover. They are in the process of continuing the project for this school year. The STEM AC worked with NAPE and the Motorola Foundation to secure a grant for the Granite School District to continue their work with STEM micro-messaging. This will also include training a cohort of Master teachers to conduct micro-messaging workshops. This Master Trainer model provides a more affordable and scalable approach to continue the micro-messaging work.

OUTREACH AND ENGAGEMENT

The STEM AC conducts the following outreach and engagement activities as a means to provide project support to teachers and promote STEM AC resources. There are numerous outreach and engagement activities that are included in previous sections, such as the industry engagement portion of the report.

- **Visits with district superintendents:** The STEM AC continues to work to ensure that all

superintendents are familiar with the STEM AC and its resources, and are supportive of their district's participation in STEM AC projects. The Executive Director continues to conduct visits to districts, as well as engage with the **Utah State Superintendents Association** meetings on relevant topics. The district visits typically take place on site in superintendents' offices, with their administrative teams.

- The STEM AC continues to build relations with school boards including the Rural School Boards Association. The STEM AC has committed to attending the Rural School District Association meetings to understand more fully how to support rural districts and their STEM needs. The STEM AC has increased its interaction and work with the **Regional Education Service Centers** (NUES, CUES, SESC and SEDC). They have been a great partners to increase access to resources for rural school district partners.
- **Site visits to STEM AC projects:** The STEM AC team conducted site visits for several projects during FY 2018.
 - (1) **Classroom grants:** Classroom grants for the 2017-18 school year varied in scope and subject. Team members observed 19 projects onsite, and more than 90% of awardees provided pictures and video of projects in action, to be shared along with project reports and lesson plans at a future time. **Appendix B** contains a summary of all classroom grant awards.
 - (2) **Road trips:** The STEM AC team conducted its third

annual multi-week "road trip" across the state to provide additional professional learning to teachers for the use of the math personalized learning tools. The STEM Roadshow consisted of five events around the State of Utah during the last week of July and the first week of August 2018. These events were designed to get the year off on the right foot, providing teachers with opportunities to collaborate, share successes, find solutions to challenges, and receive professional development related to products provided by the STEM Action Center. Across all five locations (Cedar City, Richfield, Springville, Layton, and North Logan), 391 participants from 177 schools in 30 districts and 21 charters attended.

Based on lessons learned from the first two years, we made logistical adjustments, including changes to the on site registration process, and limits for session sizes. We received a lot of positive feedback from teachers about these improvements. Several teachers exchanged contact information so that they can continue to collaborate and work together to use technology more effectively.

- Sponsorship of events for students: The STEM AC uses a portion of its operational funds to sponsor STEM-related events. A total of 30 events were sponsored with funding for the FY2018 and 21 events were given in-kind donations such as exhibiting or promotional items, with an estimated 278,000 students, parents, educators, administrators,

community and industry partners impacted and a total of \$44,950 allocated. These are discussed in greater detail in a previous section.

- The STEM AC distributes a monthly newsletter with a reach of 7,104 Utahns (in FY17 there were a little over 4,000 recipients), yielding more than 3,200 unique sign ups (compared to a little over 1,500 unique sign ups in FY17) via stem.utah.gov in the past year alone. The newsletter averages a 53.8% open rate, as compared to FY17 which saw an open rate of 23.05%.
- The STEM AC website had an upward trend of site traffic, nearly doubling its new-user flow to 39,496 compared to 19,765 in the 2017 fiscal year, and seeing an almost parallel increase in overall users, with 40,143 total users in the 2018 fiscal year compared to 20,138 in the 2017 fiscal year.

Acquisition of STEM education related instructional technology program – Research and development of education related instructional technology (63M-1-3205)

The STEM AC completed its fourth full year of training and implementation to support the **K-12 Math Personalized Learning** program (2017-18 school year). The overall goal of this program is to provide supplemental math support to teachers and students in an innovative approach that includes: (1) ongoing research of best practices in the use of supplemental instructional tools (2) using a statewide approach to design and implement a robust analysis of the use of content-specific

supplemental technology-based tools and (3) a statewide approach to implement a program that leverages state contracting and critical mass for cost effective access and (4) integrating a mechanism that allows for continuous assessment of new products at no cost to the state.

A total of 134,616 students had access to licenses provided by the STEM AC for math personalized learning tools. The program covered 21% of all Utah students in grades K-12, with 33 districts and 15 charter schools participating (550 schools total). Six math personalized learning products were used during the 2017-18 school year.

There were numerous “lessons learned” from each full year of implementation, and the STEM AC was very intentional about applying solutions to the issues that emerged. A matrix is provided in Appendix G that describes the “lessons learned” by school year and solutions that were applied to the identified challenges. The spreadsheet also describes “lessons learned” from the 2017-18 school year and the solutions that are currently being applied and tracked.

Buy-in at all levels is critical to success. Initially, programs were coordinated with district level administration, and it resulted in school building administration and teachers not always knowing they had access to grant resources or not understanding the purpose of the program or its data and reporting needs. This often led to low usage and missed opportunities in data collection. Though the system used in 2017-18 was still a district application, school principals were required to sign a letter of commitment promising

to ensure that students would have access to technology for at least 45 minutes per week to use the math software provided. Signatures were also required from the IT Director at each LEA to ensure they were aware of any technology provided by the grant and that they would have adequate bandwidth and infrastructure prior to implementation. Efforts the past three years have been made to provide summer learning opportunities for classroom teachers to increase buy-in at the teacher level. This series of learning opportunities is referred to as the STEM Roadshow. STEM AC staff travel state with product providers, setting up regional meetings about a month prior to the start of school to get as many classroom teacher participants comfortable with the products they will be using over the course of the year.

In year one product providers had difficulty distributing licenses and arranging professional development. To mitigate these issues, all applications in years two and three were required to list “on-site” contacts. For the 2017-18 school year, the application was shifted to the school level requiring signatures from a district administrator and the IT director. While there was resistance to this from some district administrators, it helped to improve communication between the STEM AC and each individual site. Starting in year five, the STEM AC will also work with district level contacts to verify school level contacts right before school starts in the fall. This helped ensure that correct contact information is secured for each school-level point of contact at the start of the year in spite of turnover in school administration. Product providers were able to distribute the majority of awarded licenses and facilitate professional

development at the beginning of the school year. Since year two, the contracts have also required product providers to distribute licenses and arrange professional development before they received payment, which has encouraged them to put forth extra effort to ensure timely completion of these activities. The STEM AC also made sure that usage expectations were clearly communicated to administrators and math coordinators.

The first three years, applications were not available until the end of the school year or beginning of the summer, and sometimes administrators did not see their award notifications until the beginning of the next school year. Based on feedback from both district and school level administrators, the application was opened for the 2017-18 school year early in the spring, and sent award notifications in April. This change allowed school and district administrators to more strategically plan implementation.

In year two, the evaluation team did not receive SSID numbers from all schools participating in the grant, which resulted in a small sample size for some products. In years three and four, the evaluation team was required to verify receipt of SSID numbers for 2016-17 before 2017-18 awards were authorized. The SSIDs were received from nearly every participating school in 2016-17, and in 2017-18, SSID numbers were received from every school.

As this program has matured, it was found that there is a difference between “fidelity”- using a product for a certain amount of time, and effective implementation. When working to ensure products are used effectively

with over 100,000 students, the easiest metric to look at is minutes of use.

While this metric has been valuable, it does not provide a complete picture of what effective usage looks like. Over the past couple years, it has been learned that there is a need to increase the focus on implementation strategies and effective use of reporting features as well. Using data from one of these personalized learning programs, one 30-year veteran teacher was able to help 89% of her students reach grade level proficiency in the 2016-17 school year, outperforming the state average by over 45%. As success stories were shared with teachers during the STEM Roadshow, several other teachers shared similar success stories from their own classrooms. Each of them emphasized the importance of using these supplemental products strategically, rather than just focusing on minutes of use and other product specific fidelity requirements.

Due to limited funding, licenses were provided to schools where there was evidence that teachers would use the products and receive support from administrators. In year four, only schools who had received the grant the previous year and used technology effectively were allowed to apply. In 2018-19, licenses were made available to anyone who wished to apply. Feedback from district partners indicated that “long-time” users were prepared to develop strategic plans for how to support more of this technology on their own moving forward.

The third-party evaluation team for the STEM AC has been working with the USBE to access end-of-year test scores (SAGE) for 2017-18 to align with

use of the digital learning tools.

The data was provided to the STEM AC in January 2017 for the 2016-17 school year and it is anticipated that there will be a similar release date for the 2017-18 school year SAGE data. The evaluation team will provide a full report and it will be included as an addendum to this report once the SAGE data is received and adequate time has passed for completion of the report.

Third party evaluation report on performance of students participating in STEM Action Center programs as collected in Subsection 63M-1-3204(4).

The STEM AC continues to work with the Utah Education Policy Center to expand beyond basic metrics, such as aligning SAGE scores with one or two benchmarks for usage, to a more robust analysis that provides greater stratification of the data. The initial results of this work were reflected in the FY17 third party evaluation report. The STEM AC is working with the new evaluators to look at impact in student learning with changes in teaching methodology (for the endorsement and professional learning grants). Strategies are being developed to capture information that will be used to track data longitudinally. Further, the STEM AC has worked with the evaluators to create extensive evaluation strategies which are included in the logic models that are included in the STEM AC strategic plan ([Appendix I](#)).

The third party evaluator has completed the annual report that includes assessment of the K-12 Math Personalized Learning, Professional Learning, and Elementary STEM Endorsement projects. Preliminary information indicates that nearly all teachers and administrators feel that access to the software has had a positive impact on student performance, and more than half of the students report that using the software helped increase their confidence in math (see [Appendix J](#)).

It should be noted that the K-12 Math Personalized Learning report will only include qualitative data from surveys administered by the third party evaluator and usage data of the licenses that is tracked by the software. The student proficiency and growth data will not be completed until January 2019 due to the delayed release of the data by the Utah State Board of Education. The STEM AC will provide the proficiency and growth data as an addendum to the report once it is received.

ADDITIONAL INFORMATION:

SB93 COMPUTER SCIENCE INITIATIVE – 2016 Legislative Session

The SB93 activities, fiscal and programmatic, are overseen by the Utah State Board of Education (USBE); the STEM AC is involved in a very limited capacity. The Computer Science Initiative is to provide incentives to current educators to earn a Computer Science endorsement. Districts may elect to use funds for professional development training for teachers, travel reimbursements for relative conferences, conference registration fees, tuition fees, and other approved

computer science related expenses. The STEM AC has been working to include links to open resources for computing (<https://stem.utah.gov/for-educators/website-resources/>) and has compiled a spreadsheet of computer science resources that are being used currently by Utah LEAs or are being supported by the STEM AC.

The STEM AC has requested a report from the Utah State Board of Education on the status of the SB93 grants. It will be forwarded as an addendum once received.

ATTACHMENTS:

Appendix A:

Selected Product Providers

Appendix B:

Classroom Grants Summary

Appendix C:

Organization Grants Summary

Appendix D:

STEM School Designation Awardees

Appendix E:

“Lessons Learned” Summary – Professional Learning

Appendix F:

Professional Learning Grant Awards Summary

Appendix G:

“Lessons Learned” Summary – K-12 Math Personalized Learning

Appendix H:

CS4Utah Grant Awards Summary

Appendix I:

STEM Action Center Strategic Plan

Appendix J:

Utah Education Policy Center Independent Evaluation Report

CURIOSITY UNLEASHED



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APPENDIX A

Selected Product Providers

HB Project	Vendor	Alignment
Math Software: Grades K-12	<ul style="list-style-type: none"> - Curriculum Associates (i-Ready) - Imagine Learning (Imagine Math) - McGraw-Hill (ALEKS) - MIND Research Institute (ST Math) 	<ul style="list-style-type: none"> ✓ Contains individualized instructional support for skills and understanding of core standards ✓ Is self-adapting to respond to the needs and progress of the learner ✓ Provides opportunities for frequent, quick and informal assessments ✓ Includes an embedded progress monitoring tools and mechanisms for regular feedback to students and teachers
Professional Development Software	<ul style="list-style-type: none"> - Frontline Education (Edivate) For pilot in FY19: - Frontline Education (Frontline) - Kyte Learning - MIDAS 	<ul style="list-style-type: none"> ✓ Access to automatic tools, resources and strategies ✓ Work in online learning communities ✓ Includes video examples of highly effective STEM education teaching ✓ Covers a cross section of grade levels and subjects ✓ Includes videos of Utah STEM educators ✓ Contains tools to help implement what has been learned ✓ Allowance for face-to-face learning in a hybrid model

APPENDIX B

Classroom Grants Summary

District	# of Students	Grade(s)	Short Description	Off the Front?
Jordan School District	120	1,2,3,4,5,6	4-5 small robots to teach math, programming, coding and engineering	N
Weber School District	100	6	Ozobots Evo robots	N
Davis School District	46	2	Leprechaun Traps	N
Davis School District	46	2	windmills in DLI 2nd grade with LA and Soc. Studies tie	N
Charter	36	2,3,4,5	Origami workshop series for students grade 2-5	Y
Canyons School District	22	3	STEAM supplies	N
Cache School District	76	6	Hill Air Force Base Museum, Living Planet Aquarium and Clark Planetarium field trips	Y
Morgan School District	38	K,1,2,3,4	Severe SpEd Math and Sci manipulatives (SumBlox)	Y
Charter	104	2	seed starting station	Y
Granite School District	60	K	STEM bins	N
Washington School District	495	7	3-Act Math	Y
Charter	230	2,3,4	Paper circuits	N
Davis School District	63	2	Leprechaun Traps	N
South Summit School District	22	5	STEM project supplies, including Ozobots	Y
Box Elder School District	120	K	Math manipulatives	Y
Jordan School District	28	4	Coding for math comprehension using bots	N
Washington School District	495	7	3-Act Math	Y
Washington School District	495	7	3-Act Math	Y
Washington School District	450	8	3D printer	Y
Charter	165	10,11	Field trip	N
Charter	50	9	bridge unit	N
Alpine School District	150	1	Aviary FT	N
Charter	75	1	science STEM kits	N
Alpine School District	32	5	STEM Centers	N
Jordan School District	200	10,11,12	classroom set of inclinometers	N
Weber School District	1000	10,11,12	Fish populations with DWR	N
Charter	710	8	Model rockets with Alg and Geo	Y
Salt Lake City School District	75	6	Delta Foss kit "Weather and Water"	N
Weber School District	60	9	heart rate monitors	N
Davis School District	145	4	FT Dinosaur Park	N
Charter	98	6,7,8,9,10,11,12	2 - 3D Printers and filament	N
Davis School District	100	5	VEX robots	N
Daggett School District	16	K,1	Math manipulatives	Y
Iron School District	300	8	owl pellet dissection	Y
Davis School District	130	5	magnets	N
Millard School District	90	9,10,11,12	Water Quality testing tools	Y
Box Elder School District	200	10,11,12	Drones	Y
Ogden City School District	80	6	AstroCamp visit to Odyssey Elementary	N
Davis School District	30	7	trout in the classroom	N
Canyons School District	95	9,10,11,12	two robotics kits	N
Provo City School District	30	3	integrate Heat and Light with the district's language art program, writing, technology, art, and math.	N
North Sanpete School District	70	7,8	Coding/Drones	Y
Davis School District	30	5	VEX IQ Robots	N
Salt Lake City School District	60	7,8	alternative energy types	N
Emery School District	34	9,10,11,12	Trebuchet Materials	Y
Davis School District	400	3,4,5,6	InfiniD Learning	N
Iron School District	479	K,1,2,3,4,5	STEAM supplies, restoration	Y
Tooele School District	1096	5	STEAM- art with electricity	Y
Davis School District	30	6	Ecosystem Bio domes	N
Charter	170	7,8,9	Math manipulatives	Y
Alpine School District	30	4	littleBits coding kits	N
Charter	120	7,8,9,10,11,12	Arduino controlled drones	Y
Jordan School District	25	6	The project will be integrating Social Studies (Industrial Revolution) with STEM.	N
Charter	110	10,11,12	cold weather food production system (e.g., hydroponics, aquaponics, and greenhouse)	N
Alpine School District	30	1	Legos as a hands-on tool to help my students learn more about mathematical problem solving	N
Davis School District	115	6	Minecraft Education	N
Charter	108	4	Soil Science	N
Charter	200	7,9	Dissection supplies	Y
Davis School District	120	4	Rock samples	N
Salt Lake City School District	200	9,10,11,12	Projectile Motion experiment equipment	N
Alpine School District	34	6	3D printer	N
Jordan School District	21	3	Zoobs & other building toys	N
Davis School District	29	5	Makeblock	N

District	# of Students	Grade(s)	Short Description	Off the Front?
Box Elder School District	300	10,11,12	Sony DSC-RX10M II Cyber-shot Digital Still Camera	Y
Charter	50	9	populations of fruit flies	N
Provo City School District	103	4	Natural History Museum of Utah field trip (utah earth science)	N
Iron School District	650	7,8	2-Energy Car Full Modules from CPO Science	Y
Box Elder School District	540	6	SEEd experiment materials	Y
Charter	50	7,8,9,10,11,12	physics based unit used in a music classroom over the course of 3-4 days with brass instruments	N
Alpine School District	150	1,6	Sphero SPRK+ robot balls	N
Box Elder School District	180	2,3	Cubelets	Y
Granite School District	22	K	BeeBot	N
Alpine School District	50	4	design and create their own water filters.	N
Charter	400	1,2,3,4,5,6	3D printer	Y
Charter	80	6	Science observation materials	N
Uintah School District	160	7	5 MOD-t 3D printers	Y
Davis School District	372	3,4,5,6	Robotics club	N
Davis School District	75	K	Wonder Kits from OSMO	N
South Summit School District	30	5	STEM project supplies, including Ozobots	Y
Alpine School District	55	3,4,5	Dash bots	N
Iron School District	180	8	classroom set of Ozobots	Y
Cache School District	31	4	different robots to learn different coding types	Y
Ogden City School District	650	K,1,2,3,4,5,6	students create STEM career videos	N
Charter	120	2,3,4,5,6	Simple Machine Lego sets	N
Ogden City School District	650	K,1,2,3,4,5,6	video production	N
Carbon School District	100	K, 1,2,3,4,5	Dash Robot	Y
Charter	500	6,7,8,9,10,11,12	Drones	N
Charter	250	K,1,2,3,4,5,6	"Race to the Moon" math incentive program	N
Duchesne School District	200	6,7,8	Programmable Drones	Y
Salt Lake City School District	210	8	K'NEX rollercoaster physics sets	N
Charter	105	6	Sphero	Y
Davis School District	600	10,11,12	chemistry principles through modern materials including quantum dots (nano particles), aero-gel, neodymium magnets, Carbon 60 (Buckyballs), and super conductors	Y
Tooele School District	29	5	Ozobots	Y
Davis School District	42	10,11,12	two more CIM test beds	N
San Juan School District	80	7,8	SEEd Materials	Y
Logan City School District	26	3	robots	Y
Davis School District	120	5	electronic kits	N
Weber School District	25	1	STEM Maker Space centers	N
Charter	60	6,7,8	robotics equipment	N
Salt Lake City School District	175	8	Properties of water- watershed studies in Emmigration Canyon	N
Tooele School District	15	9, 10,11, 12	Sever SpEd Sci manipulatives	Y
Alpine School District	60	4	LLPA, TP, Zoo FTs	N
Murray City School District	300	7	shake tables	N
Provo City School District	65	K	6 Sphero Robots	N
Davis School District	92	1	maze for their robot	N
Logan City School District	90	1	"Code & Go" Robot Mouse Activity Set	Y
Tooele School District	90	6	SEEd supplies	Y
Canyons School District	32	2	LittleBits	N
Davis School District	25	2	STEM bins	N
Ogden City School District	23	K	KIBO choosing robots	N
Provo City School District	112	4	FT	N
Davis School District	23	6	3d printer	N
Iron School District	600	K,1,2,3,4,5	Thermoplastic art, Paper circuits, STEAM	Y
Granite School District	30	4	Math Activity Stations	N
Washington School District	495	K,1,2,3,4,5	Grade designed STEM rotation materials	Y
Granite School District	60	K	Osmo game system	N
Jordan School District	32	6	STEM day activities	N
South Summit School District	90	5	STEM project supplies, including Ozobots	Y
Weber School District	105	5	SEEd supplies	N
Weber School District	105	6	SEEd experiment materials	N
Granite School District	155	7	shake table	N
Davis School District	750	K,1,2,3,4,5,6	Dash robots and the "Learn to Code" curriculum pack	N
Davis School District	632	K,1,2,3,4,5,6	STEM materials	N
Davis School District	25	K	BeeBots	N
Alpine School District	162	2	field trip to the Clark Planetarium	N
Iron School District	650	1,2,3,4,5	STEAM animal adaptations	Y

District	# of Students	Grade(s)	Short Description	Off the Front?
South Summit School District	35	K,1,2,3,4,5	SEEd materials	Y
Salt Lake City School District	130	7	snap circuits	Y
Alpine School District	30	1	hands on activities: Hot Wheels cars, Hot Wheels track, small magnets, kites, wooden glider kits, water rocket launchers, and marble runs.	N
Salt Lake City School District	50	5	Faraday's ice pail experiment.	N
Weber School District	560	10, 11, 12	centrifugal casting in my jewelry classes	N
Alpine School District	120	3	Ozobots for fractions	N
Charter	50	9	DNA	N
Washington School District	495	7	3-Act Math	Y
Cache School District	42	K	STEM Box materials	Y
Ogden City School District	82	6	Clark Planetarium field trip	N
Ogden City School District	80	6	Gravity Sprint 3D Printing Derby (hosted by Weber State)	N
Charter	75	1	Lesson kits with story and engineering project materials	Y
Charter	150	9	large grid white boards	N
Alpine School District	150	1	Thanksgiving Point FT, not toy sets	N
Charter	60	8	Vernier motion detectors	N
Ogden City School District	30	6	kinetic sculpture local art commission	N
San Juan School District	200	9,10,11,12	materials desired in Earth Science, Biology, and Chemistry classes.	Y
Jordan School District	30	4	Rock samples	N
Charter	63	7	underwater rovers	Y
Washington School District	120	5	soldering kits	Y
Millard School District	16	11	Remote controlled airplanes to study Bernoulli's	Y
Alpine School District	35	5	OSMO	N
Cache School District	375	8	modeling materials	Y
Jordan School District	24	5	circuit materials	N
Iron School District	550	K,1,2,3,4,5	Finch Robots	Y
Davis School District	15	7,8	Lego Robots	N
Charter	54	1	STEAM workshop series for 1st graders	Y
Jordan School District	150	6	Lego Robots	N
Iron School District	105	5	earthquake simulator and a seismograph machine	Y
Salt Lake City School District	20	7,8	Severe SpEd Lego materials	N
Charter	600	3,4,5,6,7,8	school's Infini-D space simulator lab.	N
Charter	80	7	Hoot book study with ecology ties	Y
Alpine School District	31	5	Integrated STEM Centers	N
Wasatch School District	59	3,4,5	classroom set of Ozobots	Y
Alpine School District	28	1	butterflies and ant farm to watch how they work in a community, buy plant seeds to grow plants life cycles	N
Ogden City School District	7	K-3	SpED math manipulatives	N
Morgan School District	135	9,10,11,12	Arduino projects	Y
Cache School District	56	3	simple machines; math; learn coding	Y
Alpine School District	480	3,4,5,6	Lego WeDo	N
Jordan School District	24	2	magnets	N
Charter	96	6	Prusa i3 MK2 3-D printer & filament and 8 Vernier temperature probes	N
Weber School District	84	2	Hermit crab 3D printed habitats	N
Millard School District	55	7,8	Finch Robots and car model kits	Y
South Summit School District	29	5	STEM project supplies, including Ozobots	Y
Nebo School District	76	6	Building toys	Y
Charter	50	K	Stem Boxes	Y
Davis School District	45	K	STEM Early Learning kits	N
Charter	55	9,10,11,12	Matter cycles/phases experiment materials	Y
Charter	81	7	Microscopes	Y
South Sanpete School District	200	7	CO2 cars	Y
South Summit School District	22	5	STEM project supplies, including Ozobots	Y
Granite School District	46	K	Mathracks	N
Salt Lake City School District	160	K,1	STEAM robotics	N
Alpine School District	28	1	Ozobots, Bee-Bots, and Bee-Bot mats to teach my first graders beginning coding and math skills.	N
Davis School District	30	6	SEEd experiment materials	N
Jordan School District	100	4,5,6	robotics and engineering with Lego	N
Charter	137	6,7,8,9,10,11	Camera for robot versions of ELA readings	N
Totals	29316			Off the front= 70/183
				Off the front 38%

APPENDIX C

Organization Grants Summary

<u>Organization</u>	<u>Program</u>	<u># of students impacted</u>
Alliance for Innovative Education	Alliance Robotics	36
American Indian Services	AIS Pre-Freshman Engineer Program	100
Astro Camp Space and Science Center	Astro Camp	5,500
Because Learning, Inc.	Classroom Launch Pack	90
Box Elder County 4-H Program	Bear River Makers	35
Boys & Girls Clubs of Greater Salt Lake	STEM Diversity and Inclusion	934
Cache Makers, Utah State University	Girls Space Science	12
Carbon School District	SESC Makerspace Activity Kits	466
Center for Technology Outreach, Weber State University	WSU PREP	186
Center for Technology Outreach, Weber State University	FIRST Lego League UT	1,859
Center for Technology Outreach, Weber State University	FIRST Tech Challenge Utah	500
City of South Salt Lake	Promise SSL STEM Program	1,500
Civil Air Patrol	Intro to Engineering and Manufacturing	30
College of Engineering, University of Utah	Utah Science Olympiad	409

<u>Organization</u>	<u>Program</u>	<u># of students impacted</u>
Davis School District	Exploratory STEM Clubs	280
Discovery Gateway	Reaction Time	48,494
Discovery Gateway	Afterschool Enrichment Program	130
Dixie State University	Dixie PREP	596
Dixie State University	FIRST Lego League Utah South	42
Edgemont Elementary	Space and Science Lab	661
FIRST Utah Robotics	FIRST Robotics Competition	1,247
FutureINDesign	Young Adult Job Readiness	24
InfiniD Learning	InfiniD Lab	2,800
MESA Utah	MESA Utah Engineering Design	400
Natural History Museum of Utah	Challenge STEM Education Programs	699
Nebo School District	ACE Mentoring	60
Neighborhood House Association	Neighborhood House Afterschool Program	177
Ogden Weber Learners Society	Exploring Electronics	50
(OWLS) Red Butte Garden	Red Butte Garden Botany Bin Program	60
School of Computing, University of Utah	The GREAT Camp	7
Shadow Valley Elementary	STEM Writing Enrichment	193
Spy Hop Productions	Digital Pathways Program	424
Sunrise Elementary	Sunrise STEM	701

<u>Organization</u>	<u>Program</u>	<u># of students impacted</u>
Syracuse High School	STEM resources	200
Thanksgiving Point Institute	Thanksgiving Point Summer Day Camps	70
Tooele Valley Community Co-operative	FRC Team 4348 Bonneville Bots	10
University of Utah	BioEYES Utah	435
University of Utah	Water Conversation Garden Curriculum Pilot Program	475
Utah State University	ROAVcopter Mini	163
Utah State University	Rich County 4-H	156
Utah State University	Washington County STEM and Maker	368
Utah State University	Camps Utah State VEX Robotics	750
Utah State University	Utah County Engineering is Elementary	7,150
Utah State University Extension 4-H	4-H Junior Youth Conference	155
Utah State University Foundation	Kane County 4-H	568
Utah Valley STEM Foundation	FIRST Robotics Competition Team 6844	15
Utah Valley University	UVU PREP	210
Utah Valley University	Math Adventure Camp	107
UTAH VEX IQ	VEX IQ	400
Washington County School District	Infini D Lab	250
YMCA of Northern Utah	YMCA STEM Summer Camp	228

APPENDIX D

Utah STEM School Designation Awardees (Comprehensive List)

Note: DLI = Dual Language Immersion

Name of School	District or Charter	Level Awarded	Year Awarded	Expires
Green Acres Elementary	Weber School District	Bronze	2015-2016	Summer 2020
Foothill Elementary	Alpine School District	Platinum*	2016-2017	Summer 2020
Manila Elementary School	Alpine School District	Silver	2015-2016	Summer 2020
Rocky Mountain Elementary	Alpine School District	DLI	2015-2016	Summer 2020
Summit Elementary	Cache County School District	DLI	2015-2016	Summer 2020
Sunrise Elementary	Cache County School District	DLI	2015-2016	Summer 2020
Draper Park Middle School	Canyons School District	Bronze	2015-2016	Summer 2020
Union Middle School	Canyons School District	Bronze	2015-2016	Summer 2020
Mount Jordan Middle School	Canyons School District	Bronze	2015-2016	Summer 2020
Beehive Science and Technology Academy	Charter	Platinum	2015-2016	Summer 2020
DaVinci Academy	Charter	Gold	2015-2016	Summer 2020
Mountainville Academy	Charter	Silver	2015-2016	Summer 2020
Quest Academy	Charter	Silver	2015-2016	Summer 2020
Itineris Early College High School	Charter	Bronze	2015-2016	Summer 2020
Utah County Academy of Sciences (UCAS)	Charter	Bronze	2015-2016	Summer 2020
Summit Academy	Charter	DLI	2015-2016	Summer 2020

West Point Elementary	Davis School District	Silver	2015-2016	Summer 2020
Samuel Morgan Elementary	Davis School District	DLI	2015-2016	Summer 2020
Foxboro Elementary	Davis School District	DLI	2015-2016	Summer 2020
Odyssey Elementary	Davis School District	DLI	2015-2016	Summer 2020
Neil Armstrong Academy	Granite School District	Gold	2015-2016	Summer 2020
Bluffdale Elementary	Jordan School District	DLI	2015-2016	Summer 2020
Woodruff Elementary	Logan City School District	Gold	2015-2016	Summer 2020
Lakeview Elementary	Provo City School District	DLI	2015-2016	Summer 2020
Overlake Elementary	Tooele School District	Silver	2015-2016	Summer 2020
West Elementary	Tooele School District	DLI	2015-2016	Summer 2020
Sterling Elementary	Tooele School District	DLI	2015-2016	Summer 2020
Crimson View Elementary	Washington County School District	Platinum	2015-2016	Summer 2020
Hurricane Elementary	Washington County School District	Gold	2015-2016	Summer 2020
Creekview Elementary	Carbon School District	Gold	2016-2017	Summer 2021
Utah Virtual Academy	Charter	Silver	2016-2017	Summer 2021
George Washington Academy	Charter	Bronze	2016-2017	Summer 2021
Endeavour Elementary	Davis School District	Platinum	2016-2017	Summer 2021
New Bridge School	Ogden School District	Platinum	2016-2017	Summer 2021
Westridge Elementary	Provo City School District	Platinum*	2016-2017	Summer 2021

Willow Elementary	Tooele School District	Platinum*	2016-2017	Summer 2021
Sunset Elementary	Washington County School District	Silver	2017-2018	Summer 2022
Arrowhead Elementary	Washington County School District	Bronze	2017-2018	Summer 2022
Cedar North Elementary	Iron County School District	Gold	2017-2018	Summer 2022
Coral Canyon Elementary	Washington County School District	Bronze	2017-2018	Summer 2022
Diamond Valley Elementary	Washington County School District	Gold	2017-2018	Summer 2022
Northern Utah Academy of Math, Engineering, and Science (NUAMES)	Charter	Platinum	2017-2018	Summer 2022
Hillcrest Elementary	Logan City School District	DLI, Silver*	2017-2018	Summer 2022

Foothill Elementary was originally awarded Silver in 2015-16.

Westridge Elementary was originally awarded Gold in 2016-17.

Willow Elementary was originally awarded Gold in 2016-17.

Hillcrest Elementary was originally awarded DLI in 2015-16, then pursued another designation in 2017-18.

APPENDIX E

“Lessons Learned” Summary - Professional Learning

Professional Learning Initiative Effectiveness and Accountability

Funding	Statutory	STEM AC activity	Outcomes	Next Steps	Partnerships
\$5M ongoing	<ul style="list-style-type: none"> ● Select one or more product providers that provide professional learning support that: ● Allows for SBOE, district or school to define the application content and track results ● Provides access to automatic tools, resources and strategies including instructional materials with integrated STEM content ● Supports online learning communities, including giving and receiving feedback via uploaded video ● Track and report data on usage ● <i>Includes video of highly effective STEM education teaching that:</i> 	<ul style="list-style-type: none"> ● Distributed RFP ● Created and distributed district application ● District and Charter school grant awards ● Supported license distribution ● Facilitated teacher training ● Video production ● Teacher Cactus IDs received ● Tracking usage ● Evaluation of student performance ● Evaluate changes in classroom instruction between pre & post video shared by teachers ● Contracted with independent evaluator 	<ul style="list-style-type: none"> ● 2 products selected (1 dropped out after year 1) ● 37 Districts and Charters ● 426 schools ● 4,487 teachers ● 51 videos produced by product provider 	<ul style="list-style-type: none"> ● Increase usage ● Continue teacher training ● Scale up 2.0 ● Look for ways to utilize Edviate platform for other STEM AC projects (math, CTE etc.) 	<ul style="list-style-type: none"> ● USOE Science Standards training and implementation to be funneled through Edviate (School Improvement Network product)

<p>FY17</p>	<ul style="list-style-type: none"> ● Covers a cross section of grade levels and subjects ● Works SBOE the videos will include highly effective Utah STEM educators ● Allow for additional STEM content to be added ● May create hybrid or blended professional learning that allows for face-to-face learning 	<ul style="list-style-type: none"> ● Work with new external evaluation team to develop logic model, pre and post survey questions ● Collect CACTUS ID's ● Supported license distribution ● Meet with SINET PSM a minimum of every two weeks to track project status ● Work with SINET to create STEM "courses" for LEA's to utilize within Edivate ● Remove custom content from SINET contract ● Site visits and email/phone call check in conversations at least twice ● Payments for additional funds come in 4 payments ● Mid year and end of year reports required from all project leaders ● Work with legislators to remove Edivate requirement 	<ul style="list-style-type: none"> ● No new custom content created this year ● STEM content courses created within Edivate to provide project sites guidance in selecting content ● slow submission of CACTUS ID's for participants ● 67 projects were funded and accepted by participants. 144 applications had been selected, with 78 applications initially approved for funding ● 10,074 Edivate license distributed ● Difficult to track 4 separate payments with two reports- change to 2 payments (50% upfront, 50% at the end of the year) and quarterly reports ● base future awards partially on usage and fulfilling grant requirements (rubric component) 	<ul style="list-style-type: none"> ● Move up submission of CACTUS ID's to beginning of school year to maximize the amount of ID's collected ● All projects choosing to use Edivate to select a STEM course or create their own prior to start of year ● Remove Edivate requirement 	<p>Created course for new SEEd standard implementation for following school year</p> <p>Revitalized partnership with SINET PSM</p>
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		<ul style="list-style-type: none"> ● Move up application cycle for FY18 projects to improve use of summer time ● Revise PL application to include monthly schedule to further define plans and provide pre-defined checkpoints (use DTL application as model to make consistent) 	<ul style="list-style-type: none"> ● Completed SINET boot camp to improve communications and establish protocols between SINET and STEM AC 		
FY18		<ul style="list-style-type: none"> ● Require user lists by mid July to get all Edivate accounts created prior to start of year ● Edivate review training to all projects using Edivate to ensure all participants know how to correctly use ● Require at a minimum those using Edivate to have “Implementation Lite” to schedule all visits with SINET PSM 	<ul style="list-style-type: none"> ● Created instructional video on how to submit quarterly reports ● 2500 Edivate licenses purchased for participants ● 58 grants selected- no grants were fully funded, funding varies from 47-97% based on reviewer scores ● 31 projects requested Edivate licenses after removing those sites that withdrew from project participation. The remainder will use 	<ul style="list-style-type: none"> ● Multiple districts are working with other products to maintain video and provide video links feedback- what other platforms could we fiscally support ● Begin process to identify “approved-ve ndors” using R&D methods similar to 	<ul style="list-style-type: none"> ● Pilot with Frontline, Kyte, and MIDAS for 18-19 school year

		<ul style="list-style-type: none"> ● Non Edivate users to submit participant lists ● All projects require all participants to complete video self reflection ● Provide Pre and Post surveys ● Make contact quarterly with all project leaders to check in ● Quarterly financial reports 	<p>a different, self-selected digital platform to share media and expectations locally</p> <ul style="list-style-type: none"> ● 2 projects initially applying for Edivate licenses withdrew from the project ● Edivate users are much more successful than they ever have been (58% at usage requirements) ● Quarterly phone calls with Kellie were praised by group leaders for keeping them on taks and informed ● Used free “Sign Up Genius” account to maga phone calls with ~75% of site leads each quarter 	<p>Math program</p> <ul style="list-style-type: none"> ● Open RFSQ ● Invite product partners to apply- get suggestions of products district may be interested in to apply for no-cost pilot participation 	
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APPENDIX F

Professional Learning Grant Awards Summary

LEA	Grant Duration
Alpine Elementary Schools	3 years
Alpine Elementary Science	1 year
Alpine Secondary Science	1 year
American International School of Utah (AISU)	1 year
Beehive Academy	3 years
Cache	3 years
Canyon Grove	1 year
Canyons Middle and High Schools	1 year
Carbon- Creekview Elementary	1 year
Channing Hall	1 year
City Academy	1 year
CUES	3 year
DaVinci Academy	1 year
Davis Elementary Schools (EBIS)	3 years
Davis Elementary Math (CMI)	3 years
Davis Jr High Math (Race to the Top)	3 years
Davis New Secondary Teachers	3 years
Davis North Layton Jr and West Point Jr	3 years
Davis Integrated STEM	1 year
Davis District- Science	3 years
DLI STEM Schools	1 year
Early Light Charter Consortium	3 years
George Washington Academy	3 years
Granite District-Math	1 year
Granite District-Science	1 year
John Hancock	3 years
Jordan- Rosamond Elementary	1 year
Jordan- Rose Creek Elementary	3 years
Jordan School District-Science	3 years
Millard School District	3 years
Morgan School District	3 years
Mountainville Academy	3 years
Nebo School District	3 years
Noah Webster	1 year
Ogden Jr high, High School	1 year
Ogden- New Bridge Elementary	1 year
Park City School District	1 year
Piute School District	3 years
Providence Hall	1 year
Provo School District	3 years

Provo- Westridge Elementary	3 years
Rockwell Charter High School	3 years
Salt Lake City School District-Math	1 year
Salt Lake City School District-Science	1 year
San Juan School District	1 year
San Juan- Science	3 years
South Sanpete School District	1 year
South Summit School District	3 years
Spectrum Academy	3 years
Summit Academy	1 year
Uintah School District	1 year
Utah Virtual Academy	1 year
Washington- Crimson View Elementary	1 year
Washington- Math	3 years
Washington-Science	3 years
Wayne School District	3 years
Weber School District	3 years
Weilenmann	3 years

APPENDIX G

“Lessons Learned” Summary – K-12 Math Personalized Learning

Targeted Areas	Observations --Year 2 (2015-2016)	Observations - - Year 3 (2015-2016)	Observations - - Year 4 2016-17	Observations - - Year 5 2017-18	Potential process or contractual changes
Application Process	<p>(1) Application Detail: As we met with teachers and administrators in Year 2, it became clear that usage expectations and other grant expectations needed to be communicated more clearly in the application. (2) Oversight: In Year 2, we also learned that teachers and administrators did not always know exactly who to contact to receive support or get their questions answered.</p>	<p>Award notifications should be made earlier: In Year 3, we also realized that teachers and administrators plan budgets and curriculum for the following year late in the spring. If they do not know how many licenses they will receive, it makes strategic implementation of personalized learning technology much more difficult.</p>	<p>No significant observations.</p>	<p>The review of potential pilot programs needs to take place early in the year. We did not anticipate the number of delays that we had in the process as we brought on new product providers. It's important for contracts to be in place before the start of the next school year so that schools can get started on the right foot.</p>	<p>If the STEM Action Center were to enter into a lengthy contract for a software product it could preclude a district or school from the opportunity to integrate new and or improved products. One recommendation is to pursue a three year R&D cycle where products are selected, with district involvement, through an RFP process. The products would be piloted at small scale while being evaluated for the first year, and then scaled up for two years of implementation to understand impact. In addition, few students will want to</p>

					use the same program for multiple years, because they may get tired of the interface or other design features (possible "product fatigue"). Therefore, we could use an approach that allows local decision-making and the option of different product selection for different grades, every few years, to maximize the benefit from education technology.
Oversight & Communication	The STEM AC notifies district math coordinators and ALL principals and teacher contacts regarding requirements of the grant. It became clear that greater oversight by the STEM AC was necessary in order to ensure that effective communication could support successful implementation. In the Year 2 evaluation some products had a relatively small sample size because schools did not submit SSIDs in the correct format.	We need better school level contact information: As we sent out program updates, training notices, and other important information in Year 3, it became clear that in several cases the contact information we had for school level contacts was incorrect or incomplete.	We need to make sure new products are reviewed as they are introduced, to ensure that teachers have access to the best technology available. The STEM AC worked with the State Procurement Office to create a process whereby new math personalized learning programs	The Pilot needs to be on a two year cycle. After the first year of the pilot, it became clear that we would not have quantitative data in time to compare new products to the other products in use. We were able to make preliminary determinations based on qualitative feedback from students, teachers, administrators and parents. Product providers who were well received and met all other requirements will be	One of the issues noted by teachers in their end of year survey (from both years) was the lack of access to computers as the largest constraint to implementation. This was a direct result and the reason why we required the principal to commit and ensure students have access to technology for at

			<p>designed for K-12 students can be piloted in Utah schools. Product providers who wish to participate must meet all of the requirements of the original RFP, be approved by a review team, and demonstrate that they are willing and able to provide licenses at no cost to a minimum of 1,000 Utah students for one full school year. Outcomes from new products will be compared to products currently under contract. If the performance of students using a new product meets or exceeds the average performance of students using other personalized learning products, that product will be added to an approved vendor</p>	<p>supported at the pilot level moving into the second year of the evaluation while we wait for quantitative data.</p>	<p>least 45 minutes. This is also why we required the IT Director's signature to ensure they were aware of the principal's commitment. We cannot use STEM AC funds for the purchase of devices but we are working with industry partners to secure funding for computers or donations of high quality machines.</p>
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			list.		
Unused Licenses	In Year 2 80% of license issued were used. However, only 37% were used to the level recommended by product providers. Educators indicated that it would useful to them to see how other educators, that had higher level of success with adoption and outcomes, were integrating the learning tools into their every day instruction.	60 days into Year 3, any licenses that had not been used were shifted to schools that had used all of their licenses and needed more. Any licenses that were not used by at the end of the year were credited back to the STEM Action Center. In this way, we ensured that 100% of license paid for were used. While in prior years, there has been a focus on fidelity, this year our evaluation team is digging deeper into the data to understand how various usage levels relate to student achievement. This will allow us to make better recommendations to educators, and it will allow us to better understand how products are performing relative to other products.	We had zero unused licenses for the 2016-17 school year. The established process is working well.	No significant observations.	The STEM AC is working with their third party evaluators to track analyze longitudinal data, and stratify the usage, or adoption, data. In other words, we want to track schools that are within certain benchmarks of the defined fidelity threshold. We know those that are at or above fidelity, but how many are within 5 or 10 minutes of fidelity and how does each usage level relate to student performance? This will allow the Center team to be more targeted with their support.

Implementation Strategies				Digging deeper into the usage data allowed us to see some interesting patterns and trends. We were able to find a few case study examples where one teacher had more than 89% of their students meeting grade level proficiency in Math. By observing these classrooms we were able to gather a few ideas of what implementation best practices might look like.	We want to set up a more robust methodology for analyzing best practices. If we can clearly identify the best ways to use these programs, we may be able to help facilitate better implementation and increase overall efficacy.
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APPENDIX H

CS4Utah (K-16 Computing Partnership) Grants Summary

Project	Description	3 Year Award
Three Falls Elementary School	Deliver afterschool CS and robotics clubs and summer CS programs using 4-H curriculum. Provide professional learning for teachers in partnership with Utah State University, to integrate CS into future curriculum.	\$ 43,852.00
Provo City School District	Develop and implement K-6 CS pilot program: keyboarding, CS Professional Development, curriculum material development	\$127,620.00
Coral Canyon Elementary	Deliver afterschool CS and robotics clubs and summer CS programs using 4-H curriculum. Provide professional learning for teachers in partnership with Utah State University, to integrate CS into future curriculum.	\$ 95,760.00
Iron County School District	Increase CS offerings of high school Programming I course and partner with Southwest Tech for Computer Programming certification program. Add Creative Coding to middle school. Add keyboarding classes for elementary schools and hands-on coding exercises for all elementary grades. Partner with CodeChangers to bring coding to elementary classrooms and after school coding programs.	\$ 538,856.00
Entheos Academy	Increase keyboarding classes in elementary schools, through an increase in software and hardware. Offer professional learning to increase teacher knowledge and integrate CS into classrooms. Computer Science Discoveries and Computer Technology classes to middle school students. Provide after school clubs in CS for middle school.	\$ 90,800.00
Bryant Middle School	Offer after school coding and robotics clubs with mentors from nearby high school and summer GREAT camps run by U of U. Deliver professional learning for coding and teaching Computer Science Discoveries. Expand extracurricular classes to include Computer Science Discoveries.	\$ 50,570.00
Kearns	Introduce low income students to CS through robotics and coding. Create pathway between schools to recruit students in elementary school and keep them involved through middle school. Intensive summer coding program and afterschool clubs for elementary students, Creative Coding for middle school.	\$ 182,440.00
Davis School District	Provide comprehensive professional learning for Lab Managers, through partnership with BootUp. Lab Managers will offer CS classes to district teachers. Half of elementary schools included in initial roll out, with second half in year following.	\$ 207,255.00

Success Academy	Recruit students for CS “fast track” advanced collegiate pathway at ACE (Academy for Computers and Engineering). Retain students in pathways with tutors, college mentors and industry speakers. Prepare students for CS degree with intensive summer programs focusing on critical thinking, study skills and beginning coding.	\$ 64,615.00
Juab/South Sanpete/North Sanpete Consortium	Create CS pathway from elementary to high school. Add elementary basic coding classes and after school coding clubs and summer camps. Offer girls coding club in middle school and increase class offerings, including Creative Coding.	\$ 147,900.00
Delta Middle School	Create coding classes with CSD curriculum; add summer camps and after school coding clubs such as Girls Who Code. Sponsor student showcase of created projects at the end of coding camps. Students will mentor elementary kids through science projects with infrared cameras.	\$ 23,243.00
Kane County School District	Develop afterschool 4-H CS clubs, FIRST Lego Leagues, and summer camps.	\$ 139,399.00
Davis School District	Expand K-12 pathway by adding coding classes to elementary keyboarding classes, expanding offerings in middle school (switching from ECS to CSD) and expanding coding classes in high school. Offer distance learning for students unable to participate in their school.	\$ 105,000.00
Ogden City School District	Expand Computer Science in district elementary schools, starting with New Bridge. Lab Monitors will be trained to teach CS in all grade. BootUp to provide professional learning and incentives to teachers.	\$ 124,550.00
San Juan School District	Create 9-week summer coding boot camp, supported by peer mentors and weekly guest speakers.	\$ 91,119.00
Alpine School District	Write computer science standards for elementary schools, with coding central to the curriculum. Professional learning for computer specialty provided by BootUp. K-2 to use Blockly programming. Introduce grades 3-6 to creative coding with Scratch.	\$ 137,238.00
Washington County School District	Provide after school programs with 4-H coding clubs, robotics and FIRST Lego leagues for all grades. Offer weeklong summer coding camps for all grades. Create teacher professional learning in CS and coding.	\$ 148,694.00
Juab School District	Deliver professional learning for all elementary teachers in partnership with BootUp. Integrate computer science into 4-6 grade classes, with expansion to 3rd grade. Coding to be taught through creative coding using Scratch.	\$ 126,352.00
InTech Collegiate High School	Increase CS course offerings and teacher professional learning to offer a wide range of courses. Purchase IT industry certification tests and test prep for students.	\$ 47,775.00
Garfield County School District	Incorporate STEM and coding into the classroom through professional learning for all teachers. Expand course offerings in middle and high school. Pay for endorsement of high school CS teacher. Hire part time teacher to support smaller schools in coding and STEM instruction. Deliver career fair for high school students, including local partners.	\$ 212,115.00
Cache County School District	Increase course offerings starting in elementary school. Provide teacher professional learning through BootUp for elementary	\$ 209,192.00

	school teachers. Develop after school coding clubs in elementary schools, through partnership with with Cache Makers.	
Itineris Early College High School	Develop FIND young adult career readiness program for students: target CS training and access to industry partners.	\$ 97,289.00
Tooele County School District	Provide high school students with industry CS/IT certifications and increase course offerings at community learning center, open to all high school students.	\$ 49,492.00
Lindon Elementary	Provide 4th-6th grade students with online CS classes through Tech Trep Academy. Deliver teacher professional learning for CS integration into the classroom.	\$ 102,160.00
Pinnacle Canyon Academy	Add keyboarding classes to K-8 and increase offerings of CS classes in 8-12, including Programming. Access higher level classes through USU and develop high school internships with local businesses.	\$ 120,000.00
Nebo School District	Develop afterschool program using WozU with the intent of creating a statewide 6th grade curriculum. Offer after school digital design labs open to all students in middle school. Deliver WozU certified training program for teachers.	\$ 208,912.00
Tabiona Elementary	Provide 4-H robotics clubs and FIRST Lego leagues. Also develop 4-H summer coding camps.	\$ 56,835.00
Duchesne Elementary	Provide 4-H robotics clubs and FIRST Lego leagues. Also develop 4-H summer coding camps.	\$ 82,890.00
Emery County School District	After school robotics and coding clubs in all elementary schools, with weekly robotics and coding for all elementary students during the school week. Expanding CS courses in middle and high school with Computer Science Principles and robotics being added.	\$ 75,000.00

APPENDIX I

STEM Action Center Strategic Plan

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Format for Agency Strategic Plan

01. Objective

- S1. Strategy
 - A1. Action
 - A2. Action
 - M1. Metrics that measure all actions above are aligned
- S2. Strategy
 - A1. Action
 - M1. Metrics that measure a specific action are indented
 - A2. Action

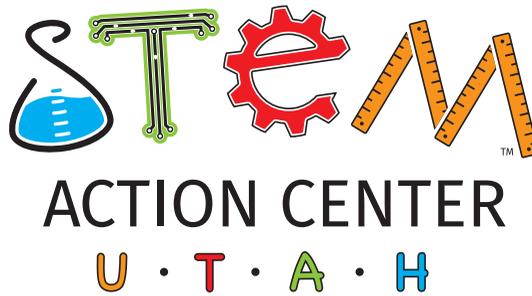


STEM Action Center Vision:

Produce a STEM-competitive workforce to ensure Utah's continued economic success in the global marketplace.

STEM Action Center Mission:

The STEM Action Center is Utah's leader in promoting science, technology, engineering and math through best practices in education to ensure connection with industry and Utah's long-term economic prosperity.



Executive Summary

- Science, Technology, Engineering, and Mathematics (STEM) careers are critical to Utah's continued economic competitiveness due to their direct ties to innovation, economic growth, and productivity. The State of Utah has responded to widespread concerns regarding the creation of STEM talent to ensure Utah's continued economic success in the global marketplace.
- Utah's talent gets diverted out of the STEM pipeline at three key times; high school graduation to matriculation, graduation from post-secondary education, and entry to the workforce. Additionally, women and minorities continue to be under-represented.
- Utah's industry requires talent with a core set of cognitive capabilities, which includes practical, hands-on AND problem solving as well as technical skills sets. *"Content, processing, and problem solving skills."*
- STEM fields provide Utah students with earning advantages at every level of educational attainment and provide innovation, technological growth, and economic development at the State and National level.

What Does Success Look Like for STEM Action Center?

- Attracting new investors and companies while supporting the expansion of existing Utah businesses by providing STEM-capable talent.
 - Supporting the Governor’s commitment to education and industry as partners in economic development.
- Leveraging resources to increase impact in education and talent alignment.
- Promote Utah as a talent rich state.
 - Improved proficiency in K-12 math and science scores.
 - Increased student and teacher engagement in STEM education and career pathways.
 - Improved teacher effectiveness that results in improved achievement for students.
- Increased investment in STEM education by Utah companies.
- Increased collaboration between K-16, industry, government agencies, and community.
- Increase in STEM graduates in Utah and an increase in Utah companies that hire students prepared with STEM skills.

The Utah STEM Action Center will address these issues through our programs and their program objectives, strategies and actions:

STEM Programs

Legislatively mandated funding

1. K-12 Math Personalized Learning
2. Professional Learning
3. Elementary STEM Endorsement
4. High School STEM Industry Certification
5. K-16 Computing Initiative

Operational funding

6. STEM School Designation
7. Classroom Grant
8. Organization Grant

Foundation developed funding

9. Utah STEM Bus
10. STEM For Life

Operational Support

1. Utah STEM Foundation
2. Marketing/Communications Outreach & Engagement

STEM Action Center Strategic Plan:

01. STEM Education

Implementing a broad-reaching strategy in the K-12 education system that supports high quality STEM professional learning for teachers.

- S1. STEM Action Center acts as a research and development center to collect and disseminate best practices for STEM education.
 - A1. “Best Practices” Educational Tools Provision to educators.
 - M1. Educators are using the top 15 identified “best practice” education tools.
- S2. Use resources to bring the latest in STEM education into Utah’s classrooms.
 - A1. Interscholastic STEM activities school participation.
 - M1. High schools participation in STEM fairs, camps, competitions.
 - A2. Mathematics Achievement change.
 - M1. Measure increase in student achievement Utah State Board of Education (USBE) data for mathematics standardized testing.
- S3. Enhance achievement in STEM-related aptitudes, skills and understanding of concepts.
 - A1. K-12 Math Personalized Learning Tools.
- S4. Increase teacher effectiveness in STEM-specific instruction, content, recruitment and retention.
 - A1. Professional Learning project.
 - A2. Elementary STEM Endorsement.
 - M1. Work with a third party evaluator to identify, collect, analyze and report data that determines effectiveness of all classroom and educator based projects.
- S5. Increase rigor, relevance and project-based learning in STEM-related areas.
 - A1. 7th and 8th grade Applied Science project in Career and Technical Education (CTE).
 - A2. High School STEM Industry Certification
 - A3. Classroom grants
 - A4. Student Fairs and Competition grants
 - M1. Use of software to manage and track data for all micro-grants.
- S6. Promote legislative, parent and student awareness of STEM education and careers.
 - A1. Advocate for targeted and intentional funding that supports efforts in STEM education and career development.
 - A2. Communicate STEM activities and successes to the Utah community at large.
 - M1. Document communication, media events, and social responses.

O2. Establish best practices and tools for K-12 in STEM

Providing independently-assessed best practice tools and resources for teachers, administrators, parents, and students.

- S1. Facilitate the identification and application of best practices in STEM.
 - A1. Best Practices Conference
 - A2. Ongoing data collection and analysis with third party evaluator.
- S2. Promote career awareness and readiness of K-16 Students.
 - A1. 7th and 8th grade Applied Science project in Career and Technical Education (CTE).
 - A2. High School STEM Industry Certification

O3. STEM Community Engagement

Increasing participation in interscholastic programs that recognize student achievement in STEM and ensuring publication of those results to the broader community.

- S1. Motivate and promote awareness and engagement in STEM efforts.
 - A1. STEM Fest
 - A2. Media Campaign
 - A3. Dynamic STEM website with deep resources for teachers, students and community at large.
 - A3. Utah STEM Bus—mobile classroom.
 - A4. Student participation in interscholastic STEM activities.
 - M1. Document participation in and satisfaction with conferences and outreach events.
- S2. Facilitate partnerships to promote support of STEM efforts in Utah.
 - A1. STEM Match mobile app
- S3. Align STEM education with talent needs of Utah companies.
 - A1. Engage private industry to provide STEM mentoring and support of program development.
 - A2. Utah STEM Industry Coalition
 - A3. K-16 Computing Initiative
 - M1. Track corporate investment (cash and in-kind).
 - M2. Document partnerships that result in innovation and effective program design and development.
- S4. Engage the media to support student STEM achievement.
 - A1. Track effectiveness of website and social media as a portal for information by documenting basic demographics, pages most frequented.

STEM Program Summaries

K-12 Math Personalized Learning

The STEM Action Center provides access to a selection of personalized learning software programs that have demonstrated through a rigorous evaluation process that there is a statistically significant relationship between program use and improved student outcomes in math.

- 01. Ensure that personalized math learning programs made available to schools are high quality, cost effective, and improve student achievement.**
- 02. Ensure that products are being used effectively, in a way that increases students' mathematics growth and proficiency.**
- 03. Recognize the limited resources allocated to math personalized learning. Ensure all allotted dollars are spent wisely and appropriately.**

Professional Learning

Support the intentional inclusion of STEM education through professional learning opportunities that will positively impact student experiences, outcomes, and growth in teacher practices.

- 01. Incorporate STEM Education, as defined by Utah State Board of Education (USBE) in Utah public education classrooms by supporting appropriate teacher professional learning opportunities.**
- 02. Create, provide, and support professional learning opportunities in alignment with legislation defining effective professional learning that provides value to the STEM community.**
- 03. Create and maintain a resource center for STEM-focused professional learning opportunities, leading to a reputation as a STEM resource throughout the state and nation.**
- 04. Establish, maintain, and justify professional learning funds allocated to STEM Action Center.**

Elementary STEM Endorsement

Provide elementary teachers in Utah access to additional education regarding STEM content and pedagogical skills needed to effectively incorporate STEM education into their classrooms.

- 01. Incorporate STEM education in Utah public elementary school classrooms by providing access to a state-recognized endorsement program designed for elementary school teachers. Content is to be delivered by higher education faculty, based on the agreed upon course frameworks, to increase content knowledge and pedagogical strategies.**
- 02. Engage educators, local education agencies (LEAs), Utah State Board of Education (USBE), and higher education partners in creating and maintaining partnerships and resources relating to STEM education in elementary schools.**

High School STEM Industry Certification

Pre-cursor to K-16 Computing Initiative – funding is completed

Establish pathway programs between secondary, post-secondary, industry, cultural and community partners, which create career awareness and build talent pipeline.

- 01. Incentivize secondary, post-secondary, industry partnerships, which provide secondary students with industry-recognized certifications and internship opportunities to prepare students for advanced education and employment.**
- 02. Increase visibility of specific industry-education partnership successes.**
- 03. Support transition from HS STEM Industry Certification Grant Program to K-16 Computing Initiative.**

K-16 Computing Initiative

This program was authorized by the legislature for commencement July 1, 2017. Consequently, the current strategy is under development by the agency and stakeholders, but the following outline provides preliminary planning prior to program launch.

Motivate students to participate in computing opportunities and elevate the relevance of computing education and careers.

- 01. Align connected network with shared goals, metrics and outcomes.**
- 02. Engage Industry-led, Advisory Group.**
- 03. Provide high quality professional learning and collaborative instructional support strategies.**
- 04. Support development and maintenance of relevant and rigorous courses and content.**
- 05. Provide equity and access to all students – including rural/urban, female, minorities, at-risk youth and people with disabilities.**
- 06. Establish pathway programs between secondary, post-secondary, industry, and cultural and community partners.**
- 07. Develop an engaging outreach and awareness plan.**

STEM School Designation

Provide a structured framework for schools to complete a thorough self-evaluation to inform long-term goals and success metrics that help to align teacher efforts and community expectations in STEM efforts.

- 01. Bring real-world applications of STEM into an educational context.**
- 02. Create, maintain, and disseminate research-based information surrounding STEM content-area knowledge, pedagogical success, and effective community engagement to assist schools in attaining and maintaining STEM designations.**

Classroom Grant

Recognizing that innovation developed by successful teachers needs to be replicated and shared, grants will be used to fund approaches to STEM education that enable teachers to implement innovative STEM ideas in the classroom.

- 01. Provide a mechanism which facilitates increased access to and involvement in innovative STEM curricula throughout Utah.**
- 02. Actively monitor funding of grants to support all components of STEM education.**
- 03. Actively promote innovative approaches, including curriculum, material design and STEM best practices statewide.**

Organization Grant

Incorporating Fairs Camps and Competitions student grants

The STEM Action Center funds grants to support innovative STEM programming for Utah preK-12 students in order to increase student STEM awareness and involvement.

- 01. Broaden student access to, and involvement in, STEM programs.**
- 02. Create statewide partnerships with organizations invested in Utah STEM education.**

Utah STEM Bus - USB

To ignite a passion for STEM education statewide, the STEM Action Center will utilize a mobile classroom to introduce real world learning experiences to students, parents and educators. The curricula will align with state standards and help build STEM talent.

- 01. Develop and maintain relevant and effective curricula that align to current state standards.**
- 02. Provide high quality and effective instruction of STEM content.**
- 03. Maintain community engagement with STEM Action Center and Utah STEM Bus.**
- 04. Implement a sustainability plan which provides ongoing support and program growth.**

STEM for Life

Funding from Intermountain Healthcare was awarded in May 2016.

The STEM for Life program promotes STEM Education through healthcare and healthy lifestyle themes.

- 01. Educate Utah students about the healthcare careers that exist in the state, and encourage them to pursue those careers in the future.**
- 02. Encourage increased industry support of integrated STEM in healthcare education.**

Operational Support

Utah STEM Foundation

The Utah STEM Foundation is the 501c3 non-profit fundraising arm of the Utah STEM Action Center, created in May 2016. The Utah STEM Foundation was created by legislative mandate to:

- Seek to enhance STEM funding and resource opportunities
 - Seek to create sustainable programs that will:
 - Connect industry to the classroom
 - Increase STEM workforce opportunities in Utah
- 01. Identify program focus areas in the near and long-term to enable the Foundation to meet its fundraising goals, as well as organizational purposes.**
 - 02. Follow a Fundraising and Financial Development Plan to provide a corporate level of awareness supporting STEM education.**
 - 03. Establish an endowment that will align STEM education with the talent needs of Utah's workforce.**

Marketing/Communications Outreach and Engagement

The STEM Action Center Marketing/Communications office will promote STEM statewide and where applicable nationally. These efforts will be undertaken to ensure the STEM Action Center remains essential to building partnerships with industry and community to assure Utah's long-term economic prosperity.

- 01. Create an agency strategy that addresses the Standard Target Audience (STA) of legislators, teachers, students, parents, administrators & industry members.**
- 02. Execute marketing plan which will include media outreach and social connectivity with the Standard Target Audience (STA).**
- 03. Create STEM managed events and sponsor external events that support the mission objectives of the agency programs and further the overall mission of the agency.**



Program Level Strategic Plans

K-12 Math Personalized Learning¹

The STEM Action Center provides access to a selection of personalized learning software programs that have demonstrated through a rigorous evaluation process that there is a statistically significant relationship between program use and improved student outcomes in math.

01. Ensure that personalized math learning programs made available to schools are high quality, cost effective, and improve student achievement.²

- S1. Qualitatively and quantitatively evaluate math personalized learning products.
 - A1. Evaluate correlations between student's math proficiency and product use.
 - A2. Evaluate correlations between student growth and product use.
 - A3. Examine the ROI of each math program.
 - A4. Evaluate qualitative feedback about each program from teachers and students.
 - M1. Quantitative/qualitative analysis of math products using teacher surveys, student surveys, and SAGE data – broken down by grade level, and stratified by level of usage.
- S2. Determine how math programs influence students' perceptions of mathematics.
 - A1. Survey students at the beginning of the year, and at the end of the year to examine students' perceptions of math and other math related subjects.
 - M1. Analyze difference in change from pre to post survey between control and treatment groups.

02. Ensure that products are being used effectively, in a way that increases students' mathematics growth and proficiency.³

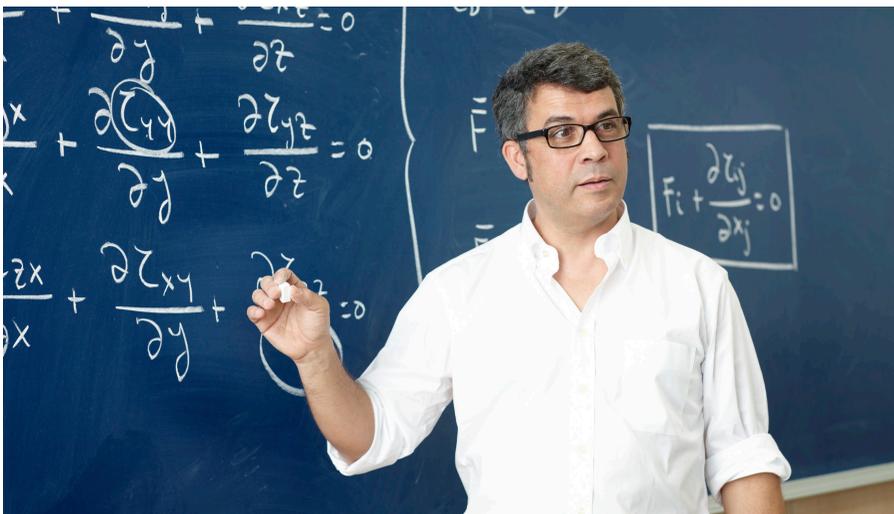
- S1. Define effective usage for each program.
 - A1. Analyze longitudinal usage data to determine "effective usage" levels for each product.
 - A2. Define usage standards to align with "effective usage."
 - A3. Shift the focus of stakeholders from "fidelity" (product provider recommended usage level), to "effective usage," based on Utah data.
 - M1. Changes in SAGE scores stratified by students' level of use, by product, comparing students with access to STEM Action Center approved software against students with no access to approved software.
- S2. Ensure that math technology is implemented equitably and used effectively.
 - A1. Move any licenses that are not used in a timely manner to other schools.
 - M1. Analysis of usage data from product providers.

- A2. Request implementation plans for grant participants, beginning the 2018-19 school year to determine best practices for implementation.
 - M1. Number of plans received.
- A3. Provide examples of successful implementation. Identify universal factors that influence successful integration of technology.
 - M2. Number of shared best practices.

03. Recognize the limited resources allocated to math personalized learning. Ensure all allotted dollars are spent wisely and appropriately.⁴

- S1. Create mechanisms to increase program capacity.
 - A1. Provide funding for a product to each adopting school for a defined implementation cycle to ensure effective use of personalized learning technology.
 - A2. As LEA's (districts and charter schools) demonstrate and that they have fully and effectively adopted math software, they have the opportunity to request a rollover of previous funding to new schools or classrooms within the LEA.
 - A3. Each year the STEM Action Center will allocate a percentage of funding to support new and/or high needs schools that will directly affect rural and underrepresented students.
 - A4. Advocate for new funds to meet increased demand.
 - A5. Actively market academic achievement success to the standard target audience in order to increase stakeholder buy in and expand implementation.
 - M1. Number of first time and returning applicants.

1. HB139:292-342 & HB150:284-331
 2. HB139:279-280 & HB150:279-280
 3. HB139:215-221 & HB150:229-233
 4. HB139:226-227 & HB150:223-224



Professional Learning

Support the intentional inclusion of STEM education through professional learning opportunities that will positively impact student experiences, outcomes, and growth in teacher practices.¹

01. Incorporate STEM Education, as defined by Utah State Board of Education (USBE) in Utah public education classrooms by supporting appropriate educator professional learning opportunities.

- S1. Maintain current, accurate content area knowledge focused on state content area standards.
 - A1. Stay informed on science and mathematics state standards and participate in revisions and updates.
 - A2. Participate as an active member on USBE STEM team.
 - A3. Stay current on science and mathematics research and development pertaining to topics taught to students.
- S2. Provide examples of STEM subject integration into other content areas based on core curriculum standards.
 - A1. Share examples of STEM integration activities within the following content areas: English Language Arts (ELA), Social Studies, Physical Education (P.E.), and Arts.
 - A2. Administer informal survey about integration example needs, based on subject areas and/or state standard topics.
 - M1. Track which subject area integration ideas are most visited/clicked.
 - M2. Use survey to determine integration support needs based on subject areas and/or state standard topics from teachers and administrators in the STEM community.
- S3. Share examples of research-based best practice STEM teaching strategies.
 - A1. Share examples via website and/or newsletter, including references for further information and study.
 - A2. Administer online survey about areas of STEM education implementation strategies most needed by educators and administrators.
 - M1. Track which category of teaching strategies is most visited.
 - M2. Produce gap analysis on areas of implementation support needed by teachers and administration. Over time, areas of need will become smaller and more defined by local needs.

02. Create, provide, and support professional learning opportunities in alignment with legislation defining effective professional learning that provides value to the STEM community.

- S1. Align available professional learning opportunities to legislative description of professional learning, found in 2014 GS HB 320.²
 - A1. STEM Action Center product partner professional learning opportunities will follow guidelines for effective professional learning.

- A2. Learning opportunities provided by STEM Action Center staff will follow guidelines for effective professional learning and best practice regarding adult education.
- A3. Instruction offered via STEM Action Center funded professional learning programs will adhere to guidelines for effective professional learning.
- A4. Promote STEM related professional learning opportunities provided by other agencies on calendar and social media.
 - M1. Use the defined guidelines for effective professional learning as rubric components for STEM Action Center funded professional learning applications.
 - M1. Track number of educator participants engaged in STEM-related professional learning opportunities offered or supported by STEM Action Center.
- S2. Provide and support opportunities that offer value in the form of additional content knowledge or pedagogical strategies to a variety of stakeholders including educators, schools, local education agencies and STEM-industry agencies.
 - A1. Facilitate the acquisition of re-licensure points based on hours of participation or other metrics as deemed appropriate by the State Board of Education to be used for renewing teacher licenses.
 - A2. Emphasize appropriateness of STEM professional learning as a component of the annual educator professional growth plan (PGP).
 - A3. Encourage participants to apply for USBE or university credit for the purpose of license renewal and lane changes affecting teacher compensation.



- M1. Capture student data to analyze the difference in schools that do and do not participate in STEM related professional learning opportunities.
 - M2. Track teacher and student data longitudinally to determine eventual impact on Utah STEM job preparedness and the rate of Utah public school graduates filling Utah STEM-industry positions.
 - M3. Use the professional learning tracking system selected by the State Board of Education to determine the number of teachers getting points for STEM related professional learning opportunities.
- S3. Identify successful professional learning opportunity structures currently in place and use these models as exemplars.
- A1. Establish and maintain relationships and protocols with credit-granting agencies including USBE and higher education partners.
 - A2. Identify and share USBE approved STEM-related endorsement programs, including the Elementary STEM Endorsement, as well as professional learning opportunities available to educators in the summer months or other year-long learning resources.
 - A3. Rely on local education leaders to drive decision making about individual community needs.
 - M1. Complete a baseline asset inventory of STEM learning resources and then track the number of participants and learning opportunities available, including year-long programs, summer programs and single event opportunities.
 - M2. Track needs of educators and administrators regarding professional learning, then determine which professional learning opportunities the STEM Action Center can provide and/or support.

O3. Create and maintain a resource center for STEM-focused professional learning opportunities, leading to a reputation as a STEM resource throughout the state and nation.

- S1. Develop and maintain resource library on STEM Action Center website.
- A1. Provide classroom activities, research-based teaching strategies and examples, and cross-content connections based on teaching standards.
 - A2. Include examples of effective video self- and peer-reflection about STEM in a classroom as well as templates and rubrics to support the integration of video based reflection.
 - M1. Administer a survey to teachers about the perceived impact on instruction after participating in video self-reflection.
 - A3. Share the dimensions required for STEM School Designation as a framework for focused school-wide improvement.
 - M1. Use data from website to determine which content areas are most visited and the amount of time typically spent with a resource.
 - M2. Collect data on the number of schools and individuals inquiring about the STEM School Designation process.

04. Establish, maintain, and justify professional learning funds allocated to STEM Action Center.

- S1. Utilize the STEM School Designation as framework for targeted school-wide improvement.
 - A1. Identify varying examples of successful schools for each dimension to act as models/mentors for their communities.
- S2. Administer a grant program founded on video-based educator self-reflection and targeted opportunities for improvement.
 - A1. Require program participants to complete self-reflection on a filmed portion of a lesson to identify growth in a targeted area of their teaching practice.
 - A2. Encourage educators to include STEM focused targeted goals in their annual professional growth plans.
 - M1. Use a variety of metrics, including pre/post surveys, submitted lesson plans, and teacher reflection templates and feedback to gauge success in teacher growth regarding STEM implementation.
- S3. Fund new participants of STEM Professional Learning projects annually.
 - A1. Solicit information about the process participating schools or districts have in place to eventually decrease the amount of funds needed from outside organizations to support STEM related professional learning opportunities.
 - M1. Determine the number of participating schools able to support their programs after 3 years and 5 years based on overall amount of project and amount of funding requested from STEM Action Center.
 - A2. Advocate for new funds and funding sources to meet increased demand.
 - M1. Collect longitudinal data on the number of teacher participants and annual costs per year of program.
 - M2. Use random sample of teachers surveyed to determine STEM professional learning needs in state.

1. HB 150/2014 UCA#63m-1-3209

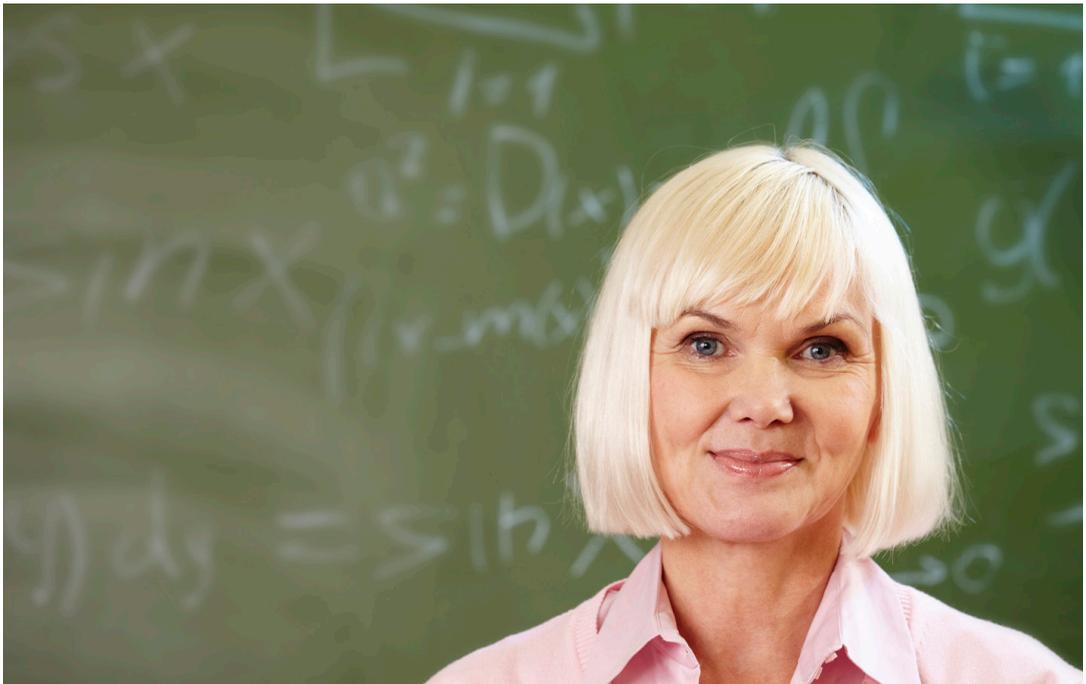
2. HB 320/2014 Utah State Board of Education creates definition of professional development as “a comprehensive, sustained, and evidence-based approach to improving teachers’ and principals’ effectiveness in raising student achievement.” Professional learning is further described as meeting the following standards: “occurring within learning communities committed to continuous improvement, individual and collective responsibility, and goal alignment; requires skillful leaders who develop capacity, advocate, and create support systems, for professional learning, requires prioritizing, monitoring, and coordinating resources for educator learning; uses a variety of sources and types of student, educator, and system data to plan, assess, and evaluate professional learning; integrates theories, research, and models of human learning to achieve its intended outcomes; applies research on change and sustains support for implementation of professional learning for long-term change; and aligns its outcomes with: performance standards for teachers and school administrators as described in rules of the State Board of Education and performance standards for students as described in the core curriculum standards; and incorporates the use of technology in the design, implementation, and evaluation of high quality professional learning practices; and includes targeted professional learning on the use of technology devices to enhance the teaching and learning environment and the integration of technology in content delivery.”

Elementary STEM Endorsement

Provide elementary teachers in Utah access to additional education regarding STEM content and pedagogical skills needed to effectively incorporate STEM education into their classrooms.

01. Incorporate STEM education in Utah public elementary school classrooms¹ by providing access to a state-recognized endorsement program designed for elementary school teachers. Content is to be delivered by higher education faculty, based on the agreed upon course frameworks, to increase content knowledge and pedagogical strategies.

- S1. Provide current, accurate STEM content area knowledge focused on K-6 state content area standards.
 - A1. Revise frameworks regularly with input from educators, Utah State Board of Education state Science and Elementary Mathematics Specialists, and higher education faculty to maintain consistency in program content while allowing for appropriate differentiation based on participants, instructors, and location.
- S2. Model and reflect on appropriate pedagogical techniques for STEM instruction.
 - A1. Share examples of research-based best practice STEM teaching strategies.
 - A2. Share video of teacher efforts for feedback from cohort group as exemplars.



- M1. Collect information on the total number of participants enrolled, progress toward completion, and recorded completed endorsements annually.
- M2. Utilize data on longitudinal student success based on teacher completion and implementation of knowledge and skills gained from completing the Elementary STEM Endorsement.

02. Engage educators, local education agencies (LEAs), Utah State Board of Education (USBE), and higher education partners in creating and maintaining partnerships and resources relating to STEM education in elementary schools.

- S1. Provide opportunities for schools and educators involved in STEM to gather informally and discuss challenges, success stories, and ask questions to improve content knowledge and teaching practices.
- S2. Identify schools and educators with exemplar integration of STEM, including those schools that have received a STEM School Designation.
- S3. Establish and maintain relationships and protocols with higher education partners.
- S4. Create and maintain cohorts based on location and existing partnerships.
 - M1. Survey administrators and educators about barriers to effective STEM implementation as a baseline data point.

1. HB 150/2014, UCA#63m-1-3209



High School STEM Industry Certification¹

Pre-cursor to K-16 Computing Initiative – funding is completed

Establish pathway programs between secondary, post-secondary, industry, and cultural and community partners which create career awareness and build talent pipeline.

01. Incentivize secondary, post-secondary, industry partnerships, which provide secondary students with industry-recognized certifications and internship opportunities to prepare students for advanced education and employment.

S1. Successfully complete current grant program.

A1. Monitor grantees for program, budget and data outcomes.

A2. Balance budgets for each grantee and for the program as a whole.

A3. Produce data/information to highlight best practices/lessons learned.

M1. Number of students participating, certifications earned, internships begun and successfully concluded.

M2. Quarterly report regarding progress, expenses and data.

02. Increase visibility of specific industry-education partnership successes.

S1. Share grantee stories and testimonials.

A1. Grantee participation in Best Practice Conference sessions, publications, and STEM visibility opportunities through social media.



03. Support transition from High School STEM Industry Certification Grant Program to K-16 Computing Initiative.

- S1. Use lessons learned from current program to inform the internal and external processes, management, data tracking and sharing, and collaboration opportunities between grantees.
 - A1. Provide orientation to grantee administrators, so that they are able to establish local management processes, data tracking, and reporting, which meet the requirements of the statewide computing program.
 - A2. Provide ongoing budget updates with accurate funding levels to be transferred from HS STEM to CS/IT HS STEM Industry Certification Grant programs.
 - M1. Quarterly reports regarding progress, expenses and data including participation, certifications and internships

1. HB 150/2014 line 394, 63M-1-3211, allows the STEM Action Center to award grants to fund STEM related certification for high school students.



K-16 Computing Initiative

This program was authorized by the legislature for commencement July 1, 2017. Consequently, the current strategy is under development by the agency and stakeholders, but the following outline provides preliminary planning prior to program launch.

Motivate students to participate in computing opportunities and elevate the relevance of computing education and careers.

01. Align connected network with shared goals, metrics and outcomes.

- S1. Build Communities of Practice
- S2. Establish broad partnership, led by industry, which includes:
 - K-12 districts and charter schools and Utah State Board of Education
 - Higher education, 2- and 4-year institutions
 - Government agencies including Utah Department of Workforce Services, Department of Heritage & Arts, Office of Energy Development, Department of Natural Resources
 - Community and Cultural Partners
 - Talent Ready Utah
- S3. Integrate all computing efforts to leverage resources, including:
 - Code.org grant (K-12 professional learning)
 - CREATE Labs and Carnegie Mellon University grant (content, supplies and professional learning)



- Utah SB93 (tuition reimbursement for secondary endorsement)
- Expanding Computer Education Pathways (ECEP)

02. Engage Industry-led Advisory Group.

- S1. Establish core industry committee to advise STEM Action Center Executive Board.
- S2. Develop early employment opportunities for undergraduates.
- S3. Identify industry partner linkages with education to include classroom engagement, curriculum review, work-based learning opportunities, and CS IT advocacy with legislative, education and community entities.

03. Provide high quality professional learning and collaborative instructional support strategies.

- S1. Inventory all curriculum offerings.
 - A1. Inventory all vendor curriculums used in LEAs.
 - A2. Identify/highlight successful curricula from pilot grant recipients.
- S2. Provide clearinghouse of instructional support choices at each level of education.
- S3. Provide teacher professional learning for successful curricula.

04. Support development and maintenance of relevant and rigorous courses and content.

- S1. Provide multiple entry and exit points in the educational continuum.
- S2. Identify high quality resources for elementary and middle school classrooms.
- S3. Support work-based learning opportunities.



05. Provide equity and access to all students – including rural/urban, female, minorities, at-risk youth and people with disabilities.

- S1. Develop distance and blended learning models.
- S2. Create virtual industry engagement.
- S3. Create incentives for underrepresented and at-risk populations.
- S4. Identify and target root causes of low participation.

06. Establish pathway programs between secondary, post-secondary, industry, and cultural and community partners.

- S1. Administer High School STEM Industry Certification Grant Program—CS IT!
 - A1. Fund secondary, post-secondary, industry partnerships which provide secondary students with industry-recognized certifications and internship opportunities.
 - A2. Prepare high school students to pursue advanced education and/or employment.
 - M1. Student participation.
 - M2. Certifications earned.
 - M3. Internships begun and successfully concluded.
 - M4. Quarterly report regarding progress, expenses and data.
- S2. Administer SB 190 Grant Program (K-8 emphasis).²
 - A1. Design and implement comprehensive K-16 Computing Grants Program, based upon the following common elements:
 - (a) outreach and student engagement;
 - (b) courses and content;
 - (c) instruction and instructional support;
 - (d) work-based learning opportunities;
 - (e) student retention;
 - (f) industry engagement;
 - (g) stacked credentials that allow for multiple exit and entry points;
 - (h) competency-based learning strategies; and
 - (i) secondary and post-secondary collaborations.
 - A2. Fund collaborations/partnerships between K-12, post-secondary, industry and cultural and community partners to develop stacked credential pathways and build infrastructure for capacity expansion.
 - M1. Established grant application and approval process.
 - M2. Established success metrics for projects.
 - M3. Increased number of programs and certificates/degrees.
- S3. Procure Department of Labor H-1B Grant to fund upper High School through adult computing pathway projects.
 - A1. Create and align K-16 computing content and courses.
 - A3. Implement outreach and engagement strategies.
 - A4. Implement high quality professional development and innovative strategies for instructional support.
 - A5. Accelerate talent readiness through Early Industry Induction model.

S4. Identify additional funding streams which may be leveraged for pathway development for partner agencies and initiatives.

A1. Consider partner applications for: SWI, TRU/UCAP.

07. Develop an engaging outreach and awareness plan.

S1. Develop a high impact marketing and messaging campaign which emphasizes importance of computing education.

S2. Create materials and activities to engage parents and counselors.

S3. Develop afterschool and summer camp opportunities.

S4. Identify/create teacher, counselor, and administrative recruitment opportunities.

1. HB 150/2014 line 394, 63M-1-3211, allows the STEM Action Center to award grants to fund STEM related certification for high school students.

2. SB 190/2017 line 69, 63N-12-214, grants creates the Computing Partnerships Grants program consisting of grants created in this part to provide for the design and implementation of a comprehensive K-16 computing partnerships program.



STEM School Designation

Provide a structured framework for schools to complete a thorough self-evaluation to inform long-term goals and success metrics that help to align teacher efforts and community expectations in STEM efforts.¹

01. Bring real-world applications of STEM into an educational context.

- S1. Involve business partners with local school communities to build engagement and awareness of needs.
- S2. Provide resources and support to create a continuum of community schools (elementary, middle/junior high school, and high school) with a focus on STEM-integration.
- S3. Meet parent expectations for providing students with a well-rounded education while preparing students to be college and career ready. Reports on future employment trends indicate that students with a well-rounded education are able to meet workforce demands without sacrificing other educational interests.



O2. Create, maintain, and disseminate research-based information surrounding STEM content-area knowledge, pedagogical success, and effective community engagement to assist schools in attaining and maintaining STEM designations.

- S1. Engage STEM designated schools in events that increase knowledge and awareness of STEM education, such as STEM Fest, STEM Academy for School Administrators, Best Practices Conference, and other events.
- S2. Maintain a network of schools, communities, and individuals to identify exemplars, act as mentors, and support new efforts within varying geographic locations.
 - M1. Determine annually the number of schools that are beginning, working on, and completing the STEM School Designation process.

1. HB 150/2014 lines 246-248, UCA#63m-1-3208



Classroom Grant

Recognizing that innovation developed by successful teachers needs to be replicated and shared, grants will be used to fund approaches to STEM education that enable teachers to implement innovative STEM ideas in the classroom.¹

01. Provide a mechanism which facilitates increased access to and involvement in innovative STEM curricula throughout Utah.²

- S1. Manage an annual statewide competition to find the best new ideas, and the accompanying fully developed, sharable lesson plans.
 - A1. Awarding the outstanding plan of the year and other honors.
 - M1. Awarded through a transparent selection process.
- S2. Maintain a repository highlighting STEM best practices that teachers can access for information and ideas.
 - A1. Require all awardees to submit shareable curriculum, photos/graphs/illustrations, and lesson plans which are tied to state standards.
 - M1. Track STEM repository usage.
- S3. Each year the STEM Action Center allocates a percentage of the classroom grant funding to support new and/or unique programs that will directly affect underrepresented, rural, and high-need students.
 - M1. Number of first time and returning applicants.



02. Actively monitor funding of grants to support all components of STEM education.³

- S1. Ensure that there are resources allocated for each STEM subject.
 - A1. Using a qualified advisory committee, actively engage in sourcing innovative curricula in each of the four STEM content areas.
 - A2. If one STEM area or grade level has limited content, endeavor to target these gaps in curriculum development.
 - M1. Track the total number of STEM resources for each content area, by grade level.

03. Actively promote innovative approaches, including curriculum, material design and STEM best practices statewide.⁴

- S1. Increase teachers' awareness and use of the classroom grant program and curricula that have been created.
 - A1. Utilize various marketing and communication tools to promote awareness and active use of created curricula.
 - A2. Showcase the "best of the best." Invite exemplar participants to share their successes at appropriate events such as STEM Best Practices conference and Utah Science Teachers Conferences, etc.
 - M1. Track the number of teachers/students impacted.
 - A3. Highlight the STEM repository.

1. HB139:226-227 & HB150:223-224

2. HB139:236-242 & HB150:234-240

3. HB139:264-265 & HB150:264-265

4. HB139:228-229 & HB150:225-226



Organization Grants

Incorporating Fairs Camps and Competitions student grants¹

The STEM Action Center funds grants to support innovative STEM programming for Utah preK-12 students in order to increase student STEM awareness and involvement.

01. Broaden student access to, and involvement in, STEM programs.²

- S1. In order to ensure equity, this program will support organizations with new and/or unique programs that will directly impact rural and high-need communities in addition to traditional Wasatch Front efforts.
 - A1. Complete thorough review of funding opportunities for organizations that offer STEM programs.
 - A2. Promote STEM opportunities to students and parents.
 - M1. Number of students participating.
 - M2. Number of first time and returning applicants.
 - M3. Track geographic distribution of funds.



02. Create statewide partnerships with organizations invested in Utah STEM education.³

S1. Expand program awareness.

A1. Produce media publications highlighting program successes.

A2. Seek out presentation opportunities at community groups, conferences, etc.

A3. Utilize STEM Action Center Marketing: spotlights, social media, newsletters, events, etc.

M1. Number of applicants per solicitation.

S2. Develop influential STEM Action Center advocates from funded organizations.

A1. Leverage grantee successes to establish a budget line item.

A2. Require funded organizations to recognize/promote the STEM Action Center support of their programs.

1. HB 139/2013, 63M-1-3205 Line 222 directs the STEM Action Center to award grants to support STEM programming.

2. HB 139/2013 Line 190-191 indicate the STEM Action Center should ensure student participation in STEM fairs, camps and competitions.

3. HB 139/2013 Line 167-173 requires the STEM Action Center to have programs that coordinate STEM activities in the state.





Utah STEM Bus – USB¹

To ignite a passion for STEM education statewide, the STEM Action Center will utilize a mobile classroom to introduce real world learning experiences to students, parents and educators. The curricula will align with state standards and help build STEM talent.

01. Develop and maintain relevant and effective curricula that align to current state standards.

- S1. Engage industry and education community members in a curriculum development coalition to assess curriculum needs.
 - A1. Utilize a curriculum committee made up of educators, industry and community representatives.
- S2. Maintain a process by which curriculum will be reviewed annually for relevance, reception, effectiveness, workforce connection, and alignment with state standards.
 - A1. Seek out industry participation for development of cutting edge curricular content.
 - A2. Assess the interest of students and educators through participation in a survey regarding programs taught on the Utah STEM Bus (USB).
 - A3. Conduct an ongoing program introducing new, relevant, and cutting edge USB curriculum using an established policy.
 - M1. Track industry participation in program development and sponsorship.
 - M2. Track the Number of USB classes requested and taught statewide.
 - M3. Assess pre and post awareness and enthusiasm for further STEM study.

02. Provide high quality and effective instruction of STEM content.

- S1. Deliver relevant, engaging training that opens the minds of K-12 students to potential educational and career opportunities in STEM.
 - A1. Ensure the needs of rural, low-income and opportunity challenged populations are specifically addressed using curriculum that engages all students.
- S2. Make equipment and resources available, which may not always be accessible in traditional school communities.
 - A2. Teach only curriculum that has been vetted by industry and education partners and aligns with state educational standards.

03. Maintain community engagement with STEM Action Center and Utah STEM Bus.

- S1. Provide outreach programs that introduce STEM and connects communities with the STEM Action Center.
 - A1. Engage community through professional development through parent, community and industry events.
 - A2. Be a strong advocate for all STEM Action Center programs within communities served by the USB.
 - M1. Regularly review parent, student and educator awareness and support for the Utah STEM Bus program.





O4. Implement a sustainability plan which provides ongoing support and program growth.

- S1. Provide a connection point where industry can find resources to fulfill their STEM interests.
 - A1. Coordinate with the Utah STEM Foundation.
 - A2. Secure on-going financial and in-kind support to provide program consumables and curriculum development.
 - A3. Align USB programing with donor/sponsorship interests.
 - A4. Provide USB grants as funding is made available.
 - M1. Track USB program donations made through the STEM Action Center.
 - M2. Track the number of companies engaged with the Utah STEM Bus annually.
 - M3. Track the number of Utah STEM Bus grants awarded to schools annually.
- S2. Establish a volunteer program that supports Utah STEM Bus programs and curriculum development.
 - A1. Identify potential sources of volunteers.
 - A2. Utilize volunteers in program development and delivery.
 - M1. Track the number and hours of volunteers supporting the USB.

- S3. Provide USB programing to school community councils, community organizations, and parent organizations that reach beyond standard “on bus” student instruction.
- A1. Provide instruction opportunities for parents, educators and organizations supporting public education.
 - A2. Monitor demand for USB usage to determine appropriate program expansion.
 - A3. Have a process by which USB curriculum can be taught in a classroom when the bus is not available.
- S4. Maintain transparency of the program sufficient to meet legislative oversight and provides access points for parents, educators and industry.
- A1. Post quantitative and qualitative information about STEM Bus activities and accomplishments.
 - M1. Track total number of engagements with schools, industry and community organizations.

1. HB 150/214 Line 37 Expands the scope of the STEM education related technology program to more students.



STEM for Life

Funding from Intermountain Healthcare was awarded in May 2016.

The STEM for Life program promotes STEM Education through healthcare and healthy lifestyle themes.¹

01. Educate Utah students about the healthcare careers that exist in the state, and encourage them to pursue those careers in the future.

- S1. Use hands-on lessons, with real world applicability and clear career ties, to teach STEM in the classroom.²
 - A1. Select groups of Utah teachers to produce targeted modules that teach students about careers through hands-on activities and real world application.
 - A2. Ensure quality modules are submitted and compliance of participating teachers through clear project expectations.
 - A3. Create a repository of completed modules to be accessible to all Utah teachers.
- M1. Number of completed modules submitted to STEM AC at the end of the school year.



- S2. Provide junior high and high school teachers with first-hand experiences of STEM careers that exist within the healthcare field so they will be better prepared to educate their students in the classroom.³
 - A1. Hold summer field trip opportunities for teachers, with multiple site visits over the course of two days.
 - A2. Holding regional Super Tours to ensure the careers teachers are exposed to are most applicable for their students.
 - M1. Pre and post surveys for participating teachers collected during Super Tours.
 - M2. Completed lesson plans submitted to STEM AC within a month of Super Tour.
- S3. Ensure program sustainability.
 - A1. Use the Super Tours as an opportunity to recruit new cohorts of teachers for module development in the following school year.
 - M1. Number of industry partners invested in the program.

02. Encourage increased industry support of integrated STEM in healthcare education.

- S1. Highlight the unique state/industry partnership of the STEM for Life program.

1. HB 139/2013 Line 40-43 states that the STEM AC work with industry to obtain private funding
2. HB 139/2013 Line 180 requires the STEM AC to provide assistance for Utah students
3. HB 139/2013 Line 180 requires the STEM AC to support professional development for educators



Operational Support

Utah STEM Foundation¹

Who we are:

The Utah STEM Foundation is the 501c3 non-profit fundraising arm of the Utah STEM Action Center, created in May 2016. The STEM Foundation was created by legislative mandate to:

- Enhance STEM funding and resource opportunities.
- Create sustainable programs that will:
 - Connect industry to the classroom.
 - Increase STEM workforce opportunities in Utah.

What Does Success Look Like for The Utah STEM Foundation?

- Attracting new investors and companies while supporting the expansion of existing Utah businesses by providing STEM-capable talent.
- Supporting the Governor’s commitment to education and industry as partners in economic development.
- Leveraging resources to increase impact in education and workforce alignment.
- Increased investment in STEM education by Utah companies.
- Promote Utah as a talent savvy state.
- Increased collaboration between K-16, industry and community.
- Increase the number of Utah companies that hire students prepared with STEM skills.

The Utah STEM Foundation will address these issues through its programs and the STEM Action Center’s program objectives, strategies and actions:

01. Identify program focus areas in the near and long-term to enable the Foundation to meet its fundraising goals, as well as organizational purposes.

S1. Develop a programing plan.

- A1. Create a programing and design committee.
- A2. Analyze collaborators and competitors programs for insights.
- A3. Draft a list of potential programs, as well as suggested programs already initiated by the STEM Action Center.

- M1. Working with the Utah STEM Foundation board, Policies and Procedures documents will result from adopted programs.



02. Follow a Fundraising and Financial Development Plan to provide a corporate level of awareness supporting STEM education.

Establishing a Development Plan will allow the Foundation to outline potential sources of income and generate a plan for how income will be spent.

- S1. Identify additional strategic partners.
 - A1. Create and maintain a donor database.
 - A2. Utilize Utah STEM Foundation Board and STEM Action Center contacts for potential funding.
 - M1. With the STEM Action Center and the STEM Foundation Board participation, focus on a target number companies each month for possible relationship and funding opportunities.
- S2. The STEM Action Center Board will create fundraising goals.
 - A1. Cultivate existing donors and expand donor pool through active research and networking.
 - M1. The Utah STEM Foundation will set yearly goals based on programs selected and projected support from targeted donors.
 - M2. Grant and donation follow up, documenting, and reporting with each donation.
 - M3. File all appropriate tax forms and certification renewals.
- S3. Facilitate partnerships and create programs that will promote advocacy of STEM efforts in the State of Utah.
 - A1. Create inaugural and annual events to introduce each program or collaboration.
 - M1. Establish strategic sub-committees that align with programs initiated through STEM Action Center and Utah STEM Foundation.

03. Establish an endowment that will align STEM education with the talent needs of Utah's workforce companies.²

- S1. Create endowment allocations for each program that the STEM Action Center fund.
 - A1. Collaborate with nonprofit community organizations, government entities and other corporations, which are currently involved with entrepreneurship and STEM equity for underserved populations to expand more resource opportunities.
 - A2. Engage industry to provide STEM mentoring and support of these specific programs.
 - M1. Track corporate investment (cash and in-kind).
 - M2. Document partnerships that result in innovation and effective program design and development.
 - M3. Provide more staff to assist in fundraising efforts.

1. HB 150/ 2014 line 3, allows the STEM Action Center Board to create a foundation

2. HB426/ 2017 line 1, UCA#63N-12-204

Operational Support

Marketing/Communications Outreach & Engagement

The STEM Action Center Marketing/Communications office will promote STEM state-wide and where applicable nationally. These efforts will be undertaken to ensure the STEM Action Center remains essential to building partnerships to industry and community in an effort to assure Utah's long-term economic prosperity.¹

01. Create an agency strategy that addresses the Standard Target Audience (STA) of legislators, teachers, students, parents, administrators & industry members.

- S1. Maintain a regular communications outreach to STA through the media and direct mail, email and social media.
 - A1. Establish STEM awareness and relationships with key media organizations/departments. (i.e. KUTV, KSL, KUTV, Fox 13, KSL Radio)
 - A2. Create weekly high impact spotlights for legislators that feature their school district.
 - A3. Maintain a set of specific legislator based activities and information.
 - M1. Track the number of media stories, spotlights, legislator contacts and districts covered.

02. Execute marketing plan which will include media outreach, and social connectivity with the Standard Target Audience (STA).

- S1. Maintain the STEM Action Center's website with news, events and technical programmatic updates.
 - A1. Update news page on website and events page weekly.
 - M2. Quarterly verify that all content is current.
 - M1. Track the number of page visitors, page clicks and bounce rate.
 - A2. Include and update legislative mandated resources such as best practices and relevant legislation bills.
 - A3. Address all programmatic needs in regular meetings with program directors.
- S2. Monthly newsletter and weekly spotlight updating community on STEM opportunities and success in the state.
 - A1. Create newsletter that includes upcoming events, news around the state, grant opportunities and other STEM highlights.



- A2. Maintain template email for program directors to send spotlights that feature their program to be sent to legislators in targeted school districts.
 - M1. Track the number of newsletter open rates and increased newsletter sign ups.
 - M2. Track total number of created spotlights and open rate.
- S3. Maintain social media presence that furthers objectives through daily posts.
 - A1. Maintain regular contact with standard target audience including key legislators, school districts, industry partners etc.
 - M1. Track monthly: number and type of posts, number of followers, views, likes & clicks.
 - A2. Use all relevant social media applications such as Facebook, LinkedIn, Instagram etc. to reach STA.
 - M1. Increase in social media following; increase in post engagement from Google Analytics.

03. Create STEM managed events and sponsor external events that support the mission objectives of the agency programs and further the overall mission of the agency.²

- S1. Oversee STEM created events including STEM Fest and STEM Best Practices.
 - A1. Utilize STEM Fest as a tool to build “ownership” and support with each part of the Standard Target Audience, specifically focused on improving support for the STEM Action Center with parents and legislators.
 - A2. Oversee STEM Best Practices event for teachers, to assist in meeting specific professional development objectives as defined by the Utah State Board of Education.
 - M1. Track the number of attendees at each event.
 - M2. Administer feedback surveys from each event to the standard target audience.
- S2. Exhibit and sponsor, when appropriate, to facilitate objectives at key STEM events across the state not “owned” by STEM Action Center.
 - A1. Coordinate activities and events with outside agencies, such as Women’s Tech Council, Utah Technology Council, Utah Jazz, CS/IT Industry Partners & educational institutions.
 - M3. Number of students/teachers impacted; engagement increase in social media.
- S3. Manage STEM Ambassador volunteers who assist with program and event implementation.
 - M1. Record number of hours each volunteer logs.

1. HB139/2013 Lines 163-197. In support of the responsibilities of the board the STEM Action Center will engage the stakeholders in the state, including children, educators, and industry in order to meet the objectives outlined in the creation of the Action Center

2. HB 139/2013 Lines 94-107 require the STEM Action Center to provide informational resources in support of the Center programs, including but not limited to, education, camps, grants and, programs created by the Center to fulfill its mission.

Logic Model: K-12 Math Personalized Learning

What do you want to accomplish?
Applications of digital math programs in order to increase student awareness, engagement, and interest in mathematics [ask vendors to confirm their intended goals]

Order of planning

RESOURCES	PROCESSES/ACTIVITIES	IMPLEMENTATION	EDUCATOR OUTCOMES	STUDENT OUTCOMES
Vendors **Ask vendors what resources they provide	In-class and at home use of digital math programs	Quantity: # of licenses requested, distributed, used; changes from previous years	Teachers perceive increased instructional effectiveness (e.g., more differentiation, less time needed for remediation, more targeted instruction on specific skills, use of data reports)	Teacher perceptions of changes in student learning
Partners (USBE, LEAs, LEA teacher leaders)	Vendor support for implementation, training, presentations for teachers	% of targeted students with access (home & school)	Teachers understand the tool and maximize use of features in an intentional way	Changes in student math
School technological readiness: availability of technology; internet connection; IT support	Availability/accessibility of technical assistance for teachers. Differentiation of instruction for teachers	% of students meeting fidelity measures Minutes spent on program Frequency that teachers use data reports	Teachers have procedures to promote fidelity to the program Teachers perceive increased parent engagement (<i>discuss with vendors</i>)	*Awareness *Engagement *Interest (e.g., increased use of other digital programs; smaller decrease relative to controls) *Perceived utility
Home technological resources (student access to technology and internet)	Criteria for distribution & use (vendor recommendations and LEA actual practice)	Quality: Perceived quality by students, LEAs, teachers, IT, administrators (e.g., preference for digital format, product fatigue, vendor support, ease of use; program requirements; admin support)	Improved math SAGE results *Proficiency *Growth percentile *Raw scores *Interactions with product type, grade level, usage type, demographic variables, schools/teachers, teacher use reports	
Teacher readiness to adopt technological tools	Factors that facilitate or impede use (e.g. teacher and admin experience and attitudes about tech)	Integration of program with instructional plans		

Order of implementation

MTSS - Multi-tiered system of support; RTI 1) bring struggling students up to speed, 2) give to students to progress beyond, 3) main way is supplement to regular instruction (cyclical review, etc.) Regular assignment with remedial pieces. 4) quizzes and tests (allows students to have multiple attempts and master the material with immediate feedback.) 5) credit recovery.

Logic Model: Professional Learning

What do you want to accomplish? Implement STEM Professional Development in order to increase TPACK and its applications				
Order of planning				
RESOURCES	PROCESSES/ACTIVITIES	IMPLEMENTATION OUTCOMES	EDUCATOR OUTCOMES	STUDENT OUTCOMES
Edivate and other PD providers	PD must address both content knowledge and pedagogical skills.	Quantity: # of licenses requested, distributed, used; changes from previous years	Teachers perceive increased instructional effectiveness (e.g., more differentiation, less time needed for remediation, more targeted instruction on specific skills, use of data reports)	Teacher perceptions of changes in student's STEM
Partners (USBE, LEAs, LEA teacher leaders, teachers)	Vendor support for teachers and leaders for implementation, training, presentations	Participation levels (# of licenses requested, # allocated, # used, comparison to prior years, who is using – teachers or coaches, etc.), % PD used for STEM vs. other areas	Teacher reports of: *increased content knowledge *increased technological knowledge and skill *increased pedagogical knowledge and skill *perceived impact of PD on teaching practices (quality, effectiveness, amount) *confidence *teacher perceptions of abilities to integrate STEM into instruction.	*Awareness *Engagement *Interest *Learning
School support for instructional changes	In years 1 - 3, use was exploratory. In year 4+, more structure has been provided. Exploration may also take place. Structured plans are also required for non-Edivate sites.	Depth of teacher engagement in the PD (how many of each type, length of PD)	Teacher professional satisfaction (inc. turnover)	Improved STEM SAGE results by teacher PD type and use
Time provided for PD by the LEA or school	Structured plans are also required for non-Edivate sites.	How many teachers are reaching fidelity within Edivate (20 mins/month minimum)	Teachers report increased interest and comfort with self-reflection and videos, including use beyond the requirements (incorporate self-reflection into their teaching practice)	*Proficiency percentile *Raw scores *Interactions with grade level, usage type, demographic variables, schools/teachers
Technological resources and support needed for the type of usage of the PD tool (e.g., uploading videos, etc.)	District leadership participation/buy-in Availability/accessibility of technical assistance for teachers.	Quality: Perceived quality of the delivery system and the content by LEAs, teachers, IT, administrators (e.g., vendor support, ease of use; program requirements; admin support)		
District leadership participation/buy-in	Quarterly check-ins and review of help tickets and usage to identify schools that may need help.	Teacher perceptions of usefulness of self-videos and self-reflections; was there appropriate hardware and tech support to support this component What were the barriers and what factors facilitated ease of use Integration of the program into teacher learning plans		
Templates and other support provided by STEM AC		Teacher perceptions of cost and benefit (is the PD perceived as burdensome?)		

Order of implementation

Logic Model: Elementary STEM Endorsement Program

What do you want to accomplish?
Implement STEM endorsement programs in order to increase TPACK and its applications

Order of planning

RESOURCES	PROCESSES/ACTIVITIES	IMPLEMENTATION OUTCOMES	EDUCATOR OUTCOMES	STUDENT OUTCOMES
<p>Course frameworks</p> <p>Partners (USBE, higher ed institutions, LEAs, LEA teacher leaders, teachers)</p> <p>Course text books</p> <p>STEM expertise</p> <p>Deep understanding of the state STEM endorsement design, implementation processes, and collaborations</p> <p>Financial incentives</p> <p>Commitment to quality evaluation and stakeholder engagement</p> <p>School support for instructional changes</p>	<p>6 course frameworks; courses completed over 2 years</p> <p>LEAs must identify a higher ed partner</p> <p>Mix of in-person and online instruction (blended learning model)</p> <p>Instruction must address both content knowledge and pedagogical skills.</p> <p>District/school leadership support for implementing changes</p> <p>Cohort check-ins by STEM AC</p>	<p>Quantity Attrition or STEM endorsement coursework to completion</p> <p>Time to completion</p> <p>Quality Teacher satisfaction, perceptions of quality</p> <p>Teacher and instructor perceptions of gaps in content</p> <p>Differences between the programs (how many are using university professors, district instructors or industry partners; length of program; delivery method; emphases within the framework, etc.)</p> <p>What were the barriers and what factors facilitated participation</p> <p>Teacher perceptions of cost and benefit (was it worth their time)</p> <p>For formative purposes, disaggregate by program as well as university based programs vs. alternative formats</p>	<p>Teachers perceive increased instructional effectiveness (e.g., more differentiation, less time needed for remediation, more targeted instruction on specific skills, use of data reports)</p> <p>Teacher reports of: *increased content knowledge *increased technological knowledge and skill *increased pedagogical knowledge and skill *perceived impact of endorsement courses on teaching practices (quality, effectiveness, amount) *confidence *teacher perceptions of abilities to integrate STEM into instruction.</p> <p>Teacher professional satisfaction (inc. turnover)</p> <p>Impact on professional advancement, perceived employment options</p> <p>Changes in lesson plans (pre to post)</p>	<p>Teacher perceptions of changes in student's STEM</p> <p>*Awareness *Engagement *Interest *Learning</p> <p>Improved STEM SAGE results *Proficiency *Growth percentile *Raw scores *Interactions with grade level, usage type, demographic variables, schools/teachers</p>

Order of implementation

Program Performance and Accountability Matrices

K-12 Math Personalized Learning						
Activity, Statute & Funding	Statutory	Performance Measures	Performance Impact FY15	Performance Impact FY16	Performance Goals FY17	Outcomes
<p>Create a K-12 Math Personalized Learning program which is evaluated annually by an independent third party evaluation team, HB150, 63M-1-3205, FY14-16, all one time: \$5M (K-5) \$3.5M (6-8) \$5M (9-12) FY17: \$3M ongoing (K-12)</p>	<ul style="list-style-type: none"> Select one or more products that: Support math instruction Provide individualized instruction Self-adapt Support informal assessments Embed monitoring and feedback mechanisms Create process for school selection Provide professional development that trains educators on use of products Support independent evaluation 	<ul style="list-style-type: none"> Percent usage (overall and at fidelity) Increased likelihood of grade level proficiency as determined by SAGE scores Teacher satisfaction with qualitative feedback Student satisfaction with qualitative feedback LEA participation Competitive license cost 	<ul style="list-style-type: none"> 11 products selected 74 districts and charters 653 schools 193,213 students 78% usage 9% fidelity 21,414 surveys completed 	<ul style="list-style-type: none"> 9 products selected 51 districts and charters 556 schools 168,389 students 80% usage 49% fidelity 30,371 surveys completed 	<ul style="list-style-type: none"> Increase usage with fidelity Visit and support LEA's with low usage Visit LEA's with high usage to understand learning environment Continue teacher training Implement changes to contracts and RFP, with new funding Evaluate program effectiveness by grade level on a standardized measure 	<ul style="list-style-type: none"> Increased support for student success in math Increased support to teachers to supplement instruction Improved opportunities for intervention and personalized instruction Improved access to data to inform instructional design

Classroom, Organizational & FCC Grants

Activity, Statute and Funding	Performance Measures	FY16 Performance Impact	FY17 Performance Goals	Outcomes
Classroom Grants, HB139 63M-1-3204, Operational budget	1) Budget contribution 2) # of teacher participants 3) Teacher feedback 4) # of students impacted 5) Cost per student 6) Teacher feedback	<ul style="list-style-type: none"> • \$77,270 contributed • 280 applicants, 61 awarded • 9,883 students impacted • \$7.81/student 	<ul style="list-style-type: none"> • Measure student impact • Inform STEM best practices to improve teacher practice in classrooms statewide • Create a repository of great STEM ideas for teachers to pull from • Showcase exemplar teachers 	<ul style="list-style-type: none"> • Increased resources in classrooms • Increased direct support of educators
Organizational Grants, HB139 63M-1-3204, Operational budget	1) Budget contribution 2) # of organizations supported 3) # of students impacted 4) Cost per student 5) Student feedback	<ul style="list-style-type: none"> • \$30,425 contributed • 16 organizations funded • 4,519 students impacted • \$6.73/student 	<ul style="list-style-type: none"> • Provide unique STEM opportunities for students outside of the classroom 	<ul style="list-style-type: none"> • Increased statewide access for students • Increased community awareness
STEM Assembly Program (STEM Magic Show), HB139 63M-1-3204, Private funding	1) #of shows conducted 2) # of students impacted 3) Teacher and student feedback 4) Amount of private contribution	<ul style="list-style-type: none"> • New program • \$10,000 private donation to pilot 	<ul style="list-style-type: none"> • Host at least 30 show • Impact more than 20,000 students • Maintain \$10,000 private donation 	<ul style="list-style-type: none"> • Increased student awareness
Utah STEM Fest, HB139 63M-1-3204, \$17,251 operational	1) # of exhibitors 2) # of students attending 3) # of LEAs participating 4) # of attendees on family night 5) # of bus scholarships provided 6) Participant feedback 7) STEM AC contribution 8) Private contribution	<ul style="list-style-type: none"> • 66 exhibitors • approx. 17,000 students attending • 78 LEAs participated • approx. 3,500 attendees on family night • 51 bus scholarships • \$17,251 contributed • \$137,000 private contribution 	<ul style="list-style-type: none"> • >21,000 students • >6,000 evening attendees • at least 80 LEAs participating • at least 60 bus scholarships 	<ul style="list-style-type: none"> • Increased student awareness • Greater connection to careers
Public Awareness, HB139 63M-1-3204	1) # of page views on website 2) # of new users on website 3) # of new sessions on website 4) # of Facebook page likes 5) # of Twitter followers 6) # of Instagram followers 7) # of LinkedIn followers 8) # of Google+ followers 9) Website bounce rate	<ul style="list-style-type: none"> • Website: 106,517 page views; 33,325 new users; 47,271 sessions • Social media: Facebook(1,020); Twitter (689); Instagram (150), LinkedIn (122); Google+ (16) • 111% increase • Low bounce rate 	<ul style="list-style-type: none"> • Website: 106,517 page views; 33,325 new users; 47,271 sessions • Social media: Facebook(1,540); Twitter (900); Instagram (225), LinkedIn (184); Google+ (24) • 111% increase • Low bounce rate 	<ul style="list-style-type: none"> • Greater awareness of STEM • Increased use of resources
Event Sponsorships, HB139 63M-1-3204, \$64,470 operational	1) Budget contribution 2) # of events sponsored 3) # of total participants 4) Participant feedback	<ul style="list-style-type: none"> • \$64,470 contributed • 26 events sponsored • 63,321 participants 	<ul style="list-style-type: none"> • 30 events • 70,000 students 	<ul style="list-style-type: none"> • Increased opportunity and access for students
Fairs, Camps and Competitions Grants, HB139 63M-1-3204, Operational budget	1) Budget contribution 2) # of student participants 3) Student feedback 4) Cost per student	<ul style="list-style-type: none"> • \$217,740 contributed • 1,113 student participants • \$196/student • 660 applicants • 257 awarded 	<ul style="list-style-type: none"> • Project on hold • Re-examine management and cost effectiveness 	<ul style="list-style-type: none"> • Greater access to activities and events • Increased interest in STEM

Professional Learning					
Activity, Statute, Funding	Statutory	Performance Measures	FY16 Performance Impact	FY17 Performance Goals	Outcomes
Design and implement a PL program, HB150 63M-1-3209, FY14 –FY17, \$5M ongoing	<p>1) Select one or more product providers that provide professional learning support that:</p> <p>2) Allows for SBOE, district or school to define the application content and track results</p> <p>3) Provides access to automatic tools, resources and strategies including instructional materials with integrated STEM content</p> <p>4) Supports online learning communities, including giving and receiving feedback via uploaded video</p> <p>5) Track and report data on usage</p> <p><i>Includes video of highly effective STEM education teaching that:</i></p> <p>a) Covers a cross section of grade levels and subjects</p> <p>b) Works USBE to ensure that videos will include highly effective Utah STEM educators</p> <p>c) Allow for additional STEM content to be added</p> <p>d) May create hybrid or blended professional learning that allows for face-to-face learning</p>	<p>1) # of teachers participating</p> <p>2) # of grants awarded</p> <p>3) License usage, where appropriate (overall and fidelity)</p> <p>4) # of LEAs participating</p> <p>5) # of schools participating</p> <p>6) # of surveys returned for qualitative assessment</p> <p>7) # of teachers trained on license, where appropriate</p> <p>8) # of videos created</p> <p>9) Type of videos viewed</p> <p>10) Qualitative assessment with teacher feedback</p> <p>11) # of teacher videos uploaded</p> <p>12) Evaluate changes in classroom instruction between pre & post video shared by teachers</p> <p>13) Evaluation of student performance</p>	<ul style="list-style-type: none"> 1 product supported (1 dropped at end of FY15) 78 grants awarded 18,938 licenses provided (18,093 requested) 41 LEAs participating 581 schools 2,563 in product provider training 5,453 teachers used licenses 50 videos produced by product provider 258 surveys completed and submitted Summary of types of videos viewed in final report: key finding, 90% of videos viewed were classroom management Summary of teacher feedback in final evaluation report: key finding, disconnect in teachers versus administrator satisfaction 	<ul style="list-style-type: none"> Increase usage Continue teacher training Scale up 2.0 Look for ways to utilize Edvivate platform for other STEM AC projects (math, CTE etc.) Offer additional funds to support Edvivate usage with face to face STEM professional Learning Learning Experience pilot for Digital Math program teachers 	<ul style="list-style-type: none"> Improved classroom management Increased confidence in STEM instruction Increased ability to implement lessons that cross content areas Increase student understanding and engagement

Elementary STEM Endorsement					
Activity, Statute, Funding	Statutory	Performance Measures*	FY16 Performance Impact	FY17 Performance Goals	Outcomes
Create and Implement elementary STEM endorsement, HB150 63M-1-3208, FY14-18, \$1.5M (one time)	<ul style="list-style-type: none"> Collaborate with USBE Develop STEM endorsements Create and implement financial incentives Support incentives for higher education credit (district) or impact salary schedule (charter) 	<ol style="list-style-type: none"> # of teachers participating # of LEAs participating # of institutions of higher education (IHE) participating # of teachers completing qualitative assessment with teacher feedback (pre- and post surveys) institution feedback on quality of instruction 	<ul style="list-style-type: none"> 332 teachers participated 23 LEAs represented 7 institutions of higher education providing courses 	<ul style="list-style-type: none"> Document # of teachers that completed the endorsement sequence (retention rate) Review of Course Frameworks with intent for refinement based on implementation and evaluation Sharing of best practices amongst cohorts 	<ul style="list-style-type: none"> Greater awareness of STEM Improved integration of STEM across curriculum Creation of peer networks

STEM School Designation				
Funding	Statutory	STEM AC activity	FY16 Outcomes	FY17 Performance Goals
	<ul style="list-style-type: none"> Cooperate with USBE Designate STEM schools Identify criteria Establish implementation plans 	<ul style="list-style-type: none"> Identify criteria USBE and STEM AC Board approve Create implementation plan Solicit applications Review applications with stakeholder review team 	<ul style="list-style-type: none"> 42 applications in first cohort 19 selected 	<ul style="list-style-type: none"> create network of awardees and applicants for support add to list of STEM designated schools create list of interested future applicants and provide application support

High School STEM Certification				
Activity, Statute, Funding	Performance Measures	FY16 Performance Impact	FY17 Performance Goals	Outcomes
<p>Create certifications that are industry recognized, HB150 63M-1-3211, \$5M (one time)</p>	<p>Performance Measures</p> <p>FY16</p> <ol style="list-style-type: none"> 1) # of students entering certification programs 2) Documentation of new emphasis areas for certifications 3) # of new programs created 4) # of students completing certification programs 5) # of internships completed 6) # of partners (secondary and post-secondary) 7) # of new industry partners <p>FY17</p> <ol style="list-style-type: none"> 1) # of new CS courses created 2) # of new CS teachers recruited (endorsements, code.org training, K-6 training for CS Fundamentals) 3) # of new students participating in CS courses (breakdown by 8-12 grades, approved courses; baseline will be established using current USBE enrollment data for FY16) 4) # of new outreach programs 5) # of students participating in outreach programs 6) hours of industry engagement (with financial match of time) 7) # of students participating in work-based learning activities 8) amount of private contribution (combined with match of volunteer time) 9) # of K-6 schools offering coding opportunities (e.g., Scratch, Hour of Code) 10) # of hours of industry instruction 11) # of students from underrepresented populations participating in all supported activities 	<p>FY16 Performance Impact</p> <ul style="list-style-type: none"> • 6,919 students participated in certification pathways • 4,791 completed certifications • 639 completed internships • 12 grants awarded • 17 LEA's participated • 14 universities and technical colleges participated • 44 industry partners 	<p>FY17 Performance Goals</p> <ol style="list-style-type: none"> 1) Increase the number of qualified CS teachers 2) Increase the number of CS courses in secondary 3) Increase out of school CS opportunities 4) Increase access to coding in K-6 5) Work with districts to identify key investments required to implement a CS curriculum. (Data based on CS RFG) 6) Improve industry engagement in the classroom 7) Increase the participation of underrepresented populations in CS courses 	<p>Outcomes</p> <ul style="list-style-type: none"> • Continue to collect for impact data • Monitor sustainability • Leverage programs for other opportunities • Increase the number of teachers undergoing computing professional development • Greater employment opportunities for students in high demand STEM careers

7th and 8th Grade Applied Science Initiative (CTE)

Activity, Statute, Funding	Statutory Goals	Performance Measures	Performance Impact FY 16	Outcomes
<p>Support hands on instruction in 7th and 8th grade science courses, FY14-15:\$3.5M (one time)</p>	<ul style="list-style-type: none"> • Develop an applied science initiative for grades 7 and 8 that includes: <ul style="list-style-type: none"> • Curriculum with instructional materials • Hybrid or blended high quality PD that allows for face-to-face applied learning • Hands on tools for applied science learning • Using an RFP process the Center may select a consultant 	<ol style="list-style-type: none"> 1) # of curriculum resources selected 2) # of participating LEAs 3) # of students impacted in 7th and 8th grade courses 4) teacher satisfaction using qualitative feedback 5) student satisfaction using qualitative feedback 6) # of teachers using curriculum materials 	<ul style="list-style-type: none"> • 4 products selected and resources allocated • 2,815 licenses used* • 49,853 students impacted (about 50% of 7th and 8th grade students) • 74 schools participated • 38 LEAs represented • 3,218 surveys collected (3,120 students and 98 teachers) • feedback from teachers and students included in FY16 annual report; key finding: the majority of teachers want to continue to use resources, students report to have a strong interest in STEM-related areas 	<ul style="list-style-type: none"> • Increase access to hands on, applied learning for students • Enhance problem-based learning • Facilitate teacher-to-teacher training for lesson alignment

Utah STEM Bus - USB					
Activity, Statute, Funding	Statutory	Performance Measures	Performance Impact FY16	Performance Goals FY17	Outcomes
HB 150/2014 Line 37	Expands the scope of the STEM education technology program to more students	<ul style="list-style-type: none"> - Industry Participation in programs and funding -USB classes taught -statewide -Pre and post surveys of students and educators -Donations received through the STEM foundation -Number of Companies Engaged with USB -USB grants awarded to schools -Number of hours of volunteer support -Engagements with Schools, industry and community organizations 	<ul style="list-style-type: none"> -Partnered with 13 organizations for program development -Implemented 7 curriculum -Taught a total of 3,287 students in 132 classes at 19 schools, in 16 LEAs 	<ul style="list-style-type: none"> -Develop curriculum committee -Update current curriculum -Add 2-4 new curriculum -Teach in 40 schools 4,000 students -Present the Bus at 20 events 	<ul style="list-style-type: none"> -Increased demand for USB Programs -Increased community awareness of the USB -Increased interest in STEM education and careers

Utah STEM Foundation

Activity, Statutory (HB150 63M-1-3203)	Performance Measures	FY16 Performance Impact	FY17 Performance Goals	Outcomes
<ul style="list-style-type: none"> • Develop and implement programs authorized to Promote STEM Education; and Implementation of other STEM education objectives • Solicit and receive contributions from a private organization for STEM education objectives • Comply with Title 51, Chapter 7, State Money Management Act; • Foster partnerships with industry partners to enhance STEM Education in Utah 	<ul style="list-style-type: none"> • Private contributions for program support • Private contributions for endowment 	<ul style="list-style-type: none"> • Boeing • Comcast • IM Flash • Larry H. Miller • MHTN (in kind design work) • Rockwell Collins • Tesoro • IHC • VCBO (in kind design work) 	<ul style="list-style-type: none"> • Ongoing outreach to community and industry leaders • Leverage funding opportunities and program development • Finalize Foundation Board • Hold an inaugural Foundation and program event • Create a strategic and communication plan • Fundraising goal of (\$250,000 to \$500,000 – based on 1 person working 12-20 hours per week) 	<ul style="list-style-type: none"> • Awarded \$1.5 Million Tesoro for the creation of the Utah STEM Bus • UTA donated 2 transit buses and a transit van • Pro-bono work from architecture firms for bus schematics • Mentorship program created with students for bus schematics • Greater industry involvement • Increased support for STEM opportunities for students and teachers

Authorizing Code & Bills

U.C.A. 63M-1-3201-3211

The STEM (Science, Technology, Engineering and Math) Action Center prioritizes STEM education, which works to develop Utah’s workforce of the future. The program drives research and implementation of STEM education best practices across Utah by coordinating STEM-related activities, creating and supporting STEM education, facilitating educator access to education tools, and aligning public STEM education with higher-education STEM activities.

In order to advance STEM initiatives, the STEM Action Center Board will use legislative funding to oversee several projects that align with K-12 education and support the Utah State Office of Education and higher education partners. These programs address issues that support outreach, recruitment, retention and student achievement

Additionally, the STEM Action Center will align technology and innovation with industry needs and higher education initiatives to ensure development of the future workforce. This will be a safeguard to the state’s economic prosperity by ensuring there is a workforce ready to take on the high-quality and high-paying STEM related careers.

HB 139

**SCIENCE, TECHNOLOGY, ENGINEERING, AND
MATHEMATICS ACTION CENTER
2013 GENERAL SESSION
STATE OF UTAH
Chief Sponsor: Val L. Peterson
Senate Sponsor: Stephen H. Urquhart**

26 This bill creates educational programs for science, technology, engineering, and
27 mathematics (STEM).
28 Highlighted Provisions:
29 This bill:
30 creates a Science, Technology, Engineering, and Mathematics (STEM) Action
31 Center Board;
32 requires the STEM Action Center Board to:
33 establish a STEM Action Center; and
34 appoint an executive director to oversee administration of the STEM Action
35 Center;
36 requires the Governor’s Office of Economic Development to staff the STEM Action
37 Center Board and the STEM Action Center;
38 requires the STEM Action Center Board to select providers, through a request for
39 proposals process, to provide education related instructional technology;
40 requires the STEM Action Center Board to work with private industry to obtain
41 private funding and support for the STEM Action Center;
42 as funding allows, requires the STEM Action Center Board to perform certain
43 duties related to the STEM Action Center;

44 requires the executive director to track student achievement and progress in STEM
45 areas;
46 requires the STEM Action Center Board to report to the Education Interim
47 Committee, the Public Education Appropriations Subcommittee, and the State
48 Board of Education once each year;
49 creates the STEM education related technology program;
50 allows the State Board of Education staff and STEM Action Center staff to award
51 STEM education related instructional technology and related professional
52 development to school districts and charter schools for instructional technology for
53 STEM related education if certain conditions are met;
54 specifies criteria to consider in selecting STEM education related instructional
55 technology;
56 provides that certain education related instructional technology may be acquired
57 through a direct award or sole source procurement process for purposes of conducting a pilot;
58 and
59 eliminates certain duties of the State Advisory Council on Science and Technology
60 related to science and technology fairs and camps.

61 Money Appropriated in this Bill:

62 This bill appropriates in fiscal year 2014:

63 to Governor's Office of Economic Development - STEM Action Center, as an
64 ongoing appropriation:

65 from the General Fund, \$1,500,000; and

66 to Governor's Office of Economic Development - STEM Action Center, as a
67 one-time appropriation:

68 from the General Fund, \$8,500,000.

69 Other Special Clauses:

70 This bill provides an effective date.

71 Utah Code Sections Affected:

72 AMENDS:

73 63M-1-608, as renumbered and amended by Laws of Utah 2008, Chapter 382

74 ENACTS:

75 63M-1-3201, Utah Code Annotated 1953

76 63M-1-3202, Utah Code Annotated 1953

77 63M-1-3203, Utah Code Annotated 1953

78 63M-1-3204, Utah Code Annotated 1953

79 63M-1-3205, Utah Code Annotated 1953

80 63M-1-3206, Utah Code Annotated 1953

81 63M-1-3207, Utah Code Annotated 1953

82

83 Be it enacted by the Legislature of the state of Utah:

84 Section 1. Section 63M-1-608 is amended to read:

85 63M-1-608. Science education program.

86 (1) (a) There is established an informal science and technology education program
87 within the Governor's Office of Economic Development.

88 (b) The state science advisor shall act as the executive director of the program.

89 (c) The State Advisory Council on Science and Technology shall advise the program,
90 including:

91 (i) approving all money expended by the science and technology education program;

92 (ii) approving all operations of the program; and

93 (iii) making policies and procedures to govern the program.

94 (2) The program may:

95 (a) provide informal science and technology-based education to elementary and

96 secondary students;

97 (b) expose public education students to college level science and technology

98 disciplines; and

99 [(c) administer a science and technology camp program; and]

100 [(d)] (c) provide other informal promotion of science and technology education in

101 [this] the state[, including the direct sponsorship of science fairs and science olympiads].

102 [(3) The science and technology camp program described under Subsection (2)(c) shall

103 be:]

104 [(a) provided exclusively for elementary and secondary students and their teachers;]

105 [(b) established as a grant program for camp providers; and]

106 [(c) administered based upon annual requests for proposals, a documented review

107 process, and grant awards.]

108 Section 2. Section 63M-1-3201 is enacted to read:

109 63M-1-3201. Definitions.

110 As used in this part:

111 (1) "Board" means the STEM Action Center Board created in Section 63M-1-3202 .

112 (2) "Educator" has the meaning defined in Section 53A-6-103 .

113 (3) "Office" means the Governor's Office of Economic Development.

114 (4) "Provider" means a provider, selected by staff of the board and staff of the Utah

115 State Board of Education, on behalf of the board:

116 (a) through a request for proposals process; or

117 (b) through a direct award or sole source procurement process for a pilot described in

118 Section 63M-1-3205 .

119 (5) "STEM" means science, technology, engineering, and mathematics.

120 (6) "STEM Action Center" means the center described in Section 63M-1-3204 .

121 Section 3. Section 63M-1-3202 is enacted to read:

122 63M-1-3202. STEM Action Center Board creation -- Membership.

123 (1) There is created the STEM Action Center Board within the office, composed of the

124 following members:

125 (a) five private sector members who represent business, appointed by the governor;

126 (b) the state superintendent of public instruction or the state superintendent of public

127 instruction's designee;

128 (c) the commissioner of higher education or the commissioner of higher education's

129 designee;

130 (d) one member appointed by the governor;

131 (e) a member of the State Board of Education, chosen by the chair of the State Board of Education;

132 (f) the executive director of the Governor's Office of Economic Development or the

133 executive director of the Governor's Office of Economic Development's designee; and

134 (g) the president of the Utah College of Applied Technology or the president of the

135 Utah College of Applied Technology's designee.

136 (2) (a) The private sector members appointed by the governor in Subsection (1)(a) shall

137 represent a business whose primary focus is science, technology, or engineering.

138 (b) Except as required by Subsection (2)(c), members appointed by the governor shall

139 be appointed to four-year terms.

140 (c) The length of terms of the members shall be staggered so that approximately half of

141 the committee is appointed every two years.

142 (d) The members may not serve more than two full consecutive terms except where the

143 governor determines that an additional term is in the best interest of the state.

144 (e) When a vacancy occurs in the membership for any reason, the replacement shall be

145 appointed for the unexpired term.

146 (3) Attendance of a simple majority of the members constitutes a quorum for the

147 transaction of official committee business.

148

149

150 (4) Formal action by the committee requires a majority vote of a quorum.
151 (5) A member may not receive compensation or benefits for the member's service, but
152 may receive per diem and travel expenses in accordance with:
153 (a) Section 63A-3-106 ;
154 (b) Section 63A-3-107 ; and
155 (c) rules made by the Division of Finance pursuant to Sections 63A-3-106 and
156 63A-3-107 .
157 (6) The governor shall select the chair of the board to serve a one-year term.
158 (7) The executive director of the Governor's Office of Economic Development or the
159 executive director of the Governor's Office of Economic Development's designee shall serve as
160 the vice chair of the board.
161 (8) The state science advisor described in Section 63M-1-606 and the office shall
162 provide staff support to the board.
163 Section 4. Section 63M-1-3203 is enacted to read:
164 63M-1-3203. STEM Action Center Board -- Duties.
165 (1) The board shall:
166 (a) establish a STEM Action Center program to:
167 (i) coordinate STEM activities in the state among the following stakeholders:
168 (A) the State Board of Education;
169 (B) school districts and charter schools;
170 (C) the State Board of Regents;
171 (D) institutions of higher education;
172 (E) parents of home-schooled students; and
173 (F) other state agencies;
174 (ii) align public education STEM activities with higher education STEM activities; and
175 (iii) create and coordinate best practices among public education and higher education;
176 (b) with the consent of the Senate, appoint an executive director to oversee the
177 administration of the STEM Action Center;
178 (c) select a physical location for the STEM Action Center;
179 (d) strategically engage industry and business entities to cooperate with the board:
180 (i) to support professional development and provide other assistance for educators and
181 students; and
182 (ii) to provide private funding and support for the STEM Action Center;
183 (e) give direction to the STEM Action Center and the providers selected through a
184 request for proposals process pursuant to this part; and
185 (f) work to meet the following expectations:
186 (i) that at least 50 educators are implementing best practice learning tools in
187 classrooms per each product specialist or manager working with the STEM Action Center;
188 (ii) performance change in student achievement in each classroom working with a
189 STEM Action Center product specialist or manager; and
190 (iii) that students from at least 50 high schools participate in the STEM competitions,
191 fairs, and camps described in Subsection 63M-1-3204 (2)(d).
192 (2) The board may:
193 (a) enter into contracts for the purposes of this part;
194 (b) apply for, receive, and disburse funds, contributions, or grants from any source for
195 the purposes set forth in this part;
196 (c) employ, compensate, and prescribe the duties and powers of individuals necessary
197 to execute the duties and powers of the board;
198 (d) prescribe the duties and powers of the STEM Action Center providers; and
199 (e) in accordance with Title 63G, Chapter 3, Utah Administrative Rulemaking Act,
200 make rules to administer this part.
201 Section 5. Section 63M-1-3204 is enacted to read:

202 63M-1-3204. STEM Action Center.

203 (1) As funding allows, the board shall:

204 (a) establish a STEM Action Center;

205 (b) ensure that the STEM Action Center:

206 (i) is accessible by the public; and

207 (ii) includes the components described in Subsection (2);

208 (c) work cooperatively with the State Board of Education to acquire technology and

209 select schools as described in Sections 63M-1-3205 and 63M-1-3206 ; and

210 (d) engage private entities to provide financial support or employee time for STEM

211 activities in schools in addition to what is currently provided by private entities.

212 (2) As funding allows, the executive director of the STEM Action Center shall:

213 (a) support professional development for educators regarding education related

214 instructional technology that supports STEM education;

215 (b) ensure that the STEM Action Center acts as a research and development center for

216 education related instructional technology acquired through a request for proposals process

217 described in Section 63M-1-3205 ;

218 (c) review and acquire STEM education related technology for:

219 (i) educator professional development;

220 (ii) assessment, data collection, analysis, and reporting; and

221 (iii) public school instruction;

222 (d) facilitate participation in interscholastic STEM related competitions, fairs, and

223 camps;

224 (e) engage private industry in the development and maintenance of the STEM Action

225 Center;

226 (f) use resources to bring the latest STEM education learning tools into public

227 education classrooms;

228 (g) identify at least 10 best practice innovations used in Utah schools that have resulted

229 in at least 80% of students performing at grade level in STEM areas;

230 (h) identify best practices being used outside the state and implement selected practices

231 through a pilot program;

232 (i) identify:

233 (i) three learning tools for kindergarten through grade 6 identified as best practices; and

234 (ii) three learning tools per STEM subject for grades 7 through 12 identified as best

235 practices;

236 (j) provide a Utah best practices database, including best practices from public

237 education, higher education, the Utah Education Network, and other STEM related entities;

238 (k) keep track of the following items related to the best practices database described in

239 Subsection (2)(j):

240 (i) how the best practices database is being used; and

241 (ii) how many individuals are using the database, including the demographics of the

242 users, if available;

243 (l) join and participate in a national STEM network;

244 (m) identify performance changes linked to use of the best practices database described

245 in Subsection (2)(j);

246 (n) work cooperatively with the State Board of Education to designate schools as

247 STEM schools, where the schools have agreed to adopt a plan of STEM implementation in

248 alignment with criteria set by the State Board of Education and the board;

249 (o) support best methods of professional development, including methods of

250 professional development that reduce cost and increase effectiveness, to help educators learn

251 how to most effectively implement best practice learning tools in classrooms;

252 (p) recognize a high school's achievement in the STEM competitions, fairs, and camps

253 described in Subsection (2)(d);

254 (q) send student results from STEM competitions, fairs, and camps described in
 255 Subsection (2)(d) to media and ask the media to report on them;

256 (r) develop and distribute STEM toolkits to parents of students being served by the
 257 STEM Action Center;

258 (s) support targeted professional development for improved instruction in STEM in
 259 grades 6, 7, and 8, including:

260 (i) improved instructional materials that are dynamic and engaging for students;

261 (ii) targeted instruction for students who traditionally avoid enrolling in STEM
 262 courses;

263 (iii) introduction of engaging engineering courses; and

264 (iv) introduction of other research-based methods that support student achievement in
 265 STEM areas; and

266 (t) ensure that an online college readiness assessment tool be accessible by:

267 (i) public education students; and

268 (ii) higher education students.

269 (3) The board may prescribe other duties for the STEM Action Center in addition to
 270 the responsibilities described in this section.

271 (4) (a) The executive director shall track and compare the student performance of
 272 students participating in a STEM Action Center program to all other similarly situated students
 273 in the state, in the following STEM related activities, at the beginning and end of each year:

274 (i) public education high school graduation rates;

275 (ii) the number of students taking a remedial mathematics course at an institution of
 276 higher education described in Section 53B-2-101 ;

277 (iii) the number of students who graduate from a Utah public school and begin a
 278 postsecondary education program; and

279 (iv) the number of students, as compared to all similarly situated students, who are
 280 performing at grade level in STEM classes.

281 (b) The State Board of Education and the State Board of Regents shall provide
 282 information to the board to assist the board in complying with the requirements of Subsection
 283 (4)(a) if allowed under federal law.

284 Section 6. Section 63M-1-3205 is enacted to read:

285 63M-1-3205. Acquisition of STEM education related instructional technology
 286 program -- Research and development of education related instructional technology
 287 through a pilot program.

288 (1) For purposes of this section:

289 (a) "Pilot" means a pilot of the program.

290 (b) "Program" means the STEM education related instructional technology program
 291 created in Subsection (2).

292 (2) (a) There is created the STEM education related instructional technology program
 293 to provide public schools the STEM education related instructional technology described in
 294 Subsection (3).

295 (b) On behalf of the board, the staff of the board and the staff of the State Board of
 296 Education shall collaborate and may select one or more providers, through a request for
 297 proposals process, to provide STEM education related instructional technology to school
 298 districts and charter schools.

299 (c) On behalf of the board, the staff of the board and the staff of the State Board of
 300 Education shall consider and may accept an offer from a provider in response to the request for
 301 proposals described in Subsection (2)(b) even if the provider did not participate in a pilot
 302 described in Subsection (5).

303 (3) The STEM education related instructional technology shall:

304 (a) support mathematics instruction for students in grade 6, 7, or 8; or

305 (b) support mathematics instruction for secondary students to prepare the secondary

306 students for college mathematics courses.

307 (4) In selecting a provider for STEM education related instructional technology to
308 support mathematics instruction for students in grade 6, 7, or 8 as described in Subsection
309 (3)(a), the board shall consider the following criteria:

310 (a) the technology contains individualized instructional support for skills and
311 understanding of the core standards in mathematics;

312 (b) the technology is self-adapting to respond to the needs and progress of the learner;

313 and

314 (c) the technology provides opportunities for frequent, quick, and informal assessments
315 and includes an embedded progress monitoring tool and mechanisms for regular feedback to
316 students and teachers.

317 (5) Before issuing a request for proposals described in Subsection (2), on behalf of the
318 board, the staff of the board and the staff of the State Board of Education shall collaborate and
319 may:

320 (a) conduct a pilot of the program to test and select providers for the program;

321 (b) select at least two providers through a direct award or sole source procurement
322 process for the purpose of conducting the pilot; and

323 (c) select schools to participate in the pilot.

324 (6) (a) A contract with a provider for STEM education related instructional technology
325 may include professional development for full deployment of the STEM education related
326 instructional technology.

327 (b) No more than 10% of the money appropriated for the program may be used to
328 provide professional development related to STEM education related instructional technology
329 in addition to the professional development described in Subsection (6)(a).

330 Section 7. Section 63M-1-3206 is enacted to read:

331 63M-1-3206. Distribution of STEM education instructional technology to schools.

332 (1) Subject to legislative appropriations, on behalf of the board, the staff of the board
333 and the staff of the State Board of Education shall collaborate and shall:

334 (a) distribute STEM education related instructional technology described in Section
335 63M-1-3205 to school districts and charter schools; and

336 (b) provide related professional development to the school districts and charter schools
337 that receive STEM education related instructional technology.

338 (2) A school district or charter school may apply to the board, through a competitive
339 process, to receive STEM education related instructional technology from the board.

340 (3) A school district or charter school that receives STEM education related
341 instructional technology as described in this section shall provide the school district's or charter
342 school's own computer hardware.

343 Section 8. Section 63M-1-3207 is enacted to read:

344 63M-1-3207. Report to Legislature and the State Board of Education.

345 (1) The board shall report the progress of the STEM Action Center, including the
346 information described in Subsection (2), to the following groups once each year:

347 (a) the Education Interim Committee;

348 (b) the Public Education Appropriations Subcommittee; and

349 (c) the State Board of Education.

350 (2) The report described in Subsection (1) shall include information that demonstrates
351 the effectiveness of the program, including:

352 (a) the number of educators receiving professional development;

353 (b) the number of students receiving services from the STEM Action Center;

354 (c) a list of the providers selected pursuant to this part;

355 (d) a report on the STEM Action Center's fulfilment of its duties described in
356 Subsection 63M-1-3204 ; and

357 (e) student performance of students participating in a STEM Action Center program as

358 collected in Subsection 63M-1-3204 (4).

359 Section 9. Appropriation.

360 Under the terms and conditions of Title 63J, Chapter 1, Budgetary Procedures Act, for
361 the fiscal year beginning July 1, 2013, and ending June 30, 2014, the following sums of money
362 are appropriated from resources not otherwise appropriated, or reduced from amounts
363 previously appropriated, out of the funds or accounts indicated. These sums of money are in
364 addition to any amounts previously appropriated for fiscal year 2014.

365 To Governor's Office of Economic Development - STEM Action Center

366 From General Fund \$1,500,000

367 From General Fund, one-time \$8,500,000

368 Schedule of Programs:

369 STEM Action Center \$10,000,000

370 The Legislature intends that:

371 (1) up to \$1,500,000 of the appropriation for STEM Action Center be used to establish
372 a STEM Action Center as described in Section 63M-1-3204 ;

373 (2) at least \$5,000,000 of the appropriation for STEM Action Center be used for STEM
374 education related instructional technology and related professional development to support
375 mathematics instruction for students in grades 6, 7, or 8 as described in Subsection
376 63M-1-3205 (3)(a) and Section 63M-1-3206 , and related assessment, data collection, analysis,
377 and reporting;

378 (3) at least \$3,500,000 of the appropriation for STEM Action Center be used for STEM
379 education related instructional technology and related professional development to support
380 mathematics instruction for secondary students to prepare the secondary students for college
381 mathematics courses as described in Subsection 63M-1-3205 (3)(b) and Section 63M-1-3206 ,
382 and related assessment, data collection, analysis, and reporting;

383 (4) that the appropriation described in Subsection (1):

384 (a) be ongoing; and

385 (b) not lapse at the close of fiscal year 2014; and

386 (5) that the appropriations described in Subsections (2) and (3):

387 (a) be one-time; and

388 (b) not lapse at the close of fiscal year 2014.

389 Section 10. Effective date.

390 (1) Except as provided in Subsection (2), if approved by two-thirds of all the members
391 elected to each house, this bill takes effect upon approval by the governor, or the day following
392 the constitutional time limit of Utah Constitution Article VII, Section 8, without the governor's
393 signature, or in the case of a veto, the date of veto override.

394 (2) Uncodified Section 9, Appropriation, takes effect on July 1, 2013.

HB150

SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS AMENDMENTS 2014 GENERAL SESSION STATE OF UTAH

Chief Sponsor: Val L. Peterson

Senate Sponsor: Stephen H. Urquhart

25 This bill amends and enacts provisions relating to the Science, Technology,
26 Engineering, and Mathematics Action Center.

27 Highlighted Provisions:

28 This bill:

- 29 . defines terms;
- 30 . adds members to the STEM Action Center Board;
- 31 . allows the STEM Action Center Board to create a foundation;
- 32 . specifies that the STEM Action Center shall support high quality professional
33 development for educators related to STEM education in kindergarten through
34 grade 12;
- 35 . allows the STEM Action Center to further STEM education with nontechnological
36 means;
- 37 . expands the scope of the STEM education related technology program to more
38 students;
- 39 . creates the STEM education endorsements and incentive program, and requires the
40 State Board of Education to make rules regarding the endorsements;
- 41 . requires the STEM Action Center to select technology providers to create a certain
42 professional development application;
- 43 . requires the STEM Action Center to create in-person STEM education high quality
44 professional development;
- 45 . creates the STEM education middle school applied science initiative;
- 46 . creates the high school STEM education initiative; and
- 47 . makes technical changes.

48 Money Appropriated in this Bill:

49 This bill appropriates in fiscal year 2015:

- 50 . to the Governor's Office of Economic Development - STEM Action Center, as an
51 ongoing appropriation:
- 52 . from the General Fund, \$5,000,000; and
- 53 . to the Governor's Office of Economic Development - STEM Action Center, as a
54 one-time appropriation:
- 55 . from the General Fund, \$15,000,000.

56 Other Special Clauses:

57 This bill provides an effective date.

58 Utah Code Sections Affected:

59 AMENDS:

- 60 63M-1-3201 , as enacted by Laws of Utah 2013, Chapter 336
- 61 63M-1-3202 , as enacted by Laws of Utah 2013, Chapter 336
- 62 63M-1-3203 , as enacted by Laws of Utah 2013, Chapter 336
- 63 63M-1-3204 , as enacted by Laws of Utah 2013, Chapter 336
- 64 63M-1-3205 , as enacted by Laws of Utah 2013, Chapter 336
- 65 63M-1-3207 , as enacted by Laws of Utah 2013, Chapter 336

66 ENACTS:
67 63M-1-3208 , Utah Code Annotated 1953
68 63M-1-3209 , Utah Code Annotated 1953
69 63M-1-3210 , Utah Code Annotated 1953
70 63M-1-3211 , Utah Code Annotated 1953
71

72 Be it enacted by the Legislature of the state of Utah:

73 Section 1. Section 63M-1-3201 is amended to read:

74 63M-1-3201. Definitions.

75 As used in this part:

76 (1) "Board" means the STEM Action Center Board created in Section 63M-1-3202 .

77 (2) "Educator" has the meaning defined in Section 53A-6-103 .

78 (3) "High quality professional development" means professional development that
79 meets high quality standards developed by the State Board of Education.

80 [(3)] (4) "Office" means the Governor's Office of Economic Development.

81 [(4)] (5) "Provider" means a provider, selected by staff of the board and staff of the
82 Utah State Board of Education, on behalf of the board:

83 (a) through a request for proposals process; or

84 (b) through a direct award or sole source procurement process for a pilot described in
85 Section 63M-1-3205 .

86 [(5)] (6) "STEM" means science, technology, engineering, and mathematics.

87 [(6)] (7) "STEM Action Center" means the center described in Section 63M-1-3204 .

88 Section 2. Section 63M-1-3202 is amended to read:

89 63M-1-3202. STEM Action Center Board creation -- Membership.

90 (1) There is created the STEM Action Center Board within the office, composed of the
91 following members:

92 (a) [five] six private sector members who represent business, appointed by the
93 governor;

94 (b) the state superintendent of public instruction or the state superintendent of public
95 instruction's designee;

96 (c) the commissioner of higher education or the commissioner of higher education's
97 designee;

98 (d) one member appointed by the governor;

99 (e) a member of the State Board of Education, chosen by the chair of the State Board of
100 Education;

101 (f) the executive director of the Governor's Office of Economic Development or the
102 executive director of the Governor's Office of Economic Development's designee; [and]

103 (g) the president of the Utah College of Applied Technology or the president of the
104 Utah College of Applied Technology's designee[.]; and

105 (h) one member who has a degree in engineering and experience working in a
106 government military installation, appointed by the governor.

107 (2) (a) The private sector members appointed by the governor in Subsection (1)(a) shall
108 represent a business or trade association whose primary focus is science, technology, or
109 engineering.

110 (b) Except as required by Subsection (2)(c), members appointed by the governor shall
111 be appointed to four-year terms.

112 (c) The length of terms of the members shall be staggered so that approximately half of
113 the committee is appointed every two years.

114 (d) The members may not serve more than two full consecutive terms except where the
115 governor determines that an additional term is in the best interest of the state.

116 (e) When a vacancy occurs in the membership for any reason, the replacement shall be
117 appointed for the unexpired term.

118 (3) Attendance of a simple majority of the members constitutes a quorum for the
119 transaction of official committee business.

120 (4) Formal action by the committee requires a majority vote of a quorum.

121 (5) A member may not receive compensation or benefits for the member's service, but
122 may receive per diem and travel expenses in accordance with:

123 (a) Section 63A-3-106 ;
124 (b) Section 63A-3-107 ; and
125 (c) rules made by the Division of Finance pursuant to Sections 63A-3-106 and
126 63A-3-107 .

127 (6) The governor shall select the chair of the board to serve a one-year term.

128 (7) The executive director of the Governor's Office of Economic Development or the
129 executive director of the Governor's Office of Economic Development's designee shall serve as
130 the vice chair of the board.

131 [(8) The state science advisor described in Section 63M-1-606 and the office shall
132 provide staff support to the board.]

133 Section 3. Section 63M-1-3203 is amended to read:
134 63M-1-3203. STEM Action Center Board -- Duties.

135 (1) The board shall:

136 (a) establish a STEM Action Center program to:

137 (i) coordinate STEM activities in the state among the following stakeholders:
138 (A) the State Board of Education;
139 (B) school districts and charter schools;
140 (C) the State Board of Regents;
141 (D) institutions of higher education;
142 (E) parents of home-schooled students; and
143 (F) other state agencies;
144 (ii) align public education STEM activities with higher education STEM activities; and
145 (iii) create and coordinate best practices among public education and higher education;

146 (b) with the consent of the Senate, appoint an executive director to oversee the
147 administration of the STEM Action Center;

148 (c) select a physical location for the STEM Action Center;

149 (d) strategically engage industry and business entities to cooperate with the board:

150 (i) to support high quality professional development and provide other assistance for
151 educators and students; and
152 (ii) to provide private funding and support for the STEM Action Center;

153 (e) give direction to the STEM Action Center and the providers selected through a
154 request for proposals process pursuant to this part; and
155 (f) work to meet the following expectations:

156 (i) that at least 50 educators are implementing best practice learning tools in
157 classrooms per each product specialist or manager working with the STEM Action Center;

158 (ii) performance change in student achievement in each classroom working with a
159 STEM Action Center product specialist or manager; and
160 (iii) that students from at least 50 high schools participate in the STEM competitions,
161 fairs, and camps described in Subsection 63M-1-3204 (2)(d).

162 (2) The board may:

163 (a) enter into contracts for the purposes of this part;

164 (b) apply for, receive, and disburse funds, contributions, or grants from any source for
165 the purposes set forth in this part;

166 (c) employ, compensate, and prescribe the duties and powers of individuals necessary
167 to execute the duties and powers of the board;

168 (d) prescribe the duties and powers of the STEM Action Center providers; and
169 (e) in accordance with Title 63G, Chapter 3, Utah Administrative Rulemaking Act,

170 make rules to administer this part.

171 (3) The board may establish a foundation to assist in:

172 (a) the development and implementation of the programs authorized under this part to

173 promote STEM education; and

174 (b) implementation of other STEM education objectives described in this part.

175 (4) A foundation established by the board under Subsection (3):

176 (a) may solicit and receive contributions from a private organization for STEM

177 education objectives described in this part;

178 (b) shall comply with Title 51, Chapter 7, State Money Management Act;

179 (c) does not have power or authority to incur contractual obligations or liabilities that

180 constitute a claim against public funds;

181 (d) may not exercise executive or administrative authority over the programs or other

182 activities described in this part, except to the extent specifically authorized by the board;

183 (e) shall provide the board with information detailing transactions and balances of

184 funds managed for the board; and

185 (f) may not:

186 (i) engage in lobbying activities;

187 (ii) attempt to influence legislation; or

188 (iii) participate in any campaign activity for or against:

189 (A) a political candidate; or

190 (B) an initiative, referendum, proposed constitutional amendment, bond, or any other

191 ballot proposition submitted to the voters.

192 (5) Money donated to a foundation established under Subsection (3) may be accounted

193 for in an expendable special revenue fund.

194 Section 4. Section 63M-1-3204 is amended to read:

195 63M-1-3204. STEM Action Center.

196 (1) As funding allows, the board shall:

197 (a) establish a STEM Action Center;

198 (b) ensure that the STEM Action Center:

199 (i) is accessible by the public; and

200 (ii) includes the components described in Subsection (2);

201 (c) work cooperatively with the State Board of Education to [acquire technology and

202 select schools]:

203 (i) further STEM education; and

204 (ii) ensure best practices are implemented as described in Sections 63M-1-3205 and

205 63M-1-3206 ; and

206 (d) engage private entities to provide financial support or employee time for STEM

207 activities in schools in addition to what is currently provided by private entities.

208 (2) As funding allows, the executive director of the STEM Action Center shall:

209 (a) support high quality professional development for educators regarding [education

210 related instructional technology that supports] STEM education;

211 (b) ensure that the STEM Action Center acts as a research and development center for

212 STEM education [related instructional technology acquired] through a request for proposals

213 process described in Section 63M-1-3205 ;

214 (c) review and acquire STEM education related [technology] materials and products

215 for:

216 (i) [educator] high quality professional development;

217 (ii) assessment, data collection, analysis, and reporting; and

218 (iii) public school instruction;

219 (d) facilitate participation in interscholastic STEM related competitions, fairs, [and]

220 camps, and STEM education activities;

221 (e) engage private industry in the development and maintenance of the STEM Action

222 Center and STEM Action Center projects;

223 (f) use resources to bring the latest STEM education learning tools into public

224 education classrooms;

225 (g) identify at least 10 best practice innovations used in Utah [schools] that have

226 resulted in at least 80% of students performing at grade level in STEM areas;

227 (h) identify best practices being used outside the state and, as appropriate, develop and

228 implement selected practices through a pilot program;

229 (i) identify:

230 (i) [three] learning tools for kindergarten through grade 6 identified as best practices;

231 and

232 (ii) [three] learning tools [per STEM subject] for grades 7 through 12 identified as best

233 practices;

234 (j) provide a Utah best practices database, including best practices from public

235 education, higher education, the Utah Education Network, and other STEM related entities;

236 (k) keep track of the following items related to the best practices database described in

237 Subsection (2)(j):

238 (i) how the best practices database is being used; and

239 (ii) how many individuals are using the database, including the demographics of the

240 users, if available;

241 (l) as appropriate, join and participate in a national STEM network;

242 (m) identify performance changes linked to use of the best practices database described

243 in Subsection (2)(j);

244 (n) work cooperatively with the State Board of Education to designate schools as

245 STEM schools, where the schools have agreed to adopt a plan of STEM implementation in

246 alignment with criteria set by the State Board of Education and the board;

247 (o) support best methods of high quality professional development[,] for STEM

248 education in kindergarten through grade 12, including methods of high quality professional

249 development that reduce cost and increase effectiveness, to help educators learn how to most

250 effectively implement best practice learning tools in classrooms;

251 (p) recognize a high school's achievement in the STEM competitions, fairs, and camps

252 described in Subsection (2)(d);

253 (q) send student results from STEM competitions, fairs, and camps described in

254 Subsection (2)(d) to media and ask the media to report on them;

255 (r) develop and distribute STEM [toolkits] information to parents of students being

256 served by the STEM Action Center;

257 (s) support targeted high quality professional development for improved instruction in

258 STEM [in grades 6, 7, and 8] education, including:

259 (i) improved instructional materials that are dynamic and engaging for students;

260 [(ii) targeted instruction for students who traditionally avoid enrolling in STEM

261 courses;]

262 [(iii) introduction of engaging engineering courses; and]

263 (ii) use of applied instruction; and

264 [(iv)] (iii) introduction of other research-based methods that support student

265 achievement in STEM areas; and

266 (t) ensure that an online college readiness assessment tool be accessible by:

267 (i) public education students; and

268 (ii) higher education students.

269 (3) The board may prescribe other duties for the STEM Action Center in addition to

270 the responsibilities described in this section.

271 (4) (a) The executive director shall track and compare the student performance of

272 students participating in a STEM Action Center program to all other similarly situated students

273 in the state, in the following STEM related activities, at the beginning and end of each year:

274 (i) public education high school graduation rates;
275 (ii) the number of students taking a remedial mathematics course at an institution of
276 higher education described in Section 53B-2-101 ;
277 (iii) the number of students who graduate from a Utah public school and begin a
278 postsecondary education program; and
279 (iv) the number of students, as compared to all similarly situated students, who are
280 performing at grade level in STEM classes.

281 (b) The State Board of Education and the State Board of Regents shall provide
282 information to the board to assist the board in complying with the requirements of Subsection
283 (4)(a) if allowed under federal law.

284 Section 5. Section 63M-1-3205 is amended to read:
285 63M-1-3205. Acquisition of STEM education related instructional technology
286 program -- Research and development of education related instructional technology
287 through a pilot program.

288 (1) For purposes of this section:
289 (a) "Pilot" means a pilot of the program.
290 (b) "Program" means the STEM education related instructional technology program
291 created in Subsection (2).

292 (2) (a) There is created the STEM education related instructional technology program
293 to provide public schools the STEM education related instructional technology described in
294 Subsection (3).

295 (b) On behalf of the board, the staff of the board and the staff of the State Board of
296 Education shall collaborate and may select one or more providers, through a request for
297 proposals process, to provide STEM education related instructional technology to school
298 districts and charter schools.

299 (c) On behalf of the board, the staff of the board and the staff of the State Board of
300 Education shall consider and may accept an offer from a provider in response to the request for
301 proposals described in Subsection (2)(b) even if the provider did not participate in a pilot
302 described in Subsection (5).

303 (3) The STEM education related instructional technology shall:
304 (a) support mathematics instruction for students in [grade 6, 7, or 8; or]:
305 (i) kindergarten through grade 6; or
306 (ii) grades 7 and 8; or
307 (b) support mathematics instruction for secondary students to prepare the secondary
308 students for college mathematics courses.

309 (4) In selecting a provider for STEM education related instructional technology to
310 support mathematics instruction for the students [in grade 6, 7, or 8 as] described in Subsection
311 (3)(a), the board shall consider the following criteria:
312 (a) the technology contains individualized instructional support for skills and
313 understanding of the core standards in mathematics;
314 (b) the technology is self-adapting to respond to the needs and progress of the learner;
315 and
316 (c) the technology provides opportunities for frequent, quick, and informal assessments
317 and includes an embedded progress monitoring tool and mechanisms for regular feedback to
318 students and teachers.

319 (5) Before issuing a request for proposals described in Subsection (2), on behalf of the
320 board, the staff of the board and the staff of the State Board of Education shall collaborate and
321 may:
322 (a) conduct a pilot of the program to test and select providers for the program;
323 (b) select at least two providers through a direct award or sole source procurement
324 process for the purpose of conducting the pilot; and
325 (c) select schools to participate in the pilot.

326 (6) (a) A contract with a provider for STEM education related instructional technology
327 may include professional development for full deployment of the STEM education related
328 instructional technology.

329 (b) No more than 10% of the money appropriated for the program may be used to
330 provide professional development related to STEM education related instructional technology
331 in addition to the professional development described in Subsection (6)(a).

332 Section 6. Section 63M-1-3207 is amended to read:
333 63M-1-3207. Report to Legislature and the State Board of Education.

334 (1) The board shall report the progress of the STEM Action Center, including the
335 information described in Subsection (2), to the following groups once each year:

336 (a) the Education Interim Committee;
337 (b) the Public Education Appropriations Subcommittee; and
338 (c) the State Board of Education.

339 (2) The report described in Subsection (1) shall include information that demonstrates
340 the effectiveness of the program, including:

341 (a) the number of educators receiving high quality professional development;
342 (b) the number of students receiving services from the STEM Action Center;
343 (c) a list of the providers selected pursuant to this part;
344 (d) a report on the STEM Action Center's fulfilment of its duties described in
345 Subsection 63M-1-3204 ; and
346 (e) student performance of students participating in a STEM Action Center program as
347 collected in Subsection 63M-1-3204 (4).

348 Section 7. Section 63M-1-3208 is enacted to read:
349 63M-1-3208. STEM education endorsements and incentive program.

350 (1) The State Board of Education shall collaborate with the STEM Action Center to:

351 (a) develop STEM education endorsements; and
352 (b) create and implement financial incentives for:

353 (i) an educator to earn an elementary or secondary STEM education endorsement
354 described in Subsection (1)(a); and
355 (ii) a school district or a charter school to have STEM endorsed educators on staff.

356 (2) In accordance with Title 63G, Chapter 3, Utah Administrative Rulemaking Act, the
357 State Board of Education shall make rules to establish how a STEM education endorsement
358 incentive described in Subsection (1)(a) will be valued on a salary scale for educators.

359 Section 8. Section 63M-1-3209 is enacted to read:
360 63M-1-3209. Acquisition of STEM education high quality professional
361 development.

362 (1) The STEM Action Center shall, through a request for proposals process, select
363 technology providers for the purpose of providing a STEM education high quality professional
364 development application.

365 (2) The high quality professional development application described in Subsection (1)
366 shall:

367 (a) allow the State Board of Education, a school district, or a school to define the
368 application's input and track results of the high quality professional development;
369 (b) allow educators to access automatic tools, resources, and strategies;
370 (c) allow educators to work in online learning communities, including giving and
371 receiving feedback via uploaded video;
372 (d) track and report data on the usage of the components of the application's system
373 and the relationship to improvement in classroom instruction;
374 (e) include video examples of highly effective STEM education teaching that:
375 (i) cover a cross section of grade levels and subjects;
376 (ii) under the direction of the State Board of Education, include videos of highly
377 effective Utah STEM educators; and

378 (iii) contain tools to help educators implement what they have learned; and
379 (f) allow for additional STEM education video content to be added.

380 (3) In addition to the high quality professional development application described in
381 Subsections (1) and (2), the STEM Action Center may create STEM education hybrid or
382 blended high quality professional development that allows for face-to-face applied learning.

383 Section 9. Section 63M-1-3210 is enacted to read:
384 63M-1-3210. STEM education middle school applied science initiative.

385 (1) The STEM Action Center shall develop an applied science initiative for students in
386 grades 7 and 8 that includes:
387 (a) a STEM applied science curriculum with instructional materials;
388 (b) STEM hybrid or blended high quality professional development that allows for
389 face-to-face applied learning; and
390 (c) hands-on tools for STEM applied science learning.

391 (2) The STEM Action Center may, through a request for proposals process, select a
392 consultant to assist in developing the initiative described in Subsection (1).

393 Section 10. Section 63M-1-3211 is enacted to read:
394 63M-1-3211. High school STEM education initiative.

395 (1) Subject to legislative appropriations, after consulting with State Board of Education
396 staff, the STEM Action Center shall award grants to school districts and charter schools to fund
397 STEM related certification for high school students.

398 (2) (a) A school district or charter school may apply for a grant from the STEM Action
399 Center, through a competitive process, to fund the school district's or charter school's STEM
400 related certification training program.

401 (b) A school district's or charter school's STEM related certification training program
402 shall:
403 (i) prepare high school students to be job ready for available STEM related positions of
404 employment; and
405 (ii) when a student completes the program, result in the student gaining a nationally
406 industry-recognized employer STEM related certification.

407 (3) A school district or charter school may partner with one or more of the following to
408 provide a STEM related certification program:
409 (a) a Utah College of Applied Technology college campus;
410 (b) Salt Lake Community College;
411 (c) Snow College; or
412 (d) a private sector employer.

413 Section 11. Appropriation.

414 Under the terms and conditions of Title 63J, Chapter 1, Budgetary Procedures Act, for
415 the fiscal year beginning July 1, 2014, and ending June 30, 2015, the following sums of money
416 are appropriated from resources not otherwise appropriated, or reduced from amounts
417 previously appropriated, out of the funds or accounts indicated. These sums of money are in
418 addition to any amounts previously appropriated for fiscal year 2015.

419 To Governor's Office of Economic Development - STEM Action Center

420 From General Fund	\$5,000,000
421 From General Fund, One-time	\$15,000,000
422 Schedule of Programs:	
423 STEM Action Center	\$20,000,000

424 The Legislature intends that:
425 (1) up to \$5,000,000 of the appropriation for the STEM Action Center program be used
426 for STEM education related instructional technology and related professional development to
427 support mathematics instruction as described in Subsection 63M-1-3205 (3)(a)(i) and Section
428 63M-1-3206, and related assessment, data collection, analysis, and reporting;
429 (2) up to \$1,500,000 of the appropriation for the STEM Action Center program be used

430 for developing the STEM education endorsements and related incentive program described in
431 Section 63M-1-3208;
432 (3) up to \$5,000,000 of the appropriation for the STEM Action Center program be used
433 for providing a STEM education high quality professional development application as
434 described in Section 63M-1-3209;
435 (4) up to \$3,500,000 of the appropriation for the STEM Action Center program be used
436 to fund the STEM education middle school applied science initiative described in Section
437 63M-1-3210;
438 (5) up to \$5,000,000 of the appropriation for the STEM Action Center program be used
439 to fund the high school STEM education initiative described in Section 63M-1-3211 ;
440 (6) the appropriations described in Subsections (1), (2), (4), and (5):
441 (a) are one-time; and
442 (b) not lapse at the close of fiscal year 2015; and
443 (7) the appropriation described in Subsection (3):
444 (a) is ongoing; and
445 (b) not lapse at the close of fiscal year 2015.
446 Section 12. Effective date.
447 (1) Except as provided in Subsection (2), if approved by two-thirds of all the members
448 elected to each house, this bill takes effect upon approval by the governor, or the day following
449 the constitutional time limit of Utah Constitution, Article VII, Section 8, without the governor's
450 signature, or in the case of a veto, the date of veto override.
451 (2) Uncodified Section 11, Appropriation, takes effect on July 1, 2014.

HB45

**STEM PROGRAM AMENDMENTS
2016 GENERAL SESSION
STATE OF UTAH
Chief Sponsor: Val L. Peterson
Senate Sponsor: Stephen H. Urquhart**

7 **LONG TITLE**

8 **General Description:**

9 This bill modifies provisions related to the STEM (Science, Technology, Engineering,
10 and Mathematics) Action Center.

11 **Highlighted Provisions:**

12 This bill:

13 ⇨ defines terms;

14 ⇨ modifies:

- 15 · the membership and duties of the STEM Action Center Board;
- 16 · the duties of the director of the STEM Action Center; and
- 17 · the rulemaking authority of the State Board of Education related to the award of
18 STEM education endorsement incentives;

19 ⇨ adds Utah State University Eastern to the list of educational institutions that may
20 partner with a school district or charter school to provide a STEM related
21 certification program; and

22 ⇨ makes technical changes.

23 **Money Appropriated in this Bill:**

24 None

25 **Other Special Clauses:**

26 None

27 **Utah Code Sections Affected:**

28 AMENDS:

29 63N-12-203, as renumbered and amended by Laws of Utah 2015, Chapter 283

30 63N-12-204, as renumbered and amended by Laws of Utah 2015, Chapter 283

31 63N-12-205, as renumbered and amended by Laws of Utah 2015, Chapter 283

32 63N-12-209, as last amended by Laws of Utah 2015, Chapter 258 and renumbered and
33 amended by Laws of Utah 2015, Chapter 283

34 63N-12-210, as renumbered and amended by Laws of Utah 2015, Chapter 283

35 63N-12-212, as renumbered and amended by Laws of Utah 2015, Chapter 283

36 -----
37 *Be it enacted by the Legislature of the state of Utah:*

38 Section 1. Section **63N-12-203** is amended to read:

39 **63N-12-203. STEM Action Center Board creation — Membership.**

40 (1) There is created the STEM Action Center Board within the office, composed of the
41 following members:

42 (a) six private sector members who represent business, appointed by the governor;

43 (b) the state superintendent of public instruction or the state superintendent of public
44 instruction's designee;

45 (c) the commissioner of higher education or the commissioner of higher education's
46 designee;

47 (d) one member appointed by the governor;

48 (e) a member of the State Board of Education, chosen by the chair of the State Board of
49 Education;

50 (f) the executive director of the office or the executive director's designee;

51 (g) the president of the Utah College of Applied Technology or the president of the

52 Utah College of Applied Technology's designee; ~~and~~

53 (h) the executive director of the Department of Workforce Services or the executive

54 director of the Department of Workforce Services' designee; and

55 ~~[(h)]~~ (i) one member who has a degree in engineering and experience working in a

56 government military installation, appointed by the governor.

57 (2) (a) The private sector members appointed by the governor in Subsection (1)(a) shall

58 represent a business or trade association whose primary focus is science, technology, or

59 engineering.

60 (b) Except as required by Subsection (2)(c), members appointed by the governor shall

61 be appointed to four-year terms.

62 (c) The length of terms of the members shall be staggered so that approximately half of

63 the committee is appointed every two years.

64 (d) The members may not serve more than two full consecutive terms except where the

65 governor determines that an additional term is in the best interest of the state.

66 (e) When a vacancy occurs in the membership for any reason, the replacement shall be

67 appointed for the unexpired term.

68 (3) Attendance of a simple majority of the members constitutes a quorum for the

69 transaction of official committee business.

70 (4) Formal action by the committee requires a majority vote of a quorum.

71 (5) A member may not receive compensation or benefits for the member's service, but

72 may receive per diem and travel expenses in accordance with:

73 (a) Section 63A-3-106;

74 (b) Section 63A-3-107; and

75 (c) rules made by the Division of Finance under Sections 63A-3-106 and 63A-3-107.

76 (6) The governor shall select the chair of the board to serve a ~~one-year~~ two-year term.

77 (7) The executive director of the office or the executive director's designee shall serve

78 as the vice chair of the board.

79 Section 2. Section **63N-12-204** is amended to read:

80 **63N-12-204. STEM Action Center Board — Duties.**

81 (1) The board shall:

82 (a) establish a STEM Action Center to:

83 (i) coordinate STEM activities in the state among the following stakeholders:

84 (A) the State Board of Education;

85 (B) school districts and charter schools;

86 (C) the State Board of Regents;

87 (D) institutions of higher education;

88 (E) parents of home-schooled students; ~~and~~

89 (F) other state agencies; and

90 (G) business and industry representatives;

91 (ii) align public education STEM activities with higher education STEM activities; and

92 (iii) create and coordinate best practices among public education and higher education;

93 (b) with the consent of the Senate, appoint a director to oversee the administration of

94 the STEM Action Center;

95 (c) select a physical location for the STEM Action Center;

96 (d) strategically engage industry and business entities to cooperate with the board:

97 (i) to support high quality professional development and provide other assistance for

98 educators and students; and

99 (ii) to provide private funding and support for the STEM Action Center;

100 (e) give direction to the STEM Action Center and the providers selected through a

101 request for proposals process pursuant to this part; and

102 (f) work to meet the following expectations:

103 (i) that at least 50 educators are implementing best practice learning tools in

104 classrooms [~~per each product specialist or manager working with the STEM Action Center~~];

105 (ii) performance change in student achievement in each classroom [~~working with~~

106 participating in a STEM Action Center [~~product specialist or manager~~] project; and

107 (iii) that students from at least 50 [high] schools in the state participate in the STEM

108 competitions, fairs, and camps described in Subsection 63N-12-205(2)(d).

109 (2) The board may:

110 (a) enter into contracts for the purposes of this part;

111 (b) apply for, receive, and disburse funds, contributions, or grants from any source for

112 the purposes set forth in this part;

113 (c) employ, compensate, and prescribe the duties and powers of individuals necessary

114 to execute the duties and powers of the board;

115 (d) prescribe the duties and powers of the STEM Action Center providers; and

116 (e) in accordance with Title 63 G, Chapter 3, Utah Administrative Rulemaking Act,

117 make rules to administer this part.

118 (3) The board may establish a foundation to assist in:

119 (a) the development and implementation of the programs authorized under this part to

120 promote STEM education; and

121 (b) implementation of other STEM education objectives described in this part.

122 (4) A foundation established by the board under Subsection (3):

123 (a) may solicit and receive contributions from a private organization for STEM

124 education objectives described in this part;

125 (b) shall comply with Title 51, Chapter 7, State Money Management Act;

126 (c) does not have power or authority to incur contractual obligations or liabilities that

127 constitute a claim against public funds;

128 (d) may not exercise executive or administrative authority over the programs or other

129 activities described in this part, except to the extent specifically authorized by the board;

130 (e) shall provide the board with information detailing transactions and balances of

131 funds managed for the board; and

132 (f) may not:

133 (i) engage in lobbying activities;

134 (ii) attempt to influence legislation; or

135 (iii) participate in any campaign activity for or against:

136 (A) a political candidate; or

137 (B) an initiative, referendum, proposed constitutional amendment, bond, or any other

138 ballot proposition submitted to the voters.

139 (5) Money donated to a foundation established under Subsection (3) maybe accounted

140 for in an expendable special revenue fund.

141 Section 3. Section **63N-12-205** is amended to read:

142 **63N-12-205. STEM Action Center.**

143 (1) As funding allows, the board shall:

144 (a) establish a STEM Action Center;

145 (b) ensure that the STEM Action Center:

146 (i) is accessible by the public; and

147 (ii) includes the components described in Subsection (2);

148 (c) work cooperatively with the State Board of Education to:

149 (i) further STEM education; and

150 (ii) ensure best practices are implemented as described in Sections 63N-12-206 and

151 63N-12-207; [and]

152 (d) engage private entities to provide financial support or employee time for STEM

153 activities in schools in addition to what is currently provided by private entities[-]; and

154 (e) work cooperatively with stakeholders to support and promote activities that align
155 STEM education and training activities with the employment needs of business and industry in
156 the state.

157 (2) As funding allows, the director of the STEM Action Center shall:

158 (a) support high quality professional development for educators regarding STEM
159 education;

160 (b) ensure that the STEM Action Center acts as a research and development center for
161 STEM education through a request for proposals process described in Section 63N-12-206;

162 (c) review and acquire STEM education related materials and products for:

163 (i) high quality professional development;

164 (ii) assessment, data collection, analysis, and reporting; and

165 (iii) public school instruction;

166 (d) facilitate participation in interscholastic STEM related competitions, fairs, camps,
167 and STEM education activities;

168 (e) engage private industry in the development and maintenance of the STEM Action
169 Center and STEM Action Center projects;

170 (f) use resources to bring the latest STEM education learning tools into public
171 education classrooms;

172 (g) identify at least 10 best practice innovations used in Utah that have resulted in [~~at~~
173 ~~least 80% of students performing at grade level~~] a measurable improvement in student
174 performance or outcomes in STEM areas;

175 (h) identify best practices being used outside the state and, as appropriate, develop and
176 implement selected practices through a pilot program;

177 (i) identify:

178 (i) learning tools for kindergarten through grade 6 identified as best practices; and

179 (ii) learning tools for grades 7 through 12 identified as best practices;

180 (j) [~~provide a~~] collect data on Utah best practices [~~database~~], including best practices
181 from public education, higher education, the Utah Education and Telehealth Network, and
182 other STEM related entities;

183 (k) keep track of the following items related to [~~the~~] best practices [~~database~~] described
184 in Subsection (2)(j):

185 (i) how the best practices [~~database is~~] data are being used; and

186 (ii) how many individuals are using the [~~database~~] data, including the demographics of
187 the users, if available;

188 (l) as appropriate, join and participate in a national STEM network;

189 [~~(m) identify performance changes linked to use of the best practices database~~
190 ~~described in Subsection (2)(j);~~]

191 [~~(n)~~] (m) work cooperatively with the State Board of Education to designate schools as
192 STEM schools, where the schools have agreed to adopt a plan of STEM implementation in
193 alignment with criteria set by the State Board of Education and the board;

194 [~~(o)~~] (n) support best methods of high quality professional development for STEM
195 education in kindergarten through grade 12, including methods of high quality professional
196 development that reduce cost and increase effectiveness, to help educators learn how to most
197 effectively implement best practice learning tools in classrooms;

198 [~~(p)~~] (o) recognize [~~a high school's~~] achievement in the STEM competitions, fairs, and
199 camps described in Subsection (2)(d);

200 [~~(q)~~] (p) send student results from STEM competitions, fairs, and camps described in
201 Subsection (2)(d) to media and ask the media to report on them;

202 [~~(r)~~] (q) develop and distribute STEM information to parents of students [~~being served~~
203 ~~by the STEM Action Center~~] in the state;

204 [~~(s)~~] (r) support targeted high quality professional development for improved
205 instruction in STEM education, including:

206 (i) improved instructional materials that are dynamic and engaging for students;
 207 (ii) use of applied instruction; and
 208 (iii) introduction of other research-based methods that support student achievement in
 209 STEM areas; and
 210 ~~[(t)]~~ (s) ensure that an online college readiness assessment tool be accessible by:
 211 (i) public education students; and
 212 (ii) higher education students.
 213 (3) The board may prescribe other duties for the STEM Action Center in addition to
 214 the responsibilities described in this section.
 215 (4) (a) The director shall work with an independent evaluator to track and compare the
 216 student performance of students participating in a STEM Action Center program to all other
 217 similarly situated students in the state, if appropriate, in the following ~~[STEM-related]~~
 218 activities~~[-, at the beginning and end of each year]:~~
 219 (i) public education high school graduation rates;
 220 (ii) the number of students taking a remedial mathematics course at an institution of
 221 higher education described in Section 53B-2-101;
 222 (iii) the number of students who graduate from a Utah public school and begin a
 223 postsecondary education program; and
 224 (iv) the number of students, as compared to all similarly situated students, who are
 225 performing at grade level in STEM classes.
 226 (b) The State Board of Education and the State Board of Regents shall provide
 227 information to the board to assist the board in complying with the requirements of Subsection
 228 (4)(a) if allowed under federal law.
 229 Section 4. Section **63N-12-209** is amended to read:
 230 **63N-12-209. STEM education endorsements and incentive program.**
 231 (1) The State Board of Education shall collaborate with the STEM Action Center to:
 232 (a) develop STEM education endorsements; and
 233 (b) create and implement financial incentives for:
 234 (i) an educator to earn an elementary or secondary STEM education endorsement
 235 described in Subsection (1)(a); and
 236 (ii) a school district or a charter school to have STEM endorsed educators on staff.
 237 (2) In accordance with Title 63 G, Chapter 3, Utah Administrative Rulemaking Act, the
 238 State Board of Education shall make rules ~~[to establish how a]~~ establishing the uses of STEM
 239 education ~~[endorsement]~~ endorsements described in Subsection (1) ~~[will be valued on a salary~~
 240 ~~scale for educators.], including that:~~
 241 (a) an incentive for an educator to take a course leading to a STEM education
 242 endorsement may only be given for a course that carries higher-education credit; and
 243 (b) a school district or a charter school may consider a STEM education endorsement
 244 as part of an educator's salary schedule.
 245 Section 5. Section **63N-12-210** is amended to read:
 246 **63N-12-210. Acquisition of STEM education high quality professional**
 247 **development.**
 248 (1) The STEM Action Center shall, through a request for proposals process, select
 249 technology providers for the purpose of providing a STEM education high quality professional
 250 development application.
 251 (2) The high quality professional development application described in Subsection (1)
 252 shall:
 253 (a) allow the State Board of Education, a school district, or a school to define the
 254 application's input and track results of the high quality professional development;
 255 (b) allow educators to access automatic tools, resources, and strategies, including
 256 instructional materials with integrated STEM content;
 257 (c) allow educators to work in online learning communities, including giving and

258 receiving feedback via uploaded video;

259 (d) track and report data on the usage of the components of the application’s system

260 and the relationship to improvement in classroom instruction;

261 (e) include video examples of highly effective STEM education teaching that:

262 (i) cover across section of grade levels and subjects;

263 (ii) under the direction of the State Board of Education, include videos of highly

264 effective Utah STEM educators; and

265 (iii) contain tools to help educators implement what they have learned; and

266 (f) allow for additional STEM education video content to be added.

267 (3) In addition to the high quality professional development application described in

268 Subsections (1) and (2), the STEM Action Center may create STEM education hybrid or

269 blended high quality professional development that allows for face-to-face applied learning.

270 Section 6. Section **63N-12-212** is amended to read:

271 **63N-12-212. High school STEM education initiative.**

272 (1) Subject to legislative appropriations, after consulting with State Board of Education

273 staff, the STEM Action Center shall award grants to school districts and charter schools to fund

274 STEM related certification for high school students.

275 (2) (a) A school district or charter school may apply for a grant from the STEM Action

276 Center, through a competitive process, to fund the school district’s or charter school’s STEM

277 related certification training program.

278 (b) A school district’s or charter school’s STEM related certification training program

279 shall:

280 (i) prepare high school students to be job ready for available STEM related positions of

281 employment; and

282 (ii) when a student completes the program, result in the student gaining [~~a nationally~~]

283 an industry-recognized employer STEM related certification.

284 (3) A school district or charter school may partner with one or more of the following to

285 provide a STEM related certification program:

286 (a) a Utah College of Applied Technology college campus;

287 (b) Salt Lake Community College;

288 (c) Snow College; [~~or~~]

289 (d) Utah State University Eastern; or

290 [~~(d)~~] (e) a private sector employer.

**EDUCATION COMPUTING PARTNERSHIPS
2017 GENERAL SESSION
STATE OF UTAH
Chief Sponsor: Ralph Okerlund
House Sponsor: Bradley G. Last
Cosponsor: Howard A. Stephenson**

8 LONG TITLE

9 General Description:

10 This bill creates the Computing Partnerships Grants program.

11 Highlighted Provisions:

12 This bill:

13 < creates the Computing Partnerships Grants program, administered by the STEM
14 Action Center;

15 < authorizes the STEM Action Center to work with the State Board of Education to:
16 adopt rules for the administration of the grant program;

17 establish a grant application process; and

18 establish a review committee; and

19 < requires the STEM Action Center to annually report on the grant program to the
20 Education Interim Committee.

21 Money Appropriated in this Bill:

22 None

23 Other Special Clauses:

24 None

25 Utah Code Sections Affected:

26 AMENDS:

27 63N-12-202, as renumbered and amended by Laws of Utah 2015, Chapter 283

28 ENACTS:

29 63N-12-214, Utah Code Annotated 1953

30

31 Be it enacted by the Legislature of the state of Utah:

32 Section 1. Section 63N-12-202 is amended to read:

33 63N-12-202. Definitions.

34 As used in this part:

35 (1) "Board" means the STEM Action Center Board created in Section 63N-12-203.

36 (2) "Computing partnerships" means a set of skills, knowledge, and aptitudes used in
37 computer science, information technology, or computer engineering courses and career options.

38 [(2)] (3) "Educator" [has the same meaning as] means the same as that term is defined
39 in Section 53A-6-103.

40 (4) "Grant program" means the Computing Partnerships Grants program created in this
41 part.

42 [(3)] (5) "High quality professional development" means professional development that
43 high quality standards developed by the State Board of Education.

44 (6) "Institution of higher education" means an institution listed in Section 53B-1-102.

45 (7) "K-16" means kindergarten through grade 12 and post-secondary education
46 programs.

47 [(4)] (8) "Office" means the Governor's Office of Economic Development.

48 [(5)] (9) "Provider" means a provider, selected by staff of the board and staff of the

49 Utah State Board of Education, on behalf of the board:
50 (a) through a request for proposals process; or
51 (b) through a direct award or sole source procurement process for a pilot described in
52 Section 63N-12-206.

53 (10) “Review committee” means the committee established under Section 63N-12-214.
54 (11) “Stacked credentials” means credentials that:
55 (a) an individual can build upon to access an advanced job or higher wage;
56 (b) are part of a career pathway system;
57 (c) provide a pathway culminating in the equivalent of an associate’s or bachelor’s
58 degree;
59 (d) facilitate multiple exit and entry points; and
60 (e) recognize sub-goals or momentum points.

61 [(6)] (12) “STEM” means science, technology, engineering, and mathematics.
62 [(7)] (13) “STEM Action Center” means the center described in Section 63N-12-205.
63 (14) “Talent Ready Utah” means a partnership between the Governor’s Office of
64 Economic Development, the Governor’s Education Advisor, the Department of Workforce
65 Services, the Utah State Board of Education, the Utah System of Higher Education,
66 representatives of post-secondary technical education, industry partners, and the Utah STEM
67 Action Center.

68 Section 2. Section 63N-12-214 is enacted to read:
69 63N-12-214. Computing Partnerships Grants program.
70 (1) There is created the Computing Partnerships Grants program consisting of the
71 grants created in this part to provide for the design and implementation of a comprehensive
72 K-16 computing partnerships program, based upon the following common elements:
73 (a) outreach and student engagement;
74 (b) courses and content;
75 (c) instruction and instructional support;
76 (d) work-based learning opportunities;
77 (e) student retention;
78 (f) industry engagement;
79 (g) stacked credentials that allow for multiple exit and entry points;
80 (h) competency-based learning strategies; and
81 (i) secondary and post-secondary collaborations.

82 (2) The grant program shall incentivize public schools and school districts to work
83 with the STEM Action Center, staff of the State Board of Education, Talent Ready Utah,
84 industry representatives, and secondary partners on the design and implementation of
85 comprehensive K-16 computing partnerships through:
86 (a) leveraging existing resources for content, professional learning, and instruction,
87 including existing career and technical education funds, programs, and initiatives;
88 (b) allowing for the support of professional learning for pre- and in-service educators;
89 (c) supporting activities that promote and enhance access, diversity, and equity;
90 (d) supporting collaborations and partnerships between K-12, institutions of higher
91 education, cultural and community partners, and industry representatives;
92 (e) identifying the appropriate credentials that align with industry needs and providing
93 the credentials in a stacked credentials pathway;
94 (f) implementing a collaborative network that enables sharing and identification of best
95 practices; and
96 (g) providing infrastructure assistance that allows for the support of new courses and
97 the expansion of capacity for existing courses.

98 (3) The grant program shall include the following:
99 (a) rigorous and relevant metrics that are shared by all grant participants; and
100 (b) an evaluation by the STEM Action Center of the grant program that identifies best

101 practices.

102 (4) The STEM Action Center, in consultation with the State Board of Education, shall:

103 (a) in accordance with Title 63G, Chapter 3, Utah Administrative Rulemaking Act,

104 adopt rules:

105 (i) for the administration of the grant program and awarding of grants; and

106 (ii) that define outcome-based measures appropriate to the type of grant awarded under

107 this part;

108 (b) establish a grant application process;

109 (c) in accordance with Subsection (5), establish a review committee to make

110 recommendations for:

111 (i) metrics to analyze the quality of a grant application;

112 (ii) approval of a grant application; and

113 (iii) criteria to establish a requirement for an applicant to demonstrate financial need;

114 and

115 (d) with input from the review committee, adopt metrics to analyze the quality of a

116 grant application.

117 (5) (a) The review committee shall consist of K-16 educators, staff of the State Board

118 of Education, representatives of Talent Ready Utah, post-secondary partners, and industry

119 representatives.

120 (b) The review committee shall:

121 (i) review a grant application submitted;

122 (ii) make recommendations to a grant applicant to modify the grant application, if

123 necessary; and

124 (iii) make recommendations regarding the final disposition of an application.

125 (6) The STEM Action Center shall report annually on the grant program to the State

126 Board of Education and any findings and recommendations on the grant program shall be

127 included in the STEM Action Center annual report to the Education Interim Committee.

HB 426

**STEM AMENDMENTS
2017 GENERAL SESSION
STATE OF UTAH
Chief Sponsor: Val L. Peterson
Senate Sponsor: Brian E. Shiozawa**

9 This bill modifies provisions related to the STEM Action Center.

10 **Highlighted Provisions:**

11 This bill:

12 ⇒ defines terms;

13 ⇒ creates an expendable special revenue fund called the “STEM Action Center
14 Foundation Fund”;

15 ⇒ provides for treating a portion of money in the fund as an endowment fund such that
16 the principal of the fund is not expended;

17 ⇒ modifies provisions related to the STEM Action Center creating a foundation; and

18 ⇒ makes technical changes.

19 **Money Appropriated in this Bill:**

20 None

21 **Other Special Clauses:**

22 None

23 **Utah Code Sections Affected:**

24 AMENDS:

25 **63N-12-202**, as renumbered and amended by Laws of Utah 2015, Chapter 283

26 **63N-12-204**, as last amended by Laws of Utah 2016, Chapter 139

27 **63N-12-210**, as last amended by Laws of Utah 2016, Chapter 139

28 ENACTS:

29 **63N-12-204.5**, Utah Code Annotated 1953

30 *Be it enacted by the Legislature of the state of Utah:*

31 Section 1. Section **63N-12-202** is amended to read:

32 **63N-12-202. Definitions.**

33 As used in this part:

34 (1) “Board” means the STEM Action Center Board created in Section 63N-12-203.

35 (2) “Director” means the director appointed by the board to oversee the administration
36 of the STEM Action Center.

37 ~~[(2)]~~ (3) “Educator” ~~[has the same meaning as]~~ means the same as that term is defined
38 in Section 53A-6-103.

39 (4) “Foundation” means a foundation established as described in Subsections
40 63N-12-204(3) and (4).

41 (5) “Fund” means the STEM Action Center Foundation Fund created in Section
42 63N-12-204.5.

43 ~~[(3)]~~ (6) “High quality professional development” means professional development that
44 meets high quality standards developed by the State Board of Education.

45 ~~[(4)]~~ (7) “Office” means the Governor’s Office of Economic Development.

46 ~~[(5)]~~ (8) “Provider” means a provider[,] selected ~~[by staff of the board and staff of the
47 Utah State Board of Education, on behalf of the board]~~ on behalf of the board by the staff of the
48 board and the staff of the State Board of Education:

49 (a) through a request for proposals process; or
50

51 (b) through a direct award or sole source procurement process for a pilot described in
52 Section 63N-12-206.

53 [~~6~~] (9) "STEM" means science, technology, engineering, and mathematics.

54 [~~7~~] (10) "STEM Action Center" means the center described in Section 63N-12-205.

55 Section 2. Section **63N-12-204** is amended to read:

56 **63N-12-204. STEM Action Center Board — Duties.**

57 (1) The board shall:

58 (a) establish a STEM Action Center to:

59 (i) coordinate STEM activities in the state among the following stakeholders:

60 (A) the State Board of Education;

61 (B) school districts and charter schools;

62 (C) the State Board of Regents;

63 (D) institutions of higher education;

64 (E) parents of home-schooled students;

65 (F) other state agencies; and

66 (G) business and industry representatives;

67 (ii) align public education STEM activities with higher education STEM activities; and

68 (iii) create and coordinate best practices among public education and higher education;

69 (b) with the consent of the Senate, appoint a director to oversee the administration of
70 the STEM Action Center;

71 (c) select a physical location for the STEM Action Center;

72 (d) strategically engage industry and business entities to cooperate with the board:

73 (i) to support high quality professional development and provide other assistance for
74 educators and students; and

75 (ii) to provide private funding and support for the STEM Action Center;

76 (e) give direction to the STEM Action Center and the providers selected through a
77 request for proposals process pursuant to this part; and

78 (f) work to meet the following expectations:

79 (i) that at least 50 educators are implementing best practice learning tools in
80 classrooms;

81 (ii) performance change in student achievement in each classroom participating in a
82 STEM Action Center project; and

83 (iii) that students from at least 50 schools in the state participate in the STEM
84 competitions, fairs, and camps described in Subsection 63N-12-205(2)(d).

85 (2) The board may:

86 (a) enter into contracts for the purposes of this part;

87 (b) apply for, receive, and disburse funds, contributions, or grants from any source for
88 the purposes set forth in this part;

89 (c) employ, compensate, and prescribe the duties and powers of individuals necessary
90 to execute the duties and powers of the board;

91 (d) prescribe the duties and powers of the STEM Action Center providers; and

92 (e) in accordance with Title 63G, Chapter 3, Utah Administrative Rulemaking Act,
93 make rules to administer this part.

94 (3) The board may establish a foundation to assist in:

95 (a) the development and implementation of the programs authorized under this part to
96 promote STEM education; and

97 (b) implementation of other STEM education objectives described in this part.

98 (4) A foundation established by the board under Subsection (3):

99 (a) may solicit and receive contributions from a private organization for STEM
100 education objectives described in this part;

101 (b) shall comply with [~~Title 51, Chapter 7, State Money Management Act~~] the
102 requirements described in Section 63N-12-204.5;
103 (c) does not have power or authority to incur contractual obligations or liabilities that
104 constitute a claim against public funds;
105 (d) may not exercise executive or administrative authority over the programs or other
106 activities described in this part, except to the extent specifically authorized by the board;
107 (e) shall provide the board with information detailing transactions and balances [~~of~~
108 ~~funds managed for the board~~] associated with the foundation; and
109 (f) may not:
110 (i) engage in lobbying activities;
111 (ii) attempt to influence legislation; or
112 (iii) participate in any campaign activity for or against:
113 (A) a political candidate; or
114 (B) an initiative, referendum, proposed constitutional amendment, bond, or any other
115 ballot proposition submitted to the voters.
116 [~~(5) Money donated to a foundation established under Subsection (3) may be accounted~~
117 ~~for in an expendable special revenue fund.]~~
118 Section 3. Section **63N-12-204.5** is enacted to read:
119 **63N-12-204.5. STEM Action Center Foundation Fund.**
120 (1) There is created an expendable special revenue fund known as the “STEM Action
121 Center Foundation Fund.”
122 (2) The director shall administer the fund under the direction of the board.
123 (3) Money may be deposited into the fund from a variety of sources, including
124 transfers, grants, private foundations, individual donors, gifts, bequests, legislative
125 appropriations, and money made available from any other source.
126 (4) Money collected by a foundation described in Subsections 63N-12-204(3) and (4)
127 shall be deposited into the fund.
128 (5) Any portion of the fund may be treated as an endowment fund such that the
129 principal of that portion of the fund is held in perpetuity on behalf of the STEM Action Center.
130 (6) The state treasurer shall invest the money in the fund according to the procedures
131 and requirements of Title 51, Chapter 7, State Money Management Act, except that all interest
132 or other earnings derived from those investments shall be deposited into the fund.
133 (7) The director, under the direction of the board, may expend money from the fund for
134 the purposes described in this part.
135 Section 4. Section **63N-12-210** is amended to read:
136 **63N-12-210. Acquisition of STEM education high quality professional**
137 **development.**
138 (1) The STEM Action Center [~~shall~~] may, through a request for proposals process,
139 select technology providers for the purpose of providing a STEM education high quality
140 professional development application.
141 (2) The high quality professional development application described in Subsection (1)
142 shall:
143 (a) allow the State Board of Education, a school district, or a school to define the
144 application’s input and track results of the high quality professional development;
145 (b) allow educators to access automatic tools, resources, and strategies , including
146 instructional materials with integrated STEM content ;
147 (c) allow educators to work in online learning communities, including giving and
148 receiving feedback via uploaded video;
149 (d) track and report data on the usage of the components of the application’s system
150 and the relationship to improvement in classroom instruction;

151 (e) include video examples of highly effective STEM education teaching that:
152 (i) cover a cross section of grade levels and subjects;
153 (ii) under the direction of the State Board of Education, include videos of highly
154 effective Utah STEM educators; and
155 (iii) contain tools to help educators implement what they have learned; and
156 (f) allow for additional STEM education video content to be added.
157 (3) In addition to the high quality professional development application described in
158 Subsections (1) and (2), the STEM Action Center may create STEM education hybrid or
159 blended high quality professional development that allows for face-to-face applied learning.

UTAH STEM ACTION CENTER PROGRAM EVALUATION

Academic Year 2017-18



in partnership with





Bridging Research, Policy, & Practice

The Utah Education Policy Center (UEPC) is a research-based center at the University of Utah founded in the Department of Educational Leadership and Policy in 1990 and administered through the College of Education since 2007. As an integral part of the College's commitment to improving educational access and opportunities, the purpose of the UEPC is to improve the quality of educational policies, practices, and leadership in public schools and higher education by informing and influencing educational policy and practice in Utah and the surrounding region through research, evaluation, and technical assistance.

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Please visit our website for more information about the UEPC.

<http://uepc.utah.edu>

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Addendum to the 2017-18 STEM Action Center Program Evaluation

To be added once 2017-18 SAGE data are available.

STEM ACTION CENTER PROGRAM EVALUATION: ACADEMIC YEAR 2017-18

Introduction

In 2013, the Utah Legislature passed HB 139, *Science, Technology, Engineering, and Mathematics Action Center*, which established Utah's STEM Action Center (STEM AC). The STEM AC's mission is to serve as "Utah's leader in promoting science, technology, engineering and math through best practices in education to ensure connection with industry and Utah's long-term economic prosperity." The STEM AC is supported by the Governor's Office of Economic Development (GOED).

The Utah Education Policy Center (UEPC) at the University of Utah, in partnership with Utah Valley University's (UVU) School of Education (SOE) received the contract to conduct an evaluation of three of the STEM Action Center's programs:

- K-12 Mathematics Personalized Learning Software Grant,
- Elementary STEM Endorsement Program, and
- STEM Professional Learning Program.

This report presents findings and recommendations on the 2017-18 implementation year of these three programs. This is the second year of a five-year evaluation cycle for the UEPC and UVU team.

Similar to 2016, this evaluation was informed by two frameworks. These frameworks included the Pedagogical Content Knowledge (PCK) and the Technological, Content, and Pedagogical Knowledge (TPACK) frameworks.

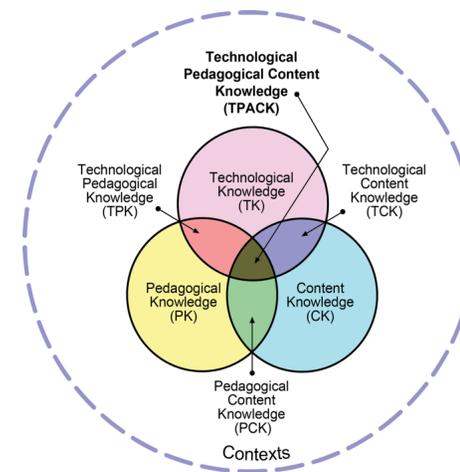
Evaluation Background

Continuing the plan started in 2016-17, the 2017-18 evaluation process builds on two foundational frameworks that were applied as appropriate to each project's evaluation. These frameworks include the Pedagogical Content Knowledge (PCK) and the Technological, Content, and Pedagogical Knowledge (TPACK) frameworks. In addition, the evaluation team used the logic models developed along with the STEM AC, to guide the evaluation. A brief overview of the frameworks and the logic model is provided below.

PCK and TPACK

The Pedagogical Content Knowledge (PCK) framework proposed by Shulman (1986) describes teaching as a continuous interaction between content knowledge, curriculum knowledge, and pedagogical knowledge to produce what Shulman called "knowledge for teaching." The PCK ideas have evolved through the current work of leading STEM researchers. With the expansion of technology integration in schools, Mishra and Koehler (2006) proposed the Technological, Pedagogical, and Content Knowledge (TPACK) framework as one that utilizes the ideas of Shulman. The

Figure 1. TPACK Framework



SOURCE: [HTTP://TPACK.ORG](http://TPACK.ORG)

TPACK framework is enhanced with the integration of technology pedagogy and content. The TPACK Framework (Figure 1) shows the interactions of the three major elements as envisioned by Mishra and Koehler. The TPACK framework establishes a foundation for technology integration in meaningful ways and supports the instructional processes in 21st century classrooms (see <http://www.tpack.org> for more details). The PCK and TPACK frameworks also provided essential support and guidelines in evaluating the STEM AC projects as they represent most current directions to classroom instruction and to professional development and teacher growth.

Logic Models

Program logic models are standard practice for mapping program inputs and resources, implementation activities, and outcomes (e.g., short- and long-term by participant group). Once completed, the logic model is used as a means to focus evaluation efforts (i.e., design, methods, analysis) to assess core program aspects and expectations for outcomes. Logic models facilitate evaluation methodology by providing all program elements that are believed to be important to achieving desired outcomes. Evaluation methodologies based on logic models allow us to assess each model component (or a prioritized subset of components). This allows the evaluation to draw conclusions not only about the degree to which the outcomes are obtained, but also why or why not.

Evaluation Methodology and Analysis

This five-year evaluation methodology consists of collecting and analyzing data to 1) assess the degree to which process and outcome goals as indicated in the logic models were attained, and

2) provide considerations for program improvement. The three primary data sources for the evaluations include software vendor data, survey data, and student performance and achievement data.

Software vendor data are available for the K-12 Mathematics Personalized Learning Software Grantees and the STEM Professional Learning Program. Vendors that provide software programs to schools collect data, including the number of licenses used, amount of time spent on the software for each user, and progress made through the material.

Surveys were developed to collect data from participating teachers (all three programs), administrators (math software and professional learning programs), and students (math software program only). In all cases, the data collection instruments from prior evaluations were reviewed and considered in order to provide continuity in the evaluation. In addition, existing surveys from the research literature on TPACK and STEM education were reviewed. Surveys for the three STEM AC programs to be evaluated were then developed using the logic models. Furthermore, surveys were aligned across groups of participants to provide comparable data on the project components and their perceived impact.

More detailed information on methodology and analysis specific to each grant program is provided in the relevant subsections of this report.

SAGE data for the 2017-18 school year are not yet available at the time this report was finalized; analyses from those data will be provided in an addendum to the 2017-18 report.

K-12 Mathematics Personalized Learning Software Grant

Background

In addition to the creation of the Utah STEM Action Center, HB 139 created the *K-12 Mathematics Personalized Learning Software Grant Pilot Program*. Through this program, the STEM Action Center selected providers of online instructional technology to support mathematics instruction in Utah classrooms. HB 139 required that the technology be individualized, self-adapting, engaging, and provide frequent feedback while addressing core standards for math. The STEM AC uses a competitive bidding process and annual evaluation results to determine which math software products will be offered annually to public K-12 schools in Utah.

This annual report provides results from Year Four of the K-12 Mathematics Personalized Learning Software Grant (2017-18). In the first year of the grant (2014-15), there were 11 software products available to schools and LEAs. In year four (2017-18), there were five supported software products (see Table 1 on page 11). Schools and LEAs applied to utilize the programs through a grant application released in January of 2017 and awarded in spring 2017.

Program Overview

The mathematics software programs are intended to improve student math performance. Specifically, the software are designed to increase student math understanding and skill as well as interest and engagement with math, perceived utility of math, and awareness of math in everyday life. Each software program is adaptive and provides students with problems that are suited to each individual's ability. Moreover, the software programs reportedly aid student learning by showing steps to solving the

problems, and providing immediate feedback. Some products have competitive features or rewards to engage students. Because programs are designed to adapt to students' skill levels, frustration with too difficult problems and boredom with too easy problems reportedly should be minimized. Students can use the software in school or anywhere they have access to a compatible device with internet.

Availability of the math software is not intended to supplant teacher instruction. Teachers are encouraged to actively engage with students during use of the software. For instance, teachers may use the software in small group instruction for acceleration or remediation; teachers can also work one-on-one with students while the rest of the class is engaged with the software. To maximize student outcomes, teachers are expected to make frequent use of student data reports to understand student progress and needs.

Evaluation Methods

The evaluation of the K-12 Mathematics Personalized Learning Software Grant focused on program implementation, educator outcomes, and student outcomes (see the program logic model, Figure 2) to determine the degree to which the program is meeting the goal of increasing student awareness, engagement, and interest in mathematics. Specifically, for program implementation, we assessed both *quantity* (e.g., to what extent were students and teachers using the software, and in what ways?) and *quality* (e.g., what was the perceived quality of each program and training for each program?). We also assessed perceptions of barriers to use as

well as factors that facilitated use. For teacher outcomes, we assessed teachers' perceptions of the impact of the programs on their teaching (e.g., to what extent did they perceive that access to the programs increased their instructional effectiveness, and in what ways?). Finally, for student outcomes, we assessed teacher and administrator perceptions of the impact of program use on student performance and learning as well as student perceptions of the impact of the programs on their engagement with and enjoyment of math, confidence in math, interest in math, and understanding of math utility. Student outcomes will be further assessed by analyzing student end-of-level math performance by program use, as these data become available (see the forthcoming addendum).

Data sources included participation records, vendor data (including usage), and year-end surveys of administrators, teachers, and students who used the program during the 2017-18 school year. This report provides descriptive statistics from the survey responses and the vendor data for each program where there were at least 10 responses. Results are also presented for the grant program as a whole, aggregated across all the software programs (labeled "Combined Programs" on the tables). In addition, vendor results are presented alphabetically, except in figures where results are presented in rank order. Qualitative data from the surveys were analyzed by the evaluation team who used open coding followed by development of coding categories. Results are synthesized and presented by major themes.

Figure 2. Math Personalized Learning Software Program Logic Model

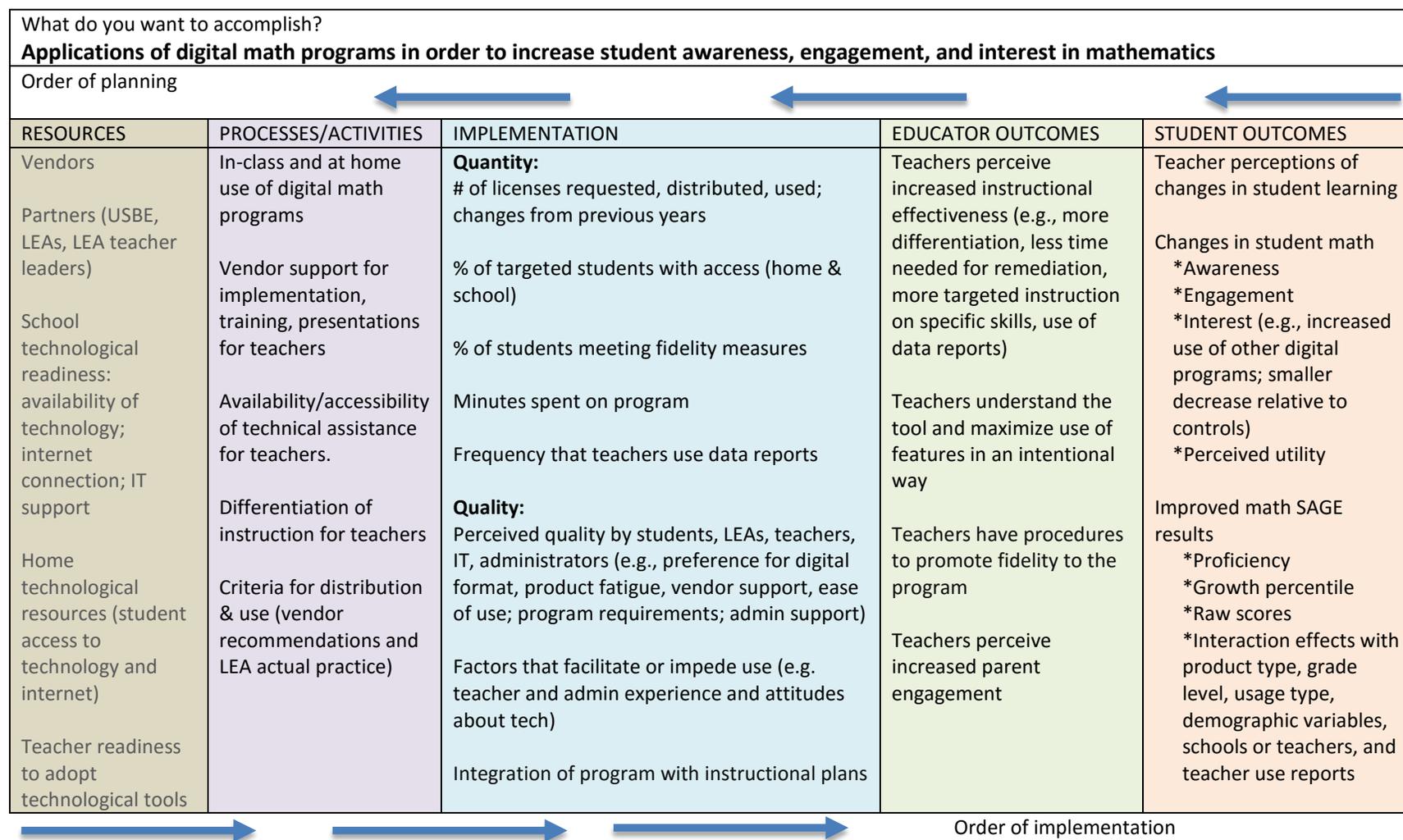


Table 1. Implemented Personalized Math Learning Products

Year	Vendor	McGraw-Hill	Ascend Education	Hot Math	The NROC Project	Imagine Learning	Curriculum Associates	Pearson	Carnegie Learning	Compass Learning	Explore Learning	MIND Research Institute	Pearson
Product	ALEKS	Ascend Math	Catchup Math	Ed Ready	Imagine Math	iReady	Math XL	MathiaX	Odyssey Math	Reflex Math	ST Math	Success Maker	
2014-15	X		X	X	X	X	X	X	X	X	X	X	
2015-16	X		X	X	X	X	X	X		X	X		
2016-17	X	X			X	X		X				X	
2017-18	X	X			X	X					X		

Table 2. Statewide Distribution by Schools and Districts

	2014-15	2015-16	2016-17	2017-18	
Total licenses requested	n/a	183,109	223,623	195,449	License requests met:
Total licenses funded by STEM AC	193,213	166,993	134,269	134,616	✓ 91% in 2015-16
Total districts and charters with STEM AC funded licenses	139	93	72	62	✓ 60% in 2016-17
Total schools with STEM AC funded licenses	653	556	586	440	✓ 69% in 2017-18
Total number of student licenses used	150,706	131,602	147,238 ¹	134,807	

SOURCES: STEM AC DATA, VENDOR DATA, AND NATIONAL CENTER FOR EDUCATION STATISTICS DATA (FOR SCHOOL CLASSIFICATIONS)

¹ The number of licenses used in 2016-17 is larger than the number of licenses funded by STEM AC because vendors provided data for all students in Utah who used the program regardless of funding source.

Table 3. 2017-18 License Statewide Distribution by Product

	<i>ALEKS</i>	<i>Ascend Math</i> ²	<i>Imagine Math</i>	<i>iReady</i>	<i>ST Math</i>	Combined Programs
Licenses requested	98,508	3,145	28,324	28,698	36,774	195,449
Percent of total licenses requested	50%	2%	14%	15%	19%	100%
Initial licenses awarded	66,412	2,206	20,006	18,322	27,670	134,616
Percent of total licenses awarded	49%	2%	15%	14%	21%	100%
Percent of awarded licenses compared to requested licenses	67%	70%	71%	64%	75%	69%
Number of districts with awarded licenses	28	3	8	14	11	32
Number of schools with awarded licenses	251	19	83	89	113	440
Adjusted licenses awarded (STEM AC funded student licenses) by school level						
Elementary (274 schools)	15,100	2,124	15,492	16,399	26,763	75,878
Secondary (98 schools)	23,816	55	1,744	1,826	445	27,886
Mixed (66 schools)	27,585	27	2,770	97	533	31,012
Overall (438 schools)	66,501	2,206	20,006	18,322	27,741	134,776
Total students who used the product (licenses from STEM AC and other sources) by school level*						
Elementary	6,783	662	18,630	16,216	37,032	79,323
Secondary	38,366	28	3,608	2,074	374	44,450
Mixed	3,980	0	1,060	243	0	5,283
Overall	49,129	690	23,298	18,533	37,406	129,056
Average minutes of use per year per student by school level*						
Elementary	1,435	317	2,212	1,109	1,136	1,402
Secondary	1,755	1,050	1,277	1,062	641	1,674
Mixed	1,539	--	1,293	1,027	--	1,466
Overall	1,693	347	2025	1,102	1,131	1,498

✓ In 2017-18, half of the requested licenses were for *ALEKS*.

✓ STEM AC met 69% of product requests.

✓ Based on a 36 week academic year, elementary students spent an average of 39 minutes and secondary students spent an average of 47 minutes per week on the programs.

* Cases were excluded from analysis if a student's monthly use was less than one minute or larger than the 99.99th percentile for the software vendor for that month.

SOURCE: STEM AC DATA, VENDOR DATA, AND NATIONAL CENTER FOR EDUCATION STATISTICS DATA (FOR SCHOOL CLASSIFICATIONS)

² Due to low student usage, Ascend Math was not included in the evaluation on the recommendation of STEM AC.

Table 4. Fidelity Recommendations by Product

Product	Publisher	Supported	Fidelity Requirements
<i>ALEKS</i>	<i>McGraw-Hill</i>	Grades 3-12	60 minutes OR 5 topics per week
<i>Ascend Math</i>	<i>Ascend Education</i>	K-12 Secondary Math I, II, and III	K-1: 5 learning objectives in Quarter 1, thereafter, 2 objectives per month 2-3: 5 learning objectives in Quarter 1, thereafter, 4 objectives per month 4-6: 30 minutes or 1 learning objective per week 7-12: 45 minutes or 1 learning objective per week
<i>Imagine Math</i>	<i>Imagine Learning</i>	Grades 3-8 Algebra I Geometry	Quarter 1 (Sept-Nov): 5+ Lessons Completed Quarter 2 (Dec-Feb): 10+ Lessons Completed Quarter 3 (Mar-May): 15+ Lessons Completed
<i>iReady</i>	<i>Curriculum Associates</i>	Grades K-8	45 minutes per week
<i>ST Math</i>	<i>MIND Research Institute</i>	Grades K-12	K-1: 60 minutes per week 2-8: 90 minutes per week

SOURCE: STEM AC RECORDS

Table 5. Survey Response Rates and Grade Level Distributions for the Math Personalized Learning Software Grant

		<i>ALEKS</i>	<i>Imagine Math</i>	<i>iReady</i>	<i>ST Math</i>	Combined Programs
Teachers	Ns	405	237	287	434	1363
	% Using Each Program	30%	17%	21%	32%	100%
	Teacher Grade Level Distributions within Each Program³					
	K - 2nd	0%	0%	29%	40%	0%
	3rd - 6th	43%	95%	66%	65%	43%
	7th - 8th	36%	5%	8%	0%	36%
	9th - 12th	33%	1%	1%	0%	33%
	Other	4%	2%	2%	0%	4%
Students	Ns	20,063	7,677	7965	5,548	41,253
	% Using Each Program	49%	19%	19%	13%	100%
	Student Grade Level Distributions within Each Program					
	3rd - 6th	21%	82%	79%	99%	54%
	7th - 8th	48%	13%	20%	1%	30%
	9th - 12th	31%	5%	1%	1%	16%
Administrators	Ns	44	26	35	36	141
	% Using Each Program	31%	18%	25%	26%	100%

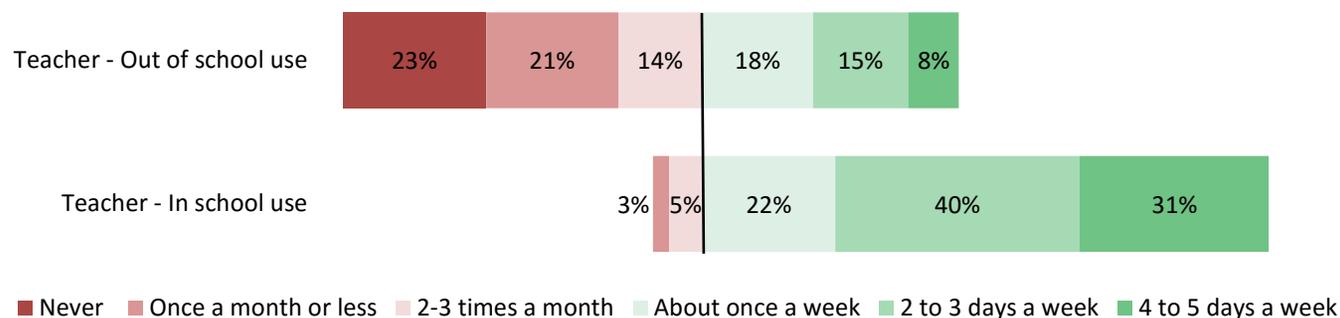
✓ The majority of teacher respondents taught elementary classes (83%). Student respondents for Math, iReady, and ST Math were primarily in grades 3 through 6 while respondents for ALEKS were primarily in grades 7 through 12.

SOURCE: ADMINISTRATOR, TEACHER, AND STUDENT SURVEYS SPRING 2018

³ Teachers and administrators could choose all that apply for grade levels and software programs. Students could select only one.

Program Use

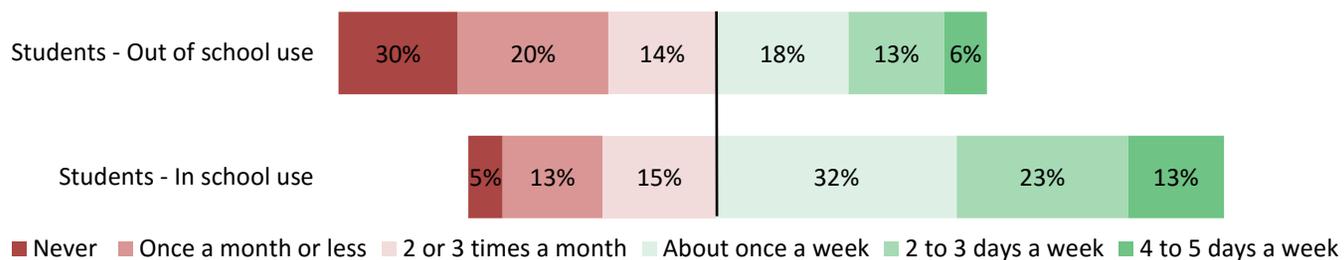
Figure 3. Frequency of 2017-18 Student Program Use Reported by Teachers



✓ On the student survey, this question was asked only of secondary students. Teachers of all grade levels were asked this question.

✓ Teachers reported greater use than secondary students.

Figure 4. Frequency of 2017-18 Student Program Use Reported by Secondary Students



✓ 93% of teachers and 68% of secondary students reported using the program at school at least weekly.

SOURCES: TEACHER AND STUDENT SURVEYS SPRING 2018

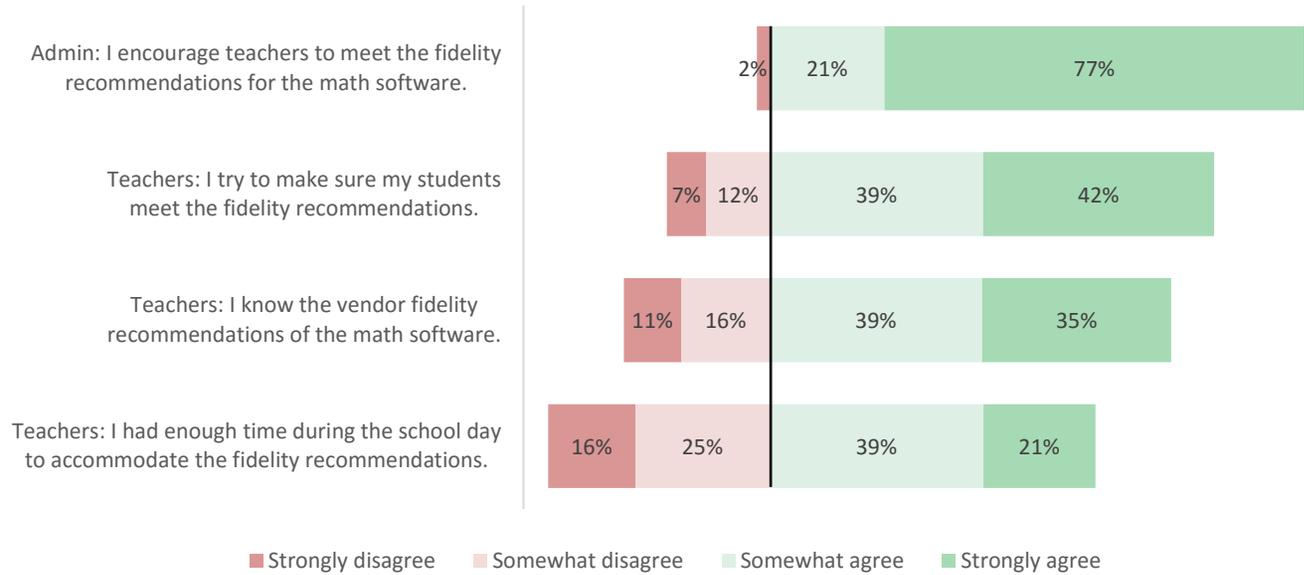
Table 6. Frequency of 2017-18 Program Use by Program Type
 Percentage of teachers and students reporting student use *about once a week* or more.

	ALEKS	Imagine Math	iReady	ST Math	Combined Programs
Teachers					
In School	87%	91%	97%	94%	91%
Outside of School	60%	39%	29%	34%	42%
Secondary Students					
In School	69%	29%	79%	61%	67%
Outside of School	38%	25%	19%	29%	36%
Teacher estimates of their average number of minutes used per week					
Minutes per week	76	76	66	70	72

SOURCES: TEACHER AND STUDENT SURVEYS SPRING 2018

- ✓ All programs were used primarily *in* school, although over half of ALEKS and almost a third of other programs reported out-of-school use as well.
- ✓ Teachers reported having students use the software an average of 72 minutes per week.
- ✓ *Not shown:* Number of reported years of teaching and years of using the software did not predict number of minutes used each week.

Figure 5. Administrator and Faculty Intentions to Meet Fidelity Requirements



- ✓ Over three quarters of administrators strongly agreed that they encourage teachers to meet the fidelity recommendations.
- ✓ Over 80% of teachers somewhat or strongly agreed they try to have their students meet the fidelity recommendations.

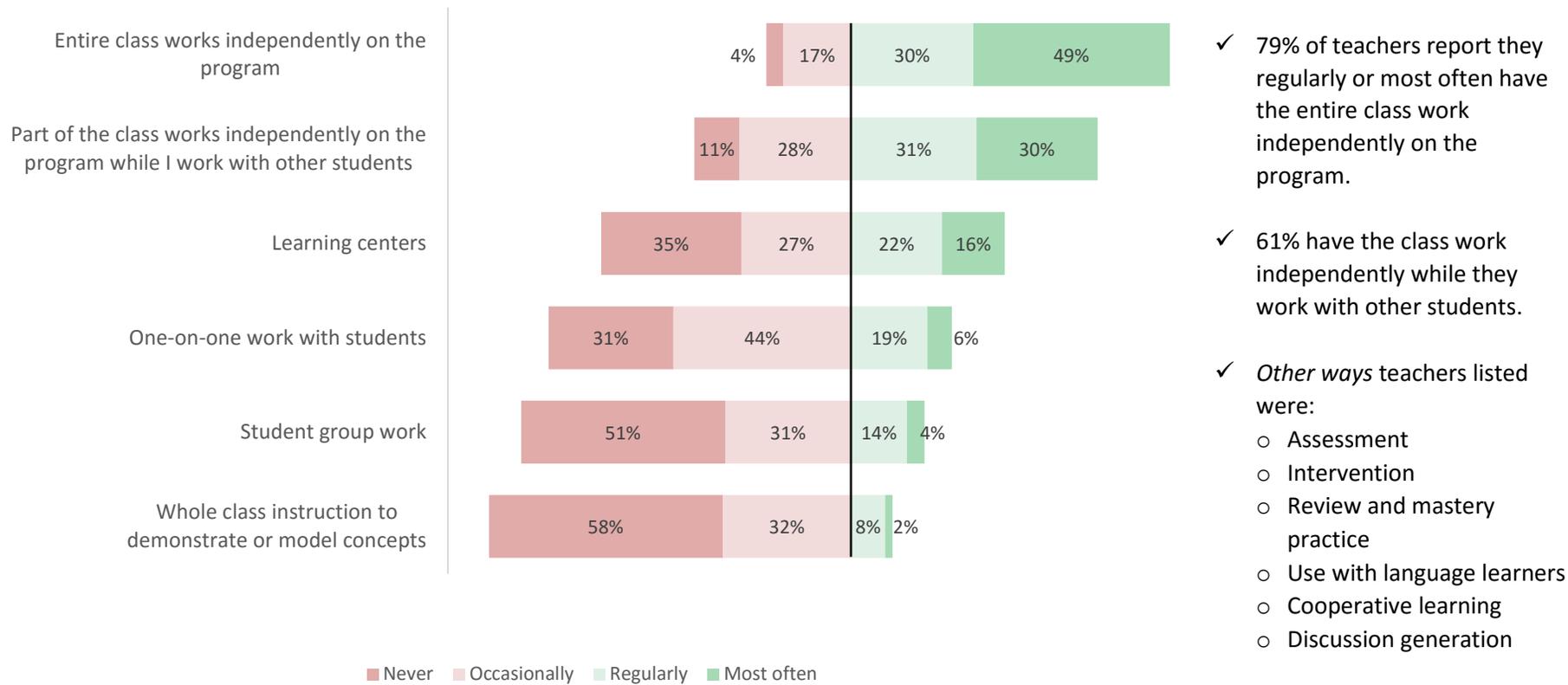
Table 7. Faculty Intentions to Meet Fidelity Requirements
 Percentage who *somewhat agree* or *strongly agree* with each statement

	ALEKS	Imagine Math	iReady	ST Math	Combined Programs
Administrators					
I encourage teachers to meet fidelity recommendations for the math software.	98%	100%	97%	97%	98%
Teachers					
I try to make sure my students meet the fidelity recommendations.	76%	85%	85%	82%	82%
I know the vendor fidelity recommendations of the math software.	67%	79%	78%	73%	73%
I had enough time during the school day to accommodate fidelity recommendations.	57%	66%	68%	53%	53%

- ✓ Almost all administrators indicated they encourage teachers to meet the fidelity recommendations.
- ✓ The majority of teachers across programs (82%) reported they try to have students meet the fidelity recommendations.
- ✓ 27% of teachers across programs were not sure they knew the fidelity recommendations for their program. *Not shown:* Only 35% of teachers strongly agreed they knew the fidelity recommendations.
- ✓ A slightly higher percentage of teachers reported they try to meet the recommendations than knew the recommendations.
- ✓ 53% of teachers across programs indicated they had enough time during the school day to meet fidelity recommendations.

SOURCES: ADMINISTRATOR AND TEACHER SURVEYS SPRING 2018

Figure 6. Type of In-Class Use Reported by Teachers – All Programs Combined



SOURCE: TEACHER SURVEY SPRING 2018

Table 8. Type of In-Class Use Reported by Teachers by Program
 Percentage of teachers using the method *regularly* and *most often*

	ALEKS	Imagine Math	iReady	ST Math	Combined Programs
Entire class works independently on the program	84%	77%	75%	78%	79%
Part of the class works independently on the program while I work with other students	55%	64%	63%	64%	61%
Learning centers	24%	39%	36%	52%	38%
One-on-one work with students	35%	18%	20%	23%	25%
Student group work	15%	13%	22%	22%	18%
Whole class instruction to demonstrate or model concepts	10%	3%	17%	10%	10%

✓ Patterns of use are similar across programs with teachers reporting that most commonly they have the entire class work independently, or work independently while the teacher works with other students.

SCALE OPTIONS INCLUDED NEVER, OCCASIONALLY, REGULARLY, AND MOST OFTEN.

SOURCE: TEACHER SURVEY SPRING 2018

Figure 7. Teacher Reported Frequency of Use of Data Reports by Program



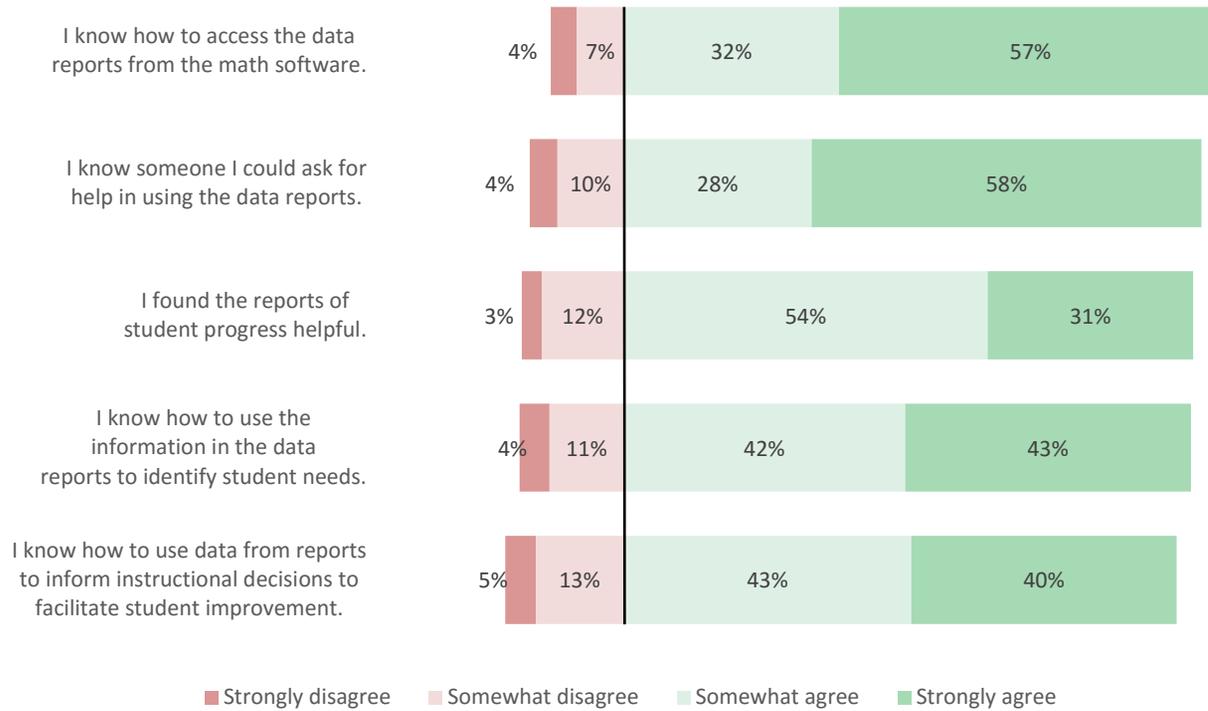
✓ For all programs combined, 40% of teachers were using the program data reports at least weekly to assess student learning.

✓ For all programs combined, 39% of teachers were using data reports once a month or less.

■ Never ■ Once a month or less ■ 2 or 3 times a month ■ About once a week ■ 2 to 3 days a week ■ 4 to 5 days a week

SOURCE: TEACHER SURVEY SPRING 2018

Figure 8. Teacher Perceptions of Data Reports



- ✓ In general, teachers know how to access and use the data reports.
- ✓ 85% of teachers overall agreed the reports of student progress were helpful.

SOURCE: TEACHER SURVEY SPRING 2018

Table 9. Teacher Perceptions of Data Reports by Program
 Percentage who *somewhat agree* or *strongly agree* with each statement

	ALEKS	Imagine Math	iReady	ST Math	Combined Programs
I know how to access the data reports from the math software.	91%	85%	93%	87%	89%
I know someone I could ask for help in using the data reports.	86%	82%	90%	86%	86%
I found the reports of student progress helpful.	90%	78%	87%	83%	85%
I know how to use the information in the data reports to identify student needs.	85%	80%	87%	84%	84%
I know how to use data from reports to inform instructional decisions to facilitate student improvement.	82%	78%	88%	82%	82%

SOURCE: TEACHER SURVEY SPRING 2018

- ✓ Across programs, the majority of teachers know how to access and use the data reports. However, there are still a number of teachers who could benefit from additional support:
 - 11% do not know how to access the data reports.
 - 16% do not know how to use the data reports to identify student needs.
 - 18% do not know how to use the data reports to inform instructional decisions.

Table 10. Teacher Reasons They Decided Not to Use the Math Educational Software

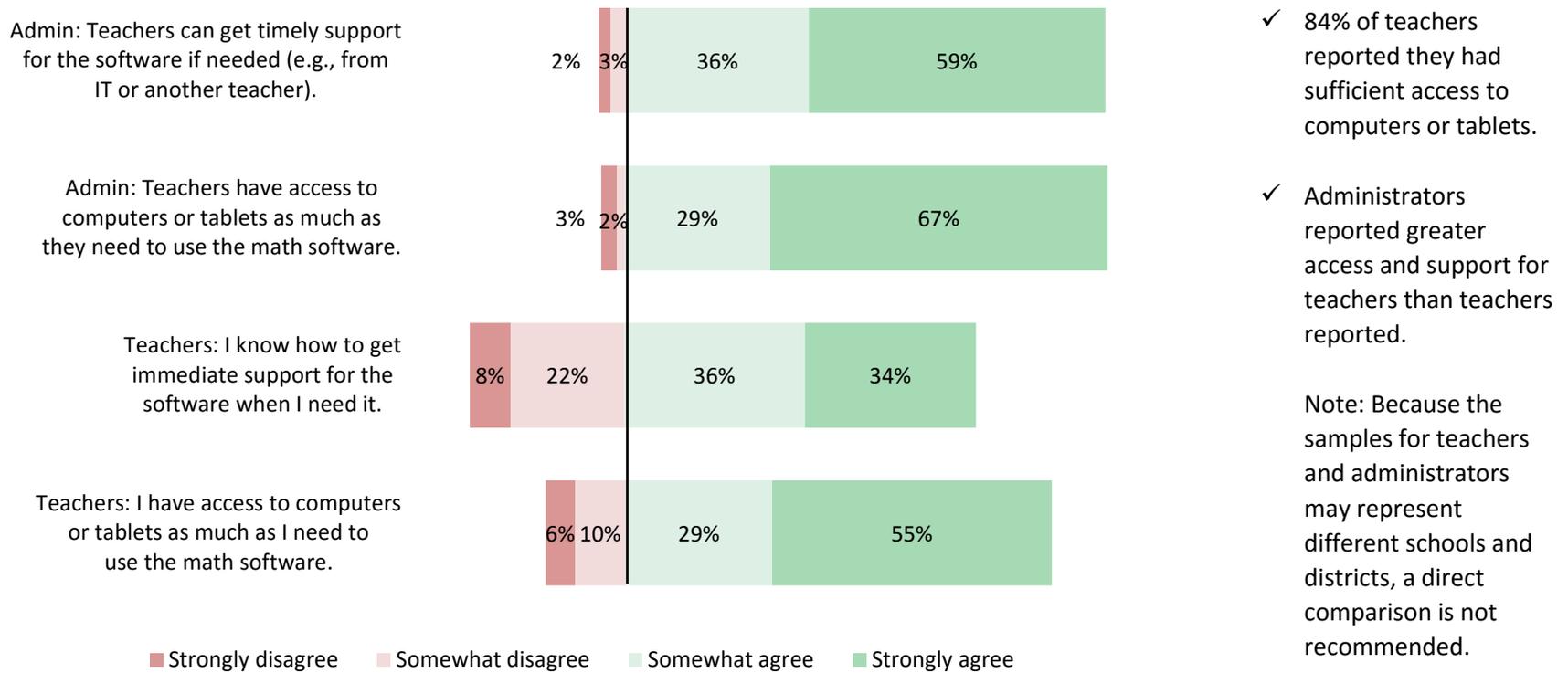
Approximately 2% of responding teachers indicated they do not use the software. These teachers were asked to explain why they do not use the software.

Theme	Example Quotes
Some teachers did not use the software because they lacked resources and time to do so.	<p>"I do not have sufficient access to Chromebooks/the Computer Lab to use these programs consistently. I also feel that the Go-Math program with additional resources I have accumulated are sufficient for meeting the Core needs. I also feel that there is not enough time to cover all that has to be taught in such a tight schedule with additional programs."</p> <p>"I teach special education. The students have their own computers but I feel that bringing them back and forth to my room takes up too much of my instructional time."</p> <p>"Lack of time and training."</p>
Some teachers did not use the software because they were not given the option to do so.	<p>"didn't get licenses"</p> <p>"I didn't know it was available."</p>
Some teachers did not use the software because they did not find it helpful.	<p>"The only one that was offered was imagine math and my students did not like that one the previous year so I chose not to use it."</p> <p>"Because they teach memorization and procedure, students don't actually learn the concepts behind them."</p>
Some teachers did not use the software because they used other resources instead.	<p>"I use math worksheets and one touch math."</p> <p>"Currently I am using work sheets and physical math."</p>

SOURCE: TEACHER SURVEY SPRING 2018

Access and Support

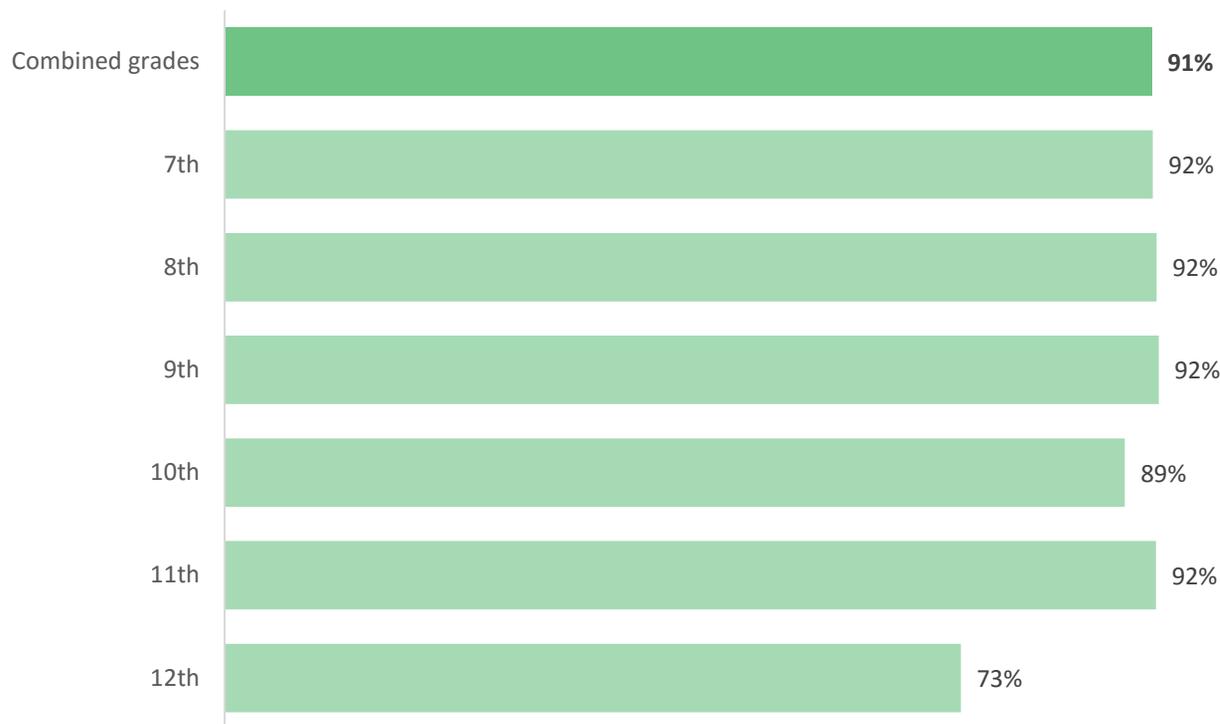
Figure 9. Teacher and Administrator Perceptions of Teacher Technology Access and Support



SOURCES: ADMINISTRATOR AND TEACHER SURVEYS SPRING 2018

Figure 10. Secondary Student Access to Devices at Home

Percentage of students indicating they have access to a computer or device at home to use the program



- ✓ Most, *but not all*, secondary students had access to a computer or device at home.
- ✓ Seniors were among the least likely to report access to a computer or device at home to use the program.

SOURCE: STUDENT SURVEY SPRING 2018

Table 11. Teacher Professional Development and Training on the Programs
 Percentage who *somewhat agree* or *strongly agree* with each statement

	<i>ALEKS</i>	<i>Imagine Math</i>	<i>iReady</i>	<i>ST Math</i>	Combined Programs
Admin					
Teachers were provided with professional development on effective use of the math software.	90%	83%	93%	83%	88%
I was satisfied with the professional development provided to teachers.	88%	83%	90%	91%	88%
Teachers: I would like to receive more training on...					
customizing programs to better meet student needs.	89%	75%	78%	77%	81%
using the program to differentiate instruction better.	80%	71%	73%	73%	75%
aligning the program with the concepts I am teaching.	81%	73%	76%	64%	73%
using various program tools.	80%	67%	69%	70%	72%
using the student data reports.	75%	73%	63%	72%	71%
integrating program use with regular instruction.	77%	69%	71%	64%	70%
ways to use the math software.	69%	55%	53%	55%	59%

- ✓ Most administrators indicated they were satisfied with the training teachers received on using the software.
- ✓ 12% of administrators indicated their teachers were not provided with training or were not satisfied with the training provided.
- ✓ The majority of teachers indicated a desire to receive more training on all aspects of using the programs.
- ✓ *Other topics* teachers listed were:
 - Assessment methods
 - Use with language learners, early readers, and special education students
 - Sharing customized assignments with other teachers
 - Student engagement
 - Trouble-shooting

SOURCES: ADMINISTRATOR AND TEACHER SURVEYS SPRING 2018

Perceived Outcomes

Table 12. Teacher Opinions on Programs Helping to Develop Soft Skills
Percentage who *somewhat agree* or *strongly agree* with each statement

	<i>ALEKS</i>	<i>Imagine Math</i>	<i>iReady</i>	<i>ST Math</i>	Combined Programs
The personalized math software has helped me teach my students how to...					
be self-directed learners.	95%	90%	90%	93%	92%
think critically.	85%	90%	84%	94%	89%
think creatively.	69%	80%	73%	94%	80%
collaborate.	49%	40%	35%	56%	47%
communicate effectively.	49%	41%	44%	48%	46%

- ✓ The majority of teachers agreed the software helped them teach their students to be self-directed learners, think critically, and think creatively.
- ✓ Less than half of teachers thought the software helped teach their students to collaborate and communicate.

SOURCES: TEACHER SURVEYS SPRING 2018

Table 13. Teacher Opinions on Programs Helping Them Provide Effective Mathematics Instruction
 Percentage who *somewhat agree* or *strongly agree* with each statement

	ALEKS	Imagine Math	iReady	ST Math	Combined Programs
Use of the software...					
Provided students with increased opportunities to learn from mistakes.	96%	89%	86%	94%	92%
Helped me engage with students more equitably.	84%	71%	76%	80%	78%
Increased my ability to explain concepts in more than one way.	78%	71%	76%	85%	78%
Helped me use data and other evidence to make changes in my instruction.	75%	60%	77%	70%	71%
Helped me analyze student errors and misconceptions and adjust my instruction.	71%	58%	68%	70%	68%

- ✓ Most teachers agreed the software provided opportunities for students to learn from their mistakes.
- ✓ The majority of teachers also agreed the software helped them engage with students equitably, explain concepts in more than one way, and use data to make changes to instruction.
- ✓ Two-thirds of teachers agreed the software helped them analyze errors and misconceptions.

SOURCES: TEACHER SURVEYS SPRING 2018

Table 14. Stakeholder Opinions on Programs Providing New Ways to Solve Math Problems
 Percentage who *somewhat agree* or *strongly agree* with each statement

	ALEKS	Imagine Math	iReady	ST Math	Combined Programs
Teachers					
The math software helped students understand different ways to solve math problems.	89%	91%	90%	95%	92%
Elementary Students					
The program showed me new ways to solve problems.	79%	71%	75%	76%	75%
Secondary Students					
The program showed me ways to solve problems that my teacher didn't show me.	60%	45%	49%	49%	58%
The program helped me understand different ways to solve math problems.	61%	46%	55%	56%	59%

- ✓ Most teachers across programs (92%) indicated the software provided new ways to solve math problems.
- ✓ The majority of elementary students (75%) and over half of secondary students (59%) agreed the software provided new or different ways to solve math problems.

SOURCES: TEACHER AND STUDENT SURVEYS SPRING 2018

Table 15. Stakeholder Opinions on Programs Building Student Confidence in Math
 Percentage who *somewhat agree* or *strongly agree* with each statement

	ALEKS	Imagine Math	iReady	ST Math	Combined Programs
Teachers					
The math software seemed to make students feel they could learn a lot in math.	81%	79%	80%	91%	83%
Elementary Students					
The program helped me feel confident about math.	67%	62%	60%	65%	63%
The program made me feel I could be good at math.	70%	67%	64%	71%	68%
Secondary Students					
The program helped me feel more confident about math.	51%	36%	39%	57%	49%
The program made me feel I could be good at math.	53%	40%	44%	45%	52%
The program helped me feel I could learn a lot in math.	52%	38%	42%	53%	50%

- ✓ Across programs, a majority of teachers (83%) reported the software seemed to make students feel like they could learn a lot in math.
- ✓ Elementary students were more likely to agree that the software increased their confidence than secondary students.
- ✓ Approximately half of secondary students reported the software increased their confidence in math.

SOURCES: TEACHER AND STUDENT SURVEYS SPRING 2018

Table 16. Teachers’ and Elementary Students’ Opinions on Programs Creating Student Enjoyment of Math
 Percentage who *somewhat agree* or *strongly agree* with each statement

	ALEKS	Imagine Math	iReady	ST Math	Combined Programs
Teachers					
My students enjoy using the software.	71%	80%	70%	93%	79%
The math software helped make math fun this year.	59%	67%	63%	88%	70%
Elementary Students					
I liked using the program at school.	63%	58%	56%	73%	62%
The program helped make math fun.	44%	47%	45%	61%	49%
I spent more time on the program than my teacher required.	36%	35%	36%	43%	38%
I liked using the program at home.	32%	34%	27%	39%	33%
I looked for other math computer programs I could use.	25%	28%	28%	32%	28%

- ✓ Teachers were more likely than elementary or secondary students (see next page) to agree that students enjoyed using the software and that the software made math fun.
- ✓ Elementary students were more likely than secondary students to report increased math enjoyment.
- ✓ 28% of elementary students and 18% of secondary students liked the program enough to look for additional math programs they could use.

SOURCES: TEACHER AND STUDENT SURVEYS SPRING 2018

Table 17. Secondary Students’ Opinions on Programs Creating Student Enjoyment of Math
 Percentage who *somewhat agree* or *strongly agree* with each statement

	ALEKS	Imagine Math	iReady	ST Math	Combined Programs	
Secondary Students						
I liked the way my teacher had us use the program.	59%	41%	52%	41%	57%	✓ About a quarter of secondary students reported that the programs helped make math fun this year.
I liked using the program to work on math at school.	45%	28%	35%	50%	43%	
The program helped me want to learn more about math.	39%	28%	35%	45%	38%	✓ About a quarter of secondary students reported that they spent more time on the program than required.
The program helped make math fun this year.	24%	17%	23%	45%	24%	
I spent more time on the program than my teacher required.	25%	18%	30%	34%	25%	
I liked using the program to work on math at home.	28%	22%	18%	31%	27%	
The program got me excited about taking more math classes.	21%	15%	19%	32%	21%	
I looked for other math computer programs I could use.	18%	16%	24%	35%	18%	

SOURCES: STUDENT SURVEY SPRING 2018

Table 18. Student Opinions on Programs Increasing Student Perceptions of Math Utility and Importance
 Percentage who *somewhat agree* or *strongly agree* with each statement

	<i>ALEKS</i>	<i>Imagine Math</i>	<i>iReady</i>	<i>ST Math</i>	Combined Programs
Elementary Students					
The program showed me ways math can be useful.	74%	72%	74%	74%	74%
Secondary Students					
The program showed me ways math can be useful in everyday life.	45%	44%	52%	50%	45%
The program made me realize how important math is.	42%	36%	39%	44%	42%

- ✓ Nearly three-quarters of elementary students agreed the program showed them ways math can be useful.
- ✓ 45% of secondary students agreed the program showed them how math can be useful.
- ✓ 42% of secondary students agreed the program made them realize the importance of math.

SOURCES: STUDENT SURVEY SPRING 2018

Table 19. Student Comments about What They *Liked* about the Way Their Teacher Used the Program

The left column represents the themes identified in the comments. The right column provides representative quotes from the responses.

Theme	Example Quotes
Students liked when teacher provided class time to work on the software.	<p>"He didn't give us a lot of homework on [software] and when he did it was fairly simple and easy to do. I liked that he had us use [software] for in class assignments and gave us enough time to work on it so we didn't have to do it at home."</p> <p>"And It was nice to have time to work on it in class to. I really liked that part because I wasn't always able to go home and work on it every day."</p>
Students liked receiving extra credit for using the software.	<p>"I like how my teacher required ten topics a week, but after that it was extra credit. The extra credit was really nice, because I sometimes struggled with math but the extra credit topics gave me the chance to keep up my grade with math problems I already understood."</p> <p>"I also like that you can get extra credit when you get two right in a row it really pushes you to do the best you can."</p> <p>"I like what he did because he allowed for every topic we did over the 10 that were required and the rest were extra credit and that helped me keep my grade up by constantly doing extra credit [software] topics."</p>
Students liked when teachers helped them understand the content so it was easy to do.	<p>"My teacher helps me try and understand what is in [software], and when it is not enough, he will research the information. If [software] is wrong he will send an e-mail to someone to get it fixed. He does all that he can."</p> <p>"She helped us if we were unsure about a question and helped students know how to fix their mistakes."</p> <p>"I liked the way my teacher helped demonstrate as it is helpful to learn math outside of school and to always keep learning."</p>
Students liked when teachers let them work at their own pace.	<p>"Our teacher would have us use [software] two or some times more a week and let us take notes on it if we needed it and would have us be at our own pace. Teacher having a goal in mind too like finish at least 3 or 4 lessons everytime we do it in class and do as much as we can at home for 30 or 10 minutes every few days. I like this because I feel accomplished when i make it through, I don't feel stupid or dumb or pressured to be at the same pace as everyone else. The teacher makes me feel at ease with [software]."</p> <p>"I really liked the [software] this year; I could go at my own pace, it taught me multiple ways to solve problems, and it had a great design and reward system. It was efficient and easy to use for my math teacher and myself. I especially love that if you need extra help you can go home and work on it, instead of having to stay after class. I believe that the [software] program is a great, new way to learn."</p>
Students liked how teachers used the software for them to practice skills and content.	<p>"We could just use it when we needed help on a certain area or subject of math, but we weren't forced to do a certain amount of problems a week."</p> <p>"I kind of liked the way our teacher had us use [software] because I feel like I got a little bit more learning time to go over things we've learned or go through things that we haven't gone over."</p> <p>"I didn't enjoy how much time I spent on it but it helped me get the practice i needed to Ace my math class...[software] is a key stone in my learning process for math."</p>

Continued from the previous page.

Theme

Students liked when teachers used the software as assessment.

Example Quotes

"I liked the quiz at the end because it showed how much I understood the subject."
"I also liked how we had 4 tries to get 100% on tests on [software]. It helped me not feel so stressed."
"My teacher gave us tests sometimes in [software], and I liked that because doing it digital is easy for me (especially when I could show my work on paper.)"

Students liked that using the software made them feel smart and confident.

"I did like the weekly goals, so when I finished one, I felt like I had accomplished something that week and was making progress."
"[Software] made me feel like I could do math and made me feel like I was smart and could accomplish things. Even if we didn't spend a whole class period it was nice to spend a small amount of time on the site."
"[Software] made me good about Math, It taught me how to do the problems, and the explain option and the unlimited amount of tries on tests made feel confident and not nervous about doing the problems. I strongly recommend [software] to anyone learning math and is struggling with it. I've come from math double dose into math regular education, because of one thing, [software]."

SOURCE: STUDENT SURVEY SPRING 2018

Table 20. Student Comments about what they *Disliked* about the Way their Teacher used the Program
 The left column represents the themes identified in the comments. The right column provides representative quotes from the responses.

Theme	Example Quotes
Students disliked the pacing of how their teachers used the software.	<p>"It was really hard to get all the way to the required percent on the [program], and I'm pretty good at math. I also didn't like that the teacher only let us work on [program] for one day in the week. Trying to get a new 20 question assignment finished in one day is really hard, not to mention the 10 topics we have to do every week."</p> <p>"It seems to be designed for those who have trouble in math and not the average or above average student."</p> <p>"She made it an assignment so that you had to do a certain number of topic each week but I didn't have time at home and I work a lot slower than other students so while some students only had to work for 45 minutes I had to work for about 2 hours to get it all done, which I often didn't."</p>
Students disliked that using the software was required and/or that it counted toward their grade.	<p>"I find it to be really frustrating and annoying to use for those of us who actually understand math and are being forced to do a certain number of topics a week."</p> <p>"My teacher put [program] on as an actual grade that affected us rather than an extra credit opportunity, & most of the topics were things that we didn't even cover during class, yet would be on our tests at the end of the unit."</p> <p>"I didn't like the way my teacher used it because we have to get done a certain amount of lessons which then goes on our grade... [The software] did not help me get better at doing math as well."</p> <p>"I dont think that things that are not in the curriculum should go on our grades. And this dont help me on tests because Im not doing what we are learning."</p>
Students disliked having to use the software at home rather than in class.	<p>"We had to do 10 [program] a week, and it gets frustrating when your trying to do it at home but you don't know it and neither does your family,"</p> <p>"I have math homework my teacher gives me and on top of that I have [program]. It is not fair that a kid has to do [program] if he already has other math homework."</p> <p>I very much am against homework in general I got a four in my sage math test and I have 17 missing assignments homework and [program] dose nothing for me. I think [program] and homework should only be given to those who need it not to people that don't.</p>
Students disliked when their teachers did not provide help in understanding the content taught by the software.	<p>"[Program] is very frustrating because I never really get the way they teach us to do math....I understand the way my teacher at school teaches, and I get good grades/ scores on my Tests and Homework, but once my teacher puts my grade on [program] in, my grade drops.."</p> <p>"The way we learn from our teacher Mrs. [removed] has been one of the funnest ways to learn math, she makes it simple and easy to do things, [program] is preventing that from happening by taking time out of our math class and making it more directly into boring, making me want to fall asleep."</p> <p>"She didn't teach, she used [program] as an excuse for not teaching. Our entire math class struggled this entire year because we had to teach ourselves every part of everything."</p>

SOURCE: STUDENT SURVEY SPRING 2018

Table 21. Perceived Effects on Student Math Performance
 Percentage who *somewhat agree* or *strongly agree* with each statement

	<i>ALEKS</i>	<i>Imagine Math</i>	<i>iReady</i>	<i>ST Math</i>	Combined Programs	
Teachers						
The math software helped my students strengthen important skills.	97%	93%	94%	97%	96%	✓ Nearly all teachers felt the software helped students strengthen important skills.
The software increased my instructional effectiveness.	84%	70%	79%	84%	81%	✓ 81% of teachers agreed the software increased their instructional effectiveness.
Administrators						
The math software had a positive impact on students' math performance.	95%	100%	97%	91%	95%	✓ Nearly all administrators (95%) agreed the software had a positive impact on students' math performance.

SOURCES: ADMINISTRATOR AND TEACHER SURVEYS SPRING 2018

Table 22. Teacher Perceived Ancillary Effects of the Software
 Percentage who *somewhat agree* or *strongly agree* with each statement

	<i>ALEKS</i>	<i>Imagine Math</i>	<i>iReady</i>	<i>ST Math</i>	Combined Programs
Teachers					
The math software increased my satisfaction with my job.	77%	62%	65%	75%	71%
The math software increased parent engagement.	34%	26%	27%	27%	29%

- ✓ Although not a specific goal of the software, 71% of teachers reported that the software increased their job satisfaction.
- ✓ Approximately a quarter of teachers thought use of the software increased parent engagement (29%).

SOURCE: TEACHER SURVEY SPRING 2018

Table 23. Teacher Reasons that Software Increased Parent Engagement

The left column represents the themes identified in the comments. The right column provides representative quotes from the responses.

Theme	Example Quotes
<p>Parents communicated more with teachers because they had questions about the program.</p>	<p>“Parent’s [sic] were asking questions about it and asking if they could do it at home.” “Parents contacted regarding questions/concerns with [the software] in some cases where I wouldn’t have heard from them otherwise.” “I had a situation where a parent wanted to know how the program worked. I sat down and showed them. Very effective.” “Parents seemed to check in with me more this year and encourage their child to meet math goals set specifically with [this software].”</p>
<p>Parents took ownership over tracking student progress and encouraging home use.</p>	<p>“Parents were checking on student progress and could better see the progress that their child had made. They also took charge of making sure they did it at home.” “During conferences, parents were interested to see this game that their child has explained to them. They were excited that this math program helped their child enjoy math. Since then, I have had many parents contact me to ask me how they can log on at home so their child can practice there.” “Some parents encouraged their students to be using [the software] as practice at home. As a teacher it was awesome.” “some parents develop a routine at home to do [the program]”</p>
<p>Parents knew what content was being taught.</p>	<p>“By allowing the students access to the program at home, it allowed the parents to see what they are learning and to be able to help them if needed. It also allowed the parents to see how their child was doing.” “Parents are aware of the concepts we cover in class and their student’s performance at a better level because they are seeing the work done on [the software]. They can view a tutorial as well if they don’t know how to help their student.” “When I have students struggling, I would tell the parent to work on [the software] with them at home. It helped the parent see how it was being taught.”</p>
<p>Parents had resources to help their children and spent time helping their children with math assignments.</p>	<p>“When using assignments, parents are able to use the “worked examples” button to help there students. They are able to monitor progress and encourage students to reach class goals.” “A few parents mentioned working with their child at home on some of the problems.” “Parents were involved in [the software] and lessons at home, and showed interest.”</p>

SOURCE: TEACHER SURVEY SPRING 2018

Facilitators of Program Use

Table 24. Teacher Responses for What Helped Facilitate Use of the Math Software

The left column represents the themes identified in the comments. The right column provides representative quotes from the responses.

Theme	Example Quotes
Access to equipment	<p>“Having access to the lab as well as a cart full of computers made it easier.”</p> <p>“Easy access in my classroom.”</p> <p>“Having 1:1 computers in my classroom was a tremendous help!”</p>
Technical support to understand how to use the software.	<p>“I liked that I could get a hold of main contact to get questions answered and the help desk. Everyone worked hard to help me when I needed it.”</p> <p>“Having a representative teach us how to use it was helpful.”</p> <p>“Collaborating with colleges helped. Also training on the software.”</p> <p>“Another team member helped show me what it was.”</p>
Time allocated to use the training.	<p>“I just found a small chunk of time each day after recess to have the students work on it. They looked forward to it and for the most part worked hard during that short time.”</p> <p>“Having students have a "Math Lab" class where [the software] was the mode of learning. Each student got 45 min per day in [the software].”</p>

SOURCE: TEACHER SURVEY SPRING 2018

Table 25. Administrator Reported Facilitators of Software Use

The left column represents the themes identified in the comments. The right column provides representative quotes from the responses.

Theme	Example Quote
Availability of devices	<p>"We were able to get 1:1 technology for all of our students 1-5 grade this year."</p> <p>"Our school has a computer lab and Chromebooks shared among grade-level teams. Students also use [the software] during center time in classrooms."</p>
On-going training and professional development	<p>"Continual PD for new and more experienced teachers. Very accommodating."</p> <p>"The reps were great with training and meeting with teachers during PLCs."</p> <p>"The [software] team came to us and gave us PD two times this year to help us better use the software."</p>
Scheduled time for program use	<p>"We scheduled time into our master schedule for all classes to be in the lab to do [software] 3-4 days per week."</p> <p>"We scheduled time at the beginning of the year and planned to use the math program at the same times every week. That made it easy to get the required minutes."</p> <p>"We have a rotation schedule so our computer lab is used at full capacity."</p>
Teacher comfort with the program, including having an expert teacher who could help other teachers	<p>"Teacher's being familiar with the interface aided the overall use."</p> <p>"Having a teacher who had piloted the program the previous year was very helpful. He was able to help the other teachers with any problems they might have had."</p> <p>"We assigned a teacher expert over the software and she helped the others with any questions or needs."</p> <p>"Teachers training other teachers. It was nice to have teachers try out the software first and then have them train our staff on how the program works for our unique population"</p>
Teacher buy-in	<p>"It was most impacted by the buy in from our teachers."</p> <p>"[teachers] were anxious to have something for the students that would help them understand Math better."</p> <p>"A need to improve student competency in math facilitated widespread use of [the software]."</p>
Support from the vendor, IT, or designated staff	<p>"We had digital coach assigned to our school on a part time basis and she helped support and facilitated effective use."</p> <p>"We had an excellent training and we have an excellent school technology specialist that is able to support our teachers when necessary."</p> <p>"Our implementation specialist is great to work with! She made sure we had access to the software and the company is great to work with!"</p>
Lab access provided at school	<p>"We provided before, during and after school access to the computer lab for struggling students."</p> <p>"Students being able to access the software at school and home."</p> <p>"We had an established schedule for when students were to use the programs. We had an open lab after school and encouraged home use with parents."</p>
Rewards for student goals	<p>"We also rewarded students immediately when they passed a lesson with 80% or better in the lab. Then we put those names into a weekly drawing for little prizes. Teachers celebrated regularly with students on their progress."</p> <p>"We did do some incentivizing in particular classrooms to ensure effective use of the program. We also use it to support small group instruction which has made a world of difference for our teachers and students."</p>

SOURCE: ADMINISTRATOR SURVEY SPRING 2018

Problems and Difficulties with the Software

Table 26. Difficulties Using the Programs

Percentage who *somewhat agree* or *strongly agree* with each statement

	<i>ALEKS</i>	<i>Imagine Math</i>	<i>iReady</i>	<i>ST Math</i>	Combined Programs	
Teachers						
Sometimes the math software was frustrating for students to use.	69%	72%	69%	75%	71%	✓ Most administrators (96%) and teachers (90%) agreed the software worked well on their devices.
The math software works well on our devices (without crashing or slowing, etc.).	96%	90%	87%	88%	90%	
I would have used the math software more, but I had trouble getting it to work correctly.	8%	12%	15%	14%	12%	✓ 73% of secondary students and 71% of teachers agreed the program could be frustrating for students.
Administrators						
The math software works well on our devices (without crashing or slowing, etc.).	95%	96%	97%	97%	96%	
Our school has enough wifi coverage to support widespread use of the software.	95%	96%	97%	97%	96%	✓ On average, 24% of secondary students and 12% of teachers agreed they would have used the program more if they had not had trouble with it.
Elementary Students						
I had trouble using the program.	19%	20%	16%	22%	19%	
Secondary Students						
Sometimes the program was frustrating to use.	72%	80%	68%	52%	73%	
I would have used the program more, but I had trouble getting it to work correctly.	24%	28%	22%	19%	24%	

SOURCES: ADMINISTRATOR, TEACHER, AND STUDENT SURVEYS SPRING 2018

Table 27. Teacher Reported Problems with Software

The left column represents the themes identified in the comments. The right column provides representative quotes from the responses.

Theme	Example Quotes
Software could be slow, have glitches, or not work on certain hardware or browsers.	<p>“The only thing I really have trouble with is the writing feature does not work well on the Chromebooks. Also, the data is very overwhelming so I don't really use it.”</p> <p>“You can 't do it on the ipads.”</p> <p>“The diagnostic is ONLY usable on a desktop computer. My classroom only has iPads. A week or more would go by before we would have access to desktops or laptops to continue the testing. This can be frustrating. Plus the diagnostic is only available for a controlled window of time. It should be free to issue when the teacher wants. The lessons became frustrating when the student could not pass a lesson, it would repeat twice then lock them out for the prep instructor or myself to set them on another path. For the cost this should be more intuitive.”</p> <p>“Sometimes there were glitches in the software and the students had to reboot or the software froze.”</p> <p>“...Students entering the correct answer but getting is wrong.”</p> <p>“Sometimes there were glitches, answer boxes not showing up was the main one. My students finally just knew that at that point they had to log all the way out and start over. It was very frustrating for them when this happened during knowledge checks.”</p>
Logging in and remembering passwords could be troublesome.	<p>“Signing in was an issue sometimes...”</p> <p>“There were times that it wouldn't let part of my students login when they were entering in their correct user name and password.”</p> <p>“The lengthy passwords caused us issues at first.”</p>
Some teachers did not have good internet connections to support use of the software.	<p>“Most was a result of some computer access. Some was a result of internet connections...”</p> <p>“We had some connectivity issues when we were accessing the program on the school Chromebooks in our classroom. Because of the security settings, in my understanding, the students have been logging in as if from home, and what work they were doing has been under "homework." So it's been impossible to track since then if they have been working only at school or also at home (other than the number of log ins), and all the work has had to be assigned as homework.”</p>
Some teachers need additional training to use the software.	<p>“A great deal was also a result of my lack of knowledge on how to make the program work for me.”</p> <p>“Being my first year using this software, it is very complex and has a lot to it. The more I used it, the more I realized what I could do with it, and the easier it became to have it do what I needed it to do.”</p>
Some teachers felt the software was not aligned with the curriculum or core standards.	<p>“It was not testing Utah standards. The way the program worded the questions and answers was confusing.”</p> <p>“The lessons were not tailored to the way we learned the math concepts.”</p>
Setting up the software could be slow.	<p>“I only had difficulty when we were first trying to put students onto the program.”</p> <p>“It is a slower process at the beginning of the school year, or when a new student joins the class.”</p>

Continued from the previous page.

Theme	Example Quotes
Some teachers felt the content was confusing.	"Many students did not understand the math questions it asked, so this caused me to give more one-on-one instruction that I had not planned on giving. It was very time consuming for me and not necessary. The online assistant was also not helpful for these students. A few of the math questions need to be reworded." "Occasionally it worded the questions in very confusing ways. I didn't even understand what it was asking on some problems." "Students did not understand how to answer the questions. It was too hard for struggling students."
Some teachers felt the tools were difficult for students.	"Students had a hard time understanding how to manipulate and use some of the tools." "I never had trouble getting it to work, but students sometimes found different tools or ways of entering solutions frustrating." "Students struggled creating lines and angles using the tools."
One problem is that the software was not accessible to students of all levels, which made it hard for them to use independently.	"It was designed for touchscreen and in Australia so some wording and formats were a little weird for the kids, but we adjusted" "Spanish Speaking students could not understand the characters" "The kids had trouble getting the help they needed with just the "explain" portion of the software. They needed more one on one guidance and we can't really use the teachers that are available in the software chat." "When students have reached the "Challenge" component of [the software], there is less and less direction or instruction and students are easily frustrated."

SOURCE: TEACHER SURVEY SPRING 2018

Table 28. Secondary Students' Problems with the Software

The left column represents the themes identified in the comments. The right column provides representative quotes from the responses.

Theme	Example Quotes
Some students reported that the software was boring.	<p>“Well it worked fine, but it was so boring to do...”</p> <p>“The problems where that the system was just really boring...”</p> <p>“I was not able to choose the topics i wanted to do. it made me do the long boring ones and not the ones i was comfortable with doing”</p>
Some students reported that they had trouble understanding the content and needed better explanations.	<p>“Some of the questions are confusing and the hints don't help.”</p> <p>“The questions weren't specific and was very confusing to use”</p> <p>“I didn't get what the problems were asking. Sometimes the explanations were confusing.”</p>
Some students reported that the content was difficult.	<p>“IT was somewhat difficult because i had a hard time solving some problems!!!!”</p> <p>“On some problems it would ask for an explanation and is was very difficult cause it took 3-4 tries every time to get it right.”</p>
Some students reported that the software did not help them learn the material.	<p>“Sometimes I would get the problem wrong and I just did not know how to do it right so [the software] was not helpful to me. It would have clues that did not help.”</p> <p>“The entire program is a mess, its not helpful and it did more hurt then help.”</p>
Some students reported that using the software was stressful.	<p>“Horrible, doesn't explain STRESSFULL”</p> <p>“... It was stressful to always have on your mind.”</p> <p>“It was stressful having to get the assignments done and the questions are just worded weird.”</p>
Some students reported problems with technological aspects of the software.	<p>“... sometimes it would mark a problem wrong when it was right”</p> <p>“A lot of the times, [the software] would not accept answers if you did not solve it their way. Some tools were also very difficult to use.”</p>

SOURCE: STUDENT SURVEY SPRING 2018

Table 29. Elementary Students' Problems with the Software

The left column represents the themes identified in the comments. The right column provides representative quotes from the responses.

Theme	Example Quotes
Some students reported having trouble with all aspects of using the software.	<p>"Every time I go on [program] it says that there is a problem and it never really works. "almost every time I clicked a button it would say there was an unexpected problem." "um everything? Nothing made cents and it doesn't say how you were incorrect!!! :("</p>
Some students reported that the math was generally difficult.	<p>"I got to a point, where I learned every topic that I had learned in class already, so the problems got extremely hard, and the explanations were super long and made no sense." "It does not give me the right questions for my grade. i get super hard questions on the test and i have to repeat lessons." "Solving the problems that we had were really difficult and did not teach me enough for each lesson which made it very difficult for me and that is why i have triouble with it an that is why i do not like to use that math source"</p>
Some students reported having trouble understanding particular topic areas.	<p>"I had trouble solving problems like exponents and i also had trouble with fractions other than that the math was not that hard" "I had trouble with division and the drag the box in the box and it is just hard all together." "I had to use the [program] calculator to turn a multiplication problem into a decimal and I don't know how to do that" "figuring out how to find the product of adding, subtracting, and multiplying all together"</p>
Some students reported being confused by what they were learning.	<p>"[The software] didn't explain how to do things that I didn't understand. The math that they taught me was confusing from what my teacher was teaching me and it was very stressful to learn one thing that I understood and learn another at the same time. It was really confusing to me." "It was very confusing and the examples made no sense. It gave you no way to help solve the problem like a fraction calculator. It should not be used as a math homework system at all!!!!!!!" "It didn't explain some of the things i was wondering about, and was sometimes confusing with its explanations"</p>
Some students reported having technical difficulties	<p>"Every now and then I would always glitch out and I would need to restart my computer. When I got back in all of my progress would be lost." "I would get an answer right and it would tell me wrong. My teacher would do it multiple times and get the same answer but [software] would tell my wrong. [Software] would glitch a lot." "It wouldn't let me finish the knowledge check. Every time i finished it would log me out and make me restart."</p>

SOURCE: STUDENT SURVEY SPRING 2018

Table 30. Negative Reactions to the Program
 Percentage who *somewhat agree* or *strongly agree* with each statement

	<i>ALEKS</i>	<i>Imagine Math</i>	<i>iReady</i>	<i>ST Math</i>	Combined Programs
Teachers					
The math software was a waste of time.	5%	10%	9%	3%	6%
The math software takes time away from instruction.	17%	21%	21%	12%	17%
The math software is an added burden.	11%	16%	18%	9%	13%
The math software is not worth it.	5%	11%	10%	4%	7%
Elementary Students					
The program was boring.	53%	53%	57%	40%	51%
Secondary Students					
The program was a waste of time.	48%	64%	57%	41%	50%
The program was boring.	75%	81%	77%	57%	75%

- ✓ Three-quarters of secondary students and half of elementary students indicated the software was boring.
- ✓ 17% of teachers indicated the software took time away from instruction, and 13% indicated it was an added burden.
- ✓ Despite some negative reactions to the software, few teachers indicated the software was not worth it (7%) or was a waste of time (6%).

SOURCES: TEACHER AND STUDENT SURVEYS SPRING 2018

Table 31. Teacher and Administrator Overall Assessment of the Program

The left column represents the themes identified in the comments. The right column provides representative quotes from the responses.

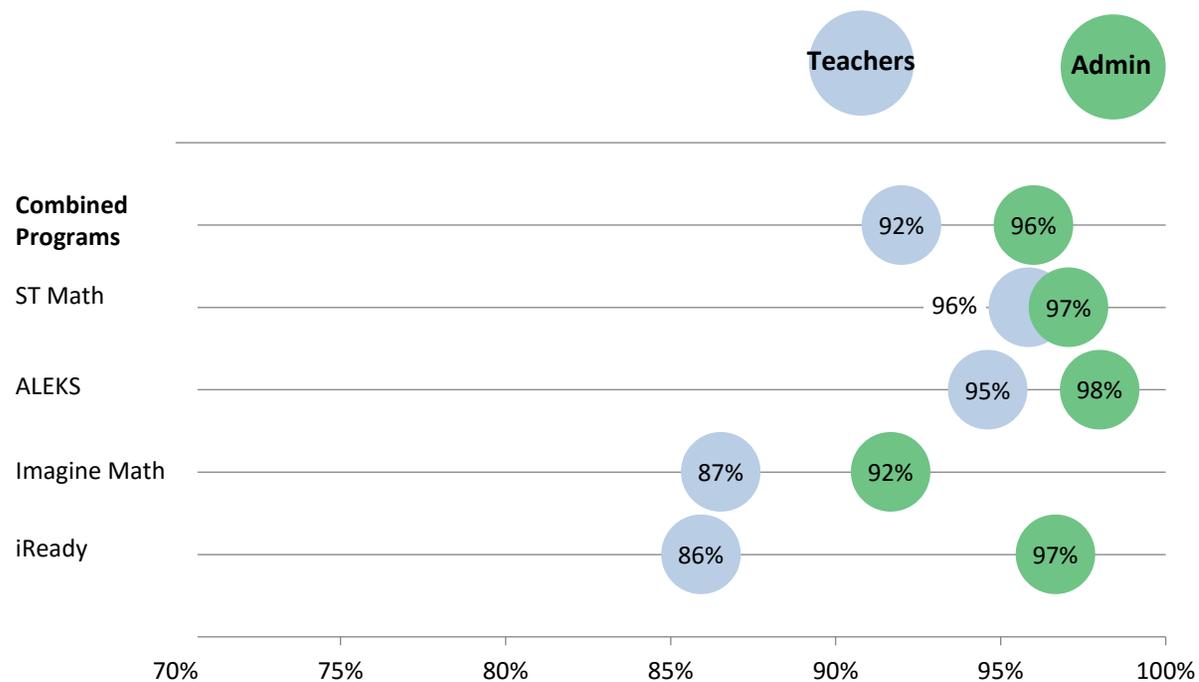
	<i>ALEKS</i>	<i>Imagine Math</i>	<i>iReady</i>	<i>ST Math</i>	Combined Programs	
Teachers						
The software was a good complement to classroom instruction.	91%	85%	88%	94%	90%	<ul style="list-style-type: none"> ✓ Most teachers felt the software complemented classroom instruction (90%) and was well-aligned with the Utah Core Standards (93%). ✓ 22% of teachers indicated the software was not well-aligned with their textbook or other curricular materials.
The content of the software was well aligned with Utah Core Standards.	93%	94%	90%	94%	93%	
The software was well aligned with my textbook or other curricular materials.	78%	77%	72%	81%	78%	
Administrators						
Overall, I am satisfied with the math software.	98%	96%	93%	94%	95%	<ul style="list-style-type: none"> ✓ Most administrators (95%) were satisfied with the math software.

SOURCES: ADMINISTRATOR AND TEACHER SURVEYS SPRING 2018

Figure 11. Teacher and Administrator Endorsement of the Software

Percentage of teachers who *somewhat agree* or *strongly agree* they would recommend the program to another teacher

Percentage of administrators who *somewhat agree* or *strongly agree* they would recommend the program to another school



✓ 92% of teachers would recommend the program to another teacher.

✓ 96% of administrators would recommend the program to another school.

SOURCES: ADMINISTRATOR AND TEACHER SURVEYS SPRING 2018

Table 32. Teacher Reasons They Would Recommend the Software to Another Teacher

The left column represents the themes identified in the comments. The right column provides representative quotes from the responses.

Theme	Example Quotes
The software aligns well with ongoing instruction and standards.	<p>“I would recommend the software to others because it is aligned to the math program the district uses. It provides an opportunity for students to independently practice concepts taught in class. It allows for students to correct mistakes they make through guided scaffolds. [The software] provides notes for students to use and fluency exercises. It was highly recommended by my math coach! We even prepared lessons and activities together using the software.”</p> <p>“I think it is a great supplement to instruction...”</p> <p>“The students are motivated to earn points for their avatar so they want to do well and master the concepts, and [the software] presents things in ways similar to SAGE testing so the student feels capable for year end testing.”Also, the program gives practice in a standard or strand in multiple ways, which solidifies true mastery.”</p> <p>“This program is the closest program I've seen in 22 years to use as a SAGE indicator. The scores seem to match quite closely. It provides individualized instruction that is so difficult to do with only one teacher in a classroom.”</p> <p>“...it goes along with our 4th grade curriculum and the standards and either teaches them before I teach it or after to solidify their understanding.”</p>
The software provides supplemental instruction.	<p>“It is a good support tool but should not replace direct classroom or group instruction. Aligning with classwork is sometimes challenging.”</p> <p>“It is a great supplement, however our school has adopted a comprehensive math program (that we didn't have before) and it has similar technology components. Prior to this, we did not have access to those components and so [the software] was critical to providing rigor to our math instruction.”</p> <p>“Its [sic] great in addition to classroom instruction I would not use it to replace math in a class.”</p>
The software promotes critical thinking.	<p>“This is the best program I have seen for teaching students to keep trying things and not giving up when it is hard. I have seen an increases their critical thinking. Often when I teach a concept they will say"Oh I know this, I did it on [the software]. They love [software] time-they beg for it!”</p> <p>“It provides different ways to learn concepts, and helps foster critical learning.”</p> <p>“I like that this software offers more critical thinking skills for my students. Next year I plan on using it more frequently and analyzing the data more.”</p>

Continued from the previous page.

Theme	Example Quotes
The software provided different and multiple ways to learn a concept.	<p>"[The software] teaches math concepts in a very different way from our book. Students are able to interact with the problems, manipulate real-life scenarios, and understand abstract concepts in a concrete way..."</p> <p>"I think that this software gives students a way to see math differently. I like that they need to work it out and see another way to do it. I also think that the added ability to work on this at home created a link in the curriculum with parents. Some parents do not like the math."</p> <p>"It gives students additional math instruction in a different format."</p> <p>"It is a very different way for the students to look at doing math. I love the problem solving component, since that is a big part of my approach to most learning. Also, I have noticed that the children that either finish or come close to finishing the whole curriculum have a better understanding of math in general and do consistently better on their end-of-year tests."</p>
The software fills gaps in understanding.	<p>"[The software] is another way to help fill in the gaps that students have in their understanding. It promotes problem solving, critical thinking, and confidence in math. Gives creative ways to solving problems. Not just one way. Gives extra practice for skills to become mastered. Motivating and engaging activities for students."</p> <p>"[The software] is useful in many ways. I liked the ability to identify gaps in what a student knows or doesn't know, track student progress, and assign extra lessons based on need."</p>
The software provides immediate feedback.	<p>"Immediate feedback is very helpful. The way the program adapts to student abilities is also a major advantage. Your slow kids can go slow, you fast kids can go fast."</p> <p>"The best thing is that the software gives immediate feedback to students, and requires them to get 2 or 3 problems correct consecutively."</p>
The software is highly personalized.	<p>"It differentiates to student ability and knowledge. It also covers the concepts that I am teaching in class. [The software] explains to the students when they miss an answer."</p> <p>"i like the way it has students on their own level and at their own pace."</p> <p>"It adapts well to each student and they enjoy the program."</p>
The software meets needs of accelerated students and struggling students.	<p>"I like that it goes with the student. Students that excel can go as high as they want. I like it best for advanced students."</p> <p>"It is essential to meet the needs of all students, including the mathematically gifted. The standard curriculum does not do this and until I started using [the software] I had no idea how far my gifted kids could go. I even sent some of my 5th graders onto 7th grade for next year's general ed math. Truly this is a program that is worth every minute spent."</p> <p>"It is a great way for my students who struggle with reading to access math concepts."</p> <p>"It was a great tool for students that are struggling."</p>

Continued from the previous page.

Theme	Example Quotes
The software shows results.	“I have noticed over the years that every student who has passed off the [software] curriculum for their grade has done exceptionally well on the state summative math test scoring on grade level and above grade level.” “My students who have worked on [the software] during the school year did better on the end of year test.” “Students who consistently completed at least 45 minutes per week made more growth academically in math than students who did not do minutes...”
The software provides data.	“This software provides me with lots of data that use almost every day to help me do small group instruction....” “The diagnostic gives me data that is difficult to obtain through other avenues.” “identifies off grade level misconceptions and records them into a friendly report”
Students find the software engaging.	“[The software] is the absolute best math software that I have seen out there. It is amazing in its ability to engage students on an immediate level. They love the program and beg to use it! I love that they learn to solve math problems in creative and thoughtful ways, not just through rote memorization. There is real thinking and strategizing going on with [the software]. It is truly worth the investment of classroom and homework time.” “It is engaging for the students and helps them to learn to solve problems.”
The software is easy to use.	“[the software] is very user-friendly for the most part.” “[The software] is easy to use. I can usually find any topic I would like. The students can easily use the software at home and at school.” “It is easy to use and the students enjoy the program.”

SOURCE: TEACHER SURVEY SPRING 2018

Table 33. Teacher Reasons They Would Not Recommend the Software to Another Teacher

The left column represents the themes identified in the comments. The right column provides representative quotes from the responses.

Theme	Example Quotes
<p>Lack of alignment with ongoing instruction and standards.</p> <p>The software does a poor job of explaining concepts, correcting student errors, or meeting students' individual needs.</p>	<p>"The questions were not aligned to the Utah Math Core. For struggling students, problems that are not similar to the in-class problems create a much bigger burden."</p> <p>"It is nice for giving students a head start as they grow in math, but I would rather see a math program used that gave more practice for what we are learning. That way teachers can focus on interventions that are applicable to what the students should be proficient in at the time."</p> <p>"Not able to align with on-going classroom instruction, many of the activities were not intuitive to students..."</p> <p>"I don't feel that [the software] has enough opportunities for students to get explanations when they have errors."</p> <p>"I feel that the explanations and worked examples are usually very confusing. When I have taught a concept and they have practiced in other ways, giving them an [the software] assignment tends to increase rather than decrease confusion. This isn't all bad, as the kids have practice for confusing language on the SAGE test, but it lowers confidence because they have been successful with the concept until they try to understand the [the software] questions and explanations."</p> <p>"It has too much reading for the low readers in the group."</p> <p>"Many of the program content activities were over-used and once a student had demonstrated proficiency, it should have moved them forward. Some of the skills were represented in a simplistic way that did not promote a broader range of thinking."</p> <p>"The wording of the questions was confusing and I did not feel like the creation of assignments was conducive to my students' needs."</p>
<p>Lack of training or difficulty using the software.</p>	<p>"Never trained on it. It was used as an activity covered by a teacher's aid. I never knew what it was all about..."</p> <p>"The program is a little confusing and I feel I did not have adequate training to make it helpful to use as a teaching tool."</p>
<p>Too many technology issues with the software.</p>	<p>"Complicated to get to, not wholly student-interactive, needs more props and individual devices to use for student work. Still had to print out worksheets for every lesson."</p> <p>"Many times it would kick my students out of the program. It would also say their answer was wrong and it wasn't when they tried the second time. Some of the wording was not student friendly"</p> <p>"I didn't feel like the math reports were super user friendly. I got on a few times during the year to try to use them, but found that they were more overwhelming than helpful so I didn't really use the results to inform my instruction. Also, the diagnostic tests were kind of annoying as if a student didn't get done within three weeks, it would just start over again. I had an ELL student who needed it translated so she couldn't work on it all the time and it reset her to 0 two different times. Not the most effective use of her time or mine."</p>

Continued from the previous page.

Theme	Example Quotes
Lack of student engagement	<p>“My students did not enjoy it as much as programs like [software]. It was frustrating and confusing for them.”</p> <p>“It wasn't engaging for the students. They would race through the instructional part, and then be lost during the quizzes and come ask me to reteach it. Much of what they were being taught wasn't aligned to our core. They could "complete" a section without actually demonstrating proficiency. Things they learned didn't generalize to classroom instruction.”</p> <p>“My students hated it and I felt like I was just using it as a time filler while I worked with other students.”</p>
The software took time away from other instructional activities	<p>“I have tried to use [software] as a home assignment for children to receive the added benefit outside of school hours. Parents have not followed through. It is all but impossible for students to meet fidelity during the school day without added support from home, and this takes away from valuable instruction time. I've noticed that students who already spend lots of time on screens at home are those who gravitate towards using the software (and those who I don't worry about in terms of screen time do everything in their power to avoid it.)”</p> <p>“Software requirements of 90 minutes a week to enhance instruction time that is taken away from Go-Math, from the computer lab for projects like teaching argumentative writing, PowerPoint Presentations, etc.”</p>

SOURCE: TEACHER SURVEY SPRING 2018

Table 34. Administrator Reasons They Would or Would Not Recommend the Software to Another School

Theme	Example Quotes
The software facilitates differentiated instruction.	<p>"It is a multi-tier system so that students may work at their independent level and be pushed to harder math problems."</p> <p>"Students are able to pace themselves and move as fast as they want. It is differentiation at its best!"</p> <p>"I would recommend it because of how individualized it is. It allows us to challenge the higher achieving students on their level. I also like that it helps fill the gaps of the lower achieving students."</p> <p>"The rigor of the instruction and the differentiation of instruction helps teachers meet the needs of all their students."</p>
The software is well aligned with the Utah Core Standards and end-of-level testing.	<p>"Many of the teachers that use the program consistently have noted growth for students. It also easily goes along with our math curriculum."</p> <p>"It is great support material for the curriculum."</p> <p>"The teachers have felt like it provides students with a good spiral review....When teachers have presented lessons, they have heard comments from students such as, <i>I already saw this on [software]</i>."</p> <p>"Aligns with the Core... Strong correlations with SAGE testing results."</p> <p>"I think it is very close to determining outcomes for how well the students will perform on the end of the year testing. It is helpful for setting goals for students with special needs."</p>
The software promotes student depth of learning and problem solving.	<p>"We love [the math software] at our school. I love how it encourages students to really think and problem solve."</p> <p>"The math software has helped to develop our students' conceptual knowledge."</p> <p>"It helps students look at math and problem solving in a different way that helps them remember."</p> <p>"It is easy to use for the students and it encourages them to problem solve to figure out solutions."</p> <p>"The students that work through this program find great success in all math areas. We find that our students who finish the program each year have more tenacity and a larger ability to struggle for longer before they shut down and quit."</p>
The software increases student engagement with math.	<p>"I feel like the software is beneficial when we can get students to be engaged."</p> <p>"The main reason I would recommend this software is because the students really enjoy using the software."</p> <p>"We find it to be a creative approach to mathematical concepts and not an on-line workbook."</p> <p>"The students at our school love [the math software]."</p>
The software improves student scores on end-of-level testing.	<p>"We have seen great academic gains in our students."</p> <p>"With only one year of use, we have seen tremendous growth and our end of level math assessments are showing overall improvement."</p> <p>"It has greatly impacted our math scores overall. Teachers are able to use the intervention piece in their math intervention block."</p> <p>"We believe that [the math software] has been a large part of the success of our SAGE scores."</p> <p>"End of year testing in math improved this year at our school. We believe it is a result of great teachers and [the math software]!"</p>

Continued from the previous page.

Theme

Example Quotes

The software helps increase math learning in students who are language learners or not strong readers.

"Great program. Visual, adaptive, not language or reading dependent."
"I love how it supplements students in the lower grades that don't necessarily have the reading skills required of other mathematics supplementary resources. Students can show their skills in math without being hindered by reading skills that aren't fully developed."
"I love the program. It is accessible to our students regardless of their level in math or their knowledge of English."

Teachers value the software.

"We will be purchasing this software again next year based on teacher recommendation. We believe the software has supported increased learning and engagement."
"Teachers indicate they feel it is valuable."
"Teachers have seen positive student outcomes."
"My teachers LOVE it."
"All the feedback I have received from teachers has been positive. They feel [the software] has had a strong influence on student learning. It is used weekly and is part of student grades."

The software helps teachers, parents, and students monitor progress.

"Good diagnostics to inform instruction and interventions."
"The formative and summative assessments have guided our math teachers toward better instruction and services."
"It provides detailed information to teachers about progress or lack of it."
"It is a very motivating program that allows the students to actually see their progress."
"[The software] provides intervention as well as enrichment for all students. Students are able to track their own progress. Teachers are able to program the units and monitor student progress easily. Parents are able to help their students at home with their homework because the tutoring component is simple and easy to understand."
"Our students know the program well and respond to their growth reports."

SOURCE: ADMINISTRATOR SURVEY SPRING 2018

Table 35. Teacher Opinions on How Software has Increased Innovation in Classroom

The left column represents the themes identified in the comments. The right column provides representative quotes from the responses.

Theme	Example Quotes
Supports blended learning.	<p>“It brings tech to my stations and leads to a better blended classroom”</p> <p>“We created custom pathways to use with our Blended Learning groups across our grade level.”</p> <p>“Allowed an extra option of technological learning for the students...”</p>
Provides a different way of doing homework.	<p>“I assign it as homework which is more effective and the kids like much better than a worksheet.”</p> <p>“I like having the students do some of their homework on the computer. It is where the world is going.”</p>
Provides new ways to present content and reinforce concepts.	<p>“It has helped me use different instructional strategies with my students.”</p> <p>“Again, it frees up time for more creative learning activities in class and it helps me plan instruction around topics students are actually ready to learn.”</p> <p>“I am able to give my students different ways of looking at the information they are learning.”</p> <p>“It provided an extra opportunity to review concepts that we have talked about.”</p>
Provides more personalized learning and differentiation for students.	<p>“It allows me to see the students who need my help and prioritize where I spend my one-on-one time.”</p> <p>“it has allowed me to structure my instruction for students needs while focusing on each students progress”</p> <p>“It's great at helping higher students go even further.”</p> <p>“The software goes the student's pace. It is differentiated. Looking at the data, I can decide where my students are on different levels based on the data.”</p>
Allows for greater use of data to inform instruction.	<p>“It has not helped my to be innovative but it has given me immediate data after my students have completed their daily practice. The reports were easy to read and gave the data I needed on their individual progress.”</p> <p>“The data has helped to drive my instruction and create my small groups for the kids that need it. That includes kids that wish to go above and beyond.”</p> <p>“It helps me collect quality data and use it as a launch pad to help me plan more applicable lessons.”</p>
Allows for more individual and small group instruction.	<p>“I am able to direct more attention to students who are having a difficult time completing their assignments.”</p> <p>“Allows me to teach new concepts in small groups, while the rest of the class gets meaningful practice.”</p> <p>“It allows me to be more flexible with group and one on one learning/teaching”</p>

SOURCE: TEACHER SURVEY SPRING 2018

Table 36. Recommendations to Other Teachers for Using Software to Benefit Students

The left column represents the themes identified in the comments. The right column provides representative quotes from the responses.

Theme	Example Quotes
Align with curriculum	<p>“Taking the time to align the program with the sequence of lessons taught in the classroom is CRITICAL!”</p> <p>“After we completed a topic in our math books, I would assign an extra lesson on that topic as a review for the students before we tested on the topic.”</p> <p>“Before you start the year align it with your curriculum and set up the map to align with the order you will teach the topics. That way you can hand-select the topics they are struggling with and apply to what you're teaching.”</p> <p>“I create homework pathways each week that correlates with my in-class instruction. This is the only work my students have for homework for the week. This allows me to push out pathways to the majority of my class that are on grade level, but still gives me the flexibility to personalize lessons for my high-achieving or struggling students.”</p> <p>“I like giving quizzes and tests on the topic we are learning because they get immediate feedback and I can allow them to retake the quiz until they get 100%.”</p> <p>“Rearrange the order of the standards. The kids think it's like magic when it matches what they are learning in class.”</p>
Use data and reports to direct instruction and engage students in goal setting	<p>“Make sure you look at the data to change instruction or enhance instruction.”</p> <p>“Use this as a progress monitoring system, and give the students a knowledge check on a monthly basis.”</p> <p>“It is important to look at the individual reports to check for understanding. That way it is easy to know what needs to be retaught as a class or with individual students.”</p> <p>“It is an excellent source of data and to know what standards the students are missing. They are able to receive immediate feedback which really helps them as well.”</p> <p>“The software has an "exit ticket" option that is a good glance at each student's level of understanding. It helps me to quickly see who is developing understanding and who is in need of more direct instruction.”</p>
Use as supplement to instruction	<p>“When a student had an alert (meaning they failed a lesson twice), I would work with the individual student and connect what they were learning in class to the lesson in [program]. Then, I would re-assign the lesson and they would pass it off. This is the way the program is supposed to be used. Never are the children left to work on it while the teacher check their e-mail or works on correcting papers.”</p> <p>“Design homework assignments that will reteach and score their work so that your class time is freed up for math activities.”</p> <p>“If students don't have access to computers at home - we encourage them to come early and use the computers at school or go to the public library.”</p> <p>“It is a very useful tool that provides many opportunities, but not a stand-alone instruction. Students get bored if they work too long on it with no other learning activities or interaction and its effectiveness decreases without accompanying activities, instruction, and authentic learning experiences.”</p>
Ensure teacher familiarity and understanding of program utility and content	<p>“I would recommend teachers spend adequate time learning how the data can be displayed on the teacher-end of the program as well as how to best assign tasks and assessments to get the most out of the program.”</p>

Continued from the previous page.

Theme	Example Quotes
Engage families	<p>"I would encourage teachers to orient parents to all of the components of ALEKS so they can better monitor & assist their child."</p> <p>"Use the benchmark assessment results in PT conferences."</p> <p>"Train the parents on how to check their students' progress, and explain that it is perfectly fine to struggle with a concept. They will not get everything on their first try, and that is O.K."</p>
Use to reteach, review, redirect, and accelerate	<p>"When I have students who are frustrated I have had another student who has finished that section of [program] help them so they know what to do. I realize that they are supposed to be doing [program] independently but I haven't had the time to explore well enough to show them myself and am working with small groups and individual students during the time when they are using [program]."</p> <p>"I use it for instruction and modeling by opening up an assignment and showing examples before having student start the assignment."</p> <p>"I have used it whole group on the smart board to introduce new concepts. Sometimes we'll go through an activity whole class if many students are struggling with it. I have those who have been successful show us what they did."</p>
Use consistently	<p>"I think it is important to set up a schedule and stick to it. Otherwise, you will find that you don't use it regularly and will not get the benefits."</p> <p>"Get the students on a routine. They need to get the chromebooks out at the beginning of class the same day of the week. It takes a few weeks but once they learn the routine it is no longer a hassle."</p> <p>"My tip is for teachers to use it consistently. It is in the consistency that my students build their fluency and accuracy."</p> <p>"Must meet weekly minutes. Turn off the games until the minutes are met."</p> <p>"Set aside time in class for devoted time on this program. Make it a necessary component of instruction."</p>
Continue to improve access to technology and training	<p>"I would highly recommend get training. Don't try to figure things out on your own."</p> <p>"Specific training for special education teachers so we understand better how to use the program to help us with IEP goals."</p> <p>"Get the in-person training very early so you start out the year correctly. We goofed up on the placement test because we didn't really understand the importance."</p> <p>"Learn about the reports, learn more capabilities of the software all the time."</p> <p>"Make sure you have enough computers or tablets scheduled for usage. Our main concern was the problem with having the designated time and resources in order to get the time in."</p> <p>"Sometimes the program would work and sometimes it would not. My teammates have chromebooks in their rooms, and they frequently had connectivity issues."</p>
Consider motivators for student	<p>"Do not hesitate to drop a student down a grade in the same strand if he/she is having a lot of frustration at grade level. Success at a lower level spurs the student on in the program so they are willing to try harder when they are put back on grade level."</p> <p>"The students love the avatars and they love to earn points towards donating. I would recommend that other teachers limit the students to only changing their avatars 1x/week so they don't waste time doing that when they should be working on their lesson. I would also recommend that they use the goals and contests as a way to motivate students and that they post the fliers around or send them home to increase student involvement."</p>

SOURCE: TEACHER SURVEY SPRING 2018

Considerations for Improvement for the K-12 Math Personalized Learning Software Grant

Overall, administrators, teachers, and students had favorable opinions of the personalized learning software. Administrators and teachers perceived that the software had positive effects on student math performance (95% and 96%, respectively). They also agreed the software showed students new ways to solve problems; increased student math confidence, interest, and engagement; and increased student understanding of math utility and importance. Educators clearly value these programs, with 92% of teachers and 96% of administrators indicating they would recommend the program to other teachers or schools. Student perceptions were not as strongly positive, but still the majority of students indicated that the software showed them new ways to solve problems, increased their confidence in math, showed them ways that math could be useful, and helped make math more fun. Importantly, teachers report utilizing the software as a means of enrichment, differentiation, and reteaching.

Despite the positive opinions expressed by teachers, administrators, and students, respondents also indicated some concerns and frustrations. The following considerations are provided for the purpose of improving the math personalized learning software program utilization and benefits.

Findings

78% of teachers felt the software helped them engage more equitably with students, and 71% felt it helped them to use data and evidence to make changes to their instruction. Teacher comments also revealed multiple ways that teachers utilized the software to differentiate instruction and meet individual student's needs.

Most teachers (81%) try to have their students meet fidelity recommendations. However, only 35% of teachers strongly agreed they knew the recommendations. This is consistent with findings from the 2016-17 school year.

41% of responding teachers indicated they do not have enough time during the school day to accommodate fidelity recommendations.

40% of teachers reported using data reports at least weekly to assess student learning. 39% reported using data reports once a month or less. For the most part, teachers felt the data reports were useful and knew how to use them; however, 18% of teachers indicate they do not know how to use the data reports to inform instructional decisions. Notably, 71% of respondents indicated they would like to receive more training on using the reports.

While most teachers and administrators agreed they have access to devices and support for using the software, 30% of teachers indicated they do not know how to get immediate support and 16% indicated they did not have access to devices as much as they needed.

2% of responding teachers indicated they do not use the software. Reasons provided for not using the software included issues of access to software or devices, need for training, and preferences for other instructional methods.

Considerations for Improvement

Increase effective utilization of math personalized learning software programs:

- Provide regular training opportunities for teachers on a range of desired topics such as ways that other teachers have used the software to free up instructional time rather than detract from instructional time.
- Offer a wide range of training formats, including webinars, brief emails with usage tips, and online community forums for asking questions and sharing strategies.
- Provide a protocol for accessing support resources for implementation and maximizing utility of the programs.
- Provide a venue for teachers to share best practices in using

Findings

We asked teachers whether they would like training on seven aspects of the software, including customizing programs, differentiating instruction, aligning with concepts being taught, using program tools, using data reports, integrating program use with regular instruction, and ways to use the software. The majority of teachers wanted additional training on all of these.

The majority of teachers (84%) have sufficient access to computers or tablets, and 90% indicated the software works well without crashing and slowing. However, in their comments, a number of teachers indicated they had problems ranging from poor internet connections, incompatibility of software with available devices, and glitches.

Considerations for Improvement

software to expand community of practice.

- Engage teachers who utilize the software programs in ways to enrich, differentiate, and reteach students to provide professional learning opportunities for other educators.

Resolve issues regarding access to software and hardware:

- Work with LEAs with the lowest usage rates to resolve specific frustrations identified in the surveys.

Elementary STEM Endorsement Program

Background

In 2014, the Utah Legislature passed HB 150, Science, Technology, Engineering, and Mathematics Amendments, which required the Utah State Board of Education (USBE) and the STEM AC to work with Utah institutions of higher education (IHEs) to develop an elementary STEM endorsement program for Utah teachers. Utah Administrative Code R277-502-5 further specified that the STEM endorsement would be recognized as a minimum of 16 semester hours of university credit for LEA salary schedules. The program requires partnerships between IHEs and local education agencies (LEAs) across the state. In 2015, the Elementary STEM Endorsement Grant awarded funds to seven partnerships. Additionally, 20% of the spaces were made available to districts or charter schools not partnered in an existing cohort.

The STEM endorsement program started its first cohort of teachers in the 2015-16 school year. Course plans and timelines of each partnership varied and endorsements for the first cohort were awarded in fall 2016 or spring 2017. In early 2017, the STEM AC secured funding for a second STEM endorsement cohort, and a new request for applications was released in spring 2017 for endorsement courses that began in summer or fall 2017.

Program Overview

The Elementary STEM Endorsement program is comprised of six college courses designed to take place over approximately two years. Courses are designed for elementary teachers and include Data Analysis and Problem-Solving, Energy in STEM, Force in STEM,

Matter in STEM, Nature of Science and Engineering, and STEM Practices with a Focus on Technology and Problem-based Learning. The endorsement program is intended to improve student math performance through the increase of teachers' instructional effectiveness. Specifically, courses in the endorsement program are designed to increase teacher content knowledge, ability to integrate STEM into non-STEM lessons, and use of instructional best practices such as hands-on activities and student-directed and inquiry-based learning.

Evaluation Methods

The evaluation of the STEM endorsement program focuses on program implementation, educator outcomes, and student outcomes to determine the degree to which the program is meeting the goal of increasing TPACK and its applications among participating teachers (see the program logic model below). Specifically, for program implementation, we assessed both *quantity* (e.g., how many teachers completed the endorsement at each IHE) and *quality* (e.g., to what extent did the teachers perceive the overall program and specific classes to be useful?). For teacher outcomes, we assessed teachers' perceptions of the impact of the program on their teaching (e.g., to what extent did teachers perceive that the program led to increases in their content and pedagogical knowledge and skill, as well as changes in their instructional practice?). For student outcomes, we assessed teacher perceptions of the impact of their instructional changes on student STEM awareness, engagement, interest, and learning (see forthcoming appendix).

The 2016-17 report provided survey results from teachers who had just completed (or were about to complete) the two-year program. Because a new cohort started in 2017-18, the survey data reported in this report are baseline data, that is, data collected from the new cohort as they were beginning the program. Therefore, survey results reported here focus on teachers' expectations at the start of the program rather than their experiences in the program.

Data sources included participation records and a survey administered to all teachers participating in the second cohort. The survey was administered in the fall of 2017 to reflect participant expectations of the program as well as STEM instructional practices prior to participation in the Endorsement program.

This report provides descriptive statistics from the survey responses for each IHE. Results are also presented for the program as a whole, aggregated across all the programs. Qualitative data from the surveys were analyzed by the evaluation team who used open coding followed by development of coding categories. Results are synthesized and presented by major themes.

Student outcomes will be further assessed by analyzing student math performance of participating teachers at the classroom level, as these data become available.

Figure 12. Elementary STEM Endorsement Logic Model

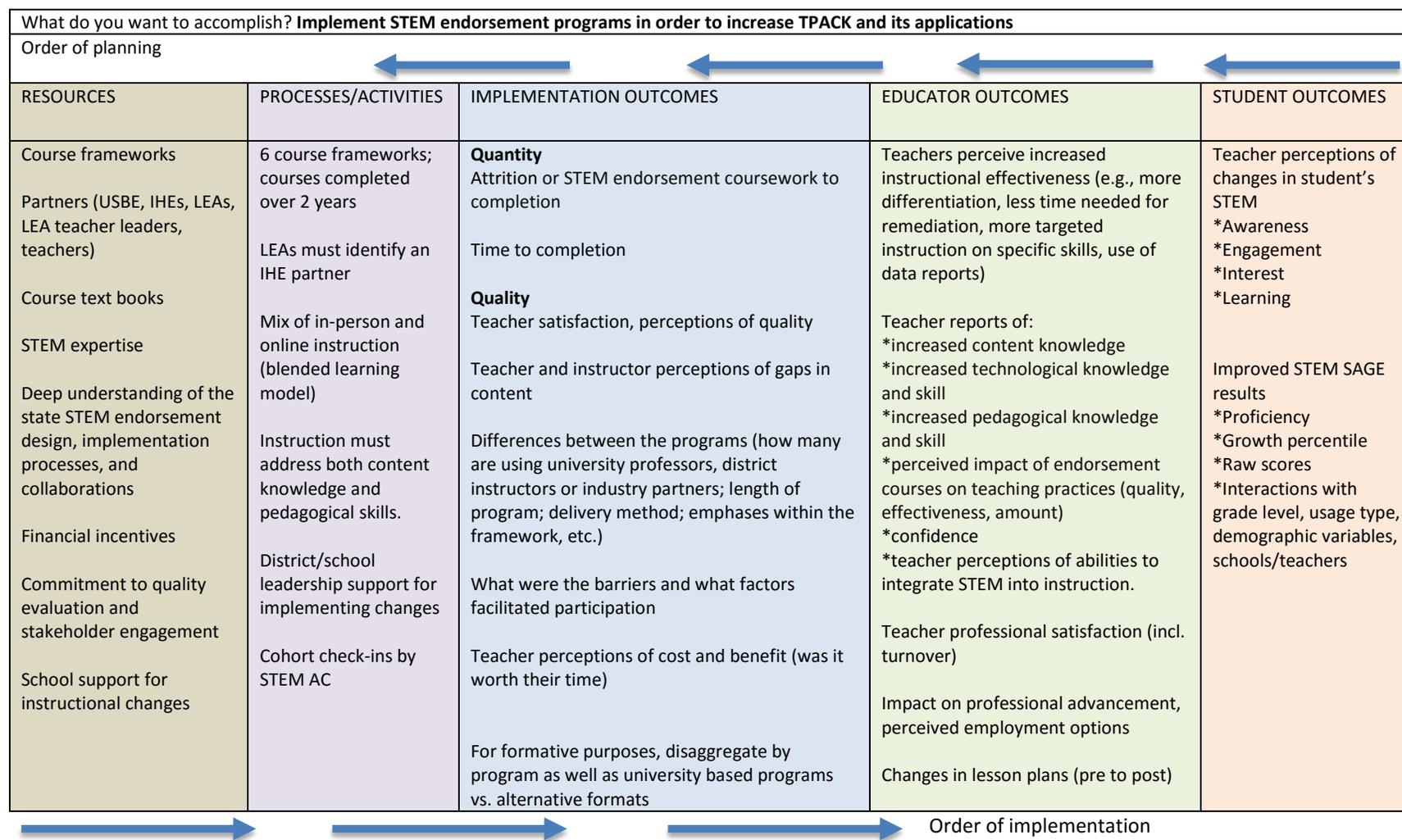
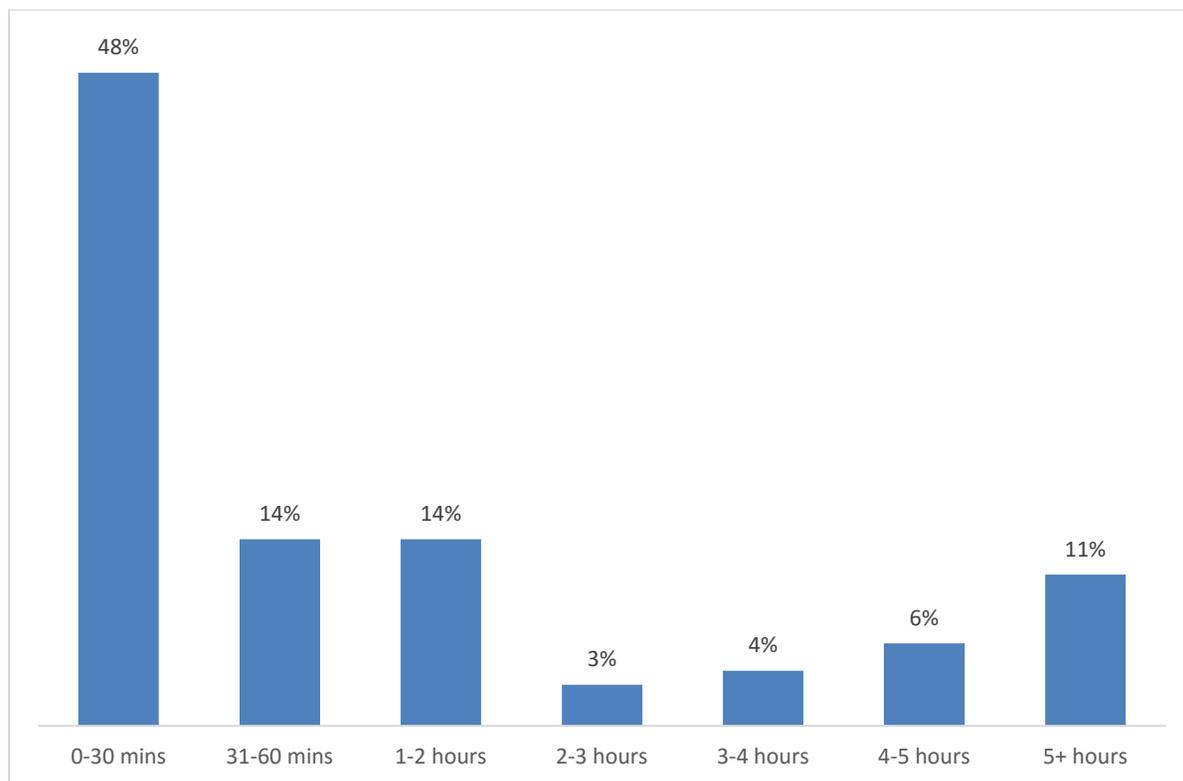


Table 37. Elementary STEM Endorsement - Participants Starting the Second Cohort

Partner IHE	Total IHE Participants	Partner Districts (and Number of Participants)
Brigham Young University (BYU)	35	Alpine SD (18), Nebo SD (18)
Dixie State University (DSU)	32	Washington SD (22), Charter (10)
Southern Utah University (SUU)	105	Beaver SD (3), Canyons SD (7), Charters (9), Garfield SD (1), Iron SD (24), Jordan SD (48), Kane SD (4), Millard SD (2), San Juan SD (4), Washington SD (3)
University of Utah (UU)	43	Granite SD (24), Murray SD (7), Salt Lake City SD (12)
Utah State University (USU)	49	Cache SD (10), Charter (3), Logan SD (3), Tooele SD (15), Weber SD (18)
Utah Science Teachers Association (UT STA)	39	Cache SD (3), Canyons SD (3), Charter (1), Granite SD (9), Iron SD (1), Jordan SD (9), Murray SD (3), Nebo SD (1), Ogden SD (3), Provo SD (2), Salt Lake City SD (2), Wasatch SD (1), Weber SD (1)
Utah Valley University (UVU)	32	Charter (3), Park City SD (11), Provo SD (12), Tintic SD (6)
Weber State University (WSU)	100	Davis SD (70), Ogden SD (30)
Total	435	24 School Districts plus 7 Charter Schools

SOURCE: STEM AC DATA

Figure 13. Last year, approximately how many minutes each week were your students engaged in instruction that integrates STEM?



✓ In the year prior to starting the STEM Endorsement program, on average, teachers engaged students in instruction integrating STEM about two hours per week; however, almost half reported 30 or fewer minutes per week.

SOURCE: STEM ENDORSEMENT TEACHER SURVEY FALL 2017

STEM Endorsement Course Format and Teacher Motivation

Figure 14. What is the format of the STEM endorsement course(s) you are currently attending?

- 96% of teachers attend face-to-face instruction** (instructor and students present in the classroom)
 - 1% of teachers attend distance education** (instructor broadcasts to multiple classrooms across the state)
 - 4% of teachers attend blended courses** (part of the course is face-to-face or distance and part is online)
- ✓ Teachers could select as many as applied.
 - ✓ Most teachers reported attending only face-to-face classes.

Figure 15. Teacher Motivation for Pursuing the STEM Endorsement



SOURCE: STEM ENDORSEMENT TEACHER SURVEY FALL 2017

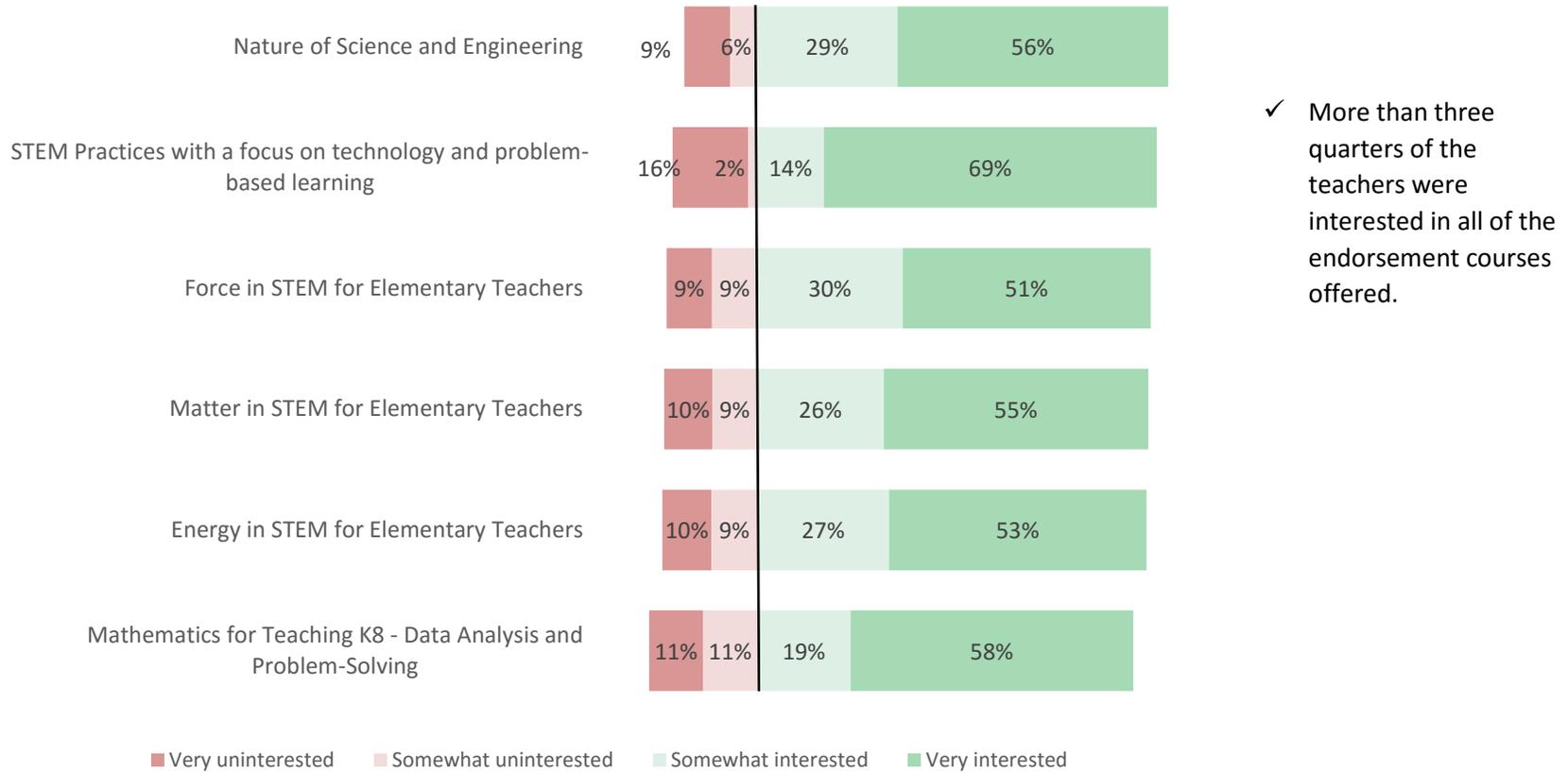
Table 40. Teacher Motivation for Pursuing the STEM Endorsement by Institution
 Percentage who *somewhat agree* or *strongly agree* with each statement.

	BYU	DSU	USU	UU	WSU	Total
I was intrinsically motivated to participate in the STEM endorsement program (e.g., I want to improve my teaching)	100%	96%	94%	98%	98%	98%
I was extrinsically motivated to participate in the STEM endorsement program (e.g., I hope to obtain a new position).	26%	43%	63%	53%	71%	54%
My school or district provided a great deal of support or motivation for enrolling in the STEM endorsement program.	65%	65%	94%	66%	83%	73%

- ✓ Teachers across institutions showed high levels of intrinsic motivation to complete the STEM endorsement.
- ✓ There were variations between institutions for extrinsic motivation and school or district support.

SOURCE: STEM ENDORSEMENT TEACHER SURVEY FALL 2017

Figure 16. Teacher Interest in Endorsement Courses

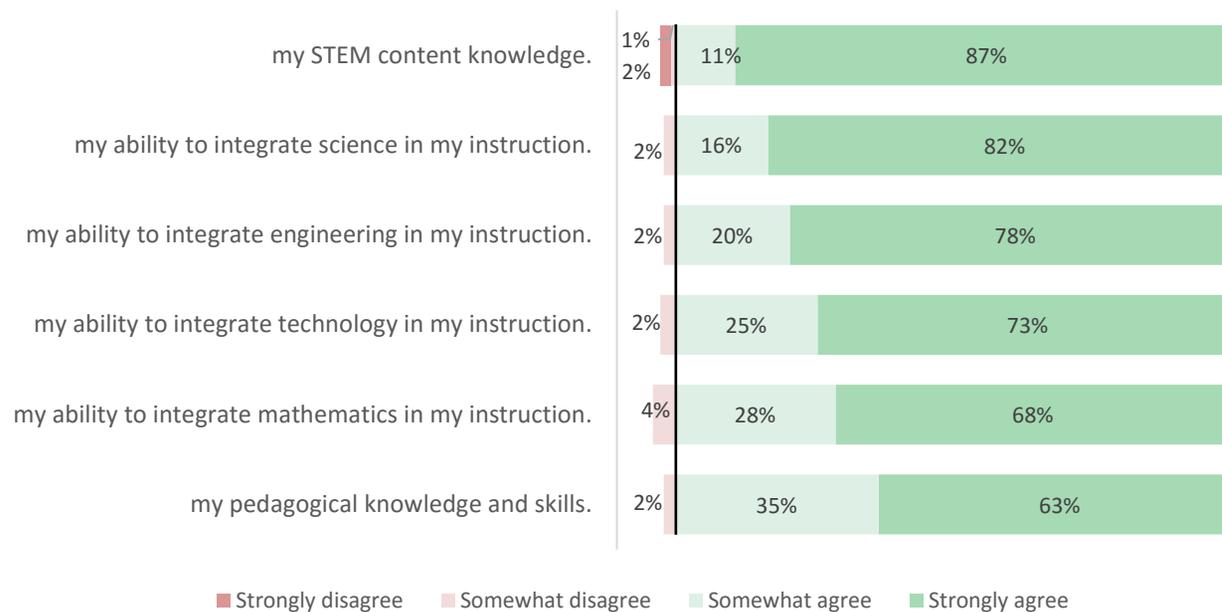


SOURCE: STEM ENDORSEMENT TEACHER SURVEY FALL 2017

Anticipated Outcomes of the STEM Endorsement

Figure 17. Expected Impact of the STEM Endorsement Program on Teaching

I expect the STEM endorsement program to have a significant effect on...

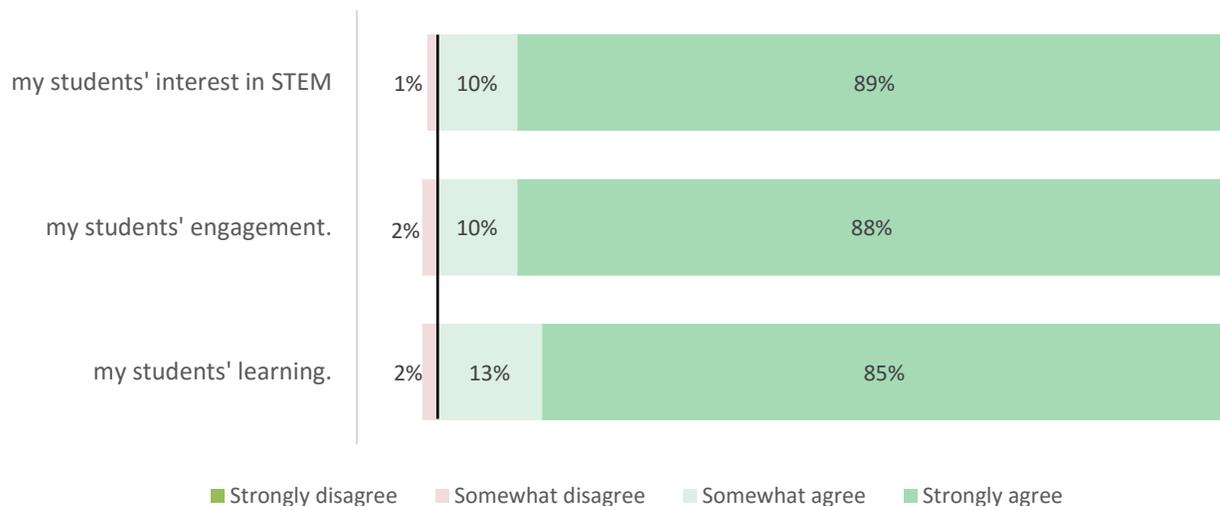


- ✓ More than half of teachers strongly agreed that they expect the STEM endorsement program to significantly affect their instruction.
- ✓ More than three-quarters (75%) of teachers strongly agreed that they expect the STEM endorsement program to significantly affect their own content knowledge and ability to integrate STEM areas into their instruction.

SOURCE: STEM ENDORSEMENT TEACHER SURVEY FALL 2017

Figure 18. Expected Impact of the STEM Endorsement Program on Students

I expect the STEM endorsement program to have a significant effect on...



✓ The majority of teachers strongly agreed that they expect the STEM endorsement program to increase students' interest, engagement, and learning in STEM.

Table 41. Teachers' Overall Expectations for the STEM Endorsement Program by Institution
Percentage who *somewhat agree* or *strongly agree*.

	BYU	DSU	USU	UU	WSU	Total
I expect that my participation in the STEM endorsement program will be a professionally rewarding experience	100%	96%	100%	100%	98%	99%

✓ Nearly all teachers across institutions expect that participating in the STEM endorsement program will be professionally rewarding.

SOURCE: STEM ENDORSEMENT TEACHER SURVEY FALL 2017

Table 42. Teachers' Expectations from Participating in the STEM Endorsement Program

Theme	Example Quotes
Participating will enhance my own content knowledge.	<p>"I hope to gain a better understanding of STEM..."</p> <p>"more confidence in the STEM areas..."</p> <p>"I anticipate that it will broaden and deepen my understanding & opportunities available in the current field of STEM education."</p> <p>"I hope to be able to add more engineering experiences to my classroom and feel more comfortable with teaching the math concepts."</p>
Participating will enhance my instructional skills.	<p>"I feel that the STEM endorsement will help me to be a more effective teacher in all aspects of my teaching. As I have taken this course, I find that I ask more questions from my students to make them think about things more deeply."</p> <p>"More ideas, more resources"</p> <p>"Application and relevance [to students]."</p>
Participating will enhance my ability to teach subjects in integration.	<p>"...how to integrate across curriculum to give my students the best possible chance to learn these concepts and ideas."</p> <p>"...help me to be confident in my abilities to teach subjects integrated STEM base strategies."</p> <p>"...being better prepared to integrate these subjects into daily teaching routines."</p>
Participating will enhance my ability to engage students in inquiry-based learning	<p>"I just hope it will help me be a better, more hands-on instructor."</p> <p>"I think it will help me get the students making sense of the science instead of me trying to teach them the sense of the science."</p> <p>"I'm hoping that my teaching will become more project/theme based. I want to teach all the subject areas around a central topic so that my students are very invested in the learning."</p>
Participating will enhance my ability to provide student-centered instruction	<p>"Change my teaching by moving to a student-centered approach rather than teacher-centered."</p> <p>"I have already experienced a shift in my approach to teaching. I am realizing through these courses that most effective teaching occurs when students are motivated, interested, involved, and allowed to own their learning. The integration piece of this program is helping me to apply new skills to begin teaching in this way."</p> <p>"I will teach with more student interaction among themselves."</p>

SOURCE: STEM ENDORSEMENT TEACHER SURVEY FALL 2017

Table 43. Teachers' Concerns About the STEM Endorsement Program

Theme	Example Quotes
Concern about the time and work required to complete courses	<p>“Time is a concern.”</p> <p>“I’m only concerned about how much additional work I’ll be doing on top of my personal class work load.”</p> <p>“Our district has adopted a new math program this year. I have concerns about my ability to complete my weekly work assignments, give enough time to study and teach the new math program, and have enough time to meet all my obligations for my endorsement class.”</p> <p>“I’m concerned about the workload compared to other endorsement classes I’ve taken.”</p> <p>“I am worried about the work load outside of class and its effect on my job as a teacher.”</p>
Concern regarding instruction received	<p>“There was a lack of communication at the beginning of the program.”</p> <p>“Too much theory not enough hands on STEM activities.”</p> <p>“Giving purpose to learning for the students, not just sitting and learning from the teacher in whole group and small group instruction. More hands on and application.”</p>
Concern about how to implement lessons learned in classroom	<p>“Would like more processing time during the class time. It has been overwhelming at times since the classes so far have been geared more for adult thinking than student thinking.”</p> <p>“Time to implement- Preparation for the classroom instruction.”</p> <p>“I have noticed an interest and excitement with many of the teachers as they have taken the classes through the summer, but there seems to be a little hesitation to implement what they have learned. I have offered to help as well, but I wonder if some of the hesitation comes from a lack of resources. The materials are all there when the teachers take the STEM classes, but when they go back to the schools there is a lack of resources and materials.”</p>
Concern about logistics of taking courses	<p>“My concern is more about the availability of the classes.”</p> <p>“I wish that the location was closer like within [my city’s] boundaries.”</p> <p>“It would be nice to be registered before classes start so we can access what we need. Textbook availability has been a bit disappointing.”</p>

SOURCE: STEM ENDORSEMENT TEACHER SURVEY FALL 2017

Table 44. Teachers' Positive Feedback About the STEM Endorsement Program

Theme	Example Quotes
General excitement for this program	<p>“Thanks for doing this, I am excited for the classes.”</p> <p>“I’m really excited to get started!”</p> <p>“I am really looking forward to completing this. I am so glad I decided to take it.”</p> <p>“Jessica has been extremely helpful in answering questions and explaining the expectations of the program. I have a colleague that encouraged me to apply for the program. because she loved it!”</p> <p>“Great program, AMAZING instructors!”</p> <p>“LOVE IT!”</p>
Excitement about what they’ll learn/have been learning	<p>“I am excited to take this course, and looking forward to the benefits of science, technology, engineering, as well as math processes to improve upon my teaching.”</p> <p>“I wish this is the way I learned about science. It is very fun and engaging and the self-discovery makes it the most rewarding.”</p> <p>“So far the program has been very intensive, thought provoking, and engaging. My view of the world has broadened so that I may now encourage my students in their learning.”</p> <p>“The instructors and labs that are provided are great as examples of how to teach using the new methods. Love the hands on, and the opportunity to write a vignette to share and have feedback on it.”</p>
Excitement about trying new things in the classroom and improving instruction	<p>“I can't wait to apply things I learn from this course in my classroom-especially the ideas that have to do with technology!”</p> <p>“The courses I have taken so far have been challenging and eye opening. I am excited to baby step my way into this program as I reevaluate how I teach and how I will have students learn.”</p> <p>“I have completed two classes, and have absolutely loved them, the instruction was incredible. I'm more excited to begin teaching our students this year than I've been before, after participating in the classes I've been in.”</p> <p>“I have found the classes that I have taken so far very engaging and enlightening. I look forward to using much of what I have learned this year with my students in science and Math.”</p> <p>“WSU and DSD are doing a great job creating an engaging, worthwhile program. This will change teaching and learning in my school.”</p> <p>“I already have both mathematics and technology endorsements. I hope that the STEM endorsement will help unify those areas in my teaching practice.”</p>

SOURCE: STEM ENDORSEMENT TEACHER SURVEY FALL 2017

Considerations for Improvement for the Elementary STEM Endorsement Program

New teachers beginning the STEM Endorsement Program were very enthusiastic about the program and optimistic that their participation would improve their instructional practices and their students learning and engagement.

These data are from teachers beginning the program. We will follow these participants longitudinally to report on persistence, attrition, and outcomes of participation. The following considerations are provided for the purpose of informing the STEM Endorsement program improvement efforts.

Findings	Considerations for Improvement
<p>370 teachers from 7 charter schools and 24 school districts started the second cohort for the STEM Endorsement.</p> <p>Nearly all respondents (97%) indicated they were participating in the program for intrinsic reasons, but over half (55%) were also participating for extrinsic reasons.</p> <p>All respondents indicated they believed the program would improve their STEM teaching and their students learning and engagement.</p>	<p>Maintain a focus on persistence of participants to maximize return of participation.</p> <ul style="list-style-type: none">• Provide an exit, completer, and two year completer survey to determine impact of the endorsement program.• Determine a scalability plan for subsequent years of the endorsement program.• Utilize endorsement participants to provide professional learning and support recruitment efforts.• Strategically market the endorsement program to recruit teachers from schools with low scores in math and science.
<p>95% of teacher indicated they teach at least one STEM subject, while only 24% teach all four.</p> <p>On average, teachers reported engaging in instruction that integrated STEM topics an average of 2 hours per week; however, 48% of teachers indicated they spent 30 minutes or less per week on STEM integration.</p> <p>Teacher comments indicated concerns about finding time for the course requirements and while maintaining their teaching loads. Teachers also indicated they preferred hands-on, usable instruction over theoretical material.</p>	<p>Increase the impact of the STEM endorsement program:</p> <ul style="list-style-type: none">• Provide samples of the changes in lesson plans resulting from the endorsement program.• Provide an integrated approach to the endorsement program that attends to the applied side of the learning and “class ready” instructional techniques.• Build a repository of integrated lessons attempted and feedback/reflections from participants to contribute to the lesson bank and professional community.

STEM Professional Learning Program

Background

In 2014, the Utah Legislature passed HB 150, *Science, Technology, Engineering, and Mathematics Amendments*, which required the STEM Action Center to select a high quality professional learning platform through an RFP process to improve STEM education. HB 150 required the platform to provide educators with automatic tools, resources, and strategies, and allow teachers to work in online professional learning communities (PLCs). The tool was also required to include videos of highly effective STEM education across a range of content and grade levels, and allow teachers to upload their own videos and provide and receive feedback.

The STEM Action Center initially selected Edivate by the School Improvement Network (SINET) as the platform that was best able to meet all of the legislative requirements; however, schools may choose a combination of technology-based, face-to-face, and hybrid or blended learning opportunities. Funds for professional development are made available to Utah's public K-12 schools through a competitive grant application process for LEAs.

Program Overview

The STEM Professional Learning Program has been designed to help schools determine and address their needs regarding STEM professional learning and growth using one-year or three-year plans. As part of the grant, teachers are required to upload videos of themselves teaching in order to reflect on their practices and receive feedback from peers. The program is intended to improve all aspects of STEM instruction, including content knowledge and pedagogy, integration of STEM into non-STEM lessons, and

confidence in teaching STEM. Additionally, the program is intended to increase teachers' perceptions of the value of professional learning and reflective practice.

Evaluation Methods

The evaluation of the STEM Professional Learning Program focused on program implementation and educator outcomes to determine the degree to which the program is meeting the goal of increasing TPACK and its applications among participating teachers (see the program logic model below). Specifically, for program implementation, we assessed both *quantity* (e.g., how much time did teachers engage in professional learning) and *quality* (e.g., to what extent did teachers perceive that they received useful content?). For teacher outcomes, we assessed teacher perceptions of the changes they had made (and intend to make) based on the professional learning. We also assessed teacher perceptions of the impact of the professional learning on their teaching, STEM skills, instructional practice, interest in professional learning, STEM content knowledge, and confidence teaching STEM. Administrators were asked similar questions about the effect of the professional learning on teachers. For student outcomes, we assessed teacher and administrator perceptions of the impact of the professional learning on students' learning outcomes and interest in STEM.

Data sources included program records and surveys administered to teachers and administrators at participating schools. This report provides descriptive statistics from the survey responses. Qualitative data from the surveys were analyzed by the evaluation team who used open coding followed by development of coding categories. Results are synthesized and presented by major themes.

Figure 19. STEM Professional Learning Logic Model

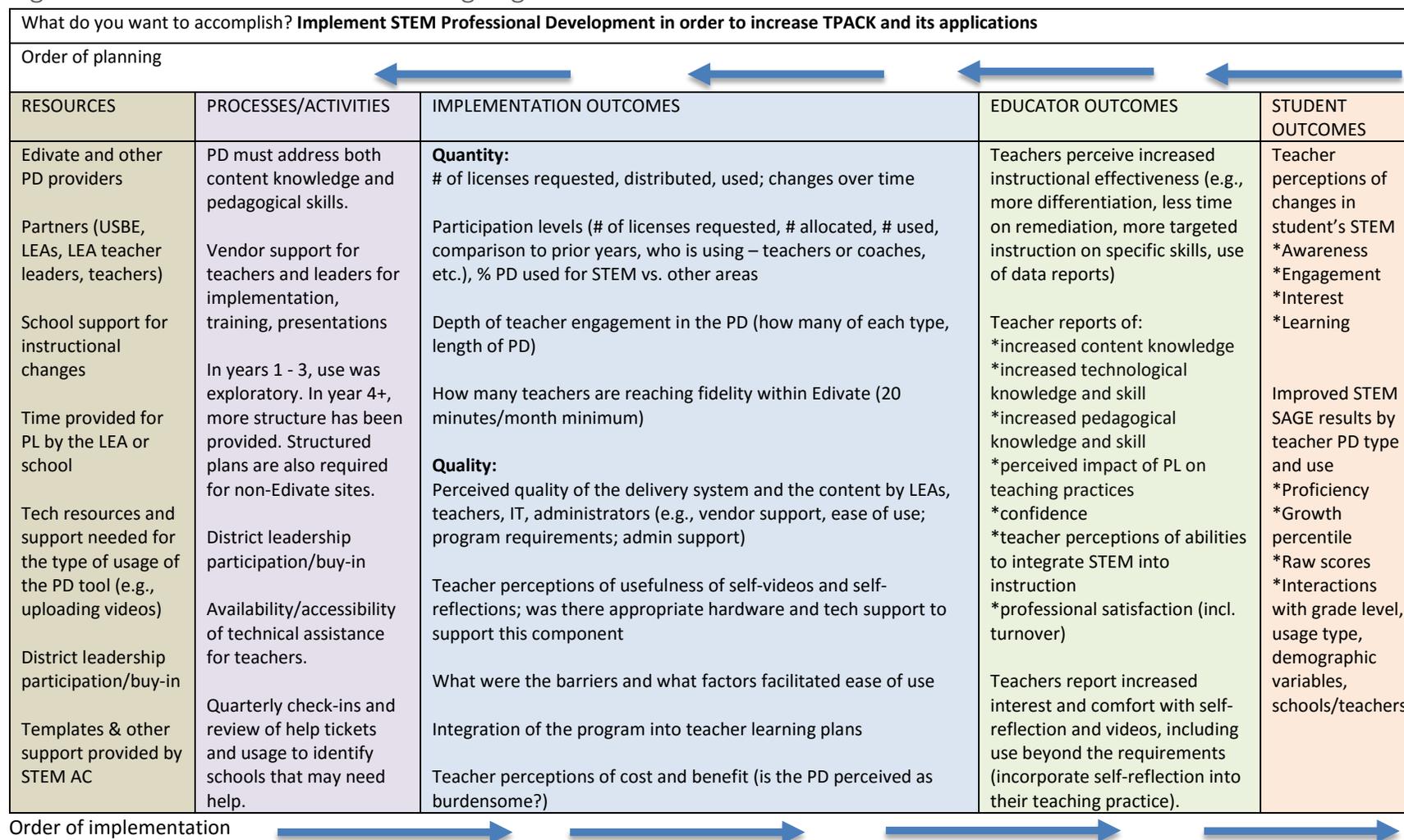


Table 45. Numbers of Participants in STEM Professional Learning (PL) 2017-18

School District or LEA	Number of LEA- Reported Professional Learning Participants	Number of Edivate Users
Alpine School District	1,366	--
Cache School District	10	--
Canyons School District	119	--
Carbon School District	21	--
Charter Schools	759	719
Davis School District	862	364
Granite School District	54	63
Jordan School District	160	--
Millard School District	41	11
Morgan School District	154	127
Nebo School District	104	72
Ogden School District	55	--
Park City School District	11	--
Piute School District	28	24
Provo School District	483	563
San Juan School District	36	11
Salt Lake City School District	64	--
South Sanpete School District	75	161
South Summit School District	95	91
CUES (Central Utah Educational Services includes Tintic, Juab, North Sanpete, South Sanpete, Sevier, Piute, and Wayne School Districts)	22	--
DLI STEM Schools (11 schools from Alpine, Cache, Davis, Jordan, Logan, Provo, and Tooele School Districts and 1 charter school)	11	--
Uintah School District	47	22
Washington School District	123	--
Wayne School District	33	25
Weber School District	859	--
Total	5,592	2,253

✓ Edivate mean use by teacher = 625 minutes per year (52 minutes per month).

✓ 58% of Edivate users used the program an average of 20 minutes per month or more.

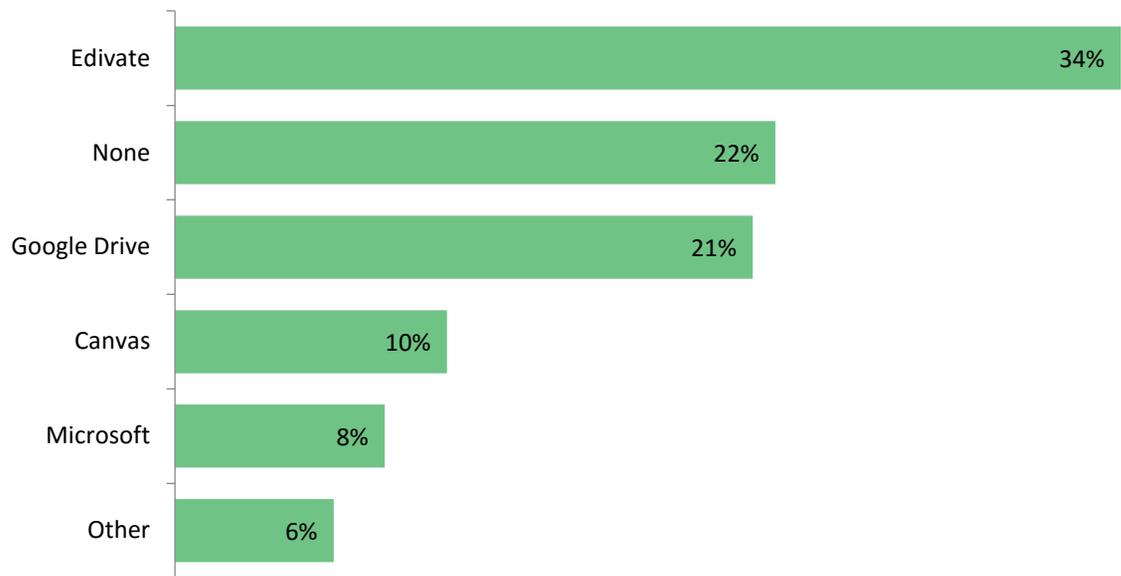
Source: STEM AC data and annual reports

Table 46. Teacher and Administrator Survey Response Numbers for the Professional Learning Project

	N	%	
Teachers Total	489	100%	
Administrators Total	26	100%	✓ Teachers could choose more than one grade level and STEM area; therefore, the percentages add to more than 100%.
Teachers by Grade Level Distributions			
K - 2nd	79	18%	
3rd - 6th	280	64%	✓ Most teachers (91%) responding to the professional learning survey taught at least one STEM area.
7th - 8th	95	22%	
9th - 12th	65	15%	
Teachers by STEM Areas			
Science	353	73%	
Technology	275	57%	
Engineering	214	44%	
Mathematics	351	73%	
Does not teach STEM	42	9%	

SOURCE: ADMINISTRATOR AND TEACHER SURVEYS SPRING 2018

Figure 20. Teacher Reported Primary Platform for Video-Based STEM Professional Learning

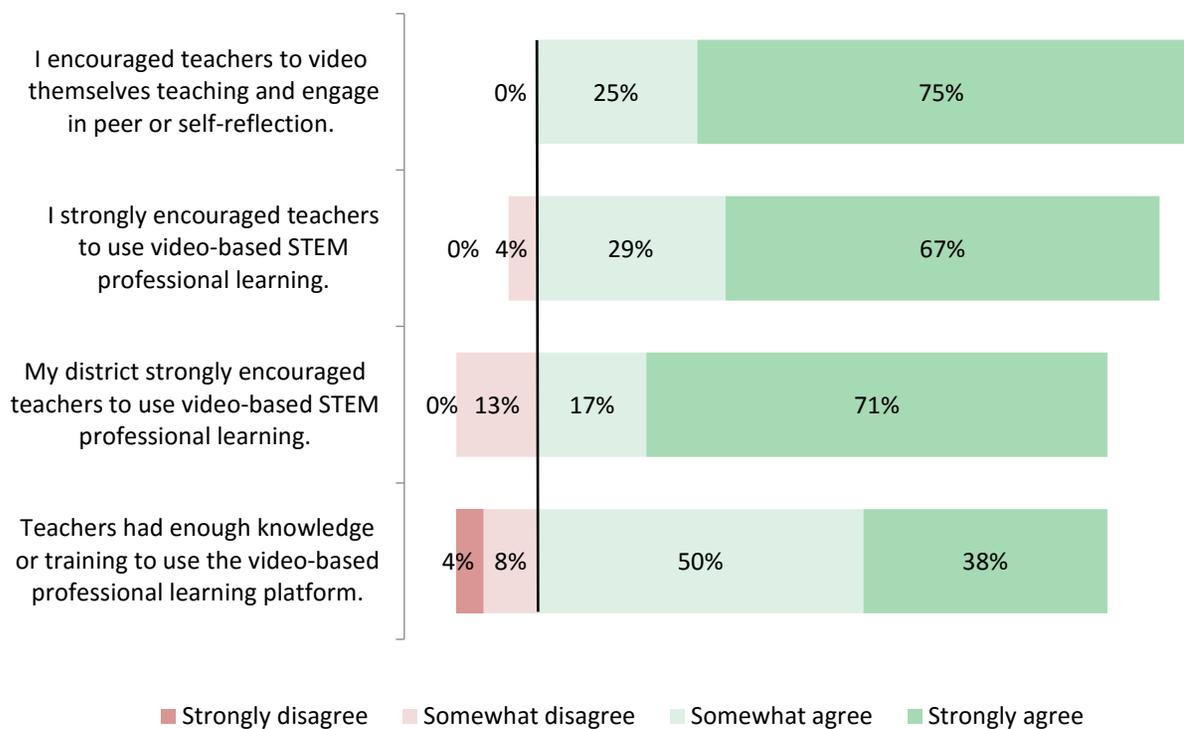


- ✓ The most commonly used platform was Edivate, followed by Google Drive.
- ✓ 22% of responding teachers did not have a platform for video-based STEM professional learning.

SOURCE: TEACHER SURVEY SPRING 2018

Preparation and Support

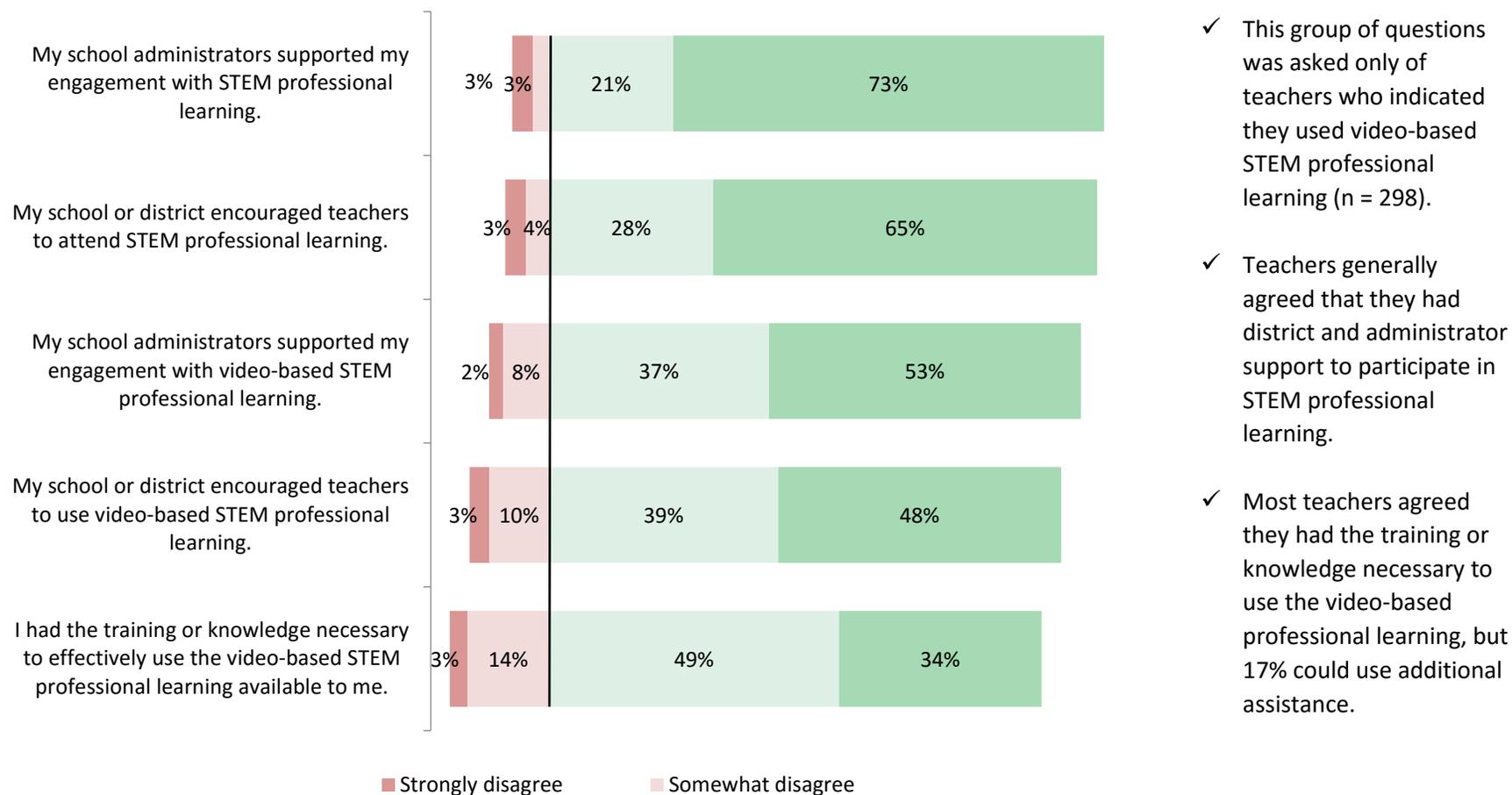
Figure 21. Administrator Perceptions of Support for Teachers to Use Video-Based STEM Professional Learning



- ✓ This group of questions was asked only of administrators who indicated they used video-based STEM professional learning (n = 24).
- ✓ 100% of responding administrators encouraged teachers to video themselves for peer- or self-reflection.
- ✓ Responding administrators generally reported that teachers had district support and enough training to use the video-based professional learning.

SOURCE: ADMINISTRATOR SURVEY SPRING 2018

Figure 22. Teacher Perceptions of Support for Use of Video-Based STEM Professional Learning

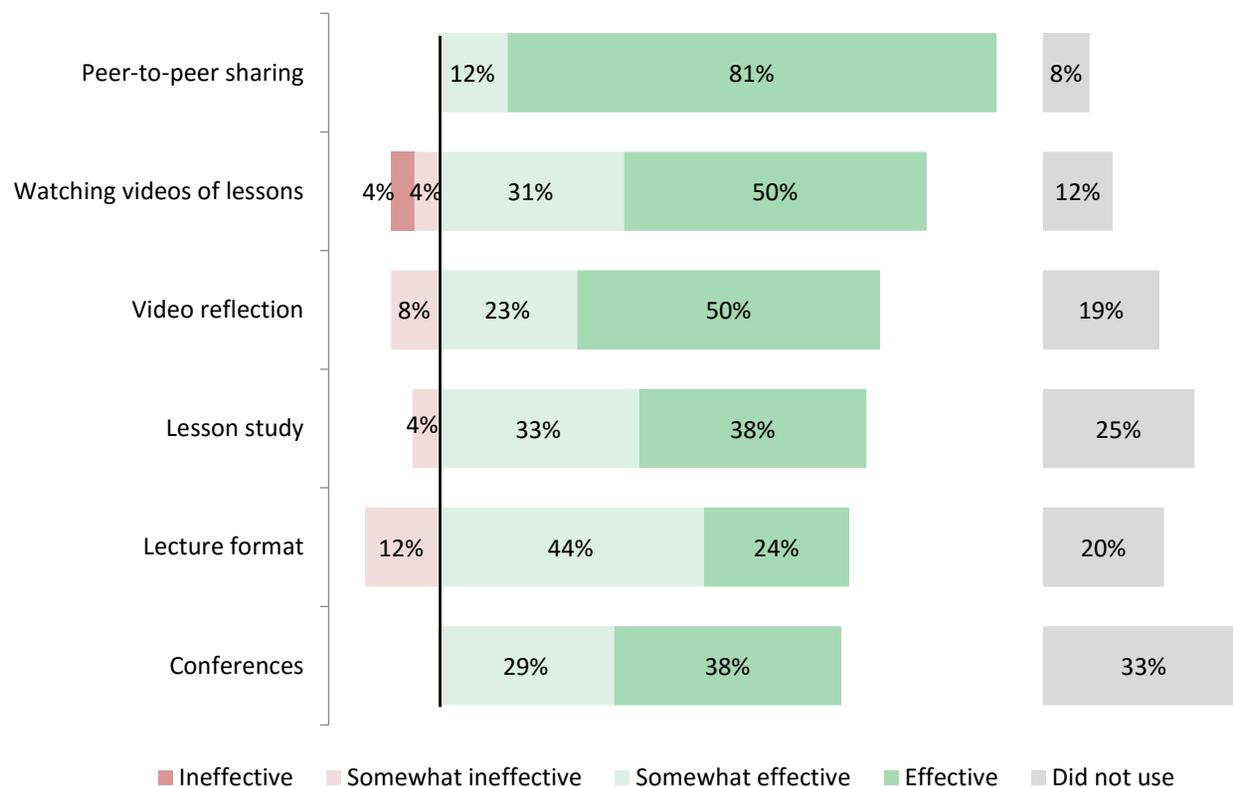


- ✓ This group of questions was asked only of teachers who indicated they used video-based STEM professional learning (n = 298).
- ✓ Teachers generally agreed that they had district and administrator support to participate in STEM professional learning.
- ✓ Most teachers agreed they had the training or knowledge necessary to use the video-based professional learning, but 17% could use additional assistance.

SOURCE: TEACHER SURVEY SPRING 2018

Use and Effectiveness of Professional Learning Formats

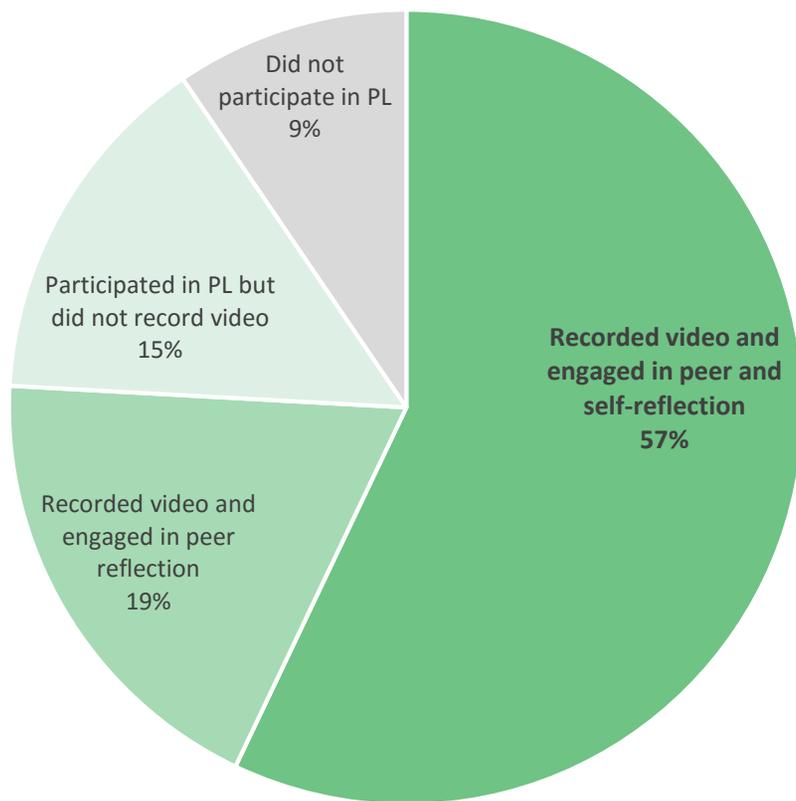
Figure 23. Administrator Use and Perceptions of Effectiveness of STEM Professional Learning Formats



- ✓ Peer-to-peer sharing for STEM professional learning used by the most administrators and was seen as effective by the most administrators.
- ✓ Watching videos of lessons and video reflection was also used by the majority of administrators and seen as effective by most.
- ✓ 19% of responding administrators indicated they did not use video reflection for professional learning.

SOURCE: ADMINISTRATOR SURVEY SPRING 2018

Figure 24. Teacher Participation with STEM Professional Learning in 2017-18

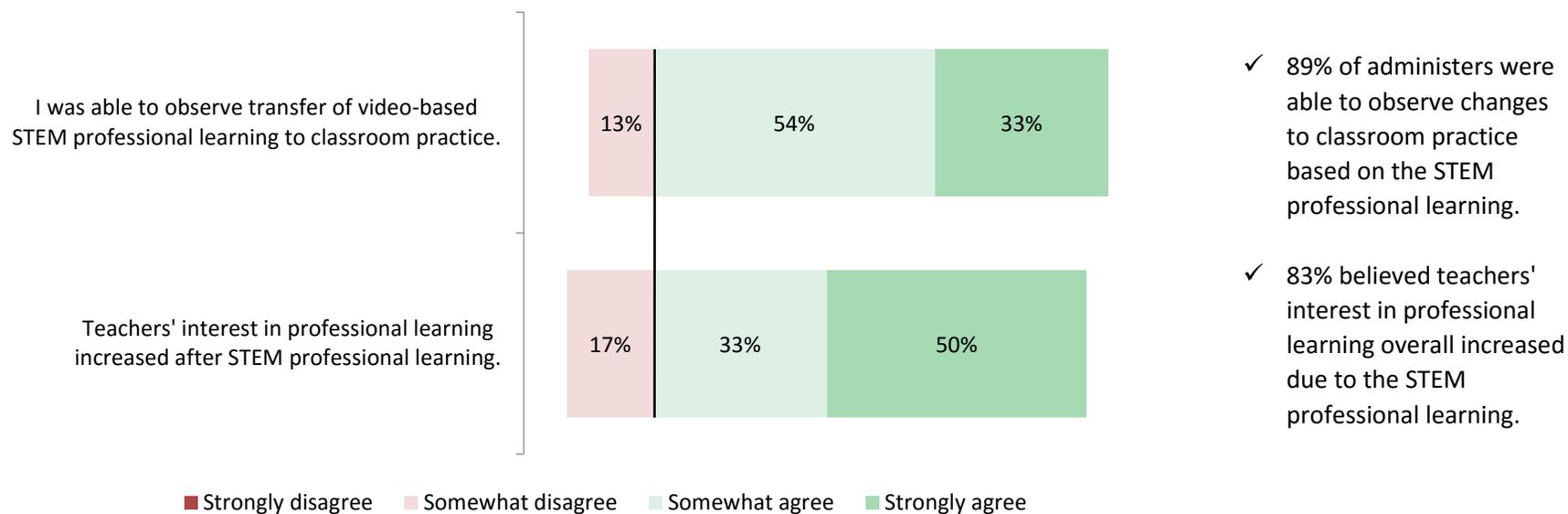


- ✓ 57% of all responding teachers indicated they recorded video of themselves teaching and engaged in peer and self-reflection (246 out of 431).
- ✓ Teachers were asked to indicate how many minutes they engaged in PL and video reflection each month during the school year. However, responses indicated that a large number of teachers likely provided the number of minutes per year, making the data uninterpretable.

SOURCE: TEACHER SURVEY SPRING 2018

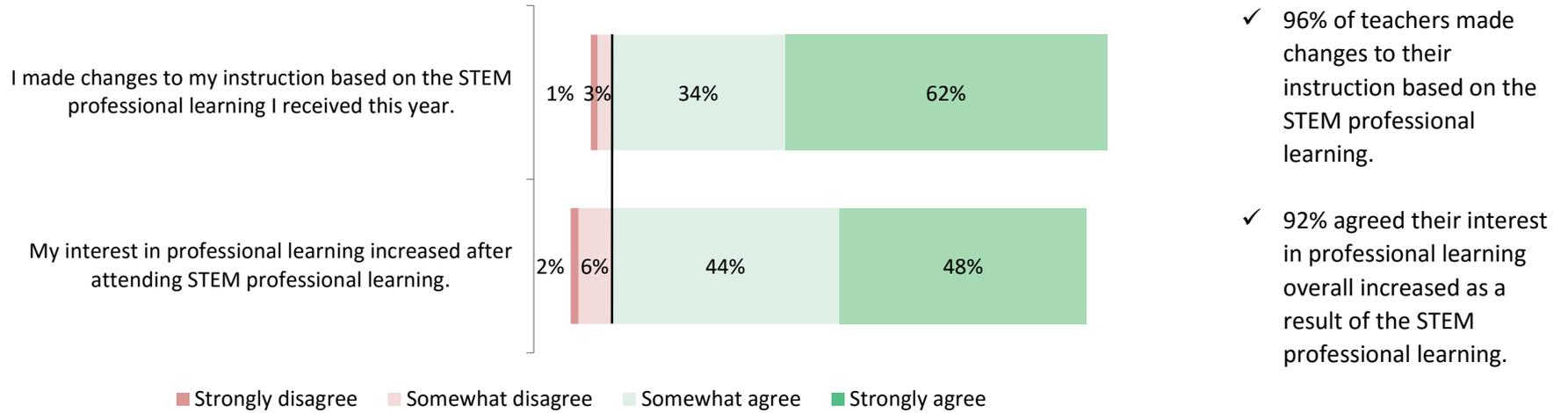
Perceived Outcomes

Figure 25. Administrator Perceptions of Overall Effects of STEM Professional Learning on Teachers



SOURCE: ADMINISTRATOR SURVEY SPRING 2018

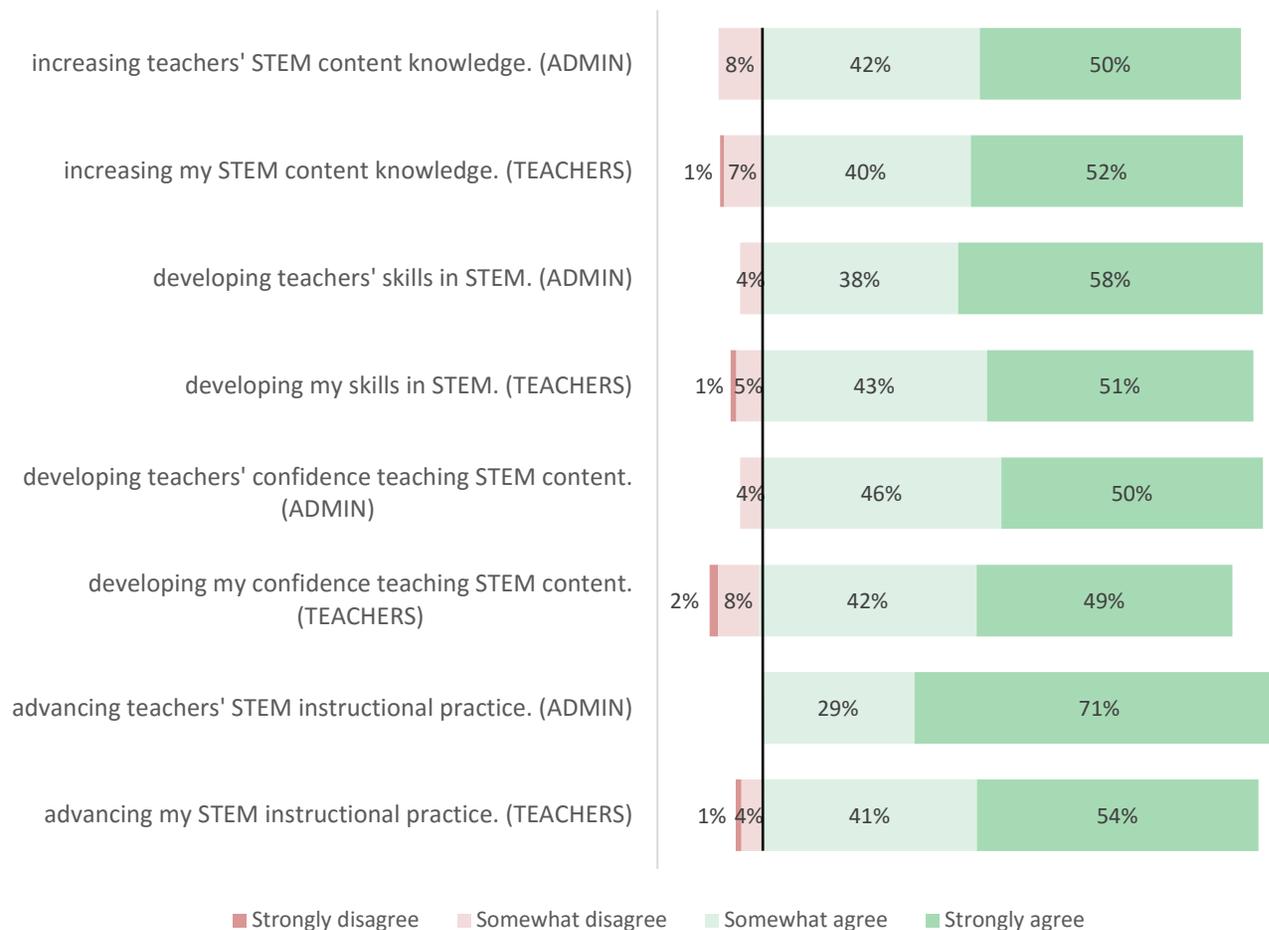
Figure 26. Teacher Perceptions of Overall Effects of STEM Professional Learning on Instruction



SOURCE: TEACHER SURVEY SPRING 2018

Figure 27. Teacher and Administrator Perceptions of Effectiveness of STEM Professional Learning

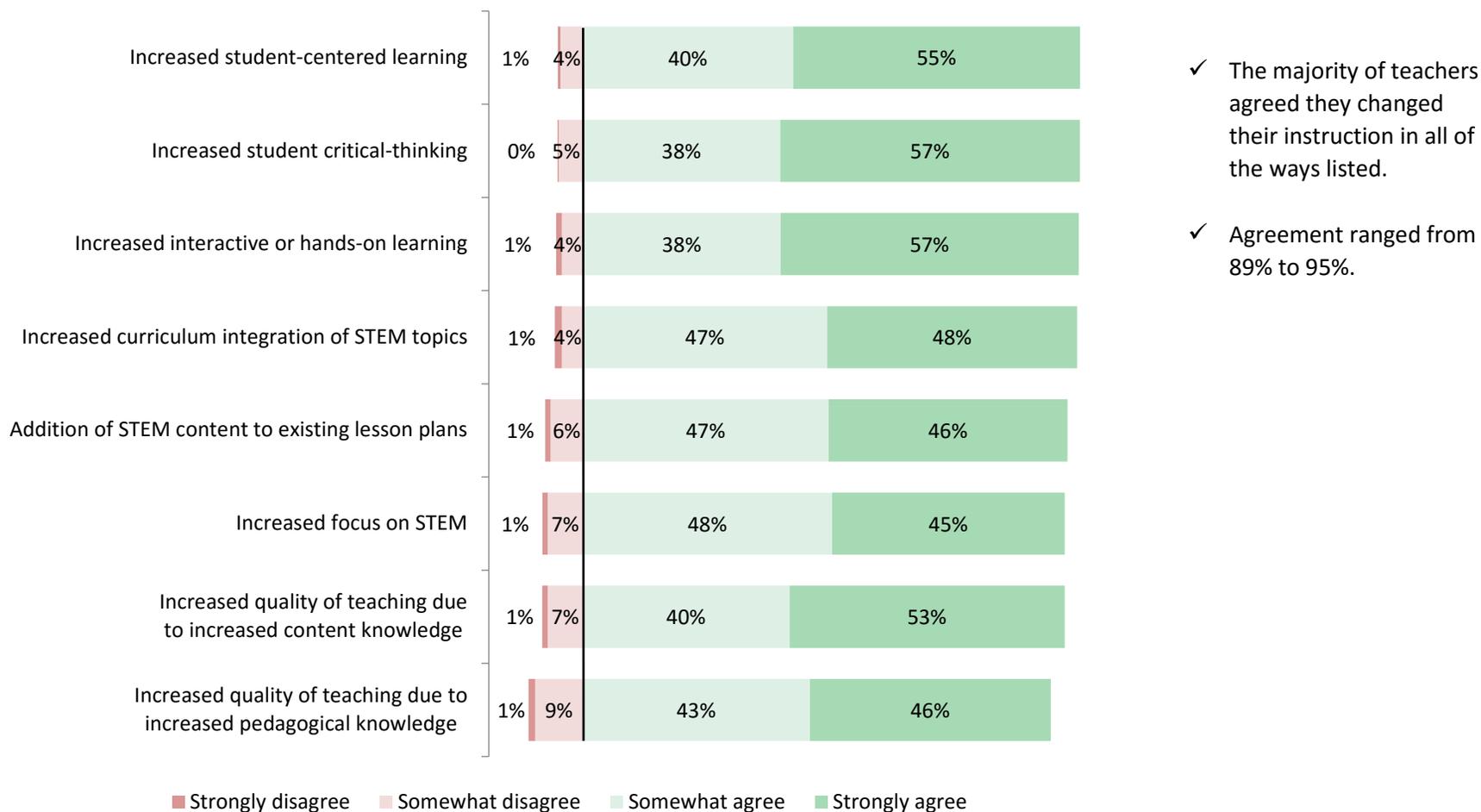
The STEM professional learning was effective in...



✓ Teachers and administrators both agreed the STEM professional learning was effective in advancing teachers' STEM instruction, including their STEM skills, confidence, content knowledge, and instructional practice.

SOURCES: ADMINISTRATOR AND TEACHER SURVEYS SPRING 2018

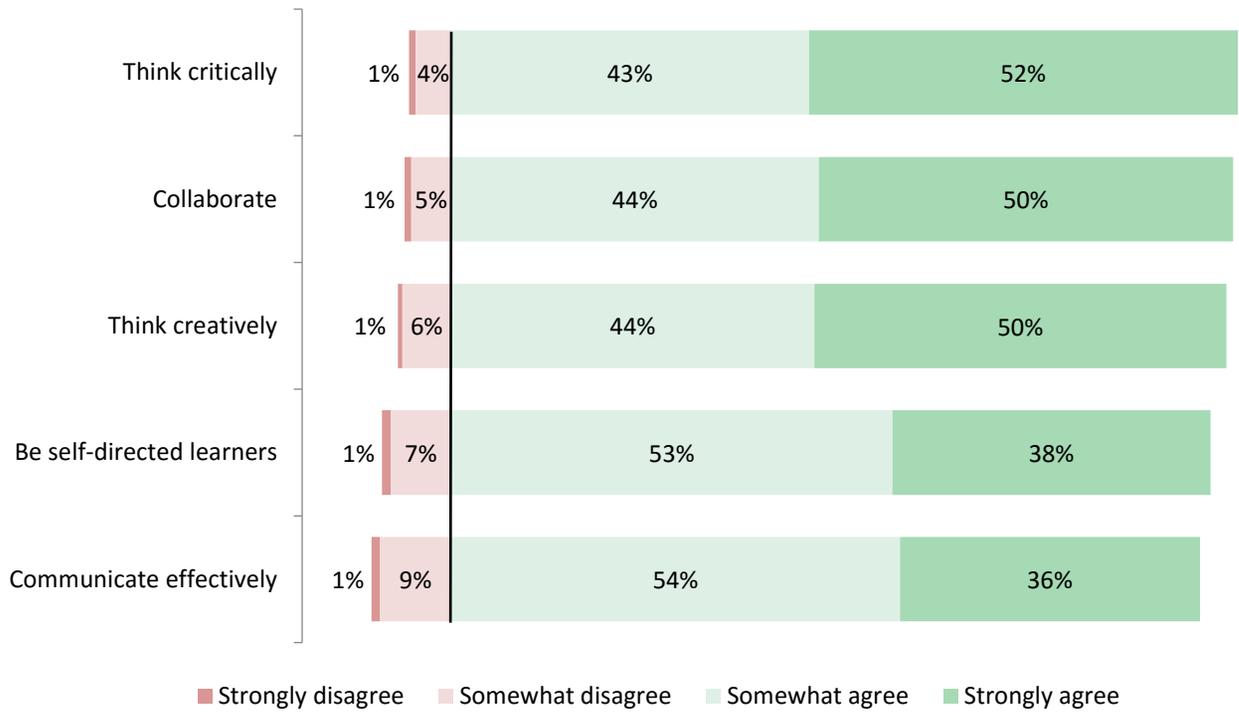
Figure 28. Teacher Reported Changes in Instruction based on the STEM Professional Learning



SOURCE: TEACHER SURVEY SPRING 2018

Figure 29. Teacher Reported Increase in Ability to Teach 21st Century Skills

My application of STEM PL has increased my ability to teach my students how to...

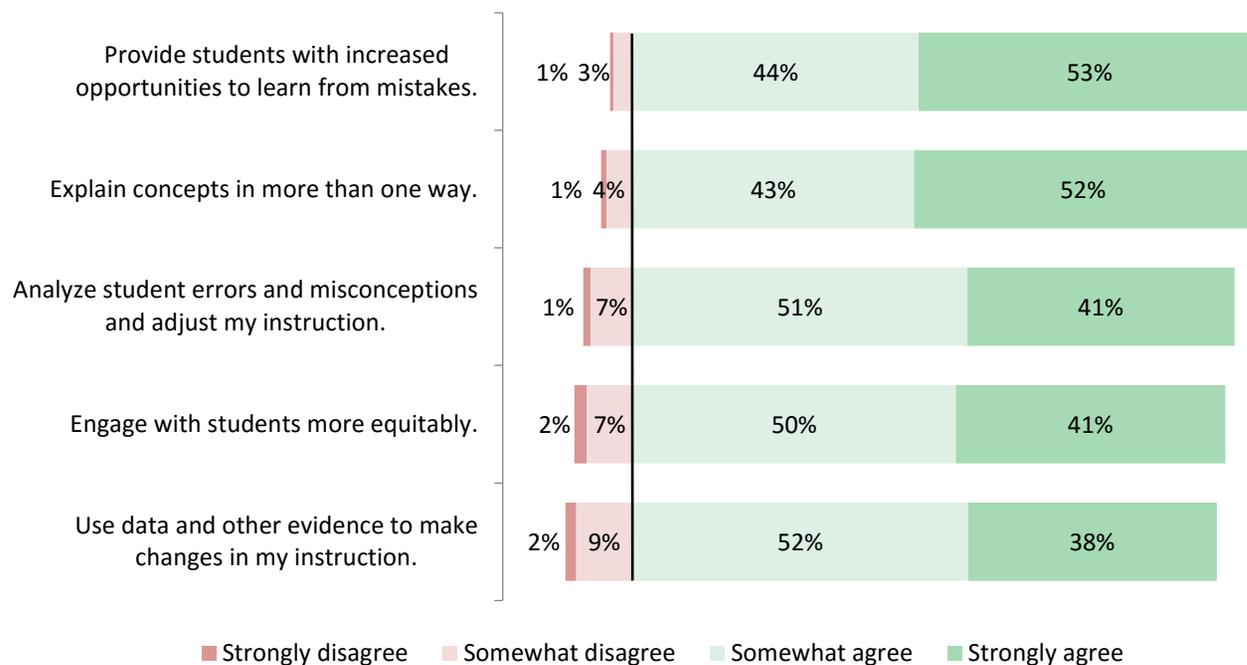


- ✓ The majority of teachers agreed the STEM professional learning increased their ability to teach 21st Century skills.
- ✓ Agreement ranged from 90% to 95%.

SOURCE: TEACHER SURVEY SPRING 2018

Figure 30. Teacher Reported Changes in STEM Instructional Abilities

My application of STEM professional learning has increased my ability to...

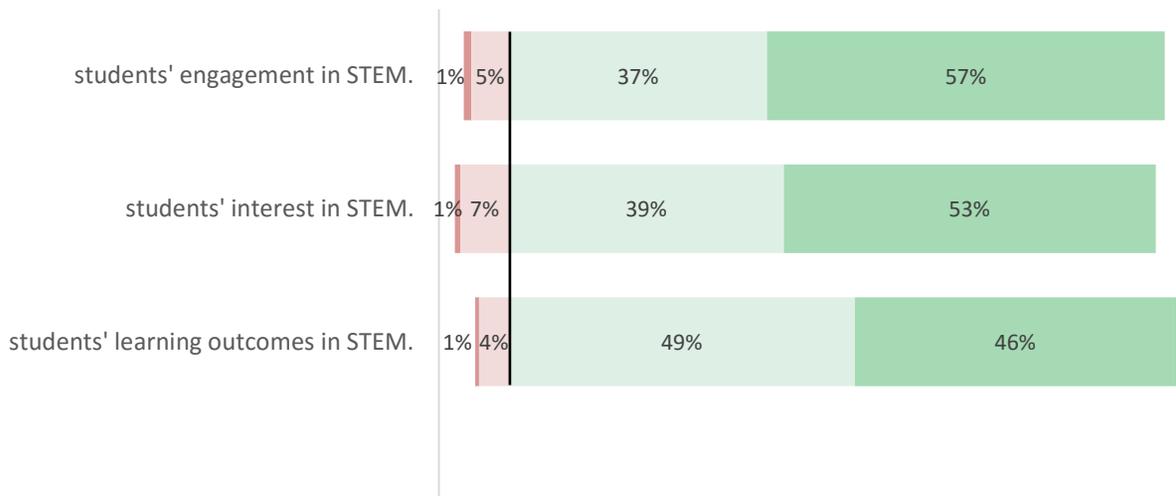


- ✓ The majority of teachers agreed the STEM professional learning increased their ability to use best practices for STEM instruction.
- ✓ 91% felt the STEM professional learning helped them to engage with students more equitably.
- ✓ Agreement ranged from 90% to 97%.

SOURCE: TEACHER SURVEY SPRING 2018

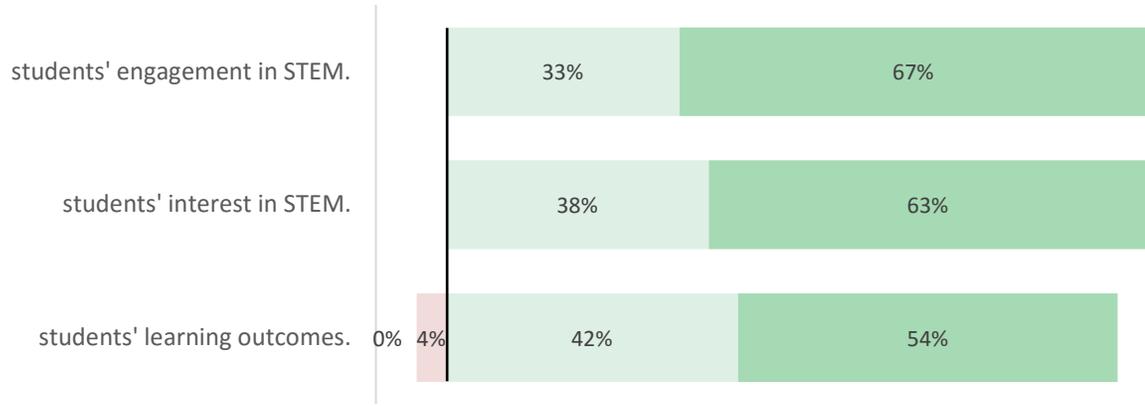
Figure 31. Teacher and Administrator Perceptions of Positive Impacts of STEM Professional Learning on Students

Teachers: My application of STEM PL had a positive impact on my...



✓ Both administrators and teachers agreed that the STEM professional learning increased student engagement, interest, and learning outcomes in STEM.

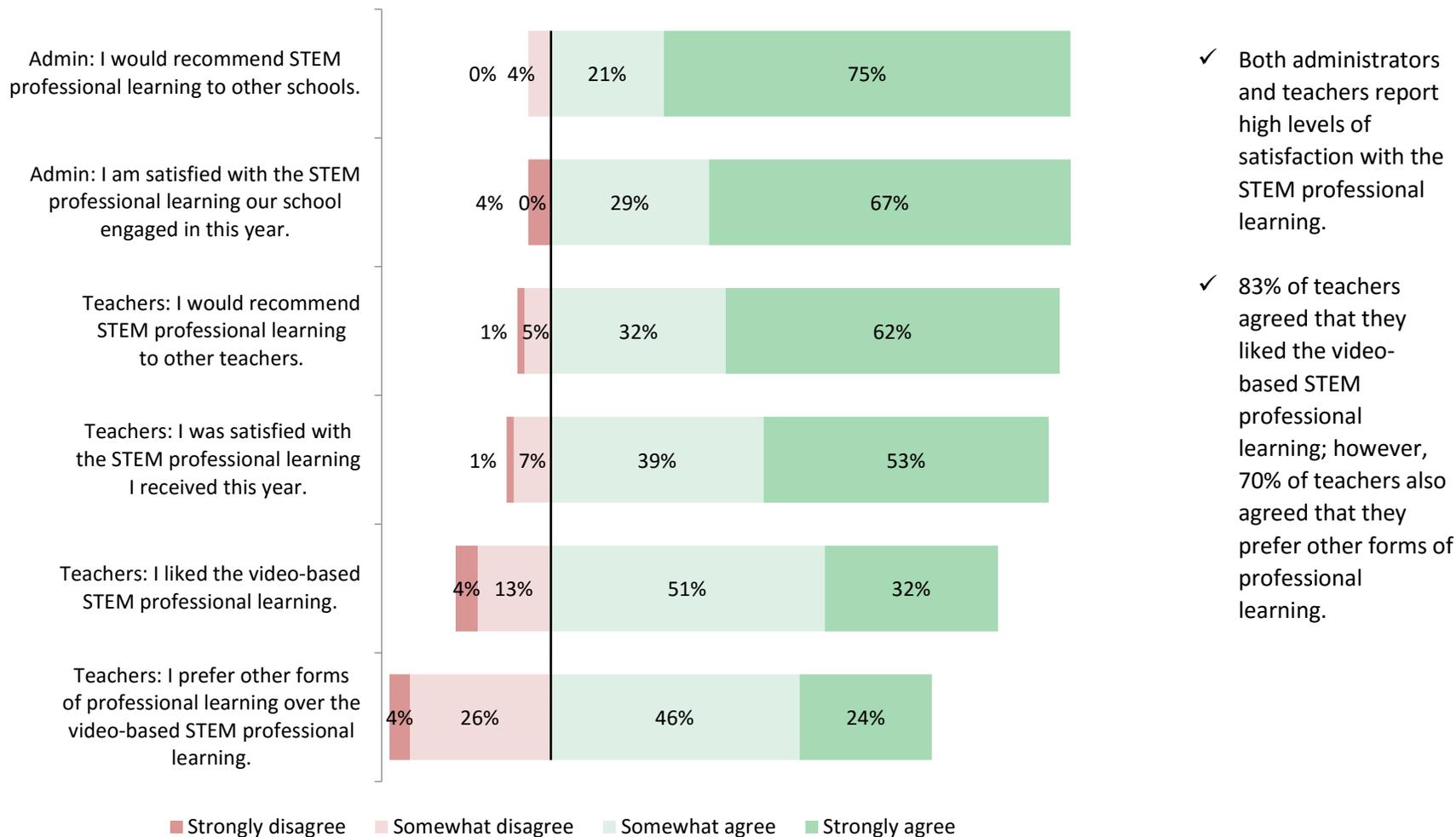
Administrators: Teachers' participation in the STEM PL had a positive impact on...



Legend: Strongly disagree (dark red), Somewhat disagree (light red), Somewhat agree (light green), Strongly agree (dark green)

SOURCES: ADMINISTRATOR AND TEACHER SURVEY SPRING 2018

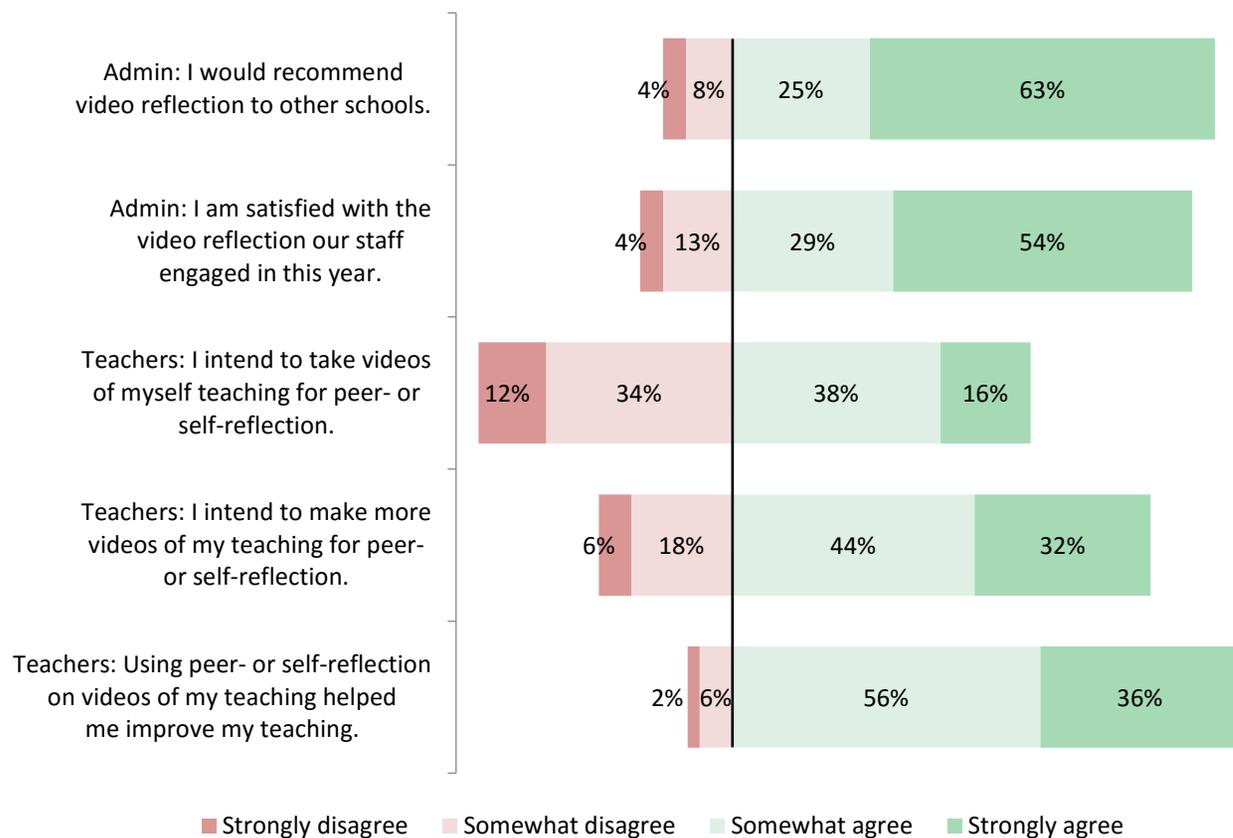
Figure 32. Administrator and Teacher Overall Perceptions about the STEM Professional Learning



- ✓ Both administrators and teachers report high levels of satisfaction with the STEM professional learning.
- ✓ 83% of teachers agreed that they liked the video-based STEM professional learning; however, 70% of teachers also agreed that they prefer other forms of professional learning.

SOURCES: ADMINISTRATOR AND TEACHER SURVEY SPRING 2018

Figure 33. Administrator and Teacher Overall Perceptions the STEM Video Reflection



- ✓ The majority of administrators were satisfied with the video reflection of their staff (83%) and recommend it to other schools (88%).
- ✓ Of the teachers who have not recorded videos of themselves, 54% intend to do so next year.
- ✓ Of the teachers who have recorded videos of themselves, 76% intend to record more.
- ✓ Of the teachers who recorded videos of themselves, 92% agreed it helped improve their teaching.

SOURCES: ADMINISTRATOR AND TEACHER SURVEY SPRING 2018

Teacher and Administrator Open-Ended Feedback about STEM Professional Learning

Table 47. Teacher Reasons They Intend to Make Videos of Themselves Teaching for Peer or Self-Reflection

Theme	Example Quotes
Some teachers felt it was useful because reflection itself was useful.	<p>“Allows me to reflect on things I am NOT noticing as I teach.”</p> <p>“I will continue to video because it helps me reflect on how to communicate and guide discussion better.”</p> <p>“I think making videos for reflection is key to becoming a better educator. I am able to see what things I do and don’t do. I will only make my teaching better.”</p> <p>“It helps you reflect on your own teaching so you can get better at it.”</p>
Some teachers felt it was helpful and informative.	<p>“I think it helps to see what you are doing and what others are doing as they teach. I don’t like to watch myself, but it is helpful.”</p> <p>“It is difficult to take videos as I get so involved in teaching it’s a challenge to slow down enough to think about it but when I do it is helpful.”</p> <p>“I enjoyed critiquing myself...it was helpful to see what my teaching looks like not what it feels like.”</p> <p>“I find that I always have room for improvement and by recording myself I can spot the things that I need to improve much quicker.”</p>
Some teachers felt it was useful to have another perspective on their teaching, particularly when they received peer feedback.	<p>“It is always helpful to view how you teach from an outside perspective. I notice student engagement more, and improvements I can make while teaching.”</p> <p>“It is helpful to hear feedback from other professionals for things that I do not realize that I am doing.”</p> <p>“I enjoy the feedback from peers.”</p> <p>“It is very helpful to watch myself and have trusted peers watch me.”</p>
Some teachers made the videos because they were required.	<p>“I am required to video tape myself as part of a grant. I do like to reflect on what I can do differently.”</p> <p>“Our school would like us to start using the swivel recorders.”</p> <p>“School requirement as well as self improvement.”</p> <p>“It is required for our professional development. Plus you can't change things you don't have the opportunity to notice.”</p>

SOURCE: TEACHER SURVEY SPRING 2018

Table 48. Teacher Reasons They Do Not Intend to Make Videos of Themselves Teaching for Peer or Self-Reflection

Theme	Example Quotes
Some teachers did not intend to make videos because they don't like to record themselves.	<p>"I dislike videoing myself. I would much rather reflect on how the lesson went and have peer review in person."</p> <p>"I don't like watching myself teach."</p> <p>"I have not ever done this and feel somewhat uncomfortable with it."</p> <p>"It's uncomfortable for me to video myself."</p>
Some teachers lacked resources (including time) to record themselves.	<p>"The process making the video was frustrating, and had to be redone a couple of times to be done correctly so it could be loaded to Edvivate. I only saw minimal benefit for the video that was posted. It ended up being more work than it was worth."</p> <p>"Time constraints"</p> <p>"Had a bad experience with the video recording equipment. Spent many hours trying to get it work and was never successful."</p> <p>"I worry about the time to watch it back and reflect."</p>
Some teachers do not think recording themselves is helpful.	<p>"The videos are not helpful for me to reflect in my practice."</p> <p>I feel like for me I reflect always as I am teaching and get the reaction from the kids. I don't feel like watching myself helps at all. I improve or change my lessons if the kids don't enjoy it or if their scores on tests aren't great."</p> <p>"I don't think filming myself was helpful. I would rather use the tools to film students so they can present and reflect."</p>

SOURCE: TEACHER SURVEY SPRING 2018

Table 49. Teacher Descriptions of How STEM Professional Learning Has Helped Them Be More Innovative

Theme	Example Quotes
Some teachers felt that STEM professional learning helped change the way they think about teaching.	<p>“Having more options on how to present material has helped me get out of teaching ruts and think outside the box a little more on how to present material.”</p> <p>“I am getting better at thinking about my own teaching, about my students’ learning, and try to change my instruction to match what they still need to master.”</p> <p>“I enjoy teaching more and am more engaged with the students [sic] learning.”</p> <p>“Helped remind me of the importance of experiments and hands on teaching.”</p> <p>“It’s reminded me to prioritize time to discover, build, create, fail, and try again. These are critical components to learning that I’ve really enjoyed focusing more on again.”</p>
Some teachers felt it added to their teaching practice by clarifying their current classroom practices.	<p>“I already teach STEM in my classroom but the professional development helped clarify some of the things I did.”</p> <p>“The STEM professional learning this year has validated skills and pedagogy practices I already use and learned in other non-STEM related classes during my master’s level courses.”</p> <p>“I realized how much STEM I already teach.”</p> <p>“This year was very freeing, because I felt like I was encouraged to be more innovative vs. feeling like I was somehow going against the grain to do so. It is always a little scary to be outside of the box a bit (which is where innovation occurs), yet it is exhilarating at the same time... The professional learning gave me enough to light my innovation and creativity flame...”</p>
Some teachers felt it helped them add new things to their current classroom practices.	<p>“STEM learning has helped me be more open to the idea of these kinds of activities. I have been a little afraid of them in the past because I don’t know how to implement them. I have also been a little unsure of how to manage these kinds of learning activities. I feel like I have a better grip on that now and I know the kids love these things.”</p> <p>“...It has changed the way I teach. Reasoning skills come first now. Mathematical modeling essentially guides how we view learning our classroom.”</p> <p>“I have given students more chances to explore and discover.”</p> <p>“...I am now finding innovative ways to allow my students to direct themselves and take accountability for their own learning.”</p> <p>“...I have found ways to include science and engineering in my classes along with the art.”</p>
Some teachers felt it helped them be more collaborative with other teachers, both during the professional learning and afterwards.	<p>“I can see what other teachers are doing and implement it on my own.”</p> <p>“Being able to read and discuss ideas, to watch the implementation and then share ideas and successes/failures...I feel this process speeds my learning curve...”</p> <p>“It helped me collaborate and be able to look at science with the mathematics I teach.”</p>

SOURCE: TEACHER SURVEY SPRING 2018

Table 50. Administrator Reasons They Would or Would Not Recommend STEM Professional Learning

Theme	Example Quotes
Some administrators found video reflection to be very effective.	<p>"Video and peer reflection were easy to do and incredibly meaningful tools for furthering our work in improving instruction for all teachers."</p> <p>"I know that as teachers, when you are in the act of teaching you cannot see all of the things that are going on. When you video yourself and reflect on that video you can watch for the pedagogy and not just the content of what you are teaching."</p> <p>"I WOULD recommend it because viewing effective lessons helps solidify concepts of best practices. Then viewing reflection videos allows for us to observe what we actually do and how it comes across to our students."</p>
Some administrators feel that collaborative professional learning is more effective than video-based professional learning alone.	<p>"The video reflection and collaboration was great. Teachers were able to collaborate and share best practices and learn from each other in a very creative way."</p> <p>"The video reflection felt like one more thing to do rather than something that helped me strengthen my own professional learning. I enjoyed the times I was with my faculty and other teachers and found the greatest learning took place in those settings, not online."</p> <p>"I love STEM I just think it needs to be in group trainings and not done alone on a computer."</p> <p>"I have discovered that It is very difficult to engage teachers in the video reflection unless there is a specific time and place established for this. Leaving it up to teachers to do independently in an online format results in superficial depth of analysis and reflection. The grant covers the training and the stipends/substitutes for teachers to participate in the training, but there is insufficient funds to schedule face to face video sharing and reflection workshops."</p>
Some administrators indicated that their teachers were uncomfortable recording video of themselves.	<p>"Teachers do not like to film themselves teaching."</p> <p>"I believe in using video reflection for all learning. However, my teachers engaged in this project were not comfortable with this format and did not choose to reflect on the lessons they taught. They reflected on lessons in other ways, but the video reflection was not effective."</p>

SOURCE: ADMINISTRATOR SURVEY SPRING 2018

Table 51. Teacher Reasons They Would Recommend STEM Professional Learning to Other Teachers

Theme	Example Quotes
Some teachers felt it was useful because students generally need to be better prepared in STEM subjects.	<p>"I would recommend STEM to other teachers because we teachers need to prepare students for the work force of the future and that includes STEM fields."</p> <p>"Powerful to use with students and better prepare them for today's world."</p> <p>"I recommend STEM professional learning because it prepares students for future careers and it employs 21st century learning."</p>
Some teachers felt the STEM professional learning helped them grow personally.	<p>"I would recommend STEM professional learning to other teachers because it enhances your ability to feel comfortable with the technology and gives structure and support for teaching."</p> <p>"It got me more enthusiastic about the STEM I was teaching."</p> <p>"It was very helpful for my growth as an educator."</p>
Some teachers learned new content.	<p>"Whenever we increase our knowledge about subject matter, we are better prepared to help students learn."</p> <p>"New curriculum requires content knowledge."</p>
Some teachers learned about the new standards.	<p>"The STEM PD was essential for me to understand the new science core. Without the professional learning, I would not have understood how to implement the changes needed for my students to tackle the new core."</p> <p>"I would recommend STEM professional learning to other teachers because the new standards are a mind shift from the old ones, and the PL helps teachers make this shift."</p>
Some teachers liked walking away with concrete resources.	<p>"The classes were very informative and supplied materials that could be immediately integrated into classroom lessons."</p> <p>"I did learn a lot, and I liked the lessons (with the plans)"</p>
Some teachers felt it improved their teaching overall.	<p>"STEM professional learning has made a tremendous difference in how I teach and how my students learn!"</p> <p>"it makes me more aware of what methods I am using and how effective they are."</p>
Some teachers reported gaining strategies for teaching critical thinking.	<p>"I would encourage it because it gets students thinking..."</p> <p>"I know I can always continue to improve my math instruction and improve my ability to help my students think about math and communicate their thinking in more effective ways."</p>
Some teachers reported gaining strategies to improve student engagement.	<p>"I would recommend STEM professional learning to other teacher because of the results I saw within my classroom. It became less of the traditional teacher-lecture-student method and increased self-driven learning and increased engagement. Students felt more responsibility for their learning."</p> <p>"STEM is an awesome way to implement a lot of different valuable lessons. It engages students in a great way."</p>

Continued from previous page

Theme	Example Quotes
Some teachers reported learning how to teach subjects in an integrated way.	<p>“It’s nice to integrate subjects together so students can see the value in learning and realize how related all learning is.”</p> <p>“It helps you learn how to integrate skills into other areas. It helps students learn how to be better problem solvers and look outside of the box.”</p>
Some teachers recommended STEM professional learning because they enjoyed the format.	<p>“It was great to collaborate and share ideas with my colleagues.”</p> <p>“I would recommend STEM professional learning because it was hands on and relevant to my teaching. I was able to see teaching in a different way that I believe would benefit students. I also really appreciated getting the materials so that I could teach the same thing the next day.”</p>

SOURCE: TEACHER SURVEY SPRING 2018

Table 52. Teacher Reasons They Would Not Recommend STEM Professional Learning to Other Teachers

Theme	Example Quotes
Some teachers reported that the STEM professional learning was not helpful or well-organized.	<p>“Workshops weren’t organized, and didn’t really teach me the content I needed to be able to come back and teach my students.”</p> <p>“I would have liked it [sic] the training was specific to 3^d grade.”</p> <p>“The videos provided great information, but was difficult to see how it would fit into the parameters within my classroom.”</p> <p>“Took a lot of time and was not that helpful.”</p>

SOURCES: TEACHER SURVEY SPRING 2018

Considerations for Improvement for the STEM Professional Learning Project

Teachers and administrators rated the STEM professional learning project very positively, with **96% of administrators and 94% of teachers indicating they would recommend STEM professional learning to other schools and teachers**. Additionally, **96% of teachers reported changes to their instruction** based on the STEM professional learning, and 92% agreed their interest in professional learning overall increased. Most teachers indicated the STEM professional learning improved their teaching in all the ways intended (increased teacher content knowledge, confidence for teaching STEM, student-centered learning, curriculum integration, etc.). Finally, both administrators and teachers indicated that the STEM professional learning increased students' engagement, interest, and learning outcomes in STEM.

The following considerations are provided for the purpose of continuous improvement efforts to the STEM professional learning program.

Findings

57% of teachers reported recording video and engaging in peer and self-reflection

54% of teachers who have not recorded video of themselves teaching intend to do so next year.

76% of teachers who have previously recorded video of themselves teaching intend to do it again.

Some administrators and teachers indicated that teachers find it uncomfortable to record and watch videos of themselves. However, the majority of who have done so report that it is an effective way to improve their teaching.

70% of teachers prefer professional learning formats other than video-based platforms.

Considerations for Improvement

Increase opportunities to expand professional learning community

- Consider multiple platforms for delivering professional learning to teachers.
- Provide collaborative spaces for sharing practice videos and having structured and open protocols for reflection.
- Offer examples of teachers practice of videoing and reflecting on teaching.
- Provide opportunities for teacher-led professional learning communities to share practice and increase peer-mentoring.