STEM Action Center

Grant Program

Annual Evaluation Report

2014-15

Prepared for the Utah STEM Action Center at the

Governor's Office of Economic Development

Presented by

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October 13, 2015

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Recommended Citation:

Brasiel, S. and Martin, T. (2015). *STEM Action Center Grant Program Annual Evaluation Report: 2014-15*. Logan, UT: Utah State University, Department of Instructional Technology and Learning Sciences.

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Chapter 1. Background

The funding from HB 139 and HB 150 was awarded to product providers in fall 2014 for K-12 digital mathematics technologies, grade 7 and 8 applied science products, STEM professional learning through online video platforms, and grants for students participating in fairs, camps, or competitions. In early 2015, the Utah STEM Action Center made awards to high school STEM industry certification programs and teacher STEM endorsement programs. We evaluated the digital mathematics technology pilot that occurred in 2013-14 with close to 6,000 students and 40 teachers based on student performance on the Student Assessment of Growth and Excellence (SAGE) assessment spring 2014; but we found no statistically significant effects. In part, this was due to the small sample size for the pilot and may be due to low usage on average 20 to 30 minutes per week. With the large scale up of technology across the state, in this evaluation report we discuss the latest results from analysis of licenses distributed, usage of licenses, performance data from the providers, the state SAGE assessment achievement results and also feedback from surveys given to teachers and students. We provide the actual language from the legislation for each program in Table 1:

Table 1. Language from HB 139 and HB 150 by Program

Legislation and Funding	Actual Language from Legislation
HB 139 Secondary Math $5 million for grades 6-8 math technology and PD and $3.5 million for college math-	*at least $5,000,000 of the appropriation for STEM Action Center be used for STEM education related instructional technology and related professional development to support mathematics instruction for students in grades 6, 7, or 8 as described in Subsection 63M-1-3205 (3)(a) and Section 63M-1-3206 , and related assessment, data collection, analysis, and reporting;* *at least $3,500,000 of the appropriation for STEM Action Center be used for STEM*

Legislation and Funding	Actual Language from Legislation
readiness technology and PD for grades 9-12.	*education related instructional technology and related professional development to support mathematics instruction for secondary students to prepare the secondary students for college mathematics courses as described in Subsection 63M-1-3205 (3)(b) and Section 63M-1-3206 , and related assessment, data collection, analysis, and reporting;*
HB 150 $5 million STEM instructional technology and PD used for K-5	*(1) up to $5,000,000 of the appropriation for the STEM Action Center program be used for STEM education related instructional technology and related professional development to support mathematics instruction as described in Subsection 63M-1-3205 (3)(a)(i) and Section 63M-1-3206 , and related assessment, data collection, analysis, and reporting;*
HB 150 $1.5 million for STEM Teacher Endorsements	*(2) up to $1,500,000 of the appropriation for the STEM Action Center program be used for developing the STEM education endorsements and related incentive program described in Section 63M-1-3208 ;*
HB 150 $5 million STEM high quality PD	*(3) up to $5,000,000 of the appropriation for the STEM Action Center program be used for providing a STEM education high quality professional development application as described in Section 63M-1-3209 ;*
HB 150 $3.5 million STEM education middle school applied science	*(4) up to $3,500,000 of the appropriation for the STEM Action Center program be used to fund the STEM education middle school applied science initiative described in Section 63M-1-3210 ;*
HB 150 $5 million for High School STEM Education initiative	*(5) up to $5,000,000 of the appropriation for the STEM Action Center program be used to fund the high school STEM education initiative described in Section 63M-1-3211*

We provide a logic model in Figure 1 to outline the ways we are monitoring the implementation of the STEM Action Center Grant Programs, the intermediate outcomes that we will measure during the 2014-15 academic year, and the long-term outcomes. We will continue monitoring and assessing outcomes during the 2015-16 academic year.

Monitoring of HB 139 and HB 150 Grant Programs

- Number of students & teachers using digital math, applied science, and professional learning products vs. number of licenses awarded (based on usage data)
- Number of students participating in high school industry certification programs
- Number of teachers participating in STEM endorsement program
- Fidelity to benchmarks set by the providers for usage
- Quality of professional development and implementation support
- Feedback from teachers and school/district leaders
- Changes in STEM interest and engagement for students

Intermediate Outcomes

- Ongoing assessment of student progress through pre/post measures within curriculum products
- Pre/post survey of student interest and self-efficacy in mathematics and applied sciences
- Changes in classroom instruction (as measured by assessment of teacher instruction video pre/post)
- Changes in classroom learning environment to engage students in hands on learning experiences and provide opportunities for them to take responsibility of their learning

Long-Term Outcomes

- % of Students meeting standard on SAGE
- % of Students graduating High School ready for College Mathematics (ACT score)
- % of Students attending post-secondary institution
- % of Students majoring in STEM Field
- % of Students prepared for STEM careers

Figure 1. Logic Model for Evaluation of STEM Action Center Grant Programs

Data to inform progress towards long-term outcomes are extremely valuable, but difficult to access. Complete data on post-secondary enrollment in Utah or other colleges, entry into the workforce, and employment in a high demand job often requires access to a student's birthdate and/or social security number. We are working with districts, USOE, and USHE to determine the best plan for requesting permission from students and their parents for access to this kind of data once they graduate. Currently we have decided that it would not be reasonable to ask for student social security number. We are considering other options, such as working with districts who have already collected some of this information informally from students with surveys and follow-up calls after graduation. Granite School District is using is being innovative by collecting (with permission) social media information from seniors so that they can contact them after they graduate to check on their progress in college and careers. The ability to measure these outcomes for individual participating students will depend on access to this data at the student level.

Next, we summarize for each grant program the product or service providers involved in the grant program and the individual timelines for each program.

Chapter 2. Overview of STEM Action Center Grants

K-12 Math Grants

All providers of K-12 mathematics technology programs had to meet minimum requirements of providing a system that was adaptive and personalized to meet individual student needs. It had to provide real time reporting to teachers and students of their progress and areas of needs. It also had to provide supports to address student needs. We provide a list of the products awarded with a few bullets of what makes each one unique in addition to meeting the minimum requirements.

Grades K-5 Awards

ALEKS, McGraw Hill

- Ongoing assessment with pie chart of mastered grade level skills updated
- Uniquely generated problems and uniquely generated explanations for each student based on highest level of technology available to adapt to students needs
- Items designed to be similar to Common Core State Standards Assessment items (such as drag and drop)

iReady, Curriculum Associates

- Developed specifically for the Common Core State Standards
- Able to predict at 85% reliability how a student will do on Common Core State Standards assessments

ST Math, MIND Research

- Developed based on neuroscience research. Students use spatial temporal (ST) reasoning
- Students manipulate visual models to solve problems with no written or oral directions
- Accessible to meet the needs of English language learners and special education students

SuccessMaker, Pearson

- Includes scaffolded feedback, step-by-step tutorials and prerequisite instruction triggered when a learner encounters challenges
- Includes game-like features, including speed games for fact fluency

Think Through Math, Think Through Learning

- Online instruction available through chat box or with headphones by certified teachers in English and Spanish during school, out of school, and weekends
- Use of gamification where students create their own avatar and earn badges
- Competitions with points towards a school or class parties (e.g., pizza party) or as donation to charity of choice

Grades 6-8 Awards

ALEKS, McGraw Hill

- Ongoing assessment with pie chart of mastered grade level skills updated
- Uniquely generated problems and uniquely generated explanations for each student based on highest level of technology available to adapt to students needs
- Items are designed to be similar to Common Core State Standards Assessment items (such as drag and drop)

Catchup Math, Hot Math

- Math lessons are provided in English and Spanish
- Student can watch videos, practice problems done on online whiteboard, play games, receive step-by-step instruction, and take quizzes
- Self-paced and can accommodate individual learning styles

iReady, Curriculum Associates

- Developed specifically for the Common Core State Standards
- Able to predict at 85% reliability how a student will do on Common Core State Standards assessments

Odyssey, Compass Learning

- Dual intensity of conceptual and procedural understanding so kids develop speed and accuracy
- Online manipulatives for students to access while problem solving align with Common Core Standards

Reflex, Explore Learning

- Online system for math fact fluency in a game-like environment
- More engaging than worksheets used for math fact practice

ST Math, MIND Research

- Developed based on neuroscience research. Students use spatial temporal (ST) reasoning
- Students manipulate visual models to solve problems with no written or oral directions
- Accessible to meet the needs of English language learners and special education students

Think Through Math, Think Through Learning

- Online instruction available through chat box or with headphones by certified teachers in English and Spanish during school, out of school, and weekends
- Use of gamification where students create their own avatar and earn badges
- Competitions with points towards a school or class parties (e.g., pizza party) or as donation to charity of choice

Grades 9-12 Awards

ALEKS, McGraw Hill

- Ongoing assessment with pie chart of mastered grade level skills updated
- Uniquely generated problems and uniquely generated explanations for each student based on highest level of technology available to adapt to students needs
- Items are designed to be similar to Common Core State Standards Assessment items (such as drag and drop)

Catchup Math, Hot Math

- Math lessons are provided in English and Spanish
- Student can watch videos, practice problems done on online whiteboard, play games, receive step-by step instruction, and take quizzes
- Self-paced and can accommodate individual learning styles

Cognitive Tutor, Carnegie Learning

- Before working on problems, students can review the lesson, read, or look up the applicable key terms, and see the skills for that particular section
- Students can see and engage in step-by-step interactive examples that promote a conceptual understanding of the problems being solved

MathXL, Pearson

- Learning management system where content can be customized by the teacher
- Students can link to learning aids such as the e-book, video clips, and animations to improve their understanding of key concepts
- Problems are regenerated algorithmically to give students unlimited opportunity for practice and mastery

At the start of the 2014-15 school year, we reviewed the products awarded through the Request For Proposal (RFP) process and provided the summary shown in Table 2 to the STEM

Action Center, which also includes potential concerns about the products that we would then compare with teacher feedback at the end of the year.

Table 2. Overview of Products, Product Features, and Potential Concerns

Product, Provider	Description from Provider Which Makes Product Unique beyond what was required in RFP	Potential Concerns
Grades K-5		
ALEKS, McGraw Hill	3rd grade through pre-calculus content. **Ongoing assessment with pie chart of mastered grade level skills updated**. Based on their current knowledge they may only be given 10 skills to learn, when they really have 27 skills to learn so they do not feel overwhelmed. **Uniquely generated problems and uniquely generated explanations for each student based on highest level of technology available to adapt to students**. "I haven't learned this yet" button is to reduce frustration. The student is put in a grade level curriculum, but the program goes lower when students do not have prerequisites. **Items are designed to be similar to Common Core State Standards Assessment items (such as drag and drop)**	Although there are conceptual parts, the procedural parts seem to be more predominant. There is a large amount of reading of information required. In the pilot, this was a concern shared by teachers who work with students with low-level reading.
iReady, Curriculum Associates	The program was **developed specifically for the Common Core State Standards.** The problem types address procedural and conceptual understanding. It can also accelerate and accommodate below grade level students. A developmental level can be set. **iReady can predict at 85% reliability how a student will do on Common Core State Standards assessments.**	Currently no concerns. This product was not in the pilot, so this year will be the test of how this product is received by teachers and students.
ST Math, MIND Research	Developed based on **neuroscience research**. Students use **spatial temporal (ST) reasoning**. Students manipulate visual models to solve problems. There are no written or oral directions. When a student gets a problem wrong, they replay the game and they do not get the same questions or levels, because it adapts to student needs. **Accessible to meet the needs of English language learners and special education students.**	Conceptual and less procedural until they master concepts. One concern reported from schools during the pilot was that if a student makes a careless mistake, but actually does know the math it bumps them down several levels, which really frustrates the student. We did have reports from schools that they were seeing great progress from ELL and SPED students.
SuccessMaker, Pearson	Online math curriculum that **differentiates and personalizes instruction**. Includes **scaffolded feedback, step-by-step tutorials** and prerequisite instruction triggered when a learner encounters challenges. It includes some **game-like features.** It includes speed games (fact fluency).	Students are given grade level content. The program seems to provide too much scaffolding, which reduces the opportunity for students to do the thinking. The scaffolding is done in a way to focus on accuracy, rules, and procedures rather than allowing for different solution pathways. Students are placed at grade level, and may struggle if they are not at grade level. In the pilot schools complained that if a student did not log off, all of their work for that session was lost. Teachers also were concerned because the student performance scores had most students

Product, Provider	**Description from Provider Which Makes Product Unique beyond what was required in RFP**	**Potential Concerns**
		scoring similarly, when teachers knew that students were very different in their level of understanding.
Think Through Math, Think Through Learning	**<u>Online instruction available through chat box or with headphones by certified teachers in English and Spanish during school, out of school, and weekends</u>**. Immediate corrective feedback. **<u>Use of gamification</u>** where students create their own **<u>avatar and earn badges</u>**. **<u>Competitions</u>** with points **<u>towards a school or class parties</u>** (e.g., pizza party). Points can go towards donations to charity or organization of choice.	We have not seen much of the math content in the RFP presentations, but what we have seen seems procedural. In the pilot one parent voiced concern that her child moved so quickly through the content to advanced grade levels, by just following the kinds and helps, but really did not know what she was doing in the math and the parent couldn't assist her. Schools need to purchase the headsets out of their own funds, because they do not come with the product license. Students begin within Grade Level Pathway, and then they take an adaptive placement test where content is inserted as below grade level precursor lessons to get students back on to grade level. However, it is not as adaptive within the type of feedback students are given.
Grades 6-12		
ALEKS, McGraw Hill	3rd grade through pre-calculus content. **<u>Ongoing assessment with pie chart of mastered grade level skills updated</u>**. Based on their current knowledge they may only be given 10 skills to learn, when they really have 27 skills to learn so they do not feel overwhelmed. **<u>Uniquely generated problems and uniquely generated explanations for each student based on highest level of technology available to adapt to students</u>**. "I haven't learned this yet" button is to reduce frustration. The student is put in a grade level curriculum. The content gets lower when students do not have prerequisites. **<u>Items are designed to be similar to Common Core State Standards Assessment items (such as drag and drop)</u>**	Although there are conceptual parts, the procedural parts seem to be more predominant. There is a large amount of reading of information required. In the pilot, this was a concern shared by teachers who work with students with low-level reading.
Catchup Math, Hot Math	Teachers can place a student in a certain grade level content or they can take a placement test to place them at their level. **<u>Math lessons are provided in English and Spanish</u>**, they can do videos, practice problems done on online whiteboard, and games played, step-by step instruction, quizzes. **<u>It is self-paced and can accommodate individual learning styles</u>**. For example, some students mostly watch videos.	The main concern is how effective a self-paced program is to improve student learning. This RFP was for adaptive programs to meet student actual needs, not student perceived needs or areas they want to focus on. There are some nice features, such as how student white board work is saved for teachers to review later. However, the individual learning style is a unique feature, giving students more choice, which may be motivating to some students.
iReady, Curriculum Associates	The program was **<u>developed specifically for the Common Core State Standards.</u>** The problem types address procedural and conceptual understanding. It can also accelerate and accommodate below grade level	Currently no concerns. This product was not in the pilot, so this year will be the test of how this product is received by teachers and students.

Product, Provider	Description from Provider Which Makes Product Unique beyond what was required in RFP	Potential Concerns
	students. A developmental level can be set. **<u>iReady can predict at 85% reliability how a student will do on Common Core State Standards assessments</u>**	
Odyssey, Compass Learning	**<u>Dual intensity of conceptual and procedural understanding so kids develop speed and accuracy in calculations</u>**. Also activities to develop depth of understanding in topics, which is a strength of this product in meeting Common Core Standards. They also provide offline rigorous activities that can be done. **<u>Online manipulatives for students to access while problem solving</u>** or used for offline calculations and for teachers. Manipulatives aligned with Common Core Standards.	The assessment is a benchmark by standard versus instructional level. The teacher has to click on standards or can select all grade level. Teachers drive content so it is not very adaptable or personalized to meet student needs. The level does not seem to allow that it be set for students who are significantly below grade level.
Reflex, Explore Learning	This is an online system for **<u>math fact fluency in a game-like environment</u>**. More engaging than worksheets used for math fact practice.	This product addresses only a small number of Utah Core Standards related to basic fact mastery. If a student does not know a fact, they go into a coaching session, which might show a rule rather than developing conceptual understanding. If students still are not getting it, they recommend teachers work with them with manipulatives.
ST Math, MIND Research	Developed based on **<u>neuroscience research</u>**. Students use **<u>spatial temporal (ST) reasoning</u>**. Students manipulate visual models to solve problems. There are no written or oral directions. When a student gets a problem wrong, they replay the game and they do not get the same questions or levels, because it adapts to student needs. **<u>Accessible to meet the needs of English language learners and special education students.</u>**	Conceptual and less procedural until they master concepts. One concern reported from schools during the pilot was that if a student makes a careless mistake, but actually does know the math, the program bumps them down several levels, which really frustrates the student. We did have reports from schools that they were seeing great progress from ELL and SPED students.
Think Through Math, Think Through Learning	**<u>Online instruction available through chat box or with headphones by certified teachers in English and Spanish during school, out of school, and weekends</u>**. Immediate corrective feedback. **<u>Use of gamification</u>** where students create their own **<u>avatar and earn badges</u>**. **<u>Competitions</u>** with points **<u>towards a school or class parties</u>** (e.g., pizza party). Points can go towards donations to charity or organization of choice. Students begin within Grade Level Pathway, and then they take an adaptive placement test where content is inserted as below grade level precursor lessons to get students back on to grade level.	We have not seen much of the math content in the RFP presentations, but what we have seen seems procedural. During the pilot, one parent voiced concern that her child moved so quickly through the content to advanced grade levels, by just following the kinds and helps, but really did not know what she was doing in the math and the parent couldn't assist her. Schools need to purchase the headsets out of their own funds, because they do not come with the product license. This program is not as adaptive within the type of feedback students are given.
Grades 9-12		

Product, Provider	Description from Provider Which Makes Product Unique beyond what was required in RFP	Potential Concerns
ALEKS, McGraw-Hill	3rd grade through pre-calculus content. **Ongoing assessment with pie chart of mastered grade level skills updated**. Based on their current knowledge they may only be given 10 skills to learn, when they really have 27 skills to learn so they do not feel overwhelmed. **Uniquely generated problems and uniquely generated explanations for each student based on highest level of technology available to adapt to students**. "I haven't learned this yet" button is to reduce frustration. The student is put in a grade level curriculum. The content gets lower when students do not have prerequisites. **Items are designed to be similar to Common Core State Standards Assessment items (such as drag and drop)**	Although there are conceptual parts, the procedural parts seem to be more predominant. There is a large amount of reading of information required. In the pilot, this was a concern shared by teachers who work with students with low-level reading.
Catchup Math, Hot Math	Teachers can place a student in a certain grade level content or they can take a placement test to place them at their level. **Math lessons are provided in English and Spanish**, they can do videos, practice problems done on online whiteboard, and games played, step-by step instruction, quizzes. **It is self-paced and can accommodate individual learning styles**. For example, some students mostly watch videos.	The main concern is how effective a self-paced program is to improve student learning. This RFP was for adaptive programs to meet student actual needs, not student perceived needs or areas they want to focus on. There are some nice features, such as how student white board work is saved for teachers to review later. However, the individual learning style is a unique feature, giving students more choice, which may be motivating to some students.
Cognitive Tutor, Carnegie Learning	Before working on problems, students can review the lesson, read, or look up the applicable key terms, and see the skills for that particular section. Students can see and engage **in step-by-step interactive examples that promote a conceptual understanding** of the problems being solved.	This product is new and recently assigned with Common Core State Standards for Integrated Math 1, 2, 3. During the review process, district curriculum leaders voiced concerns about how well it does at covering Integrated Math 2. This will be a test year for this product to see how satisfied teachers and students are with the product.
Math XL, Pearson	Learning management system where content can be customized by the teacher. **Students can link to learning aids such as the e-book, video clips, and animations to improve their understanding of key concepts**. The problems are regenerate algorithmically to give students unlimited opportunity for practice and mastery.	Since the teacher can do quite a bit of customization, it is not clear how much the software will be allowed to be completely personalized. However, within the content teachers select, the program will adapt to student needs.

K-12 Math Grant Implementation Timeline

In Figure 2, we provide a timeline of the implementation of K-12 Mathematics Technology Grants over the past two years. The project started, after the HB 139 legislation was finalized, with a cost free pilot, where product vendors donated over half a million dollars in licenses to pilot their products in Utah. Then the following year, after the finalization of the HB 150 legislation, the STEM Action Center released the RFP and selected the products. In September 2014, school districts and charters (Local Education Agencies, LEA) applied for their products of choice and specified the number of licenses needed. Based on funding 78 percent of requests for grades K-5 students, 79 percent of requests for grades 6-8 students, and 51 percent of requests for grades 9-12 students were able to be met. This was upsetting to some districts and schools who were hoping to be able to use the products for all students they had requested. The STEM Action Center notified districts and schools that unfortunately there was not sufficient funding to cover all requests. District leaders were encouraged to take the allotted licenses and determine the best use of those licenses for the schools in their districts. Charter leaders were given a similar direction, to use the allotted licenses as best as they could, given the needs of the students. For example, based on prior year assessment results, schools could provide students with needs in the area of math additional practice with these supplemental materials.

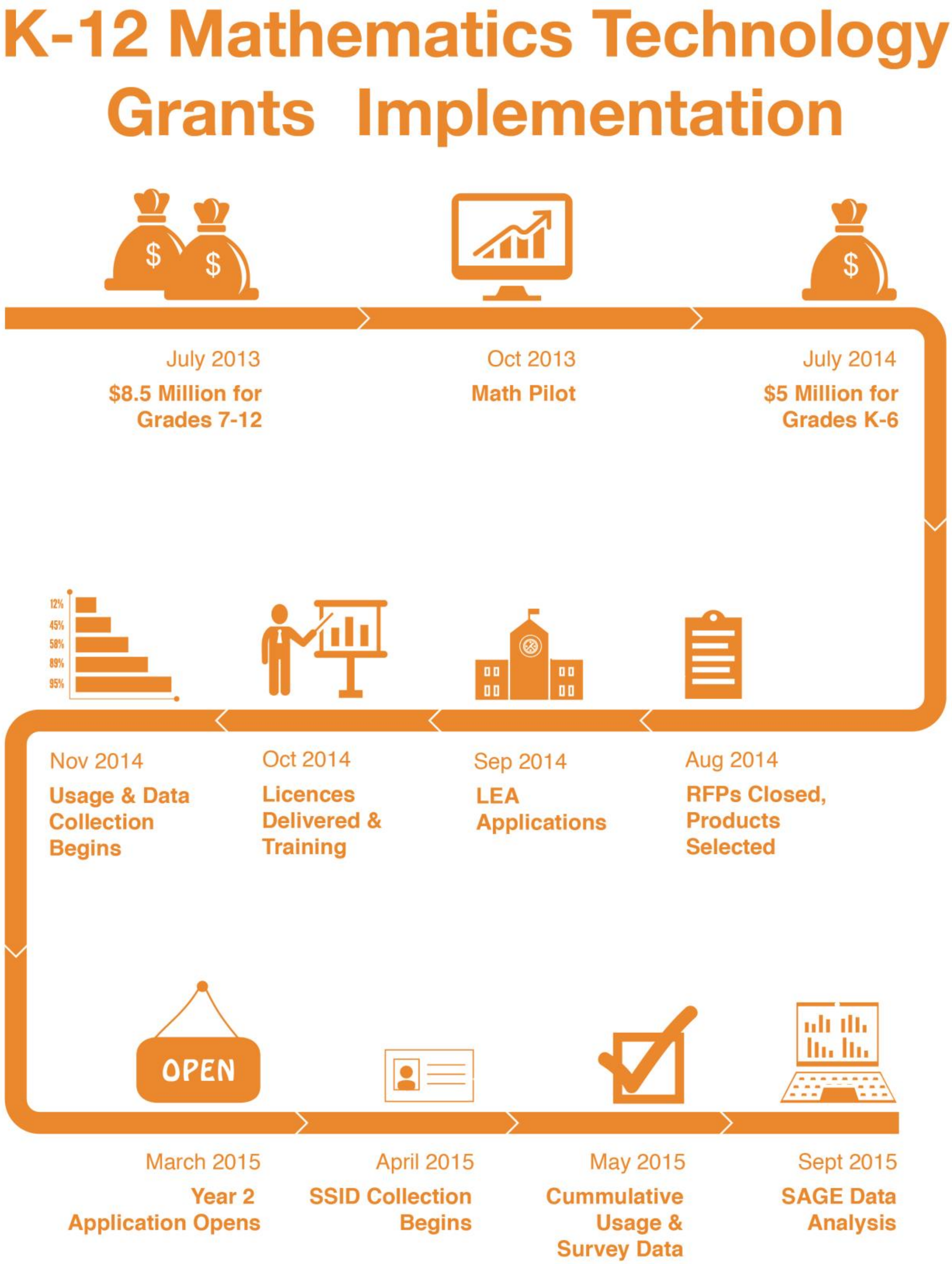


Figure 2. Timeline for K-12 Mathematics Technology Grants Implementation

As shown in Figure 2, usage did not begin until November 2014 for a majority of schools, after they attended training and determined the appropriate implementation plan. For some of the products it took longer than expected to finalize their contract with the STEM Action Center, due to a back and forth process of discussing language in the contract until it was acceptable. Some schools did not begin usage until February 2015, due to receiving their licenses late. The product with the latest start date was SuccessMaker where they did not receive a finalized contract until late spring 2015, and schools did not receive their licenses before the end of the school year.

Each month we requested usage data from the providers and put this information into a spreadsheet by school and district to compare the licenses distributed to the licenses requested and to determine which licenses had evidence of usage. We reported this information the first week of each month to the STEM Action Center project leader and to the STEM Action Center board (as shown in Table 3). At the end of December, the providers had distributed 141,437 licenses, but usage was only at about 52 percent overall. The STEM Action Center project lead the contacted product providers emphasizing the serious need to get all licenses distributed and to encourage usage, following up with schools not using the licenses to see if they needed additional assistance, training, etc. ALEKS and ST Math informed us of how they were adding a new representative to focus specifically on Utah schools implementation.

At the end of the school year based on cumulative usage through mid-June there were 193,213 licenses distributed with a 78 percent usage amount. However, only 9 percent of students across products had used the products at the recommended level (fidelity benchmark) set by product provider.

Table 3. K-12 Math Grants Distribution and Usage Overview for the 2014-15 School Year

	ALEKS	Catchup Math	Cognitive Tutor	EdReady	iReady	Math XL	Reflex	ST Math	Think Through Math	Total
Total Licenses Distributed										
Students	106,530	917	286	498	17,389	3,124	4,378	36,327	23,764	193,213
Districts	26	3	0	4	12	5	5	12	8	101
Charters	27	0	3	1	6	3	3	5	4	38
Schools	299	3	3	7	74	16	20	99	94	653
Product Usage by Month										
October	24,261	735	105	163	4,393	NA	2,466	3,544	7,865	43,532
November/ December	37,184	773	114	198	9,419	NA	2,705	10,685	12,314	73,392
January	54,917	769	137	225	12,090	2,981	3,642	17,198	14,175	106,134
February	62,630	771	142	306	14,549*	2,981	3,642	20,985	15,358	121,364
March	64,811	857	173	304	14,549	2.981	3,561	22,733	15,538	125,507
April	72,043	776	158	266	14,549	2,981	4,077	25,761	17,073	137,684
May	77,766	782	82	498	15,322	3,085	3,421	31,162	18,249	150,367
Usage Percent	73	85	29	100	88	99	78	86	77	78
Percent Meeting Fidelity Benchmark	2	10	67	NA	4	NA	NA	16	32	9

Note. Some schools and districts are implementing multiple products; therefore, the sum of the values for number of districts, charters, and schools across products may be different from the total column value. NA=Not Available from the provider. "*" notes an issue being resolved with the provider; therefore the number of licenses is an estimate based on all available information.

Grade 7 and 8 Applied Science Grants

In Figure 3, we provide a timeline of the implementation of the Career Technical Education (CTE) Applied Science Grants over the past academic year 2014-15. The project started, after the HB 150 legislation was finalized in July 2014 with $3.5 million for products and professional development to bring more real world applications and hands on experiences into grade 7 and 8 CTE courses focused on pre-engineering and information technology. The STEM Action Center released the RFP and selected the products in August 2014. The four products that were awarded were ITEEA (International Technology and Engineering Education Association), Pitsco, Project Lead the Way, and the STEM Academy. Unlike the other grants where districts/charts receive licenses, for this grant program districts/charters requested additional implementation resources, such as 3D printers, VEX Robotics, etc. Each district/charter had a slightly different plan for implementation. They outlined their needs in their application and the STEM Action Center notified each district or charter school of their award in October 2014.

It took until December 2014 for the STEM Action Center to finalize contracts with these four product vendors and the STEM Action Center. Therefore, teachers did not attend training until January. After the training, some teachers were ready to begin implementing in spring 2015 with their students, but others felt the deployment of these grants was too late, so they requested to have implementation begin the following academic year, 2015-16. The providers agreed to allow the districts/charters to have the licenses for a year and a half. This allows them to have access through the spring 2016 semester, to meet the needs of the schools awarded. The early implementers were able to begin in February 2015 and we started collecting usage data in March 2015.

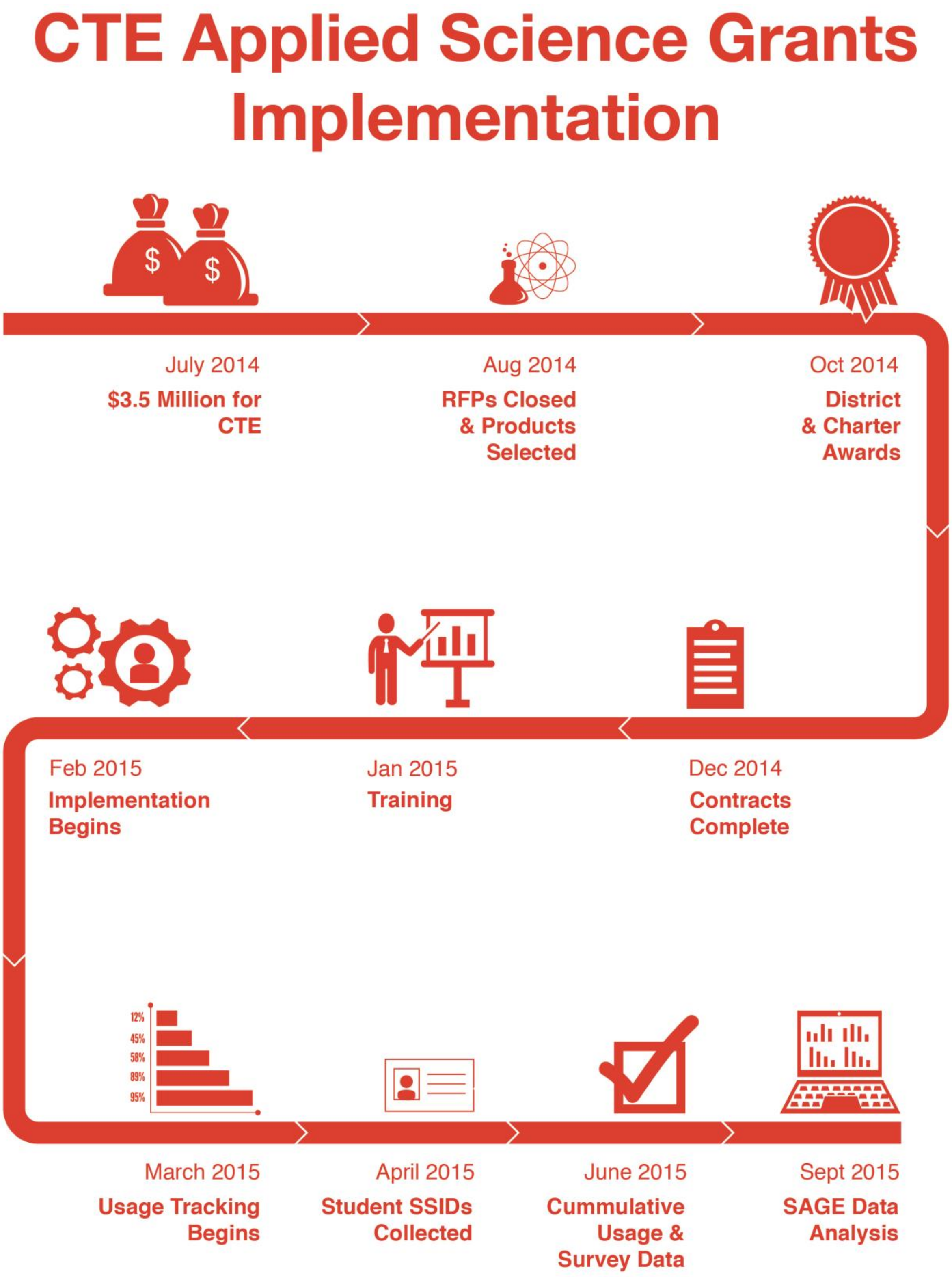


Figure 3. CTE Applied Science Grants Timeline for Implementation 2014-15

We collected state student identifiers (SSIDs) from these schools in April 2015 to use in our analysis of their performance on the state assessment. We requested cumulative usage data and surveyed teachers and students in May through June 2015. We received the SAGE state assessment data in mid-September and conducted our analysis, which we describe in the results section of this report.

Next, we provide an overview of each product and the documentation we were able to gather to summarize the plan for implementation during the spring 2015 semester.

ITEEA

International Technology and Engineering Educators Association (ITEEA) proposed the technological literacy for all students, which include Teaching and Learning Engineering by Design (EbD) program. EbD consist of two components: EbD Middle School Network School program and the professional development (PD). EbD is designed for 7th and 8th grade middle school students that can be completed in two 18-week courses.

The grant from the STEM Action Center for each participating school included the option of a three hour, asynchronous, online workshop to get them familiarized with the EbD curriculum facilitated by an EbD Teacher Effectiveness Coach (TEC). In addition, the STEM Action Center also granted schools two additional PD options. First, they had the opportunity to attend a regional EbD five-day face-to-face authentic technology and engineering trainings that provided teachers with opportunities to engage in the course content under the guidance and supervision of TEC. The second option was the opportunity to participate in a five-day Utah specific PD workshop. The workshop featured model lessons, program implementation, Utah specific standards articulation, and an outline of various avenues for successfully integrating STEM and CTE programs.

Each district and charter school developed an implementation plan summarized in Table 4.

Table 4. Summary of District/Charter Implementation Plans for ITEEA

District/ Charter	Strategies	Measurement of Success	Target Time Period	Expected Outcomes
Alpine School District	Use of teacher trainings, student pre/post-tests & Mastery Connect	Student growth on Engineering and Design Content Areas	December, 2014 - 2015	Student growth on the pre-post assessments.
Davis & Morgan School District	· Student Growth Assessments · "Train the Trainer"	Student growth on Engineering and Design Content Areas (STL; 8,9,10)	December, 2014 – June, 2015	Student growth is within one standard deviation of the national growth as indicated on the pre/post assessments.
Ogden Prep. Academy	Use of teacher trainings, student pre/post-tests & Mastery Connect	Student growth on Engineering and Design Content Areas	December, 2014 - 2015	Student growth on the pre-post assessments.

Upon reviewing the district implementation plans, there are several similarities between districts. This may be due to similar discussions they had with the provider or with each other to plan for implementation.

Pitsco

Pitsco Education STEM curriculum is designed for 7th and 8th grade students to explore technology in today's world with an emphasis on engineering. Pitsco STEM curriculum provides a year-long supplementary experience for 45 minutes per day that includes hands-on and computer based experiments in self-directed and teacher-led environments. Pitsco also includes a comprehensive PD training program that seeks to ensure that teachers are prepared for this new learning paradigm. An educational services manager (ESM) is assigned to each STEM program. The ESM leads a two-day face-to-face PD seminar and also makes a quarterly visit during the first year to ensure that the program is still operating smoothly. Each of the learning units designed provides opportunities for students to demonstrate the depth and breadth of their learning. Each unit of instruction includes a pre- and post-test.

Pitsco PD workshops are structured to assist teachers with learning the delivery system, the curriculum content, and various classroom management strategies. Pitsco provides face-to-face professional development workshops. Each workshop accommodates up to 24 teachers with hands-on explorations just like what their students will experience. All workshop participants will also get quarterly visits during the first year to provide any additional PD and to evaluate program fidelity. These services extend to one visit per year for the second and third year. In Table 5, we provide a summary of the district implementation plans for Pitsco.

Table 5. Summary of District/Charter implementation plans for Pitsco

District/ Charter	Strategies	Expected Outcomes
Canyons School District	This technology will be embedded in lesson plans focusing on Standard 9 of Exploring Technology. Teachers will participate in professional development activities prior to January 1, 2015. Ongoing teacher collaboration is held monthly for teachers to share successes, failures and best practices. In order to prepare for deployment, Exploring Technology, math and science teams will work to ensure curriculum areas are enhancing one another.	Students will have increased interest in STEM careers, e.g. design and engineering. Students will demonstrate mastery of technology use by prototyping and producing an electric vehicle.
Kane, Beaver, Iron, Garfield, and Washington School Districts	288 Licenses that will translate into 2- 12 module station labs with all software, curriculum, equipment and data monitoring system, which will be portable and fit into two enclosed trailers provided by vendor. It is the intent of this grant to provide STEM training to the rural areas of our service region. Each portable STEM learning station would be constructed with wheels to facilitate the unloading and reloading at each school site.	1- Every rural 7th and 8th grade student will participate in 5 weeks of STEM training, and that every 7th and 8th grade student over a two year period of time will spend a total of 10 weeks using these modules. 2- To continue College and Career readiness next step planning for each student as they prepare to enter 9th grade. That will include the next leg of STEM training opportunities in each of our High Schools.
Millard and Tintic, Sevier and Wayne School Districts	Physical space preparation. STEM lab installation. Professional development seminars. Observation of class operation, informal conversations with the teacher and administration. Follow up discussions will determine the need for additional professional development or other possible support mechanisms, if necessary	Suitable classrooms are identified and corresponding room drawings are created with environmental floor plans. Identified classrooms are fully functioning STEM labs ready for stud. & teacher use Site is operating successfully; students are on target with scope and sequence; no challenges are impacting learning or lab operation

District/ Charter	Strategies	Expected Outcomes
	Contact local companies that have engineers. Invite them to be guest speakers and talk to students about possible career options in Millard County and Utah. Flyers/letter, web site, and open house/parent night	Students connect the curriculum experience to local employers and job opportunities Students demonstrate the ability to effectively use teamwork to complete curriculum activities, demonstrate clear written and oral communication, engage in critical thinking related to curriculum activities, and problem solving related to curriculum activities
Weillenmann School of Discovery, Charter School	Engage & motivate students using STEM activities that relate to CTE Intro. Technology & Engineering Goals	Specific outcomes are provided per student project. For example: Unconventional Flight: 1. Students will build and fly a tetrahedron kite, they apply geometry and engineering while investigating the relationship between size and lift, calculate area and volume, and even design and build their own kite. 2. Students build and launch hot-air balloons. In the process, they approximate surface area and analyze the flight of their balloon. 3. Students compete in an engineering challenge to determine who can design, build, and fly a hot-air balloon to achieve the highest altitude.

Project Lead the Way

Project Lead The Way (PLTW) proposed the PLTW Gateway (middle school) program that are designed for 7th and 8th grade students. Their design and modeling unit for the seventh graders and automation and robotics unit for the eighth graders are aligned with the Common Core standards and designed so that it gives students a chance to apply what they have learned in class, find unique solutions, and eventually lead their own learning style.

PLTW has collaborated with a local university (Weber State University) to train teachers to get familiar with their PLTW curriculum. PLTW listed three phases in their professional development program: Readiness Training, Core Training, and Ongoing Training. Readiness training is an on-demand asynchronous training that allows teachers to explore course-specific knowledge and skills. Weber State University will provide the Core training, which teaches teachers course content and pedagogy. PLTW estimated that both Readiness and Core Training would take 44 hours to complete for each unit, totaling 88 hours for both units. Lastly, the ongoing training will provide teachers with ongoing learning experiences through many eLearning resources, live online support, and face-to-face learning opportunities to get them always up-to-date on the course and equipment changes.

In Table 6, we provide a summary of the district implementation plans for PLTW.

Table 6. Summary of District/Charter implementation plans for PLTW

District/ Charter	Strategies	Expected Outcomes
Beehive Academy	1.a) Offer Project Lead The Way Gateway: Design and Modeling (DM) unit for the 7th grade students 1.b) Offer Project Lead The Way Gateway: Automation and Robotics (AR) unit for the 8th grade students 2.a) Connect students to local job market demands. An example activity includes students completing a scavenger hunt to discover the various types of engineers and present at least one product that was invented or innovated by each type 2.b) Provide opportunities to connect students with STEM businesses and industry. Schools will create partnership teams of outside business and industry representatives 3.a) Require identified PLTW teachers to complete Readiness Training: delivered through on-demand, asynchronous eLearning resources build a foundation of essential, course-specific knowledge and skills 3.b) Require identified PLTW teachers to complete Core Training: delivered through an immersive, face-to-face training experience designed to develop understanding of course content and pedagogy essential to course	1. Curriculum aligns with Utah 7th and 8th grade CTE, math and science standards 2. Students of all backgrounds are exposed to engineering and its impact in the global economy, as well as STEM learning and STEM career pathways 3. Students utilize the design process to solve problems and find the best solution. Students apply math and science through rigorous and relevant experiences and use industry-leading technology and modern engineering tools to solve problems while gaining skills in communication, collaboration, critical-thinking, and creativity 4. Curriculum scaffolds through activity-, project-, and problem-based learning, which provides students with the appropriate foundational knowledge and skills needed to solve complex problems 5. Students learn of new careers previously unknown to them or thought to be unattainable 6. Students learn how to communicate effectively, work in teams, facilitate discussions, practice professional conduct, think critically, and problem-solve solutions

District/ Charter	Strategies	Expected Outcomes
	instruction 4.a) Require identified PLTW teachers to complete Readiness Training: delivered through on-demand, asynchronous eLearning resources build a foundation of essential, course-specific knowledge and skills 4.b) Require identified PLTW teachers to complete Core Training: delivered through an immersive, face-to-face training experience designed to develop understanding of course content and pedagogy essential to course instruction 4.c) Provide Ongoing Training throughout the year: via a blended learning experience consisting of eLearning resources, live online support, and face-to-face learning opportunities designed to develop a deeper understanding of course content and delivery while staying up-to-date on course and equipment changes 5.a) Gather evidence of change in student understanding: use a balanced assessment approach that includes both formative and summative strategies to continually monitor student understanding and skills of STEM subjects 5.b) Gather data to improve professional development offerings including the internal review of pre-assessments,	7. Teachers have basic technical and content knowledge prior to participating in pedagogy, skill, and knowledge enhancement training experiences 8. Teachers have an understanding of course content and pedagogy essential to course instruction 9. Teachers will be able to share expertise and experiences with national PLC network to improve instructional practice and student learning 10. Teachers have a working knowledge of the technologies used in PLTW Gateway programs 11. Teachers have an understanding of course content and pedagogy essential to course instruction 12. Curriculum is continuously improved and updated 13. Teacher training is continuously improved and enhanced 14. Evaluators have necessary information to perform pre-test/post-test surveys and assessment on quality of PLTW implementation 15. In DM, students apply the design process to solve problems and understand the influence of creativity and innovation in their lives. They work in teams to design a playground and furniture, capturing research and ideas in their engineering notebooks.

District/ Charter	Strategies	Expected Outcomes
	portfolios, and surveys completed by trained teachers 6.a) Per grant application, LEA will work collaboratively with GOED/The STEM AC, and Utah State Office of Education, and evaluators to provide student information from PLTW's Learning Management System (LMS) as needed to support evaluation efforts 7a) Implement Design and Modeling unit curriculum for 7th grade students 7.b) Utilize necessary equipment for Design and Modeling unit for 7th grade students 7.c) Implement Automation and Robotics unit curriculum for 8th grade students 7.d) Utilize necessary equipment for Automation and Robotics unit for 8th grade students 8.) Per grant application, LEA will work collaboratively with GOED/The STEM AC, and Utah State Office of Education, and evaluators to provide student information from PLTW's Learning Management System (LMS) as needed to support evaluation efforts 9.a) Offer Project Lead The Way Gateway: Design and Modeling unit for the 7th grade students	Using Autodesk® design software, students create a virtual image of their designs and produce a portfolio to showcase their innovative solutions 16. In AR, students trace the history, development, and influence of automation and robotics as they learn about mechanical systems, energy transfer, machine automation, and computer control systems. Students use the VEX Robotics® platform to design, build, and program real-world objects such as traffic lights, toll booths, and robotic arms 17. Evaluators have necessary information to perform pre-test/post-test surveys and assessment on quality of PLTW implementation 18. Curriculum is aligned with CTE information technology standards 19. Students are exposed to digital media, computer science, and information technology 20. Students develop and modify digital media assets, utilize numerous software, web, and digital design tools, develop proficiency with file management and online services, work with various hardware and software platforms, and work on design, drafting, and elements of coding through the robotics equipment 21. Curriculum scaffolds learning with activities, projects, and

District/ Charter	Strategies	Expected Outcomes
	9.b) Offer Project Lead The Way Gateway: Automation and Design unit for the 8th grade students 9.c) By offering Project Lead The Way Gateway DM/AR Units, provide access to additional units that are focused on computer science, information technology and programming topics	problems, which provides students with the appropriate foundational knowledge and skills needed to solve complex problems
Davis District & Morgan District	· Student Growth Assessments · "Train the Trainer"	Student growth is within one standard deviation of the national growth as indicated on the pre/post assessments.
Jordan District	32 hour course split into 5 days of training	Integration of new concepts into current courses
Uintah District	1.a) Offer Project Lead The Way Gateway: Design and Modeling (DM) unit for the 7th grade students 1.b) Offer Project Lead The Way Gateway: Automation and Robotics (AR) unit for the 8th grade students 2.a) Connect students to local job market demands. An example activity includes students completing a scavenger hunt to discover the various types of engineers and present at least one product that was invented or innovated by each type	1. Curriculum aligns with Utah 7th and 8th grade CTE, math and science standards 2. Students of all backgrounds are exposed to engineering and its impact in the global economy, as well as STEM learning and STEM career pathways 3. Students utilize the design process to solve problems and find the best solution. Students apply math and science through rigorous and relevant experiences and use industry-leading technology and modern engineering tools to solve problems while gaining skills in communication, collaboration, critical-

District/ Charter	Strategies	Expected Outcomes
	2.b) Provide opportunities to connect students with STEM businesses and industry. Schools will create partnership teams of outside business and industry representatives 3.a) Require identified PLTW teachers to complete Readiness Training: delivered through on-demand, asynchronous eLearning resources build a foundation of essential, course-specific knowledge and skills 3.b) Require identified PLTW teachers to complete Core Training: delivered through an immersive, face-to-face training experience designed to develop understanding of course content and pedagogy essential to course instruction 4.a) Require identified PLTW teachers to complete Readiness Training: delivered through on-demand, asynchronous eLearning resources build a foundation of essential, course-specific knowledge and skills 4.b) Require identified PLTW teachers to complete Core Training: delivered through an immersive, face-to-face training experience designed to develop understanding of course content and pedagogy essential to course instruction 4.c) Provide Ongoing Training throughout the year: via a	thinking, and creativity 4. Curriculum scaffolds through activity-, project-, and problem-based learning, which provides students with the appropriate foundational knowledge and skills needed to solve complex problems 5. Students learn of new careers previously unknown to them or thought to be unattainable 6. Students learn how to communicate effectively, work in teams, facilitate discussions, practice professional conduct, think critically, and problem-solve solutions 7. Teachers have basic technical and content knowledge prior to participating in pedagogy, skill, and knowledge enhancement training experiences 8. Teachers have an understanding of course content and pedagogy essential to course instruction 9. Teachers will be able to share expertise and experiences with national PLC network to improve instructional practice and student learning 10. Teachers have a working knowledge of the technologies used in PLTW Gateway programs 11. Teachers have an understanding of course content and

District/ Charter	Strategies	Expected Outcomes
	blended learning experience consisting of eLearning resources, live online support, and face-to-face learning opportunities designed to develop a deeper understanding of course content and delivery while staying up-to-date on course and equipment changes 5.a) Gather evidence of change in student understanding: use a balanced assessment approach that includes both formative and summative strategies to continually monitor student understanding and skills of STEM subjects 5.b) Gather data to improve professional development offerings including the internal review of pre-assessments, portfolios, and surveys completed by trained teachers 6.a) Per grant application, LEA will work collaboratively with GOED/The STEM AC, and Utah State Office of Education, and evaluators to provide student information from PLTW's Learning Management System (LMS) as needed to support evaluation efforts 7.a) Implement Design and Modeling unit curriculum for 7th grade students 7.b) Utilize necessary equipment for Design and Modeling unit for 7th grade students 7.c) Implement Automation and Robotics unit curriculum	pedagogy essential to course instruction 12. Curriculum is continuously improved and updated 13. Teacher training is continuously improved and enhanced 14. Evaluators have necessary information to perform pre-test/post-test surveys and assessment on quality of PLTW implementation 15. In DM, students apply the design process to solve problems and understand the influence of creativity and innovation in their lives. They work in teams to design a playground and furniture, capturing research and ideas in their engineering notebooks. Using Autodesk® design software, students create a virtual image of their designs and produce a portfolio to showcase their innovative solutions 16. In AR, students trace the history, development, and influence of automation and robotics as they learn about mechanical systems, energy transfer, machine automation, and computer control systems. Students use the VEX Robotics® platform to design, build, and program real-world objects such as traffic lights, toll booths, and robotic arms 17. Evaluators have necessary information to perform pre-test/post-test surveys and assessment on quality of PLTW implementation

District/ Charter	Strategies	Expected Outcomes
	for 8th grade students 7.d) Utilize necessary equipment for Automation and Robotics unit for 8th grade students 8.a) Per grant application, LEA will work collaboratively with GOED/The STEM AC, and Utah State Office of Education, and evaluators to provide student information from PLTW's Learning Management System (LMS) as needed to support evaluation efforts 9.a) Offer Project Lead The Way Gateway: Design and Modeling unit for the 7th grade students 9.b) Offer Project Lead The Way Gateway: Automation and Design unit for the 8th grade students 9.c) By offering Project Lead The Way Gateway DM/AR Units, provide access to additional units that are focused on computer science, information technology and programming topics	18. Curriculum is aligned with CTE information technology standards 19. Students are exposed to digital media, computer science, and information technology 20. Students develop and modify digital media assets, utilize numerous software, web, and digital design tools, develop proficiency with file management and online services, work with various hardware and software platforms, and work on design, drafting, and elements of coding through the robotics equipment 21. Curriculum scaffolds learning with activities, projects, and problems, which provides students with the appropriate foundational knowledge and skills needed to solve complex problems
Weber District	PLTW teacher trainings along with 6 PD dates throughout the year	Students will register for more STEM classes, as well as be more successful in the ones they already have
Duchesne	1.a) Offer Project Lead The Way Gateway: Design and	1. Curriculum aligns with Utah 7th and 8th grade CTE, math and

District/ Charter	Strategies	Expected Outcomes
District	Modeling (DM) unit for the 7th grade students 1.b) Offer Project Lead The Way Gateway: Automation and Robotics (AR) unit for the 8th grade students 1.c) Offer Project Lead The Way Gateway: Medical Detectives (MD) unit for the 8th grade students 2.a) Connect students to local job market demands. An example activity includes students completing a scavenger hunt to discover the various types of engineers and present at least one product that was invented or innovated by each type 2.b) Provide opportunities to connect students with STEM businesses and industry. Schools will create partnership teams of outside business and industry representatives 3.a) Require identified PLTW teachers to complete Readiness Training: delivered through on-demand, asynchronous eLearning resources build a foundation of essential, course-specific knowledge and skills 3.b) Require identified PLTW teachers to complete Core Training: delivered through an immersive, face-to-face training experience designed to develop understanding of course content and pedagogy essential to course instruction	science standards 2. Students of all backgrounds are exposed to engineering and its impact in the global economy, as well as STEM learning and STEM career pathways 3. Students utilize the design process to solve problems and find the best solution. Students apply math and science through rigorous and relevant experiences and use industry-leading technology and modern engineering tools to solve problems while gaining skills in communication, collaboration, critical-thinking, and creativity 4. Curriculum scaffolds through activity-, project-, and problem-based learning, which provides students with the appropriate foundational knowledge and skills needed to solve complex problems 5. Students learn of new careers previously unknown to them or thought to be unattainable 6. Students learn how to communicate effectively, work in teams, facilitate discussions, practice professional conduct, think critically, and problem-solve solutions 7. Teachers have basic technical and content knowledge prior to participating in pedagogy, skill, and knowledge enhancement training experiences

District/ Charter	Strategies	Expected Outcomes
	4.a) Require identified PLTW teachers to complete Readiness Training: delivered through on-demand, asynchronous eLearning resources build a foundation of essential, course-specific knowledge and skills 4.b) Require identified PLTW teachers to complete Core Training: delivered through an immersive, face-to-face training experience designed to develop understanding of course content and pedagogy essential to course instruction 4.c) Provide Ongoing Training throughout the year: via a blended learning experience consisting of eLearning resources, live online support, and face-to-face learning opportunities designed to develop a deeper understanding of course content and delivery while staying up-to-date on course and equipment changes 5.a) Gather evidence of change in student understanding: use a balanced assessment approach that includes both formative and summative strategies to continually monitor student understanding and skills of STEM subjects 5.b) Gather data to improve professional development offerings including the internal review of pre-assessments, portfolios, and surveys completed by trained teachers 6.a) Per grant application, LEA will work collaboratively	8. Teachers have an understanding of course content and pedagogy essential to course instruction 9. Teachers will be able to share expertise and experiences with national PLC network to improve instructional practice and student learning 10. Teachers have a working knowledge of the technologies used in PLTW Gateway programs 11. Teachers have an understanding of course content and pedagogy essential to course instruction 12. Curriculum is continuously improved and updated 13. Teacher training is continuously improved and enhanced 14. Evaluators have necessary information to perform pre-test/post-test surveys and assessment on quality of PLTW implementation 15. In DM, students apply the design process to solve problems and understand the influence of creativity and innovation in their lives. They work in teams to design a playground and furniture, capturing research and ideas in their engineering notebooks. Using Autodesk® design software, students create a virtual image of their designs and produce a portfolio to showcase their innovative solutions

District/ Charter	Strategies	Expected Outcomes
	with GOED/The STEM AC, and Utah State Office of Education, and evaluators to provide student information from PLTW's Learning Management System (LMS) as needed to support evaluation efforts 7.a) Implement Design and Modeling unit curriculum for 7th grade students 7.b) Utilize necessary equipment for Design and Modeling unit for 7th grade students 7.c) Implement Automation and Robotics unit curriculum for 8th grade students 7.d) Utilize necessary equipment for Automation and Robotics unit for 8th grade students 7.e) Implement Medical Detective unit curriculum for 8th grade students 7.f) Utilize necessary equipment for Medical Detective unit for 8th grade students 8.a) Per grant application, LEA will work collaboratively with GOED/The STEM AC, and Utah State Office of Education, and evaluators to provide student information from PLTW's Learning Management System (LMS) as needed to support evaluation efforts	16. In AR, students trace the history, development, and influence of automation and robotics as they learn about mechanical systems, energy transfer, machine automation, and computer control systems. Students use the VEX Robotics® platform to design, build, and program real-world objects such as traffic lights, toll booths, and robotic arms 17. Evaluators have necessary information to perform pre-test/post-test surveys and assessment on quality of PLTW implementation 18. Curriculum is aligned with CTE information technology standards 19. Students are exposed to digital media, computer science, and information technology 20. Students develop and modify digital media assets, utilize numerous software, web, and digital design tools, develop proficiency with file management and online services, work with various hardware and software platforms, and work on design, drafting, and elements of coding through the robotics equipment 21. Curriculum scaffolds learning with activities, projects, and problems, which provides students with the appropriate foundational knowledge and skills needed to solve complex problems

District/ Charter	Strategies	Expected Outcomes
	9.a) Offer Project Lead The Way Gateway: Design and Modeling unit for the 7th grade students 9.b) Offer Project Lead The Way Gateway: Automation and Design unit for the 8th grade students 9.c) Offer Project Lead The Way Gateway: Medical Detective unit for the 8th grade students 9.d) By offering Project Lead The Way Gateway DM/AR/MD Units, provide access to additional units that are focused on computer science, information technology and programming topics	
American International School	Implementation of the PLTW Gateway courses Design and Modeling and Automation and Robotics as trimester long elective courses for 7^{th} & 8^{th} grade students Development of student's 21^{st} century learning skills are inherent in the PLTW curriculum, which requires students to complete group-oriented problem solving activities. Students enrolled in the PLTW courses will present to the community, parents and their peers at the celebration of learning hosted at the end of each trimester. The STEM Director at AISU will continue to foster relationship with industry professionals, including parents	- More than 30 % of 8^{th} students will participate in the elective course - 7th grade CTE intro will be enhanced with PLTW gateway lessons - 98 % of students will show improvement on the post test assessment -98 % of students who register for the PLTW course will successfully complete it - 98% of students will show 21^{st} century skills as evaluated by

District/ Charter	Strategies	Expected Outcomes
	and community members Instructors for the PLTW Gateway course will complete Online Readiness Training and Core training before Jan. 1st. Teacher will gain access to a national Gateway professional learning community. AISU has established a learning community of math, science and CTE teacher who meet bi-weekly to discuss best practices and strategies. PLTW Gateway curriculum incorporates both formative and summative assessment strategies to monitor students understanding of STEM subjects. All AISU students participate in state standardized testing as well as NWEA MAP Testing. The school will make this data as well as data from PLTW's Learning Management System available to external evaluators. AISU will work collaboratively with GOED/The STEM AC, and USOE to provide student learning information using unique identifying numbers. Because AISU is in its first year of operation this is our largest area of need. To effectively implement the PLTW Gateway courses we will work with the PLTW staff to	the external evaluator - 98 % of students will actively participate in presenting to the AISU community during the Celebrations of Learning - A minimum of 2 guest speakers will present during the trimester - Each student will participate in 2 work-based learning opportunities through the trimester All instructors for the PLTW courses will complete the Readiness and Core training prior to the implementation of the course. Teachers will be able to share expertise and experiences with national PLC network to improve instructional practice and student learning. Teachers will be able to share expertise and experiences within the AISU community. Teacher training and curriculum is continuously updated. 98% of students will improve in pre and posttest incorporated in the curriculum 98% of students will improve in outside measure of growth CTE students will develop an increased awareness of STEM

District/ Charter	Strategies	Expected Outcomes
	review specific equipment needs. Additionally, AISU is committed to building out the facilities and infrastructure needed to support these programs	industries and careers. Student growth in STEM skills, exposure to STEM careers, development of student's 21^{st} century learning skills.
Alpine District	Student growth in STEM skills, exposure to STEM careers, development of student's 21^{st} century learning skills.	Student growth on the pre-post assessments.

As is apparent from a review of the implementation plans, Project Lead the Way provided an implementation plan template to the districts/charters to assist them in completing their application. This is why there is so much similarity across district and charter implementation plans. One concern we have about this approach is whether there is sufficient buy-in and understanding of the program, when so much of the plan copied from a template, rather than having them take time to adapt the plan to their specific context. However, the timeline for districts/charters to apply was short and this template probably assisted districts and charter schools in completing their implementation plans as part of the application process.

Professional Learning Grants

In Figure 4, we provide a timeline of the implementation of the professional learning grants during the 2014-15 academic year. The project started in July 2014, after the HB 150 legislation was finalized, providing $5 million in ongoing funding for STEM Professional Learning. The STEM Action Center released the RFP in August and selected two products that met the requirements: Edivate from School Improvement Network and a collaboration between Scholastic and the Teaching Channel. Each of these professional learning platforms provided high quality STEM instruction video exemplars and a way to form a professional learning community online to share videos of instruction and get feedback.

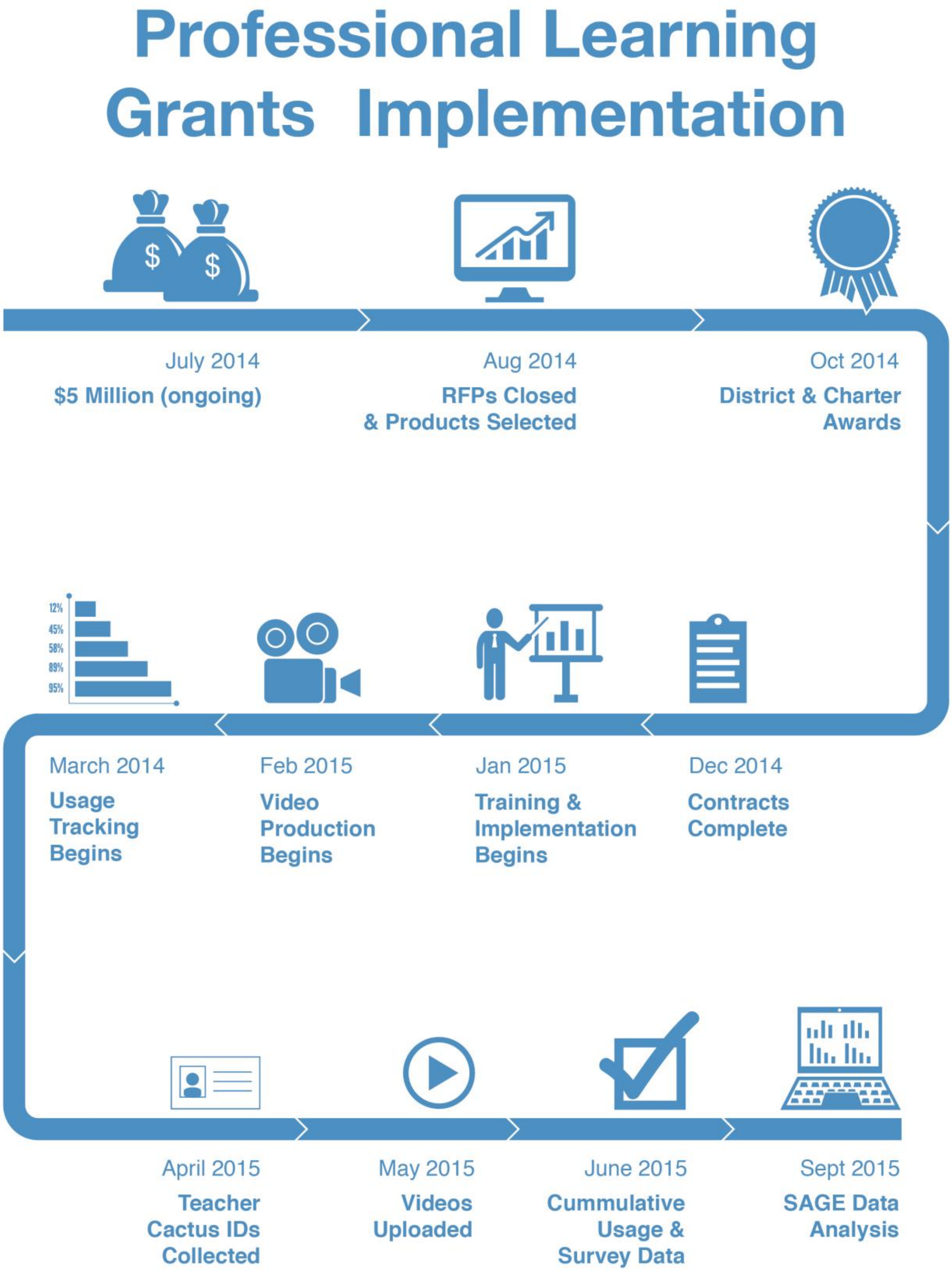


Figure 4. Timeline for Implementation of the Professional Learning Grants

Districts and Charters applied for grants for licenses for one of the two products. The STEM Action Center made the awards in October 2014. Two of the largest districts requested financial support for an implementation specialist due to the size of their district and implementation plan. The STEM Action Center completed contracts with the vendors December 2014. Many districts and charters expressed concern about the late start of the grant program with implementation beginning spring 2015. Many of them shared that they plan their professional development calendars a year in advance, so it was a big inconvenience for the districts and charter schools to have to plan to do something different for the spring semester. They requested to use the time to try it out among district/charter leaders and plan for implementation beginning summer 2015.

While training began in January 2015, many of the districts and charters had to wait to schedule their training until summer 2015 in preparation for full implementation fall 2015. The STEM Action Center also contracted with each provider to create high quality videos of teachers in Utah aligned to the Utah Core Standards. Video production began around February 2015. We began tracking usage of the online professional learning portals starting in March 2015. Then in April, we requested teacher Cactus IDs for any teacher using the product in order to measure outcomes for their students at the end of the year. By the end of May there were 51 videos produced by School Improvement Network of Utah Teachers available for use in professional learning. Scholastic/Teaching Channel did not respond after repeated attempts to understand how many videos they had produced.

We collected cumulative usage data from each provider in June 2015. We received this data from School Improvement Network, but we did not receive it from Scholastic/Teaching Channel. Based on the Cactus IDs we received from districts and charters we submitted a request to the Utah State Office of Education for SAGE data for students of teachers participating in the Professional Learning Grant program. We received the data mid-September to use in our analysis of the effectiveness of this grant program to improve outcomes for students.

Scholastic and Teaching Channel

The Teaching Channel is a well-known resource used by many teachers across the nation. However, for this initiative, they collaborated with Scholastic to provide more hands on support to schools who may lack resources or have constraints that currently prevent them from having instructional coaching or professional learning communities. Scholastic has developed small communities with the schools who selected this product to provide hands on coaching and support to improve instruction. We found that some rural districts found Scholastic/Teaching Channel to meet their needs due to a lack of instructional support resources. Some of the developed communities could bring these schools in rural districts together with other small schools to work together toward similar goals.

Other districts chose the School Improvement Network, because they had their own instructional support resources, but wanted access to the platform as a structure to meet the needs of students. Some districts have set up courses within Edivate (SCINET) to support a specific group of teachers (e.g., onboarding for new teachers). In general, districts and charters used spring 2015 primarily as a planning time with the goal for full implementation and scale-up starting summer or fall 2015.

Edivate from School Improvement Network

This evaluation is a preliminary investigation of the implementation of Edivate by School Improvement Network, a professional development platform with high quality videos of instruction as well as resources and tools to set up professional learning communities where teachers can upload their own videos to share with others. There were three primary types of data collected to understand the preliminary implementation of Edivate spring 2015: creation of implementation plans, completion of professional development Bootcamp by district and charter leaders, delivery of licenses, usage of online platform, and administration of a survey of teacher perceptions of the platform and professional development received. Due to the late start of the program and the need for most districts to have advanced time to plan implementation, most districts and schools will begin usage fall 2015. Therefore these findings are preliminary, based only on usage spring 2015, and can inform the scale-up for the 2015-16 school year. What follows is a description of the different kinds of training and implementation support offered by School Improvement Network to support implementation of Edivate.

BLUEPRINT FOR SUCCESS. District and school administrators prepared for intentional implementation of Edivate in their districts and schools through the Blueprint for Success training course. School Improvement Network (SCINET) offered these training as a one-day onsite training and recommended that leaders take the Ediviate Essentials Course first as a prerequisite. The training, based upon principles from the Implementation Framework, empowers administrators to integrate Edivate into their professional development strategy and plans. In this course, district and school administrators will do the following: develop a systematic approach to professional development, draft an action plan specific for their schools, and discuss communication strategies that increase overall adoption and use. In Table 7, we provide an overview of the number of participants and number of days by district and charter school organization for training so far for the essentials course.

Table 7. Blueprint for Success Participants and Number of Days by District and Charter

District or Charter	# of Participants	Days
District		
Beaver	15	1
Cache	12	1
Carbon	10	1
Iron	8	1
Murray	11	1
Nebo	6	0.5
Piute	15	1
Provo	10	1
Weber	30	1
Washington	235	10
Total	**352**	**18.5**
Charter		
Northern Utah Academy for Math Engineering and Science	5	1
Total	**5**	**1**
TOTAL	**357**	**19.5**

BOOT CAMP. SCINET either hosts this two-and-a-half day professionally facilitated experience at the School Improvement Network's headquarters in Salt Lake City, or regionally near the school district or charter school. Participation in this course results in a multi-year strategic plan including a detailed and actionable first year roadmap. SCINET intends for the Boot Camp to be an immersive experience that empowers school and district leaders to develop a vision-directed, comprehensive plan for professional learning. Upon attending, leaders participate in strategic discussions and activities to determine how they will use the Edivate platform to support teacher growth and effectiveness. Boot Camp helps develop a comprehensive plan to get the most out of professional learning programs through intentional application of the School Improvement Network Strategic Planning Framework. In Table 8, we provide an overview by district and charter of the number of participants and number of days for attendance to the Bootcamp training.

Table 8. Bootcamp Training Participants and Number of Days by District and Charter

District or Charter	# of Participants	Days
District		
Alpine	15	2.5
Daggett	2	2.5
North Sanpete	16	2.5
South Sanpete	15	2.5
Weber	7	2.5
Washington	20	5
Total	**75**	**17.5**
Charter		
Monticello Academy	4	2.5
Noah Webster Academy	5	2.5
Pinnacle Canyon Academy	11	2.5
Providence Hall	5	2.5

District or Charter	# of Participants	Days
Summit Academy – Bluffdale Elementary	2	1
Summit Academy – Elementary Schools	2	1
Summit Academy – High School(s)	4	0.5
Syracuse Arts Academy	3	2.5
Utah Schools for the Deaf & Blind	13	2.5
Total	**49**	**17.5**
TOTAL	**124**	**35**

EDIVATE ESSENTIALS. The purpose of the Edivate Essentials course is to provide the essentials for using Edivate for professional learning. Participants in this course will learn to integrate the essential functions of Edivate into professional learning routines. They will learn to find professional learning videos that apply directly to mission-critical needs, track professional learning activities and access reports to provide evidence of progress. They will also collaborate with other education professionals across the country and around the world. In Table 9, we provide an overview of the participants and number of days of attendance for the Edivate Essentials Part 1 training by district and charter. In Table 10, we provide the same information for Edivate Essentials Part 2.

Table 9. Edivate Essentials Part 1 Participants and Number of Days by District and Charter

District or Charter	# of Participants	Days
District		
Alpine	33	1
Beaver	8	0.5
Cache	25	1
Carbon	18	0.5
Daggett	31	0.5

District or Charter	# of Participants	Days
Davis	15	1
Juab	19	1
North Sanpete	160	1
Park City	19	1
Piute	20	1
Provo	4	1
Rich	4	1
San Juan	20	1
Washington	14	1
Total	**390**	**12.5**
Charter		
Beehive Academy for Science and Technology	25	1
Monticello Academy	24	1
Noah Webster Academy	27	1
Northern Utah Academy for Math Engineering and Science	35	1
Pinnacle Canyon Academy	3	0.5
Providence Hall	7	1
Summit Academy – Bluffdale Elementary	86	0.5
Summit Academy – Elementary Schools	150	0.5
Summit Academy – High School(s)	35	0.5
Moab Community Charter	10	0.5
Syracuse Arts Academy	35	0.5
Utah Schools for the Deaf & Blind	40	1
Total	**477**	**9**
TOTAL	**867**	**21.5**

Table 10. Edivate Essentials Part 2 Participants and Number of Days by District/ Charter

District or Charter	# of Participants	Days
District		
Alpine	225	4.5

District or Charter	# of Participants	Days
Beaver	50	1
Daggett	14	1
Park City	10	1
Piute	35	0.5
Provo	9	1
Rich	39	1
Washington	40	2
Total	**422**	**12**
Charter		
Pinnacle Canyon Academy	30	0.5
Providence Hall	25	0.5
Summit Academy – High School(s)	35	0.5
Total	**90**	**1.5**
TOTAL	**512**	**13.5**

SCHOOL LEADERSHIP M4 FRAMEWORK. The M4 Leadership Framework is a construct that can be used to facilitate effective professional development in schools and districts through Edivate. The framework focuses on 4 M's: Map, Model, Motivate, and Monitor. This construct can be used to create focus objective folders, add content to focus objective folders, share content with other users, use collaborative viewing, create groups, and generate reports. This framework provides school and district leaders with a road map and step-by-step direction for making Edivate a successful professional learning experience for everyone involved.

The School Improvement Network model for implementation of Edivate is by having a strong district or charter school leadership team attend a bootcamp where they learn about the product and spend time developing a three-year implementation plan, focusing on year 1 in more depth. Some districts start small by selecting a specific group of teachers to receive training on Edivate, such as new teachers. Other districts have committed to use this platform for a large part of their professional development, but also taking more time to invest in the development of the plan in the beginning. In the following table, we provide information about participants and days of training called "implementation meetings" that were held at some point from January to August 2015. In Table 12, we provide an overview of the implementation plans we received from Jake Hickey, the Implementation Specialist at School Improvement Network (SCINET).

Table 11. Implementation Meeting Participants and Days by District and Charter

District or Charter	# of Participants	Days
District		
Alpine	42	6
Beaver	28	2
Canyons	2	0.5
Daggett	2	0.5
Davis	2	1
Granite	6	1
Iron	8	0.5
Juab	1	0.5
Murray	15	2
Nebo	6	1
North Sanpete	4	1
Park City	24	1.5
Piute	1	0.5
Provo	50	2.5
South Sanpete	20	2
San Juan	1	0.5
Wayne County	2	1
Weber	1	0.5
Washington	30	3.5
Total	**245**	**28**

District or Charter	# of Participants	Days
Charter		
Beehive Academy for Science and Technology	2	0.5
Monticello Academy	3	0.5
Noah Webster Academy	2	0.5
Providence Hall	2	0.5
Summit Academy – Bluffdale Elementary	2	1
Summit Academy – Elementary Schools	2	1
Summit Academy – High School(s)	2	0.5
Moab Community Charter	2	1
Utah Schools for the Deaf & Blind	6	1
Total	**23**	**6.5**
GRAND TOTAL	**268**	**34.5**

Table 12. District/Charter Implementation Plans for 2015-16 School Year

District/Charter Group	Timeline: Apr – Aug2015	Timeline: Sept- Dec2015	Timeline: Jan– May2016	Year One Goals
Alpine School District	Official roll out of Edivate, PD Plan, and Blood borne Pathogen Course	1. Selected Volunteers upload first video into District Volunteer Edivate Group 2. Reflection on the first term PD	1. 2nd CTL video model 2. Reflection on the second term PD 3. Create next year plan	1. 100% of learning teams will view selected videos & complete reflection activities to supplement their study of their assigned topics. 2. 100% of departments will view department-selected videos & complete reflection activities to study chosen topics monthly. 3.100% of the faculty members will complete the Blood Borne Pathogens quiz
Beaver School District	1. Train educators in the Edivate platform 2. Create focus objective folders 3. Ask educators to join MHS group, watch videos, and participate in discussions 4. Communicate with teachers on year one priorities	1. Volunteer teachers upload videos 2. Conduct first teacher and student surveys 3. Implement videos in school PD	1. Share second teacher video 2. Conduct second teacher and student surveys	1. Videos 2. Groups 3. Focus objectives 4. Pilot Obs 360
Daggett County School District	Build courses: coaching, substitute, and induction/ compliance	Run usage report for courses, groups, focus folders	Run usage report for courses, groups, focus folders	1. Observation Tool 2. Focus Objectives 3. Groups-teachers belong to no less than two groups 4. Courses-coaches, substitute course, parent volunteer course, induction course for beginning.
Iron County School District	**Cedar**: 1. Demo to teachers	**Cedar**:	**Cedar**: PLCs use group	**Cedar:**

District/Charter Group	Timeline: Apr – Aug2015	Timeline: Sept- Dec2015	Timeline: Jan– May2016	Year One Goals
	2. Start use of a course **North:** 1. Ensure all teachers are signed up and roll out program at faculty meeting 2. Principal will watch 5 videos and become familiar with tools 3. They will ask one teacher to be in a test group. **Canyon view:** 1. Refresh teachers on Edivate 2. Help teachers begin watching videos **Parowan:** 1. Create teacher accounts 2. Train on log in and access 3. Incorporate videos into faculty meeting on Wednesday	1. Continue use of course 2. Model groups **North:** 1. Teachers will begin weekly views in PLCs and teacher responses 2. Principal will record himself teaching a lesson **Canyon view:** 1. Roll out admin directed courses 2. Have teachers begin showing videos **Parowan:** 1. Introduce exploration 2. Train on focus objective folders	**North:** 1. Teachers continue to use videos weekly in PLCs 2. One teacher per grade level will be videotaped and reviewed in a PLC **Canyon view:** Mid-year review, share usage data, progress toward goal, open to testimonials **Parowan:** 1. Teachers share videos with experiments 2. View and comment on video from folder	1. Get teachers signed up and watching videos and using groups 2. Use to support evaluation 3. Two teachers participate in videoing and watching videos **North:** All teachers signed up and using the videos to help improve instruction. Teachers will view one video and answer reflection questions 15 times during the year. **Canyon View:** Complete 10 self-selected videos Complete 4 admin directed courses **Parowan:** 1. Introduce videos to teachers and have them explore what is available 2. Create focus objective folders
Monticello Academy	1. Build courses and focus objective folders	Not specified	Not specified	1. Upload 2 videos to Edivate 2. Team and department leads use **groups** in their trainings 3. Each participating teacher creates 3 observations

District/Charter Group	Timeline: Apr – Aug2015	Timeline: Sept- Dec2015	Timeline: Jan– May2016	Year One Goals
Murray School District	**Roll out meeting:** 1. Refine curriculum map and link to core standards 2. Determine pacing schedule and time line 3. Decide PLC month theme/focus.	1. PLC 2 times a month	1. PLC 2 times a month 2. Full PD day, review SAGE data	1. Teach with differentiation, alignment, mapping, and attention to common assessments to drive and change practice. Strive for DOK levels 3-4, program development, and successful interventions. 2. Learn Edivate tools: Learning Progression tool, videos, focus folders
Nebo School District	1. Educators are trained in the Edivate platform	1. First volunteer video upload 2. Conduct first teacher and student surveys 3. Train mentors how to create groups and use the review tool	1. Mentors meta-coach each other 2. Print and present reports 3. Second volunteer videos upload 4. Conduct second teacher and student surveys	1. Mentors learn how to create group 2. Mentors learn how to use the review tool 3. Mentors learn how to upload videos and review and share feedback with mentors 4. Focus objective folders 5. 10 Basic essentials course 6. Meta-coaching – upload video to Edivate
Noah Webster	1. Review compliance courses 2. Teacher training 3. Survey from STEM AC/USU	1. Show and discuss 1 video prior to weekly meetings for teachers 2. Upload 1 teacher video	1. Show and discuss 1 video prior to weekly meetings for teachers 2. All team leaders upload teacher video	Familiarize teachers with web site: 1. show **videos** at meetings 2. create **groups** for upper and lower grades 3. use **wall** to make announcements 4. create compliance focus new teacher **folders** 5. create **template**
North Sanpete School District	1. Two days of Edivate training at fall PD conference 2. Fourth Monday PD sessions	1. Any employee not in compliance will stay Wed. before Thanksgiving 2. Fourth Monday PD sessions	1. Reflection meeting 2. Fourth Monday PD sessions	1. All coaches meet monthly 2. All new teachers meet monthly 3. Coaches familiarize teachers with Edivate: a. DO offers compliance trainings through Edivate b. Principals incorporate Edivate into their faculty meetings at least 4 times

District/Charter Group	Timeline: Apr – Aug2015	Timeline: Sept- Dec2015	Timeline: Jan– May2016	Year One Goals
				c. Set up PLC's on Edivate d. Coaches model video at least once
Northern Utah Academy for Math, Engineering and Science (NUAMES)	Train educators in the Edivate platform	1. First volunteer video upload 2. Conduct first teacher and student surveys	1. Second volunteer video upload 2. Conduct second teacher and student surveys	Not specified
Pinnacle Academy	1. Create a cooperative learning group to pilot 2. Collect data 3. Teachers record themselves and upload to Groups in Edivate Review at least quarterly	**Monthly:** 1. Department/ Team Meeting focused on data, relevance, cooperative learning 2. Behavior Management Training 3. Each teacher creates a pacing guide. Submit using their Portfolio (Sept. only)	See Monthly plan	1. Consistent team/department focused on data/relevance/co-operative learning. 2. School-wide and team department (RTI plan). 3. Pilot this with several teachers. 4. Portfolio created for each teacher with journal entries. 5. Swivel/observation templates. 6. Courses/practice/standardized elements. 7. Data will be collected.
Piute School District	1. Train educators in the Edivate platform	1. First volunteer video upload 2. Conduct first teacher and student surveys 3. Watch videos	1. Connect evaluations with edivation videos – ongoing 2. Summative evaluation connect to edivation 3. Second volunteer video upload 4. Conduct second teacher and student surveys	1. Help teachers use Edivation by using the videos in our faculty meetings to help with PD and provide insight to how the tool can help us improve our practice 2. Encourage our mentor teachers and principals to use the portfolio tool in edivation to help create mentoring plans for new teachers.
Providence Hall Academy	1. Train group leaders	**Monthly:** 1. Determine	1. Observation 360 – Observations are	1. Observation 360 2. Courses

District/Charter Group	Timeline: Apr – Aug2015	Timeline: Sept- Dec2015	Timeline: Jan– May2016	Year One Goals
	2. Choose content material for each group 3. Assign mentors to new teachers 4. Train principals on Observation 360	priorities as a faculty 2. Video teachers demonstrating IB practices 3. Each building will provide 3 videos for the year.	completed 2. Meet to evaluate Edivate implementation	3.Groups 4. Reflection Questions 5. Portfolio
Provo School District	Not specified	Not specified	Not specified	Use Edivate tools to provide: SLO Courses, videos, groups, focus objects, and catalogs
South Sanpete School District	1. Opening faculty meetings tell of vision and assign self-guided Edivate Essentials Course. 2. Selected Volunteers upload first video	1. Teacher Survey from STEM AC/USU 2. Faculty Meetings focused on Groups 3. Record a minimum of one video 4. Teacher Conference (Portfolio, recording, and uploading video) 5. Compliance Course	1. Principals assign folders to teachers 2. Mid-year TPGP (Portfolio) check 3. Selected Volunteers upload second video 4. Teachers and students complete survey from STEM AC/USU 6. Admin collect teacher CACTUS and Edivate participation info	1. Groups will be created and videos will be uploaded 2. Teachers will submit portfolio to principals 3. Focus Objectives will be created and shared out on a needs basis according to teacher need 4. Compliance courses will be offered and completed by teachers.
Summit Academy	1. Create groups and courses 2. Staff-wide training	**Monthly**: 1. Walkthroughs and observations using Observation 360, 2. Review Edivate usage and make appropriate adjustments. 3. Department heads	Meet to Review Year and plan 2016-2017	**Administrators will have opportunity** to use Edivate Video and Observation 360 **Educators will have opportunity** to use Edivate Video and courses, make and track goals, collaborate on a school level, reference the Learning Progression Tool for assistance with Common Core practice, and upload videos of themselves for Edivate Review.

District/Charter Group	Timeline: Apr – Aug2015	Timeline: Sept- Dec2015	Timeline: Jan– May2016	Year One Goals
		discuss Edivate videos with their departments. 4. Edivate group leaders encourage collaboration 5. Educators access STEM Focus Objective Folder and group		
Syracuse Arts Academy	HR Training online courses	Not specified	Not Specified	1. Admin training on using tools 2. Put the framework in place by building templates and courses 3. Identify and create Focus Objective Videos 4. Create Edivate groups (school wide, one for loading weekly lesson plans, and one for small group arts integration collaboration
Tintic School District	**Edivate Intro:** 1. Teachers training on video searching 2. Focus Objective Folders will be created aligning videos to teacher needs 3. Expectation of the teachers watching 4 videos a month will be presented	1. Each month, teachers will watch four videos and answer reflection questions 2. Selected Volunteers upload first video into District Volunteer Edivate Group	1. Completion of STEM AC/USU Teacher and Student Surveys 2. Districts provide list of participating Teacher's Cactus ID's to USU researchers.	Videos-Teachers will be expected to watch a minimum of 4 videos of their choice each month. **Focus Objectives Folders**-Folders will be created aligned to teacher needs and requests. **Groups**-A private/hidden group will be created for any teacher that is struggling and will be used to recommend specific PD content. **Courses-** at least two courses will be created and shared out: Suicide Prevention and Classroom Management.
Utah School for the Deaf and Blind	Train educators in the Edivate	1. First volunteer video upload	1. 360 Evaluation/ modeling 2. Follow-up on groups/monitoring	1. Train teachers on Edivate 2. Each teacher watch and critique vidoes 3. Determine weakness and find/watch videos to match need

District/Charter Group	Timeline: Apr – Aug2015	Timeline: Sept- Dec2015	Timeline: Jan– May2016	Year One Goals
		2. Conduct first teacher and student surveys 3. Introduce Edivate and 360 4. Roll out PLC	3. Second volunteer video upload 4. Conduct second teacher and student survey	
Washington School District	1. Identify 4th-grade pilot team 2. Host implementation Boot Camp 3. Personal on-site PD	1. Personal on-site PD	1. Reflection meeting 2. Personal on-site PD	1. Seamless integration of platforms 2. STEM PD 3. Limited use based on teacher needs 4. Staff developers use Edivate
Weber School District	1. Blueprint conducted by SINET, identify facilitators and dates 2. Train educators in Edivate	1. First volunteer video upload 2. Conduct first teacher and student survey 3. Set DOK courses and create groups 4. Leadership and training meeting	1. Second volunteer video upload 2. Conduct second teacher and student survey	1. Make full use of the product and its capabilities 2. Understand how the tools align to district initiatives

A strength of the Edivate implementation plans is that they are not coming from a template, but districts and charters are taking the time to plan for specific strategic implementation in their context and with their teachers. This is updated as of the end of August 2015, but SCINET continues to work with other districts/charters to complete their implementation plans.

In Table 13, we provide an overview of the training conducted as of September 1, 2015. However, one should take care when interpreting the grand total, since there are a few participants who attended several of these trainings, so the number 2,128 is an overestimate of unique participants to the training since the value contains some duplicates. School Improvement Network is working to get us data by individual so we will have a better understanding of how many unique teachers and administrators have attended training or have attended any particular meeting related to Edivate implementation.

Table 13. Overview of Total Participants by Type of Training by District and Charter

District or Charter	# of Participants					
	Blueprint	Boot Camp	Edivate Essentials	Edivate Essentials #2	Implementation Meetings	Grand Total
District	390	422	352	75	245	**1,484**
Charter	477	90	5	49	23	**644**
TOTAL	**867**	**512**	**357**	**124**	**268**	**2,128**

High School STEM Industry Certification Program Grants

The High School Industry Certification grant program began with a College and Career Subcommittee meeting in August 2014 to determine important considerations to include in the request for applications. The STEM Action Center released the application information in

September 2014, and they gave districts time to develop partnerships with universities, applied technology colleges, and local industry partners. The STEM Action Center awarded grants in January 2015 (as shown in Figure 5.

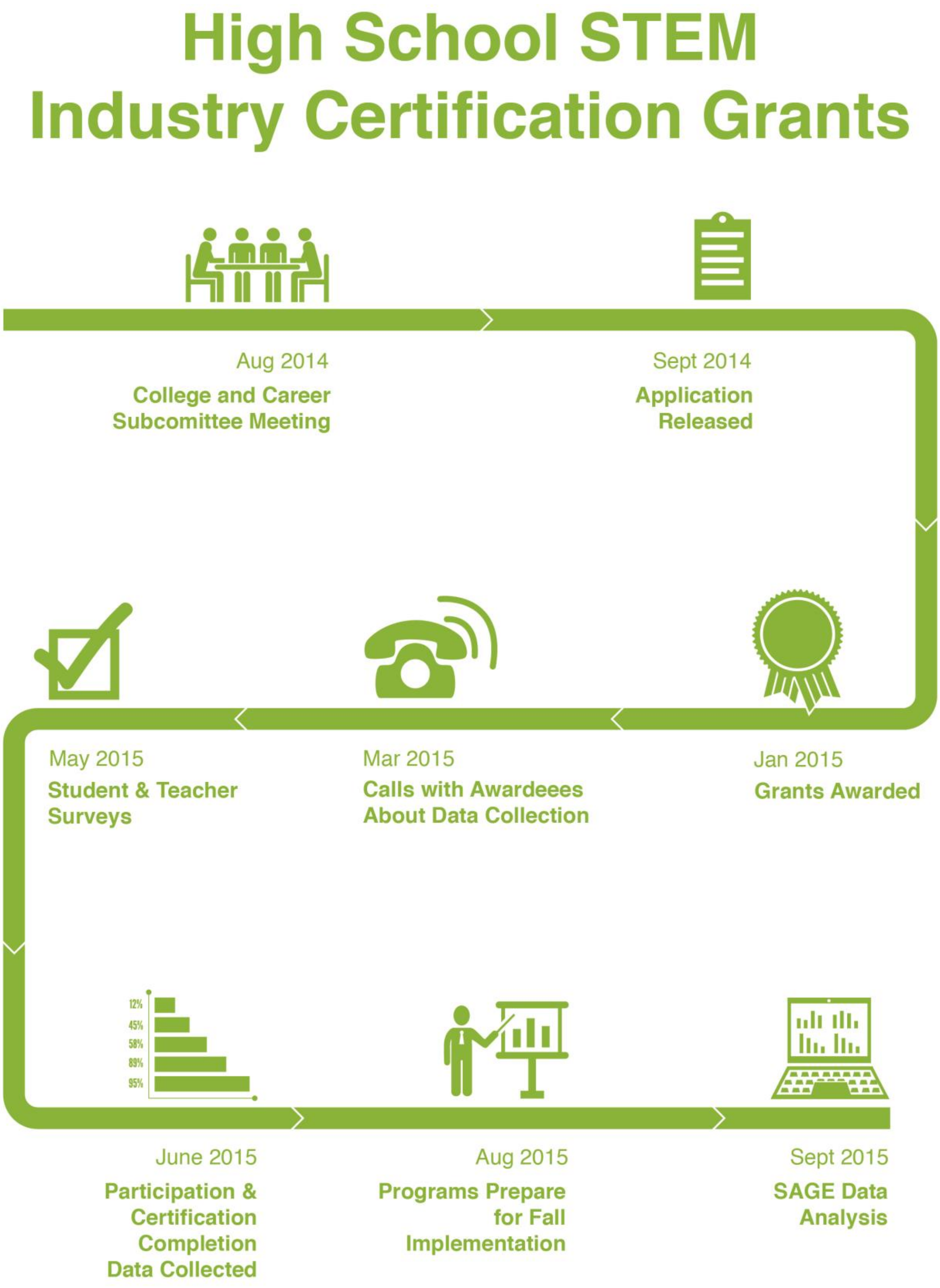


Figure 5. Timeline for High School STEM Industry Certification Grants

We reviewed the applications for the High School STEM Industry Certification Program grants and created a short overview of each program. A majority of the programs was in their planning phase during spring 2015 and some began training the instructors during summer 2015. Actual implementation of most of the programs will begin fall 2015. In Table 14, we provide an overview of all of the programs:

Table 14. Overview of High School STEM Industry Certification Programs

Program Name	Partnership	Certification/Pathway
Fast Start Programs Starting Spring 2015		
STEM Series	**Districts:** Washington **Education:** Dixie Applied Technology College, Dixie State University **Industry:** Rocketmade, USTAR, Velocity Webworks, Busy Busy, Site Select Plus, Y Draw Inc.	Launchpad Start-up School Start-up Derby
AM STEM	**Districts:** Washington **Education:** Dixie Applied Technology College **Industry:** Crystal Clear, Epic, Family Dollar, Intermountain Healthcare, Ram, Reid Ashman, Rich Electric	Advanced Manufacturing, Information Technology, Construction Technology, Healthcare Sciences
Summit Academy STEM IT Certification	**Education:** Summit Academy **Industry:** Verisk Health, CCI Network Services, Tanner Technologies	Information Technology
Planning Spring 2015 Implementation Fall 2015		
3C^5 Consortium: Computers, Certificates, Careers	**Districts:** Washington, Iron **Education:** Dixie Applied Technology College, Southwest Applied Technology College, Southern Utah Center for Computers, Engineering and Science students (SUCCESS Academy)	Computer Information Technology
Bear River Region	**Districts:** Cache, Box Elder,	Automated Manufacturing and Robotics

Program Name	Partnership	Certification/Pathway
	Logan, Rich **Education**: Bridgerland ATC, Utah State University Brigham City Regional Campus, Utah Valley University **Industry**: Autoliv, ATK, Autonomous Solutions Inc, Fanuc Robotics, Motoman Robotics, Icon Health and Fitness, Pepperidge Farms, SAE	
Corporate Connections in Manufacturing	**Districts:** Southeast Consortium (Carbon, Emery, San Juan, and Grand) **Education:** Utah State University Eastern **Industry:** STEM Academy, UMA	Manufacturing
Life Science Certification Project	**Districts**: Granite **Education**: Salt Lake Community College **Industry**: BioInnovations Gateway, Granite biotechnology Advisory Board	Life Sciences
Nebo Advanced Learning Center (Early College STEM Center)	**Districts:** Nebo **Education:** Utah Valley University, Mountainland Applied Technology College, Brigham Young University Engineering Dept **Industry:** Intermountain Healthcare, Mountain Star Health, US Synthetics, Jive Communications **Government**: Department of Workforce Services	Computer programming, IT, Pre-Engineering, Digital Media, Biomedical Science/Healthcare
Pathways to the Future in Manufacturing	**Districts:** Granite, Wasatch, Canyons, Jordan, Murray, Salt Lake City, Tooele **Education:** Salt Lake Community College **Industry:** Utah Manufacturing Association	Manufacturing

Program Name	Partnership	Certification/Pathway
	Government: Utah State Office of Education	
SOAR into STEM -"Students in Ogden Achieving Readiness into STEM"	**Districts:** Ogden **Education:** Weber State University, Ogden-Weber Applied Technology College **Industry:** Northrop Grumman, Parker Hannifin Corporation, Purch, Williams International, and Logistics Specialties Inc. **Government:** Ogden City, Hill Air Force Base, Department of Workforce Services	Engineering—Aerospace, Mechanical, and Electrical; Information Technology and Software (ITS); Advanced Composites (AC)
Tooele Information Technology and Welding/Manufacturing Certificates	**Districts**: Tooele **Education**: Tooele Applied Technology College **Industry**: Carlisle SynTec **Government**: Tooele County Alliance for Education, Department of Workforce Services, Tooele City Economic Development	Information Technology Welding/Manufacturing

STEM Series: Washington County STEM Certification

Partners: Rocketmade, Velocity Webworks, Busy Busy, Y Draw Inc., Washington County School District, Dixie Applied Technology College, Dixie State University, USTAR, Site Select Plus

Project Funding Description

Funding for this project will create a director position; who will be responsible for coordinating the Launchpads, Startup School and Startup Derby with the School District, DXATC, USTAR, and industry partners. Some funding will be paid directly to industry partners to compensate for instructor hours given by senior programmers on staff. Another portion will go to purchase a set of Macintosh laptops for use by students in the BusyBusy Launchpad who will be learning iOS application development and will need appropriate hardware and software.

Launchpad Overview

- Year 1 Projected Outcome- Participation of 30-40 students in Launchpad, resulting in certifications that outline hours spent in instruction, hours spent in practical application, and specific skills acquired.
- Goal: expose students early to the professional world and build the pipeline
- 2 Web, 1 Mobile, and 1 Content track
- 10-week program
- 7-10 person cohort
- Formal meeting 2x week, 2 hours per session

- Screening/interview process to evaluate skill level
- Dates: Jan 6-Mar 12, 2015 (10 weeks.) Tuesday and Thursday from 3:30-5:30pm

Startup School Overview

- Year 1 Projected Outcome- The students will be certified for completion of an industry recognized Lean Startup course developed by Steve Blank at Stanford University
- Pre-qualifier for Startup Derby
- 2-3 week session
- Cross -disciplinary
- Lean Startup
- Agile Development
- Dates: (proposed) March 17, 19, 24, 26, 2015 (Tuesday, Thursday, 6:30-9:00pm)

Startup Derby Overview

- Year 1 Projected Outcome- As part of the STEM startup Derby, students will each produce a pitch deck demonstrating their relevant work experience and will receive a certificate of completion for satisfactory participation in the Derby.
- Mentor-driven 3 month session
- Come together at end for pitch contest
- Stipend for each startup company (from private donor)
- Business/entity assigned as mentor
- Dream team DNA: 1 hustler (business development participant from DSU business school) 1-2 hackers (programmers) and 1 designer
- Dates: April 2 through June 26, 2015 (3 months)

Certification

Three certificates will be awarded in connection with the STEM Series. The first will be for Launchpad. The certificate will denote number of hours spent on instruction of specific principles, and number of hours outside of class spent completing assignments. The Startup School certificate will be equal to and a surrogate for the Nail It Then Scale It training currently offered multiple times a year by the Business Resource Center. The final certificate will be awarded upon completion of the Startup Derby. As each startup will be different and cover vastly divergent technologies and practices, this certificate will signify completion of a 3-month mentorship-driven startup experience.

AM STEM: Washington County School District

Partners: Washington County School District and Dixie Applied Technology College

Overview

In order to offer critical training to a new and upcoming workforce, the DXATC in partnership with WCSD has created a new division at the college known as AM-STEM. The focused goal of AM-STEM is to offer national and industry recognized certifications to high school students so that they might obtain essential skills that will make them more employable and successful in STEM related endeavors. AM-STEM division will continue to offer its Academy of Advanced Manufacturing and Academy of Information Technology, as well as open this January to high school students its Academy of Construction Technology, and Academy of Healthcare Sciences. Apart of the AM-STEM programs high school students will be able to earn nationally recognized certifications while still enrolled at their respective high school, as well as earn CTE and elective credits towards their graduation requirements.

Funding

Funding will be used in the following ways:

- Purchasing and commissioning new training equipment for AM-STEM programs
- Training the trainer professional development opportunities
- Obtaining national accreditations,
- Covering some instructor costs
- Cover a portion of an Internship Coordinator to be used in student placement initiatives
- Developing new articulation agreements with DSU for students wishing to continue their education

The main outcome will be the certification of 50+ students in AM-STEM programs with a projection of 120+ total national and industry-recognized certificates earned by June 30, 2015.

Overview:

The AM-STEM division is anew part of the college that is especially designed for high school students. During these programs students come to the DXATC campus during their zero and first hour periods and are given top quality instruction from industry professionals that follow nationally recognized curriculums.

Through the partnership between WCSD and DXATC, high school students that complete a state Pathway and/or an AM-STEM program will be given a scholarship for their first semester into a related DXATC program. For those students that complete a 900-hour AM-STEM or other DXATC program, opportunities for continued education will be readily available through articulation agreements with DSU. Currently, DXATC and DSU are in process of creating new articulations in DSU's Technology Department as well as with the Nursing Department to give DXATC completers more educational opportunities at the University.

Summit Academy High School STEM Application

Partners: Verisk Health, Tanner Technologies, Summit Academy

Overview

Summit Academy High School seeks funding for improving our current STEM student IT graduation pathway through the early implementation STEMAC high school STEM certification announcement. The following target areas are the focus for improvement: teacher training (producing highly qualified teachers), equipment (to improve curriculum delivery and enrich the classroom experience resulting in increased student engagement and program success), stackable/progressive certifications class options (resulting in increased qualifications of students for employment), and program advertising (maximizing community knowledge resulting in increased program enrollment and increasing partner participation). The following industry partners Verisk Health, Tanner Technologies, and Summit Academy are committed to provide interview opportunities to students who successfully complete Summit Academy High School IT certification classes for employment and or internships in the fields of IT such as networking, computer repair, software troubleshooting, and computer security. This project is titled "STEM IT Certification Curriculum Delivery Improvement, Enrichment, and Community Awareness". The projected outcomes are to increase the following: enrollment, IT certification exam pass rates, enrollment in advance IT classes, interview and employment obtained by students, and the number of community partners.

Outcomes and Deliverables

The number of students currently enrolled in the IT classes is 25. The goal for next year is to increase enrollment to 40 students (first class and advanced classes). The current number of IT trained teachers is one; at the completion of this year with grant funds, there will be six trained teachers and two highly trained teachers. Each successive year, the goal is to add 15 students until a natural plateau is reached. In addition, Summit Academy High School will train new teachers to have a surplus of trained and highly trained teachers. This will support a successful and sustainable program. The program will also continue to solicit partners (industry employment opportunities for students and to support other LEA programs to develop or utilize the Summit Academy High School STEM program through the SOEP. Another desired outcome is to increase the number of partners (employment and LEA development).

Funding

1) Train IT teachers
2) Add Equipment:
   - New computers for content delivery
   - Updated OS for content delivery
   - Hardware for student hands-on learning
3) Provide stackable/progressive certifications options for all students
4) Provide program advertisement to local community

3C^5 Consortium

Partners: Washington County School District, Iron County School district, Dixie Applied Technology College, Southwest Applied Technology College, Southern Utah Center for Computers, Engineering and Science Students (SUCCESS Academy).

Overview

This grant will increase the number of students who successfully complete computer certifications in computer information technology (CIT). In addition, students who have completed, or are in the process of completing, these nationally recognized certifications will receive internship opportunities which link computer industry entrepreneurs and CIT business leaders to certified and skilled public education students.

The **3C^5** consortium will collaborate with two Applied Technology Colleges. This regional collaboration with higher education ATC institutions will provide efficient, streamlined, and seamless industry connections and experience. This cooperative relationship will reduce unnecessary redundancy and increase student access to skilled knowledge sources designed to assist students in successful completion of computer certifications and focused career opportunities.

Funding

- Salaries- to be paid for two full time internship coordinators, school counselor stipends for training beyond normal contract time, and computer certification teachers are also paid a summer stipend

- Benefits- Retirement benefits will be paid, and the two full time internship coordinators will receive medical coverage
- Supplies- office materials and general supplies for parent/stakeholder outreach nights, computer certification tests
- Marketing & Outreach- SUCCESS Academy will be visiting schools and will need materials to share with students and SWATC also needs materials to share with students and parents.
- Travel- internship coordinators will be traveling to visit students and CIT businesses.
- Contracted Services- Bringing all industry partners in Southern Utah Region quarterly together for lunch to discuss needs
- Communications- cell phones for internship coordinators
- Professional Development- used to train CIT teachers in best practice
- Equipment- certification tests, access to hardware/software for test prep, increase capacity of SWATC computer lab with updated hardware as well as for WCSD to extend the computer certification in Washington
- Other- Contingency funding.

Bear River Region Automated Manufacturing and Robotics STEM Academy

Partners: Cache County School District, Box Elder County School District, Logan City School District, Rich County School District, Bridgerland Applied Technology College (BATC)

Projected Outcomes

Increase STEM training opportunities by developing Automated Manufacturing and Robotics Training Academies to be available at all high schools in the Bear River Region. Expand industry certification training classes in Motoman, Fanuc, SCARA robots and vision systems. Double the number of students trained in Automated Manufacturing and Robotics in the region.

Overview:

- The STEM academy will be developed using hybrid and distance education systems leveraging the talents of all of the instructors at each of the Bear River Region schools. Early morning lab classes will be broadcast to all six high schools and both the Logan and Brigham City BATC campuses from the Automated Manufacturing STEM lab at BATC or one of the high school labs. This will allow the instructors with the best knowledge to lift the expertise of all of the region instructors. Duplicate labs and equipment will be set up at each of the high schools.
- The focus of the courses will be to help students complete the BATC 900 hour certificate in Automated Manufacturing and Robotics STEM. This will give them 30 credits towards the Utah State University Associate of Technology AAS Degree. Students will also be working on the concurrent USU classes available to complete the AAS degree. Upon Completion of the AAS degree students can continue on at USU or UVU towards a BS degree in Engineering, Robotics or any of the other science, mathematics or technology fields.
- Local Employers and DWS will help create Internships for students completing the program to help create real life work experience and jobs. Students can then remain in the workforce or continue upon the education path for additional STEM training.

Funding:

- Developing distance delivery sites allowing classes to be broadcast to each of the highs schools from the technical college
- Curriculum development to create and upload courses to CANVAS
- Duplicate lab equipment required for all courses at each of the locations
- 5 week long training classes to get all instructors at high schools educated on the curriculum and the technical robotics programming equipment
- Equipment:
    - EDNET Distance Ed Broadcast Site
    - EDNET receiving site
    - Training Panels Training Equipment
    - VEX Robotics Equipment
    - Arduino
    - Software
    - Composites Equipment and Supplies
    - Fluid Power Trainer
    - Teacher training workshops
    - Curriculum Development
    - Marketing and Promotion

Corporate Connections in Manufacturing

Partners: STEM Academy, UMA, USU Eastern, Southeast Consortium (Carbon, Emery San Juan, Grand School Districts)

Overview:
The Corporate Connections in Manufacturing Program is designed to transform Utah high school student trajectories by connecting students directly to workforce opportunities and the skills required to succeed. The Corporate Connections in Manufacturing Program functions like a statewide internship in which ALL students get direct exposure to real products and technologies in real Utah companies. The result will be much higher numbers of students seeking STEM careers, enrolling in certification and degree programs, and importantly, more students joining the growth segments of the Utah economy.

Project Outcomes
- 50% of students participating in "recruitment" projects express interest in enrolling in skills electives
- 30% of all participating school students enroll in school based skills course
- 60% of students enrolled in skills course achieve skills certificate or national certification
- Creation of 3 new skill certifications (over a five-year period)
- 15% of students with certificates are employed in Utah companies following high school
-

Certification
Industry recognized credentials are built into the Corporate Connections in manufacturing program that indicate a level of mastery and competence. These credentials are based on workforce development activities provided by the grant and have been selected based on consultations with employers from the UMA network of over 5,000 businesses. Upon completion of the certification

program the student gains an industry--recognized STEM or STEM-related certification titled: The UMA Certified Manufacturing Associate.

In order to receive the certification, students will need to complete the approved process, submitting all required material before being awarded their credential. Students will need to complete a UMA approved certification, which will be identified or designed in this development period. Students will also need to complete an approved UMA culminating project to demonstrate application of the skills in a real world team-oriented environment. As part of this development project, culminating projects will be identified and purposely designed to give the student's instructor all the needed resources to complete the project including the final grading rubric and submission system. Students completing both the UMA approved certification and the UMA culminating project will receive a "UMA Certified Manufacturing Associate". All Utah Manufacturing Association Companies will recognize this certification as an entry-level credential. Additionally, USU Eastern will provide the stackable-credits/credentials roadmap that spans from 10^{th}-12th-grade certification through a bachelor's degree.

Funds:

- Project Development
- Development of Online Exchange
- Creation of Roadmap and Dual Credit Relationships
- Sponsoring District (Consortium Head) Administration Costs
- Lighthouse Teacher Training

The Life Sciences Certification Project (LSCP)

Partners: Granite School District, Bio innovations Gateway, Salt Lake Community College, Industry Partners from the Granite biotechnology Advisory Board

Overview

The Life Science Certification Project (LSCP) targets two certification areas for the life sciences industry. Certification goals include: 1) creation of a basic lab tech certification that includes a lab skills internship and 2) certifications on specialized equipment identified by industry as having a high demand for talent.

The Life Science Certification Project will increase the quality of the current programs and internships offered by Granite School District and the BioInnovations Gateway through the following goals:

1. Identify basic lab skills and specialized equipment operation industry needs for entry-level employment.
2. Develop and/or modify curriculum and identify/create certifications.
3. Pilot the curriculum and certifications and validate through a board review.
4. Order equipment, supplies and consumables identified by the board for certification training.
5. Market curriculum and certifications to the life sciences industry.

Deliverables:

- Industry skills list for entry-level positions
- Curriculum to train skills for certification
- Certifications created by industry and recognized by industry

- Equipment to support internship application and assessment for certification
- Staff/tenants of BIG trained in use of equipment
- A pathway that aligns high school trailing with SLCC's plastic injection molding training and other programs that train life science skills
- Increasing enrollment in high school biotechnology programs
- Increasing enrollment in BiG internships
- Increasing enrollment in SLCCL programs that train skills for the life science industry
- Students being hired by companies where they perform their industries
- Students being hired based on interviews precipitated by industry-recognized certifications.

Funds:

- Salaries- Shop supervision
- Fringe Benefits- shop supervision
- Supplies- Paulsen Software, Mold Tools, Frame for Mold, 3D Printer Consumables, Plastic Resign, Feature Cam Software, Solid Works Plastics Module Add-on for Injection Molding Simulations, Machine Tools, Lab Consumables, 3D Printer Update, Food for Board Meetings and Final Event
- Travel- between companies and contractors
- Contract Services- Maintenance Contract 3D Printer for update
- Professional Development- Training on Solid Works Plastics Modules, Feature Cam
- Equipment- Laser Welder, Conversion Parts to Change ShotBot to Plasma Cutter, 3D Print, Inspection microscope with digital camera for inspection and documentation of manufactured parts, 2 Dedicated Computers for 3D Printers
- Other- Isolation Remodel

Nebo Advanced Learning Center

The Nebo Comprehensive Development Project will focus on five STEM career pathways: Digital Media, Computer Science, Information Technology, Pre-Engineering and Biomedical Science/Healthcare. We also offer a Construction program.

Overview

Nebo School District is requesting funds to refine programs and processes at the ADVANCED LEARNING CENTER, an area STEM Center for the implementation of Career Pathway training in digital media, IT, computer programming, pre-engineering and biomedical science/healthcare. This center needs funds to hire additional staff to identify and engage industry partners and internships, develop curriculum materials, and create an effective and robust certification system. We also will need to purchase equipment and software. Funds will also be used for ongoing professional development.

Objectives/Outcomes

We hope to have 40 STEM students that have completed at least 9 credits toward their certificate when they finish high school by June 2015. Furthermore, we will have 50 complete a Career Pathway in their STEM area of focus. By June 2016, our goal is to double those numbers. A positive "unintended outcome" of our initial meetings with UVU faculty and business partners is the development of 7th grade curriculum and an 8th grade junior high course called Digital Design to introduce students at an earlier age to computer coding and technology topics. With this earlier exposure, more students entering high school will have a STEM focus.

Outcomes will be measured in all five STEM program areas. Curriculum, course materials, and articulation agreements will be developed for each program area. A Career Pathway will be clearly defined and followed for each program area. Lastly, before graduation clear information on transition to post-secondary will be developed. Our goal is to have 80 students in each of the five career program area—a total of 400 students in our STEM programs at the ADVANCED LEARNING CENTER.

Certificates Available

- Computer Science and Software Development- UVU's 1 year Certificate of Proficiency
- IT (Hardware)- Microsoft Certified Professional (MCP), Network+, Security+, Cisco Certified (CCNA), Again, students will be working towards 1 year Certificate of Proficiency developed with industry input.
- Biomedical/Healthcare-MATC has a practical nursing program, which we hope to articulate with our ADVANCED LEARNING CENTER courses. Students will receive credit from Weber State for BioMedical core classes that are pre-requisites for healthcare programs such as nursing, radiology, respiratory therapy, etc.
- Pre-Engineering- We chose Project Lead the Way for our pre-engineering program. We want to expand the offerings with a larger scope and sequence
- Digital Media- A one year post-secondary Certificate of Proficiency is being developed.

Funding

- Hire additional staff to engage industry partners and internships, develop curriculum materials, and create robust certification system
- Purchase equipment and software
- Ongoing professional development

Pathways to the Future in Manufacturing (PFAM)

Partners: Granite School District, Wasatch Front South Region, Canons School District, Jordan School District, Murray School District, Salt Lake City School District, Tooele School District, Salt Lake Community College, Utah Manufacturing Association, Utah State Office of Education, Wasatch Front South Region and School District, Salt Lake Community College

Description

PFAM will:

1) design and implement clear pathways for entry into manufacturing careers;
2) align coursework outlined by the Utah State Office of Education Career & Technical Education (CTE) Department with industry need and/or develop new coursework as needed;
3) identify and/or develop industry-recognized credentials that validate the training received in high school;
4) train teachers in identified skills through ongoing professional development and summer internships in manufacturing facilities;
5) align science and math STEM skills in all manufacturing content; and
6) establish strong partnerships with industry and postsecondary training institutions to support smooth entry into further training and/or entry-level employment, field trips, job shadows, and internships.

The Pathways to the Future in Advanced Manufacturing project is designed to:

- Address critical industry talent needs Develop partnerships with industry that increase industry involvement in the classroom and opportunities for students to participate in field trips and internships
- Develop pathways directly aligned to the manufacturing sectors in the state of Utah
- Align standards and objectives of all manufacturing courses to the skills found in the manufacturing industry
- Identify industry---recognized certifications that support student opportunities for employment
- Provide opportunities for teacher training and industry internships to increase teacher competence in instructing course content and an increased likelihood of project application opportunities in the classroom
- Align courses with postsecondary partners developing clear pathways to completion of college certificates of proficiency, certificates of completion and degrees
- Support high school student entry into college and/or employment

Funds:

- Salaries- Program support, teacher stipends, follow-up quarter training,
- Benefits- Program support, teacher stipends, follow up quarter training
- Supplies- Materials for training teachers, supplies for statewide teachers, food for training and focus groups and events
- Marketing/Outreach- webpage, flyers, open houses
- Travel, between companies, hotels/per-diem, teachers coming to trainings
- Contract Services- Survey of manufacturing needs and follow-up, trainer costs, pathways, standards, objectives and curriculum development and industry certification alignment
- Equipment- Updating of programs in one area in each of 6 districts

SOAR into STEM -*"Students in Ogden Achieving Readiness into STEM"*

Partners: Ogden City School District (OCSD) and Ogden City Education: OCSD, Weber State University (WSU), and Ogden-Weber Applied Technology College (OWATC). Civic: Ogden City, Hill Air Force Base, and Department of Workforce Services (DWS). Industry: Northrop Grumman, Parker Hannifin Corporation, Purch, Williams International, and Logistics Specialties Inc. (LSI)

Description

To address the current and future needs of Ogden's industry clusters, SOAR into STEM will create a new Advanced Composites certificate pathway; add function to its current Information Technology and Software certificate pathway; and increase the capacity of its current Engineering certificate pathway. In doing so, it will (1) better prepare high school students to be job ready for available STEM and/or STEM-related employment; (2) provide industry-recognized certification for STEM pathways graduates; and (3) catalyze a systemic change through its partnerships. To achieve this, SOAR into STEM will develop a K-16 pipeline that fosters student participation and preparation in STEM and STEM-related careers.

Goals:

- Increase the number of high school individuals who earn industry-recognized credentials that enable them to compete for employment.
- Develop career pathways with multiple entry and exit points for students along the post-secondary education continuum.
- Create systemic change that will last beyond the grant period by establishing partnerships, agreements, processes, and programs.

Funding

- Salaries
- Fringe Benefits
- Supplies
- Marketing and Outreach
- Travel
- Contract Services
- Communications
- Professional Development

Tooele County School District High School STEM

Partners: Tooele County School District (TCSD), Tooele Applied Technical College (TATC), Tooele County Alliance for Education, Department of Workforce Services, Tooele City Economic Development, Carlisle SynTec

This partnership will provide a collaborative effort to increase the amount of the industry certifications for students in the Tooele Valley specifically in the Welding/Manufacturing and Informational Technology industries. In order to reach the Governor's desired outcome of 66% percent of students being college and career ready by 2020, TCSD and TATC believe that alignment of curriculum between programs at TCSD and TATC needs to occur. This will allow students to more seamlessly achieve certifications and become employable in their career of choice.

Funding

Funding will be used in the following ways:

- 3 Virtual Welders for Tooele Stansbury and Grantsville High schools
- Test Out or Cisco Software and instructor training
- Offsetting student costs for tests vouchers. Students will be reimbursed 50% of the cost of the test after passing
- A CNC machine each for TCSD and TATC

Funding will also be used for Salaries, fringe benefits, and for the supplies and equipment mentioned.

Deliverables/Outcomes

- Curriculum alignment between TCSD and TATC in the areas of Information Technology
- Curriculum alignment between TCSD and TATC in the areas of Welding/ Manufacturing
- Increased industry certificates earned by students at TCSD & TATC in Computer A+ by 30%
- Increased industry certificates earned by students at TCSD & TATC in Network+ by 30%

- Increased industry certificates earned by students at TCSD & TATC in Linux by 30%
- Increased industry certificates earned by students at TCSD & TATC in AWS by 30%
- Increased industry certificates earned by students at TCSD & TATC in NIMS by 30%
- Increased industry certificates earned by students at TCSD & TATC in NAMS by 30%
- Increased number of students enrolling in the TATC in Information Technology and Welding/Manufacturing programs following the foundational classes at TCSD
- Increased number of students enrolling in Information Technology courses
- Increased number of students enrolling in Welding/Manufacturing courses
- Seamless articulation agreement between TCSD and TATC for Information Technology
- Seamless articulation agreement between TCSD and TATC for Welding/Manufacturing

We look forward to the opportunity to collect data during the 2015-16 school year when most of these programs will begin implementation.

Fairs, Camps, and Competitions Individual and Team Grants

The STEM Action Center began the fairs, camps, and competitions grant program in October 2013 with the release of the first application announcement (as shown in Figure 6Figure 6). During the 2013-14 academic year, there were two rounds of awards made, fall and winter. All students had to turn in receipts by June 2014, which was the deadline for the STEM Action Center to provide them payment for their award. During the 2014-15 academic year there were three grant periods (fall, winter, and spring), and again students had to submit their receipts by June 2015 to receive payment for their award. Prior to receiving their award, the students completed a survey for the purposes of this grant program evaluation.

The STEM Action Center awarded grants to 2,427 students who received an individual or team grant of up to $2,500. Students participated in science fairs or science projects affiliated with their school, district or large community (e.g., county science fair). The STEM camps that students participated in were restricted to camps within the state; many of these were about mathematics, science, LEGOs, computer programming, and Maker activities. The competitions students participated in included both local, regional, and national competitions (e.g., FIRST LEGO League, FIRST Robotics, ECybermission, and Science Olympiad).

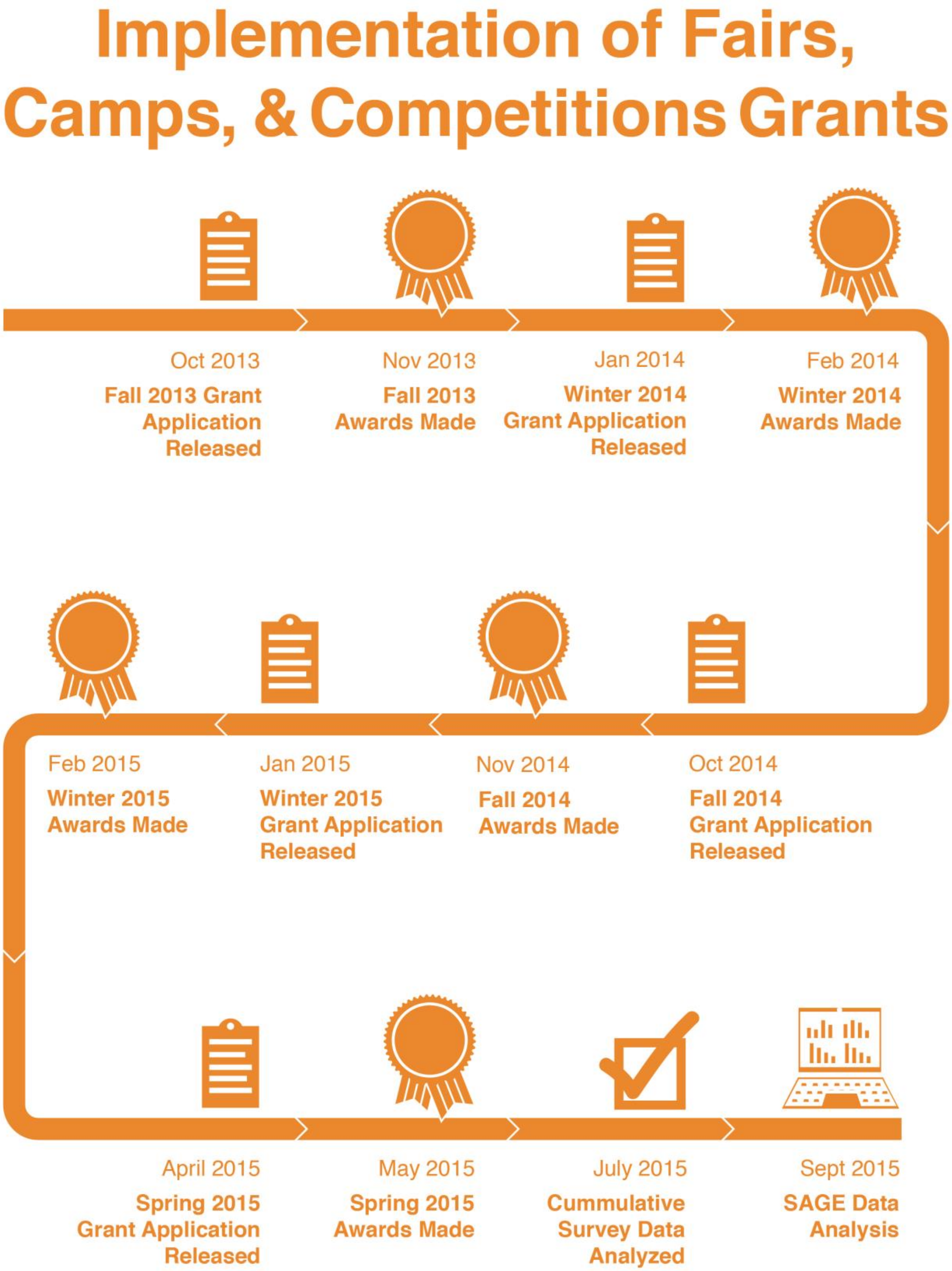


Figure 6. Timeline for Implementation of the Fairs, Camps, and Competitions Grants

Teacher STEM Endorsement Program Grants

From the HB 150 legislation there is $1.5 million in funding allocated to support teachers to take courses as part of newly developed STEM endorsement programs across the state. There were seven partnerships awarded grants to implement a STEM Endorsement program. The school district in the lead partners section of Table 15 manage the grant project, and the funding supports teacher tuition for these programs. Each award was $100,000 per year for 2 years to serve 250-350 teachers for the first cohort. Data collection will begin during the 2015-16 school year. Currently the funding for each partnership is scheduled to be distributed across three fiscal years (FY15, FY16, and FY17).

This grant project is unique in that Utah State Office of Education (USOE) and the STEM Action Center jointly manage this project. Sarah Young, the liaison between the STEM Action Center and USOE, is the project coordinator. Sarah Young sent out information about the grant application process to school districts in Utah in December 2014 (as shown in Figure 7Figure 7). In January, Sarah Young designed and coordinated a grants day, which she referred to as "speed dating," where district leaders circulated among higher education groups to discuss partnership opportunities for a STEM endorsement program after an overview was provided about all of the expectations for this grant program. The district and higher education partners submitted their applications in mid-January 2015 and then the STEM action Center made the awards in February 2015. In the spring, the partnerships began recruiting teachers to participate. In June 2015, Sarah Young met with the awardees to discussion the evaluation of the program. Most programs started fall 2015, when we will also begin collecting data for the evaluation.

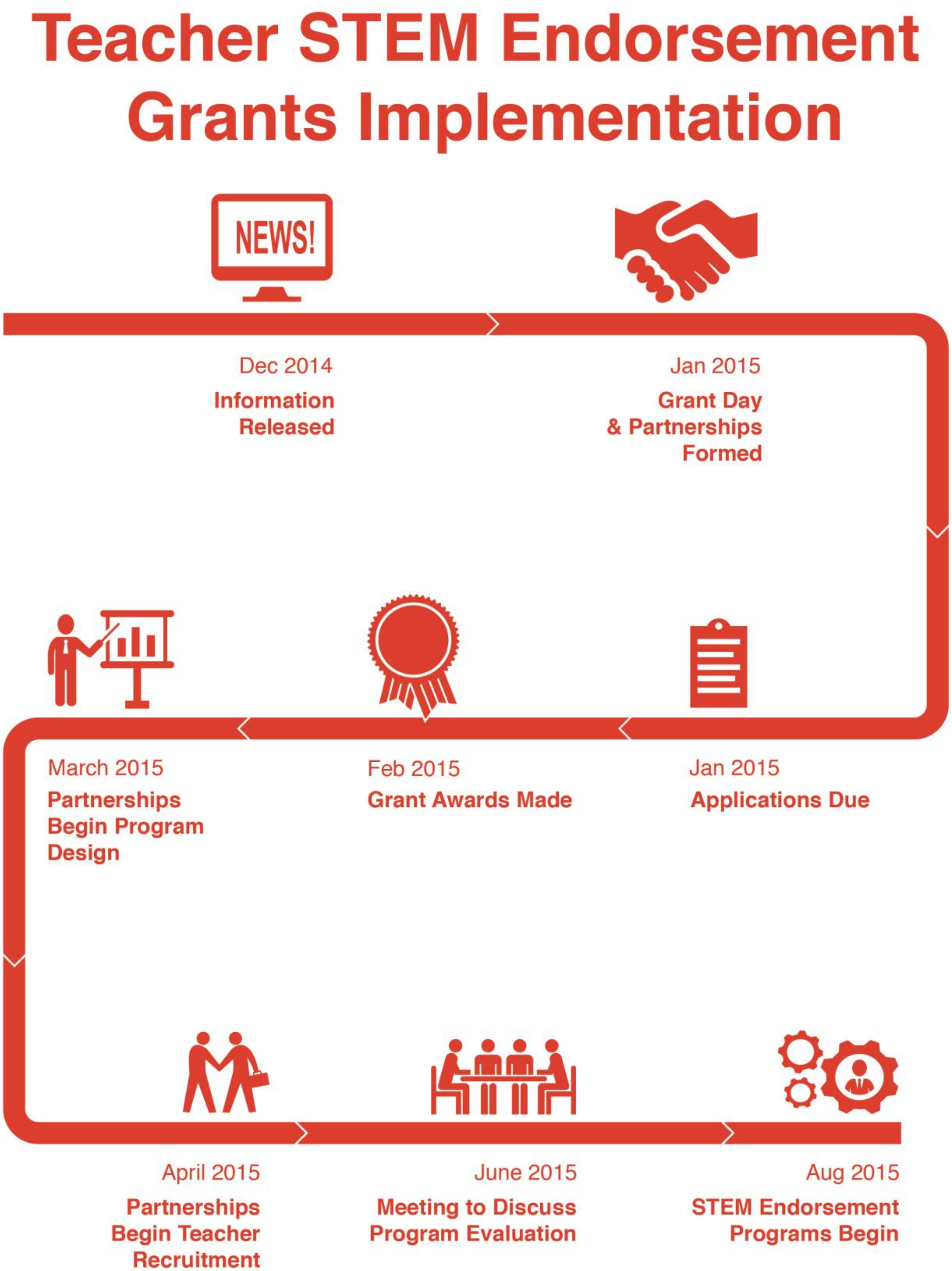


Figure 7. Timeline for Implementation of the STEM Endorsement Grants

Table 15. Overview of Partnership for STEM Endorsement Program Grants

Lead Partners	Partnering University	Partnering Districts	Other Partners	Partnering Charter Schools
Brigham Young University (BYU) and Alpine School District	BYU	Alpine, Wasatch, and Nebo School District	None	Mountainville Academy, Lincoln Academy
Weber State University (WSU) and Davis School District	WSU	Davis	None	DaVinci Academy
Utah State University (USU) and Weber School District	USU	Weber, Box Elder, Cache, Emery, Grand, Logan, Ogden, and Uintah School District	None	None
Utah Valley University (UVU) and Provo School District	UVU	Provo and Park City School District	U.S. Synthetics Corporation, Edivation (School Improvement Network)	None
University of Utah (U of U) and Salt Lake City School District	U of U	Salt Lake City and Granite School District	None	None
Dixie State University (DSU) and Washington county School District	DSU	Washington County School District	None	None
Southern Utah University (SUU) and Southwest Education Development Center	SUU	Iron, Canyons, Jordan, Washington, Garfield, Millard, and Kane School District	None	George Washington Academy, Valley Academy, Gateway Academy

We reviewed the applications from the partnerships to understand some of the similarities and differences that could inform the evaluation design. In Table 16, we summarize the recruitment strategies, the plan to recruit charter schools, the number of teacher cohorts planned, and the resources available as described in the application.

Table 16. Summary of Teacher Recruitment and Resources Planned

Partnership	Teacher recruitment	Plan to recruit teachers from charter schools	Number of teacher cohorts	Resources or capacity
BYU and Alpine School District	No recruitment criteria (teachers invited to participate)	Yes (charter schools are part of the partnership)	2	Curriculum personnel, meeting rooms, instructors, USOE support, STEM Action Center support, support from businesses
WSU and Davis School District	The partnership will recruit individuals or collaborative groups showing promise of sustained interest and ability to lead, and from high-need schools showing a broad base of wanting STEM training.	Yes (teachers from DaVinci Academy have committed to participating)	2	Faculty and their expertise, science materials & resources from the Center for Science and Math Education (at WSU), PESTL summer courses
USU and Weber School District	Each partnering district (8 total) will be allowed to use their own criteria for selecting participating teachers.	Yes (partnering LEAs will contact the charter schools within district boundaries to invite participation - "charter schools will be given the opportunity to fill additional spaces beyond the grant-funded slots)	1 (a 1-cohort/2 section model)	The proposal lacks a description of this area.
UVU and Provo School District	The partnership will take applications from individual teachers, who will then be selected based upon interviews conducted by partnership representatives.	No (they say PSD and PCSD will collaborate to recruit 20 percent of teachers from schools serving disadvantaged or low income student populations)	not specified	Edivation as a business partner, mentors from the Park City Center for Advanced Professional Studies, use of Canvas LMS, UVU administrative personnel
U of U and Salt Lake City School District	Teachers selected based on their teaching and leadership experience, a written statement of their teaching and leadership	Yes ("8 teachers will be recruited from other LEAs or area charter schools")	1 (a 1-cohort/2 section model)	Specialists in curriculum, educational technology, and CTE, educational

Partnership	Teacher recruitment	Plan to recruit teachers from charter schools	Number of teacher cohorts	Resources or capacity
	goals, an administrator's recommendation, and a signed statement of commitment to the program.			facilities, faculty with relevant research experience, the high quality science education program at the U of U.
Dixie and Washington county School District	Left to the discretion of the district and charter school partners	Yes ("Five spots will be reserved for charter school and/or outside districts teachers)	1	The proposal lacks a description of this area.
SUU and Southwest Education Development Center	"We will work with anyone who wishes to join our training" (p. 11).	Yes ("Local charter school teachers will participate with public school teachers") -they do have Charter School partnerships	2	Instructors, hands on materials, technology support, science materials, administrative resources, STEM content instructors

We also reviewed differences in the program that the teachers would receive (Table 17). There were differences in the description of the qualification of the staff providing the curriculum, differences in the expected tuition costs covered by the grant, and differences in the types of projects that teachers would engage in. However, all are to follow the framework provided by USOE.

Table 17. Overview of Grantee Staff Qualifications, Tuition, Projects, and Sustainability

Partnership	Staff Qualifications	Tuition	Teacher Projects	Sustainability Plan
BYU and Alpine School District	Not specified	$360.00 per teacher per course	Not described	Teaching responsibility will transition from BYU to the LEAs; however, BYU will continue to offer credits for the courses. The LEAs will continue to develop relationships with STEM-related businesses to provide

Partnership	Staff Qualifications	Tuition	Teacher Projects	Sustainability Plan
				teachers with STEM experiences. Teachers will be asked to stay in their LEAs to become future program instructors.
WSU and Davis School District	1 PhD in Science and Math Education, 1 PhD in Science	$240.00 per teacher per course	Collect and analyze video of their own lesson episodes. A final project in which students write a proposal, make lesson plans, collect data, and write a reflection.	An established partnership between WSU and DSD, which will expand to include WSU's College of Science
USU and Weber School District	1 PhD science education, 2 PhDs STEM education	$155.00 per teacher per course	Not described	Build capacity in participating organizations to support for teacher education of STEM endorsements. The training program results in a cadre of master teachers that can lead future cohorts.
UVU and Provo School District	1 PhD instructional leadership, 1 MS educational leadership, 1 PhD teacher education, 1 PhD curriculum & instruction	Teachers will receive a stipend of $250.00 per course, and pay a 1 time fee of $35 and $45.00 per course.	Not described	Provo SD will continue to manage the administrative aspects of the program. SOE at UVU will manage the coursework, and pursue further funding through grant writing.
U of U and Salt Lake City School District	1 MEd, 1 MS Instructional Design & Educational Technology, 1 MS Curriculum & Teacher Education, 1 PhD Geology, 1 PhD Teacher Education	The grant covers teacher tuition – but teachers will need to pay a $50 recording fee per course.	Not described	Sustainability is expected due to a strong demand for STEM education and endorsements in partnering school districts in the form of STEM elementary schools. Support from the Center for Science and Math Education at U of U.

Partnership	Staff Qualifications	Tuition	Teacher Projects	Sustainability Plan
Dixie and Washington county School District	1 MEd, 1 PhD in Teacher Education, 2 PhDs in Curriculum & Instruction	The grant covers teacher tuition – no other fees are expected	Practicum experiences	Sustainability is supported by their commitment to developing a cohort of educators that possess the skills and abilities to provide leadership within southern Utah.
SUU and Southwest Education Development Center	1 PhD in Science, 1 Masters Education & Administration, 1 Masters Administration, 1 Masters Instructional Technology	Teachers will receive a $500.00 stipend for the 2 years, intended to cover course recording fees		Teachers initially trained in the program will serve as future endorsement instructors, supported by program development, grant funding, and PD.

We noted differences in the delivery of the instruction to teachers for each program as shown in Table 18.

Table 18. Overview of the Method of Delivery of Instruction and Model

Partnership	Online courses	F2F Courses	Blended
BYU and Alpine School District	No	Yes	No
WSU and Davis School District	No	Yes	No
USU and Weber School District	Yes	Yes	Yes
UVU and Provo School District	Not Addressed in the Proposal		
U of U and Salt Lake City School District	No	Yes	No
Dixie and Washington county School District	Not Addressed in the Proposal		
SUU and Southwest Education Development Center	No	No	Yes

While we are doing the external evaluation of the entire STEM Endorsement grant program, the STEM Action Center requires each grantee to conduct their own internal evaluation to understand specific outcomes for teachers in their program. We will be contacting the grantees to determine if any of this data should be collected to understand outcomes across the grant program where similar data is collected. Therefore, when looking at the proposals, we focused on the evaluation plans and types of data to be collected (shown in Table 19) to see if there were common areas across grant programs that could be evaluated. This would be in addition to the plan to look at student SAGE data for students of teachers participating in the STEM Endorsement program compared to students of similar teachers in similar schools in the state who did not participate in this program.

Table 19. Summary of Grantee Internal Evaluation Plans

Program Evaluation	Evaluation Design	Evaluation Measures (Variables)
BYU and Alpine School District	Not addressed	Grades from coursework of participating teachers. Pre- and post-surveys of teachers' confidence in teaching STEM subjects. Changes in students' scores from SAGE as well as classroom average scores from SAGE. Surveys from parents and students; formal and informal classroom observations; conversations with participating teachers.
WSU and Davis School District	Not addressed	Pre- and post-tests of teachers' STEM content knowledge (matter, force, engineering, data analysis, problem solving, the nature of science). Changes in the content of teachers' lesson plans. Data from observations of teachers' classrooms (videotaped) and and observation protocol. Students' SAGE scores and other district tests. Analysis of students' STEM projects. District teacher evaluations and WSU course evaluations.
USU and Weber School District	Use of mixed methods; cross section, pre- and post-measures, multiple repeated measures; effect sizes	Changes in teachers' STEM content knowledge; instrument developed by Nadelson & colleagues to measure changes in teachers' knowledge of core STEM teaching practices; observations of teaching practices using observation protocol (level of inquiry, level of engineering design); teachers' level of participation in STEM education leadership.
UVU and Provo School District	Not addressed	Use of assessment instruments developed to align with policy documents such as: NGSS; Interstate Teacher Assessment and Support Consortium (InTASC) Standards; Utah Science Standards; Utah Effective Teaching Standards. Pre- and post-changes in suitable assessments for teachers' STEM knowledge, practice, and pedagogy

Program Evaluation	Evaluation Design	Evaluation Measures (Variables)
U of U and Salt Lake City School District	Within subjects design	Teacher knowledge: Content knowledge test based on the Misconceptions Oriented Standards-based Assessment Resource for Teachers and NAEP items. Changes in teaching practices will be measured using the self-report assessment from the Introducing Teachers and Administrators to the NGSS from NSTA. Changes in teacher pedagogy will be measured from teachers' lesson plans using a nationally normalized rubric.
Dixie and Washington county School District	Mixed methods: quantitative methods with analysis methods such as t-tests and ANOVA; qualitative analysis of classroom observations	Changes in: STEM content knowledge (pre- and post-tests and classroom observations using protocol); teaching practice (lesson plans); teacher pedagogy (alignment with NGSS Standards classroom observations); STEM teaching efficacy (Science Teaching Efficacy Belief Instrument)
SUU and Southwest Education Development Center	Participating teachers will experience model lessons, guest speakers, field trips and other authentic experiences	STEM content knowledge assessment (40 "closed choice" items written by 4 STEM content and 2 pedagogy specialists); teaching practice assessment (40 open response questions also written by their specialists, meant to align with NGSS teaching practice standards). Pre- and post-evaluations of lesson plans on a specific topic, evaluated for STEM practices and high quality content. Observations of teachers when teaching a STEM lesson, rated according to a STEM instrument, based on the Utah Effective Teaching Standards.

There was also a distinguishing feature of the SUU and Southwest Education Development Center proposal that we would like to highlight.

> *Upon completion of the STEM Endorsement (May 2017), 10-12 teachers will be selected to attend an intensive three day "Train the Trainers" course (June 2017) designed to teach them how to present the STEM Endorsement to teachers in their own districts. These teachers will return to their districts with the ability to sustain the STEM Endorsement well beyond the timeline of the grant.*

This seemed like a noteworthy approach to sustainability that can influence the long-term evaluation plan of the grant program outcomes.

Chapter 3. Evaluation Design

Measuring Product Distribution and Usage

Data Collection

We collected data regarding product distribution and usage to address three questions:

- To what extent has demand been met by current levels of product distribution?
- To what extent are students and/or teachers using the products distributed?
- What percent of students using the products are using them at an amount recommended by the product providers?

For each grant program, we coordinated requests for data with the providers of the products on a monthly basis. We set up a secure portal for data transfer with upload-only access. Each month the providers of each grant program uploaded data on the number of licenses distributed by providing an Excel or csv format file with user level data documenting the license username, district name, school name, participant name and any usage data available. Some products have usage at the level of time, others have a count of logs into the program, and there are a variety of other usage data types depending on the product and providers.

We also collected from the providers their recommended level of usage, which we refer to as a "fidelity of implementation benchmark." This way we can see which students are meeting this benchmark. In May, we requested that the usage data file include a flag of "1" if the participant met the fidelity benchmark and "0" if he/she did not meet the benchmark. This way we could conduct our impact analysis of effects of the product on the state assessment performance for all participants and a separate analysis of effects for participants who met the benchmark.

Data Analysis

Each month we reviewed the usage data provided by each vendor. Each license user counts as a license distributed, because the license "username" is documentation that the STEM Action Center spent funds for the participant (student or teacher) to use the license within a district or charter. However, sometimes there were anomalies in the data that we had to follow-up on with the provider. For example, a vendor gave us data for a school that was not in the grant program. This school had purchased the product with their own funds. We had to clarify with the provider that we needed data for only participants funded through the STEM Action Center project. Another vendor has a product that addresses other subjects besides math, and some schools received some licenses in a prior year through a reading initiative in the state. In the first few months of data collection, the high number of licenses the vendors had distributed surprised us. Then after researching, we discovered they were also including licenses covered by another legislative initiative for reading. We researched anomalies each month to understand license distribution.

While distribution is important as documentation of the STEM Action Center meeting the needs and requests of students, more important is actual usage. Each month we reviewed the data to determine usage. For each product, we selected a variable (e.g., time of use, number of problems completed) and summed the number of licenses according to this variable as usage. We then reported the usage percent by product monthly to the STEM Action Center. This allows for risk management on the part of the project manager at the STEM Action Center. The Project

Manager contacted products with low usage rates and low distribution rates to encourage the provider representatives to connect with schools to provide support. At the end of the year, we calculated the percent of participants who met the fidelity of implementation benchmark based on the data the vendors provided. Not all vendors could provide benchmark information, because of the design of their product. However, we provide the information we did receive in the results section of this report by vendor and product.

Measuring Product/Program Effectiveness

Data Collection

We collected data regarding product/program effectiveness to answer two broad questions:

- Do students participating in programs funded by the STEM Action Center grants experience statistically significantly greater gains on the state SAGE assessment than similar students, in similar schools, in the state of Utah?
- Do students participating in programs funded by the STEM Action Center grants, *who are meeting the fidelity of implementation benchmark,* experience statistically significantly greater gains on the state SAGE assessment than similar students in similar schools in the state of Utah?
- To what extent are similar gains made on the state SAGE assessment for different subgroups (gender, eligibility for Special Education, economically disadvantaged students, and English Language Learners)?

We conducted this part of the evaluation per the direction of HB 139 and HB 150 and under the guidance of the Utah STEM Action Center to understand the effectiveness of different products, services, and programs provided through the grant programs. We see to understand changes in student achievement and interest in STEM with the long-term goal of increasing college mathematics readiness, career readiness, and completion of a post-secondary degree. The STEM Action Center, the Utah State Office of Education, and local education agencies may use the findings to inform decisions when selecting technology and training to implement in Utah schools.

In April 2015, we sent district and charter contacts an Excel file of all students by school who had received a license as of the end of February as part of the STEM Action Center grant programs. We requested that the district and charter leaders add in each student's State Student Identifier (SSID) and for any grant directly providing service to teachers, we requested each teacher's Cactus ID. Using the teachers' Cactus IDs, we are able to access data for their students, to understand whether professional development for teachers has an effect on student achievement.

At the start of each grant program, the STEM Action Center sent the district/charter contact a letter of information for students' parents in English and Spanish. This explained to parents the purpose of the STEM Action Center grant program and the data we would be collecting to evaluate the program. This letter gave parents an opportunity to decline having their child's data included in the evaluation, but still be able to have their child participate in the program by using the product or service. Representatives from each school collected the forms returned by parents signing that they declined having their child's data used in the evaluation. Schools sent these forms to us by mail or e-mail. We maintained an ongoing record throughout the year of these "opt-out" students whose data we would not use in the evaluation.

Once we received the SSID files from districts, we removed any student on the opt-out list. We also reviewed the data for anomalies and followed up with districts and charters as needed. For example, while we were requesting the State Student Identifier, some districts use their own internal student identifier, which is a shorter number. If a district provided us with this district student identifier, we would have to request that they resubmit the file with the correct State Student Identifier.

The process of collecting SSIDs was challenging. We set up a secure portal for secure upload-only access for districts to upload their SSIDs to us. We provided technical support as needed for district and charter contacts who had difficulty figuring out how to use the secure portal. We emphasized that it would not be appropriate to e-mail or share the SSIDs in any other manner except through the secure portal. We had provided the district/charter contacts with a sample file structure and a file with the student names in it, so all they had to do was add the SSIDs. However, some district/charter contacts either did not have time, capacity, or understanding of how to do that; instead they uploaded pdf files of SSIDs for all students in their district.

Several large districts uploaded pdf files, instead of following the directions we had provided and using the file we had provided. This added significant time to the process, because we had to convert the pdf files to a format that we could use for data (Excel or csv), and then we had to locate the students participating in the STEM Action Center grant programs. Some data was lost through this process if we could not make an exact match between the name of a student given to us from the product provider and the name of the student in the district/charter school data file. However, we did our best to use the data available to identify as many students as possible within these large district pdf files.

Once we had the complete list of students and their SSIDs by district/charter school, we added in a flag (numerical code) for the grant program and product name in which they were participating. We also added a flag (1 = yes, 0 = no) for whether they met the recommended fidelity of implementation usage benchmark, and a variable for usage (e.g., time in minutes spent in the program) depending on what the provider had available.

In July 2015, we provided this SSID file to USOE after our data request was approved. Then USOE returned to us a de-identified data set with the variables listed below for all students in the state grades 4-12:

- Unique **student identifier** (Randomly generated, not the actual student ID, does not contain any identifiable information)
- Unique **school identifier** (Randomly generated, not the actual school name, does not contain any identifiable information)
- School **locale** (if available, data on whether the school is in is in an urban, suburban, or rural area)
- Student **characteristics** (gender, ethnicity, English Language Learner status, eligibility for free or reduced lunch, special education status)
- **Study Year** of individual student achievement from **2014-15** academic year SAGE Assessment Score (Language Arts, Mathematics, and Science) (The overall score for each student for each content area or any other related data that would be recommended for use in determining change in student achievement).

- **Prior Years** of individual student achievement from **2012-13** academic year SAGE Assessment (Language Arts, Mathematics, and Science) (The overall score for each student for each content area). [Note: we use prior year achievement data to match students through the propensity score matching process.]
- **Grant Program** STEM Action Center grant (Variable in a file provided by USU to USOE with all student SSIDs for students participating in the grant programs with flag for grant program)
- **Fidelity of Implementation** (Variable in a file provided by USU to USOE with all student SSIDs for students participating in the grant program with value of fidelity of implementation, such as usage time)

For the STEM Professional Development Grant we obtained from districts and charter schools the participating teacher Cactus IDs. We requested that the USOE data manager include a variable flag in the student data file for all students of teachers with a Cactus ID participating in the STEM Professional Learning Grant. We list the variables requested to be included in the data file below:

- **STEM PD Grant** (A flag for students of a teacher participating in the STEM PD based on a list of Cactus IDs provided to USOE. This was a numerical flag based on the product numeric code we assigned and provided in our Cactus ID file to USOE)
- **Teacher Cactus ID** (This comes from a list of Cactus IDs provided for all teachers participating in the STEM PD Grant used to located student SSIDs to create the flag for the students of teachers in the STEM PD Grant variable above)

It also came to our attention that some other schools in Utah purchased and used some of the products used in the STEM Action Center grant programs during the 2014-15 school year. It was important to remove students from these schools in the comparison group, since they were using the same programs. Therefore, we requested from each provider a list of schools in Utah using their product. We included a variable in our USOE data request to have schools in Utah flagged with a code representing the products we had knowledge they were using. This way we could make sure to remove any students in the comparison group using the product purchased by their school prior to conducting our analysis.

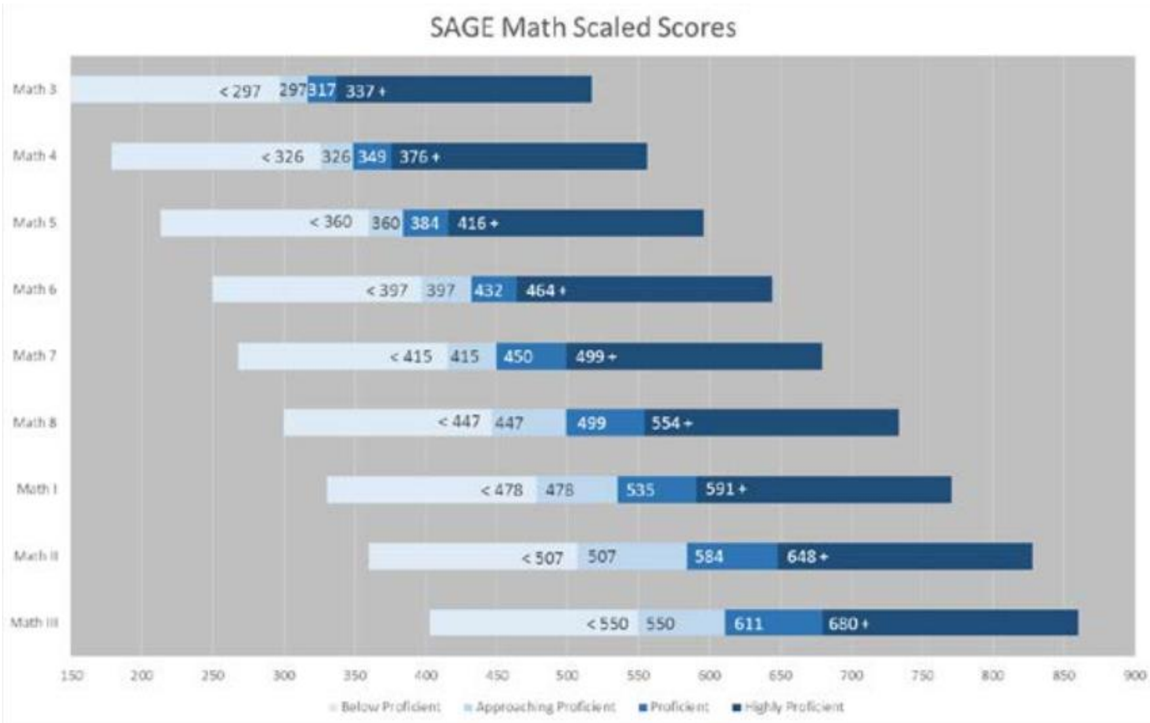
Since schools in Utah test students beginning in 3rd grade, and we need prior year baseline achievement for the 2013-14 academic year, we can only include students in grades 4-12 in this effectiveness evaluation. This data file was also to include students in grades 4-12 in Utah schools during 2014-15, which included students participating in the STEM Action Center grant programs. The USOE data manager merged our file with the student SSIDs for students participating in STEM Action Center grants with the data file for the entire state and flagged the STEM Action Center participants along with data on STEM Action Center grant program/product. The USOE data manager de-identified the data before sharing it with us through a secure file transfer process. Therefore, we cannot tell who the students are, which districts are which, or which schools are which. Only numbers are included in this file. We use this file to conduct analyses to understand the effectiveness of products/programs implemented through the STEM Action Center grants in order to add to an understanding of STEM best practices in the state.

Data Analysis

Once we received the data file of SAGE assessment results from the Utah State Office of Education, we established our analytic sample. The analytic sample is the sample of students in the STEM Action Center grant programs and the comparison students in the state not using any product or program in the STEM Action Center grants. We further reduce this data to include students with complete data, more specifically, students with SAGE assessment data for 2013-14 and for 2014-15. Next, we compare the achievement of students using the technology products with students not using the technology products by matching students based on similar student characteristics (prior achievement and student demographics).

One added complexity to this analysis is that the SAGE assessment is a vertical scaled score. For example, a 410 in ELA 5th grade is not the same as a 410 in ELA 6th or ELA 7th grade. While a 410 may be proficient in 5th grade, a 434 is required for proficiency in 6th grade and 450 in seventh. However, by matching students, they are starting in the same place and we are looking to see if the ones in the matched group are making the same amount of progress or if they are making a markedly different level of progress after participating in the grant program.

In addition, we can only compare the scores for students participating in the STEM Action Center grants to scores for students in the matched comparison group if they are taking the same test. For example, in high school students may take Secondary Math 1, Secondary Math 2, and Secondary Math 3 courses. For students matched based on taking Secondary Math 1 in 2013-14, we can only compare outcomes if the matches took Secondary Math 2 in 2014-15. If a student failed the course and needs to repeat Secondary Math 1, we would only be able to include the student in the analysis if we were able to match them to another student who failed the course and needs to repeat it. This way we are comparing similar students. An example of the SAGE Math vertical Scale Score is provided in Figure 8.



Note: This image was captured using screen capture from a publically available document retrieved from the following website: http://schools.utah.gov/assessment/SAGE/ResultsCompanion.aspx.

Figure 8. Example of Vertical Scale Scores for the SAGE Math Assessment

We used a method called propensity score matching (PSM) to create this matched comparison group. Through matching students in the program to students not in that program using the propensity score, a quasi-experimental control group is formed which balances the two groups in terms of important demographic and achievement variables related to the ultimate desired outcome—student achievement in mathematics. Using the spring 2015 state achievement scores, we compared the student achievement for the two groups to see if there is a meaningful difference. There are limitations to PSM (as is the case with assessing programs already in use); however, it is the next best approach to use when looking at program effectiveness.

Specifically, we used the MatchIt package in R to increase the equivalence of math pretest scores for intervention and control students through propensity score matching. Prior to matching the data set was split into 12 different files based on mathematics pretest-posttest test combinations (e.g., 3rd grade pretest/4th grade posttest, 4thgrade pretest /5th grade posttest, . . ., secondary math II pretest/secondary math III posttest). We then conducted a nearest-neighbor matching algorithm with 1-to-1 matching for each test combination using the model: intervention ~ mathematics pretest scaled scores. Finally, we merged the matched data sets.

After matching students in the grant programs to similar students in the state, we compared the characteristics of the grant program students to the comparison students to see if there were any characteristics or achievement performance that differed significantly that we should control for in our impact analysis. Once we reviewed the baseline differences across products, we decided on the covariates to include in the statistical model to determine impact of technology use on achievement. In Appendix C, we provide tables with baseline-equivalence comparison information for each product included in the impact analysis.

What is most important is that the two groups are equivalent on the pretest achievement score, since prior research has shown that prior achievement explains greater differences in achievement than any other student characteristic. We first matched students on their scale score achievement in groups by the test they took, since scale scores are not comparable across tests. Once we matched the students in the grant program to similar students in the state by test, we then recombined all students across tests for our analysis of baseline characteristics between the two groups.

We conducted this baseline comparison for all students with any evidence of usage or participation in the grant program, which we refer to as the full sample. Then we conduct a similar baseline comparison for only students who met the recommended level of usage according to the provider, which we refer to as the fidelity sample. In each case the comparison is with the similar students in similar schools in the state, a group created through the propensity score matching process. For some products, either no fidelity benchmark was available or there were not sufficient students who met the fidelity benchmark to include in our analysis.

After creating the matched comparison groups and conducting the baseline equivalence analysis, we conducted a follow-up logistic regression using proficiency on the math posttest as a binary outcome variable. The predictors in the model were the following student-level variables: intervention, students eligible for free or reduced price lunch, special education, English Language Learners, gender (female), proficiency level on the mathematics pretest, and proficiency level on the language pretest. We treated the proficiency levels as categorical variables, where “1” was the lowest proficiency and “4” was the highest proficiency level. We corrected the Standard errors and related significance levels for clustering of students within schools using bootstrapping with school ID as a stratum. The outcome, an odds ratio provides information on whether any impact is in favor of the students using the technology or the students in the comparison group. The group favored is more likely to have met proficiency on the SAGE assessment. We also include an effect size calculation for this odds ratio, which one can use to determine if the difference, or odds of meeting proficiency, is at a level that one can consider educationally meaningful.

Measuring Changes in Student Interest and Engagement

Data Collection

Student Mathematics Interest Survey

We collected data regarding changes in student interest and engagement to address the following questions:

- To what extent do students participating in the STEM Action Center Math Technology grant programs experience change in their interest and engagement in mathematics?
- To what extent do students participating in the STEM Action Center Math Technology grant programs experience change in their perception of the value of mathematics?
- To what extent do students participating in the STEM Action Center Math Technology grant programs experience change in their perception of the difficulty of mathematics?

To determine if the implementation of mathematics technology products had an effect on student interest and engagement in mathematics, we administered a validated mathematics engagement survey (Eccles & Wigfield, 1995), as a baseline and outcome measure. This Math Interest Survey assesses several different constructs related to students' self-perceptions of abilities, perceived task values, and perceived task difficulties in relation to mathematics. The survey contains 19 items measuring six factors of mathematics interest and engagement: Intrinsic Interest Value, Attainment Value/Importance, Extrinsic Utility Value, Ability/Expectancy, Task Difficulty, and Required Effort. We outlined these factors in the Preliminary Evaluation Report presented to the STEM Action Center in February 2014. Therefore, our hypothesis is that a strong mathematics technology product will not only improve a student's mathematics performance, but will also improve their interest in mathematics as demonstrated by improvements in their beliefs about their ability, their beliefs about the value/utility of mathematics, and the level of difficulty of mathematics.

For K-5 students, we decided that the above-mentioned survey might be too complex to follow, which is why we revised it to be shorter and to use simpler language. We transformed the Likert scale items into a visual response method of a smiley face, where students can move the mouth from happy, and neutral, to sad along a 1 to 5 scale. We also included a Yes/No item about the utility of math for the future and an item about the difficulty of math tasks that used a dial visual on a scale from one to 10.

Fairs, Camps, and Competition Participation Survey

We collected data to understand what students learned from participating in a fair, camp, or competition (FCC) and to answer the following questions:

- To what extent do participants in the STEM Action Center FCC grant program have prior experience with a person who has a job in a STEM area?
- To what extent do participants in the FCC grant program know about a STEM job that interests them?
- What did students learn from participating in a fair, camp, or competition with a STEM focus?

- How do students plan to share what they learned with others?

We used a qualitative research approach to collect data about student perceptions through a survey with four open-ended questions. The STEM Action Center sent each of the 1,393 students who received a grant to attend an FCC a link to the survey with a requirement to complete the survey prior to receiving their grant. We received data from 639 students who completed the survey. We also collected student achievement data on the state SAGE assessment in August 2015 to understand achievement effects. While these FCC activities are relatively short, research supports the potential for changing interest and motivation, factors related to achievement.

Data Analysis

Student Math Interest Survey

Based on the pre- and post-survey data for students using the available math educational technologies, we verified the factorability of the 19 items on the secondary survey with a Confirmatory Factor Analysis (CFA). We tested a series of CFA assumptions following Yong and Pearce (2013), including examining the correlation matrix, checking the Kaiser-Meyer-Olkin Measure of Sampling Adequacy, and checking the Bartlett's test of sphericity (Sarstedt & Mooi, 2014; Neil, 2008). The results show performing a CFA was appropriate for the analysis of the 19 items.

In particular, we used principal components analysis with varimax as the rotation method (Sarstedt & Mooi, 2014). The number of factors extracted was decided according to the commonly used Kaiser criteria (Kaiser, 1960). Overall, the CFA yielded three factors:

expectancy (students' perception of their math ability), task difficulty (perception of the difficulty of math tasks), and task value (perception of the value of math tasks). To analyze secondary survey data, we first created average scores by student for each of the six subscales. We then used a paired sample t-test to determine if there was any significant change from pre- to post-test on any of the factors overall and per product. We did this same process for the three factors extracted: perceived task value, expectancy, and perceived task difficulty.

We conducted an exploratory factor analysis (EFA) to understand the relations between the eight items of the K-5 survey we had created, using R (version 3.2.1) with the "psych" and "nFactors" packages. Three items loaded onto the same factor, which was labeled "intrinsic interest" since these items were created from those items on the secondary survey. For the remainder of the items, we decided to report the results of each question separately. We used McNemar's Test for one item that had Yes/No values (Will you need math when you get older and get a job?) and Wilcoxon Signed-Rank Test for the other items, which had numeric, scales of either 1 to 5 or 1 to 10. We used these tests to determine if there were significant changes in responses from the beginning of the year to the end of the year after experiencing the education technology products.

Fairs, Camps, and Competition Participation Survey

The federal government has called for an increased focus on STEM throughout the education system (The White House, Office of the Press Secretary, 2010), and seeks to ensure that there will be sufficient talent to meet industry needs; business leaders have begun partnering with schools to bring in more STEM learning experiences (Barnett, 2012). The overarching goal is to sustain economic growth by increasing *interest* in STEM fields and preparing the rising generation with the 21st century skills required to succeed in today's workforce.

Fairs, camps, and competitions (FCCs) that focus on the development of STEM skills and knowledge provide students with interdisciplinary, hands-on learning experiences, Researchers have made the claim that interest in STEM fields and 21st century skills are both cultivated through such highly engaging activities. A recent study by Potvin and Hasni (2014) reviewed the literature concerning STEM FCC and found that not only did participation positively affect interest, motivation and attitude, but also this change was positively correlated with student performance in STEM subjects. Studies have also shown that STEM interest, self-efficacy, and content knowledge can increase the rate of matriculation into stem majors (Innes, Johnson, Bishop, Harvey, & Reisslein, 2012; Hendricks, Alemdar, & Ogletree, 2012; Yilmaz, et. al., 2010; Melchior, Cutter, & Deshpande, 2009; Sahin, 2013).

Although many studies have shown an increase in STEM interest among FCC participants, it is still unclear whether the interest in STEM was a direct result of the FCC. Sahin, Gulacar, and Stuessy (2014) investigated student perceptions of factors that have influenced their interest STEM and STEM related careers. They found five factors to be of primary influence on their STEM interest: science teachers (31%), personal interest (24%), parents (20%), science fairs/Olympiads (11%), and the availability of jobs and related salary (5%).

While such experiences appear to be effective at promoting participants development and interest, many students are unable to afford participation. We investigated student perceptions of the effects of grants to participate in FCCs across a statewide initiative to increase student interest and learning in STEM related subjects. This is particularly important considering that though these grants were awarded to individuals or teams, the grants were intended to produce statewide effects.

We open-coded the student responses to understand some of the key response categories and themes related to the research questions (Strauss & Corbin, 1998). For each of the four survey items we provide in the results section tables summarizing the greatest percent of student response categories.

Measuring Changes in Instruction

Data Collection

Classroom Learning Environment Survey

We collected data to understand how teachers and students perceived their classroom learning environments for the CTE Applied Science program, and to address these questions:

- How do students and teachers perceive their classroom learning-environment in terms of the ability of students to take responsibility of their learning and engage in hands-on experiences?
- How do student and teacher perceptions about their classroom learning-environment differ?

To examine how students and teachers perceive their classroom learning environments, we created a survey based on the Constructivist Learning Environment Survey (CLES) used in Johnson and McClure (2004). The CLES survey was developed by prior research (Taylor, Fraser, & Fisher, 1997) and has been applied to science, mathematics and engineering education contexts to enable educators and researchers to measure students' perceptions of the extent to which constructivist approaches are present in classrooms. This is an approach that focuses on students as co-constructors of knowledge rather than more traditional instruction, primarily lecture based, where the teacher is the transmitter of knowledge. For both the CTE Applied Science grant program and the Professional Learning through video-platform, grant program the emphasis was on STEM learning experiences that engage all students, such as hands on learning experiences in STEM. To determine if there were changes in the classroom learning-environment because of these grants, we sought to administer the CLES survey at the start of the grant program and at the end of the school year.

We planned to administer this survey to both teachers and students. This way we could compare the responses. Sometimes teachers belief they have given students control over part of their learning or opportunities to work with other students collaboratively, but students do not recognize this as common practice in their classroom. An outcome that instructional leaders can communicate to teachers and to the program is that while teachers are beginning to shift their practice to allow students to take more responsibility for their learning, it may not be consistent enough or strong enough of a change for students to recognize this as a practice in their learning environment. Actual strong change in practice would result in similar high ratings on these types of practices by both teachers and their students.

Teacher Observation Videos

We collected data from classroom videos shared by teachers participating in the Professional Development grant program to address these questions:

- To what extent do teachers communicate student, learning objectives?
- How aligned are the instructional activities with the learning objectives?
- To what extent are students engaged in learning?
- To what extent do teachers differentiate instruction?

- How do teachers assess student learning and monitor progress?

To understand the effect of PD on teachers' teaching practice, we used a rubric to evaluate teachers' pre and post instructional videos (See Appendix B for Rubric). This rubric consists of five items – 1) student learning targets were clearly communicated, 2) instructional activities led students towards meeting the objectives, 3) students were actively engaged, 4) teacher differentiated instruction, and 5) assessments effectively monitored student progress. We assessed the instruction for each item in the rubric using a 4-point rating scale – not effective, emerging effective, effective, and highly effective. We developed the rubric descriptions from the Utah State Office of Education "Utah Teaching Observation Tool Version 2.0 DRAFT", which was publicly available on the USOE website for educator effectiveness. Currently there is a Version 3.0 that was made available July 2015 that we will consider using to assess instruction in videos uploaded during the 2015-16 school year.

There were four raters who were asked to watch and rate pre and post videos of five teachers doing instructional activities with their students, which ranged from 6 minutes to 20 minutes. For each video two of the raters were current classroom teachers in a PhD program focused on teacher education and leadership. The other two raters were graduate research assistants in a program focusing on instructional technology and learning science. The raters received a short training before they actually rated the videos, while the training showed them how to access the videos and use the SCINET rubric for the ratings. Two of the four raters completed individually the ratings of all ten videos and the other two raters (the two graduate research assistants) collaborated with each other to rate all ten videos coming to agreement on their final rating. Consequently, we counted these ratings as three sets of rating data for the analysis. The reason for this approach was that this was the first time the observation protocol was used in this manner, and the goal was to learn from this experience the strengths and weaknesses in order to prepare for next year when a much larger sample of videos is expected to be available for analysis.

Data Analysis

Classroom Learning Environment Survey

Both students and teachers were asked to complete the CLES survey about the practices that could occur in their class and how often each practice takes place (Almost Never = 1, Almost Always =5). The questionnaire consisted of 10 items in four subscales - Personal Relevance (2 items), Critical Voice (4 items), Shared Control (2 items), and Student Negotiation (2 items). Specifically, the items in the Personal Relevance scale are associated with the extent to which instruction in class relates to students' everyday out-of-school experiences and those in Critical Voice indicate the extent to which students think that it is beneficial to ask about their teachers' lesson plans and instructional strategies (Taylor et al., 1997). In addition, the items for the Shared Control scale mean the extent to which students have a chance to share with the teacher control and management for learning activities and those for Student Negotiation are about the extent to which students justify their own thinking to other students and assess other students' ideas (Taylor et al., 1997). Next, we created averages of the responses of students and teachers for each subscale of CLES. Then, we compare the average ratings for each subscale for teachers and their students to see where teachers rate the subscales higher or lower than their students rate the subscales. Finally, we also matched students' data to their teachers' data and then conducted a correlation analysis to understand if there were any statistically significant relationships between the teacher and student responses.

Teacher Observation Videos

Since we had multiple raters of each video we needed to begin by calculating the interrater reliability across the raters for each item and then the average score of all the five items, we used the intra-class correlation coefficient (ICC, one-way random) approach. In addition, we computed the mean differences between pre and post ratings for each item and the average score of all the five items. This method is appropriate when data comes from two or more raters.

In Table 20, we provide the interrater reliability values for the SCINET Items. Overall, four out of the five SCINET items achieved ICC values higher than 0.70, indicating substantial agreement across raters. For the first item regarding student-learning targets, we obtained an ICC value slightly lower than 0.60, which might be because the training did not make explicit whether the learning target needed to be physically written on the board, explicitly stated, or just explained in general to the students. In addition, what some raters might have considered a learning target, others determined was more of a general introduction to the lesson. We can improve the training to be more explicit of what counts as evidence. For the fourth item concerning differentiation in teaching, we achieved the highest ICC value of 0.77. Note that the ICC value based on the average score of all five SCINET items was 0.74, which implied the comparison between pre and post ratings using the mean is plausible.

Table 20. Interrater Reliability for the SCINET Items

Items	ICC	95% CI
SCINET #1. Student learning targets were clearly communicated.	.59*	-0.17 – 0.89
SCINET #2. Instructional activities led students towards meeting the objectives.	.73**	0.23 – 0.93
SCINET #3. Students were actively engaged.	.70*	0.14 – 0.92

Items	ICC	95% CI
SCINET #4. Teacher differentiated instruction.	.77**	0.36 – 0.94
SCINET #5. Assessments effectively monitored student progress.	.73**	0.24 – 0.93
Average Score of all five SCINET items	.74**	0.27 – 0.93

Note. ICC=Intra-class Correlation Coefficient; CI95%= 95% Confidence Interval. *p<.05, **p<.01.

Understanding Fidelity of Implementation

Data Collection

We collected data on fidelity of implementation benchmarks from the product providers in order to answer the following questions:

- To what extent do students use the products to the level recommended by the product provider?
- Is fidelity of implementation a significant predictor of greater performance gains on the SAGE assessment?

Technology providers provided an end of year cumulative usage file with a variable that identified the students who met the recommended usage level. This is defined fidelity of implementation, because it identifies students who implemented the product to the level recommended by the provider. Depending on the product, the provider determined what represents fidelity by either using variables such as usage time, levels completed, and/or student performance within the product (see Table 21). We used this information to understand differences in implementation across the schools in the pilot, whether schools are meeting the expected benchmark for implementation set by the product developer, and to understand patterns in usage across students within schools and across schools. In the final impact analysis, we also used this data to reduce the sample to only students meeting the fidelity of implementation benchmark to determine the effect on achievement for those students using the product at the recommended level. We provide available benchmarks for usage in the following table.

Table 21. Fidelity of Implementation Benchmarks Set by Product Providers

Product (Provider)	Grades	Description of Benchmark
ALEKS (McGraw-Hill)	K-5, 6-8, 9-12	Minimum of 480 minutes (8 hours)
Cognitive Tutor (Carnegie Learning)	9-12	Not available
EdReady (The NROC Project)	9-12	Not applicable *
Catchup Math (Hot Math)	6-8, 9-12	Not available
iReady (Curriculum Associates)	K-5, 6-8	30 minutes per week
Math XL (Pearson)	9-12	Not available
Odyssey Math (Compass Learning)	6-8	Not available
Reflex (Explore Learning)	6-8	An algorithm that includes fluency gains and average number of logins per week.
ST Math (Mind Research)	K-5, 6-8	An algorithm based on content progress and/or lab logins that differs by grade.
SuccessMaker (Pearson)	K-5	Not available **
Think Through Math (Think Through Learning)	K-5, 6-8	$\geq$20 lessons passed

Note. * "Not applicable" is noted for EdReady, a product where usage decisions are left to the teacher; therefore, there was no usage benchmark for recommended usage. ** "Not available" is noted when providers were not able to provide a benchmark in their data set.

The Grade 7 and 8 Applied Science grants did not have a fidelity of implementation benchmark. Teachers are to use these kits and curriculum materials according to the district implementation plan submitted at the time of the application. However, due to the late start of this program (February 2015) not all schools had time to implement these materials. The STEM Action Center asked these schools to implement the curriculum during the 2015-16 school year; at that time, we will evaluate the programs more completely. We also discovered that the providers do not automatically collect participant and usage data. Teachers would need to log into the system and enter their class roster to set up the student accounts or student data. In addition, teachers would need to enter information about the pretest and posttest scores for any unit tests administered. Clear expectation were not set by the STEM Action Center at the start of the program asking teachers to enter this type of data; therefore either no or very minimal data was available on usage from the providers. The STEM Action Center has set the expectation for Year 2 (2015-16) for districts to notify teachers who received the grants to enter their student information and unit assessment data into the product provider platform so that we can collect usage data to evaluate implementation.

Data Analysis

Once we conducted the impact analysis with the full sample, we reduced the sample to only students who met the fidelity benchmark. We provide in Appendix C, the baseline equivalence comparison of the students who met the fidelity benchmark compared to their matched comparison students. Next, we ran the same logistic regression described in the previous section to determine the impact on achievement for students who met the fidelity benchmark. We provide the results in the results section.

Understanding Teacher Satisfaction and Barriers to Implementation

Data Collection

Teacher Satisfaction/Concerns Survey

The purpose of the teacher survey is to determine areas of satisfaction and concern with the products. We were interested in addressing the following questions:

- How are teachers using the education technology products? (e.g., homework, intervention, supplemental material to support instruction)

- With what features of the products or experiences are teachers most satisfied?
- What concerns or challenges have teachers experienced with the use of the products?
- What barriers limit teachers from using the products to their desired level?
- How have teachers used the performance management features of the products?

We based the survey questions on these questions above and provided open-ended responses boxes for the teachers to share as much information as they were willing to provide. Based on the common responses, we have created a revised survey for the 2015-16 school year, which allows multiple-choice and check all that apply format items, in addition to open-ended response questions, to assess teacher satisfaction and concerns and to compare responses across products. This might encourage more teachers to respond if they feel that they can complete the survey in a short amount of time in the following academic year. We administered the survey to the teachers using Qualtrics, an online survey platform. The STEM Action Center provided a link to the survey to the district or charter school coordinator for this grant program.

Data Analysis

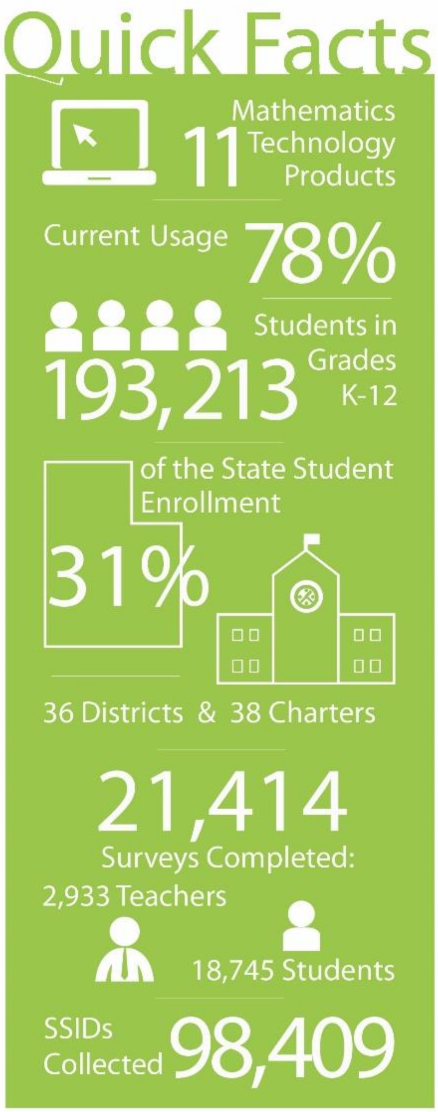
We used an open coding method for coding and categorizing participants' responses (Strauss & Corbin, 1998). Subsequently, themes emerging from the analysis that we report in the results section as percent of teachers' responses with each theme along with representative feedback as exemplars of each theme. We provide the results sorted from most common response to least common response. We coded the same themes across products in order to compare features with which teachers were satisfied or concerned across products. While the SAGE assessment data is very important, we provide a detailed overview of teacher feedback, because it sheds light on their experiences implementing the products/programs and opportunities to learn lessons from implementation that can inform future years of implementation.

Chapter 4. Results

For each grant program, we provide the results from our data analysis. First, we provide the results from our analysis of distribution of licenses, usage of the licenses or products, and the extent to which participants met the fidelity of implementation benchmark. Second, we provide a summary of teacher satisfaction and concerns data collected from the survey. Third, we provide our findings from our analysis of any additional data such as students' surveys or teacher observation data. Finally, we present the results from our analysis of the SAGE assessment data.

K-12 Mathematics Grants

Summary across Products



The 11 technology providers distributed licenses for the K-12 Mathematics Technology Grants to 193,213 students in grades K-12. This represents 31% of the state enrollment of students. It included 101 Districts and 38 Charters (653 Schools). We received usage data for 150,367 students, which represents 78% of the licenses distributed. We administered surveys to students and teachers. We received 2,933 completed teacher surveys and 18,745 student surveys. In order to measure the impact of this grant program, we requested state student identifiers (SSIDs) from districts; we received 98,409 SSIDs.

Participants and Usage

We collected data monthly from the service or product providers to understand the number of participants in each grant program. At the end of the 2014-15 academic year, we collected cumulative usage data for the grant programs where usage data was available.

Collection of usage data is important to understand return on investment. Participants do not always use the license or service given to them. We provided monthly updates to the STEM Action Center Board, and the STEM Action Center project coordinators followed up with districts and providers to work to improve both distribution of licenses based on initial awards and usage of licenses by teachers and their students across the state.

At the end of December, the providers had distributed 141,437 licenses, but usage was only at about 52 percent overall. The STEM Action Center sent districts reminder e-mails requesting that they work with the providers if there were implementation issues to improve usage. At the end of the school year based on cumulative usage through mid-June there were 193,213 licenses distributed with a 78 percent usage amount (as shown in Figure 9). However, only 9 percent of students across products had used the products at the recommended level (fidelity benchmark) set by product provider. In Table 22 (and Figure 10 and Figure 11), we provide an overview of the distribution and usage, by product, for the K-12 math grant. We also represent this information visually in a graph, cumulatively across all projects, to show the improvements in usage and distribution over time in comparison to demand, the number of licenses awarded to schools based on their requests.

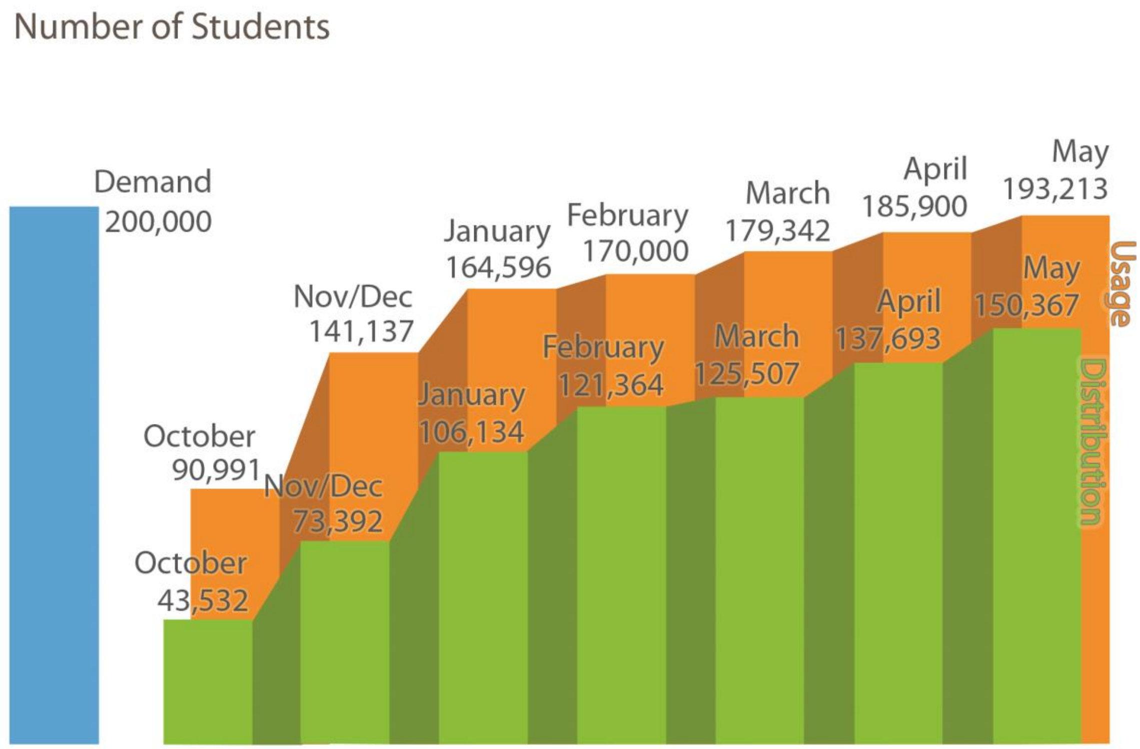


Figure 9. Improvements in License Distribution and Usage by Month Across all Products

Table 22. K-12 Math Grants Distribution and Usage Overview for the 2014-15 School Year

	ALEKS	Cognitive Tutor	Catchup Math	EdReady	iReady	Math XL	Reflex	ST Math	Think Through Math	Total
Total Licenses Distributed										
Students	106,530	917	286	498	17,389	3,124	4,378	36,327	23,764	193,213
Districts	26	3	0	4	12	5	5	12	8	36
Charters	27	0	3	1	6	3	3	5	4	38
Schools	299	3	3	7	74	16	20	99	94	653
Product Usage by Month										
October	24,261	735	105	163	4,393	NA	2,466	3,544	7,865	43,532
Nov./Dec.	37,184	773	114	198	9,419	NA	2,705	10,685	12,314	73,392
January	54,917	769	137	225	12,090	2,981	3,642	17,198	14,175	106,134
February	62,630	771	142	306	14,549*	2,981	3,642	20,985	15,358	121,364
March	64,811	857	173	304	14,549	2.981	3,561	22,733	15,538	125,507
April	72,043	776	158	266	14,549	2,981	4,077	25,761	17,073	137,684
May	77,766	782	82	498	15,322	3,085	3,421	31,162	18,249	150,367
Usage Percent	73%	85%	29%	100%	88%	99%	78%	86%	77%	78%
Percent Meeting Fidelity Benchmark	2%	10%	67%	NA	4%	NA	44%	16%	32%	9%

Note: Some schools and districts are implementing multiple products; therefore, the sum of the values for number of districts, charters, and schools across products may be different from the total column value. NA=Not Available from the provider.

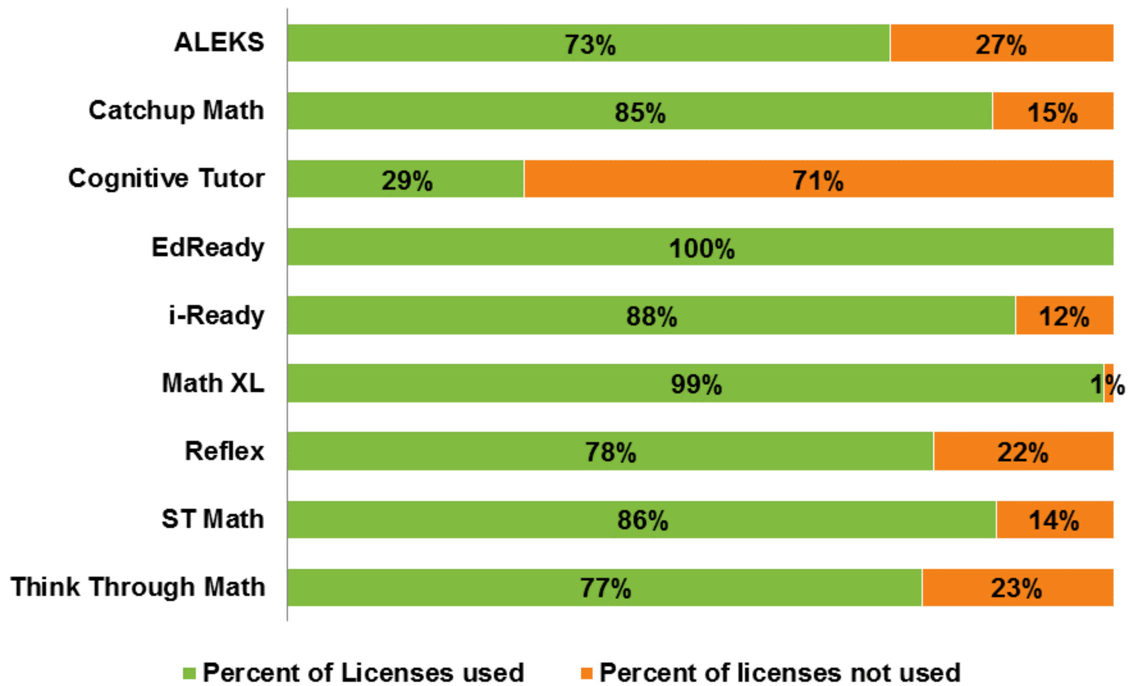


Figure 10. Comparison of Licenses Used across Math Products

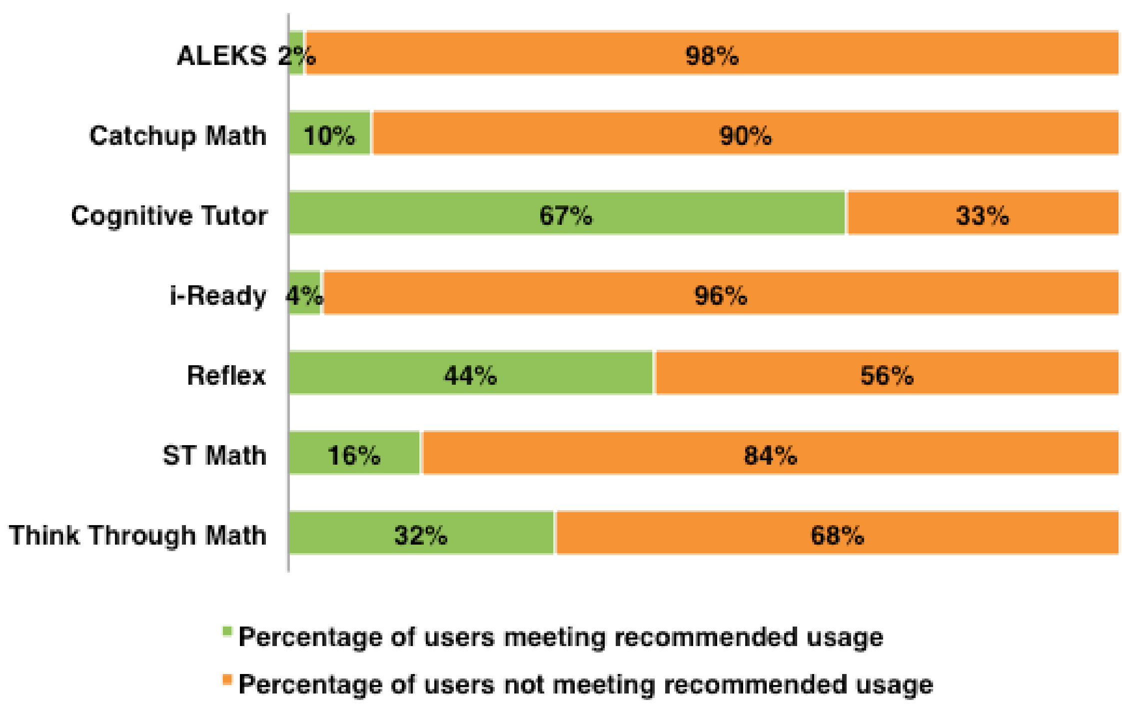


Figure 11. Comparison of Users Meeting Recommended Usage across Math Products

Student Demographics

We collected Student State Identifiers (SSIDs) from districts for every student assigned a license with usage data through the end of February. We submitted these SSIDs through a data request to the Utah State Office of Education, requesting in return a de-identified data file with student demographics for all students who had evidence of usage of the products and who had parent permission to be included in the evaluation. Based on the data file we received, which included students in the grant program and the rest of the students in the state, we provide the comparison of students in each group (students using math technology and comparison students) in Table 23. This data does not represent the full sample of students given access to the licenses, because the state only provided us with data for students in grades 4-12 who completed an assessment in 2013-14 (baseline) and in 2014-15 (outcome).

Table 23. Comparison of Students in the Grant Program to Other Students in the State

Description	Grant Program	Comparison Students
Total Students	74,627	282,067
Percent Male	52%	51%
Percent ELL	4.3%	4.1%
Percent SPED	12.87%	10.87%
Percent Free/Reduced Lunch	41.27%	35.80%
Percent Ethnicity		
African-American/Black	1.41%	1.33%
American Indian	1.67%	1.03%
Asian	1.42%	1.91%

Description	Grant Program	Comparison Students
Caucasian/White	75.74%	75.43%
Hispanic/Latino	16.30%	16.46%
Multiple Races	2.07%	2.24%
Pacific Islander	1.38%	1.60%
Mathematics Proficiency Baseline (2013-14)		
Level 1: Below Proficient	21.15%	19.32%
Level 2: Approaching Proficient	15.86%	15.32%
Level 3: Proficient	15.37%	15.64%
Level 4: Highly Proficient	9.76%	10.27%

Next, we compared the achievement of students using the technology products with students not using the technology products by matching students based on similar student characteristics (prior achievement and student demographics). Once we matched the students, we conducted a baseline characteristic comparison using appropriate statistical methods, depending on the type of characteristic (See Appendix C for baseline equivalence comparison). We controlled for any meaningful difference in the final set of analyses.

SAGE Assessment Results

In order to collect data on their achievement from the state, we had to have each student's State Student Identifier (SSID). In February, after districts/charters had a few months of usage, we provided the district/charter leaders with a list of students' user names and showed evidence of usage through the end of February. We asked that they add to this file the students' SSIDs and then upload the file to our secure portal. At this time, there were approximately 121,364 students with usage data.

By the end of the school year, there were 150,367 students using the products; however, we did not include these additional 29,003 students in our analysis, because these students were only exposed to a few months of usage. Although our request to districts and charter schools was for SSIDs for the 121,364 students, we only received SSIDS for 101,756 students. Once we had this final list of SSIDs, we removed data for students whose parents declined having their data included in the analysis (218 students). We submitted this remaining set of 101,538 SSIDs to the Utah State Office of Education.

The reason there were only 74,627 students in the SAGE data file provided to us by the state, when we had given them a list of 101,538 SSIDs, is that some of the students did not take any SAGE Assessment the year of interest (2014-15) or the prior year (2013-14). For example, students in grades K-3 were not included in this file, because they did not have a SAGE assessment for the prior year (2013-14). In addition, students in grade 11 and 12 who had finished their required assessments and did not take the SAGE during 2014-15 were not included in the data file. Of the remaining 74,627 students we received in the state data file, a majority of the students had complete data for mathematics prior year and current year. Less complete data was available for Language Arts and Science. USOE provided complete demographic information for all students with state achievement data. Once we reduced the sample to the students with complete achievement data, there were only 45,815 students remaining. We matched these students to similar students in the state data file who were not participating in any STEM Action Center grant program.

Table 24. Summary of Change in Sample Size Resulting in Final Analytic Sample

Time Period	Sample Size
Usage Through February	121,364
SSIDs received from districts/charters	101,756
SSIDs for students whose parents did not decline including them in the analysis	101,538
SSIDs provided to state requesting data	101,538
SSIDs in data provided by state	74,627
SSIDs with complete data	45,815

Next, we provide the impact findings in the context of usage of students participating in the grant program. We summarize this information for two groups of students. The first group is the full sample of students with any evidence of product usage. The second sample is the group of students who met the fidelity benchmark, if one was available from the product provider. The fidelity group analysis is the only analysis that one should use to compare effects across products. The analysis of the full sample, results in information about the impact of the less than satisfactory implementation of these products, which one should not use to draw conclusions about any of the products, since the implementation was not at the fidelity level. We are working with the STEM Action Center to set expectations of usage for schools so that we will have a greater amount of students meeting the fidelity benchmark during the 2015-16 school year.

Before considering impact on achievement, it is important to understand as context that most students in this impact analysis only used the math technology product for approximately five months. Most students did not begin to use the technology until November. We believe that seven months of usage is an appropriate estimate of the time students had the opportunity to use the product. Prior research has shown that when students experience at least 30 minutes of usage of mathematics technology each week across a school year there are moderate achievement impacts (Cheung and Slavin, 2015). During this seven-month period, usage at 30 minutes per week would amount to approximately 840 minutes (or 14 hours of usage) to experience the added benefit to their achievement.

Not all providers tracked usage by time, so we asked them to set their own benchmark for usage. In the next pages, we provide a summary of the usage for the full analytic sample of students with any usage and a summary of the usage for students meeting the fidelity benchmark. These students all had complete data from the prior year and the current year to be included in this analysis. For five of the eleven products there was an insufficient number of students with complete data to conduct an impact analysis: Cognitive Tutor, EdReady, Odyssey Math, Reflex, and SuccessMaker. Based on the usage information in Table 25, we note that only about 10 percent of students in the full analytic sample met the fidelity benchmark.

Table 25. Number of Students and Average Usage for Full and Fidelity Analytic Samples

	Full Analytics Sample		**Fidelity Analytic Sample**	
Product	**Number of Students**	**Average Usage**	**Number of Students**	**Average Usage**
ALEKS	27,190	835 minutes	633	2,329 minutes
Catchup Math	254	86 minutes	32	474 minutes
iReady	3,981	302 minutes	190	1,317 minutes
MathXL	318	1,670 minutes	—	—
ST Math	5,858	20 lab logins	801	76 lab logins
Think Through Math	6,896	19 lessons	2,814	70 lessons
Total	**44,497**	—	**4,470**	—

When we received the state data file, USOE notified us that we should only use the student scale score if we conduct a separate analysis by grade. To compare students across grades, we would need to use a proficiency score, which came in four levels: 1,2,3,4. Using this type of outcome the interpretation would be challenging to explain simply to the broad stakeholder audience, so in consultation with several methodologists we decided to recode proficiency into a 0/1 coded variable with "1" indicating met proficiency and "0" indicating not met proficiency. Using this outcome of math proficiency spring 2015, we used logistic regression to compare the proficiency of students in the grant program to similar students in the state. These students were matched based on their prior year state SAGE Mathematics assessment scale scores, to get the closest possible match of students to be able to detect any effect of the program on student achievement.

After we matched the students, we conducted a baseline comparison of the two groups, which we provide in Appendix A. For most products, the matched students were equivalent on their prior year SAGE Mathematics Scale Score, but differed somewhat in demographic characteristics. Therefore we included covariates in our logistic regression model (discussed in Appendix B) to control for differences in student demographics and prior year SAGE reading and math proficiency ordinal score (1,2,3,4). The full output of the results are available upon request. We focus this report on the key findings, which include the following: odds ratio, standard error, *p*-value, effect size, and 95 percent confidence interval of the odds ratio.

The odds ratio can be somewhat challenging to interpret it simply, anything greater than 1.0 favors the group of students in the grant program using the technology and anything less than 1.0 favors the comparison students not in the grant program. We adjusted the standard error and the related *p*-value of statistical significance for clustering, since students are nested in schools using these products. A *p*-value of .05 or less notes a difference between the grant students and comparison students that was statistically significant. One issue with using a *p*-value is that it is influenced by sample size. In research, many are now using an effect size to understand whether there are meaningful differences, since an effect size is not influenced by sample size as *p*-value is.

Across studies of education interventions or programs at all grade levels, 0.25 has become an acceptable standard for an educationally meaningful effect size of a program that shows promise in effecting student achievement. However, for education technology, which is usually more of a supplement to a regular curriculum, prior research has shown the effect size to be more around 0.16[1]. Therefore, we use 0.16 as a benchmark for the expected effect size of an impact when students are using a product as intended and meeting the fidelity benchmark. Anything greater than 0.16 we consider a meaningful positive difference for students using the particular mathematics technology product.

In Table 26, we provide the results of the logistic regression for the products where there was sufficient sample size to evaluate. There were only two products where achievement differences for students participating in the grant achieved the statistical significance level of $p < .05$: the fidelity sample for ALEKS and the fidelity sample for iReady. However, all products had at least one sample reach or exceed the expected benchmark for having an effect on

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[1] Expected Effect Size Impact based on findings from Cheung, A. C., & Slavin, R. E. (2013). The effectiveness of educational technology applications for enhancing mathematics achievement in K-12 classrooms: A meta-analysis. *Educational Research Review, 9*, 88-113.

achievement, which we determined was an effect size equal or greater than 0.16. We believe that the size of the effect of the iReady fidelity sample may be confounded by a small sample size (190 students in each group); therefore, it is best to wait until we have a larger sample meeting the fidelity benchmark to draw conclusions about the impact of use of this product. CatchUp Math had too small of a sample meeting fidelity (32 students) to conduct the analysis on the fidelity sample.

Table 26. Results from the Analysis of Impact of Technology use on Achievement

Product and Sample	Exp (B) odds ratio	Standard Error[a]	Significance Level	Effect Size	95% Confidence Interval for Exp(B) odds ratio	
					Lower	Upper
ALEKS						
Full Sample	1.014	0.026	0.607	0.01	0.964	1.067
Fidelity Sample	1.354	0.144	0.032	**0.18**	0.967	1.897
CatchUp Math						
Full Sample	1.294	0.278	0.333	**0.16**	0.730	2.293
iReady						
Full Sample	0.983	0.063	0.804	-0.01	.861	1.122
Fidelity Sample	2.765	0.279	0.002	**0.62**	1.410	5.423
MathXL						
Full Sample	1.464	0.317	0.078	**0.23**	0.821	2.611
ST Math						
Full Sample	1.125	0.126	0.296	0.07	0.910	1.390
Fidelity Sample	1.483	0.435	0.179	**0.24**	0.849	2.590
Think Through Math						
Full Sample	1.191	0.177	0.239	0.11	0.891	1.593
Fidelity Sample	1.339	0.235	0.097	**0.18**	0.952	1.884

[a]The Standard Error and Significance have been adjusted for clustering.

We also show these findings in Figure 12, as a graph for ease of comparison. If usage increases this year (2015-16), then it may be easier to detect a statistically significant difference in achievement for more products.

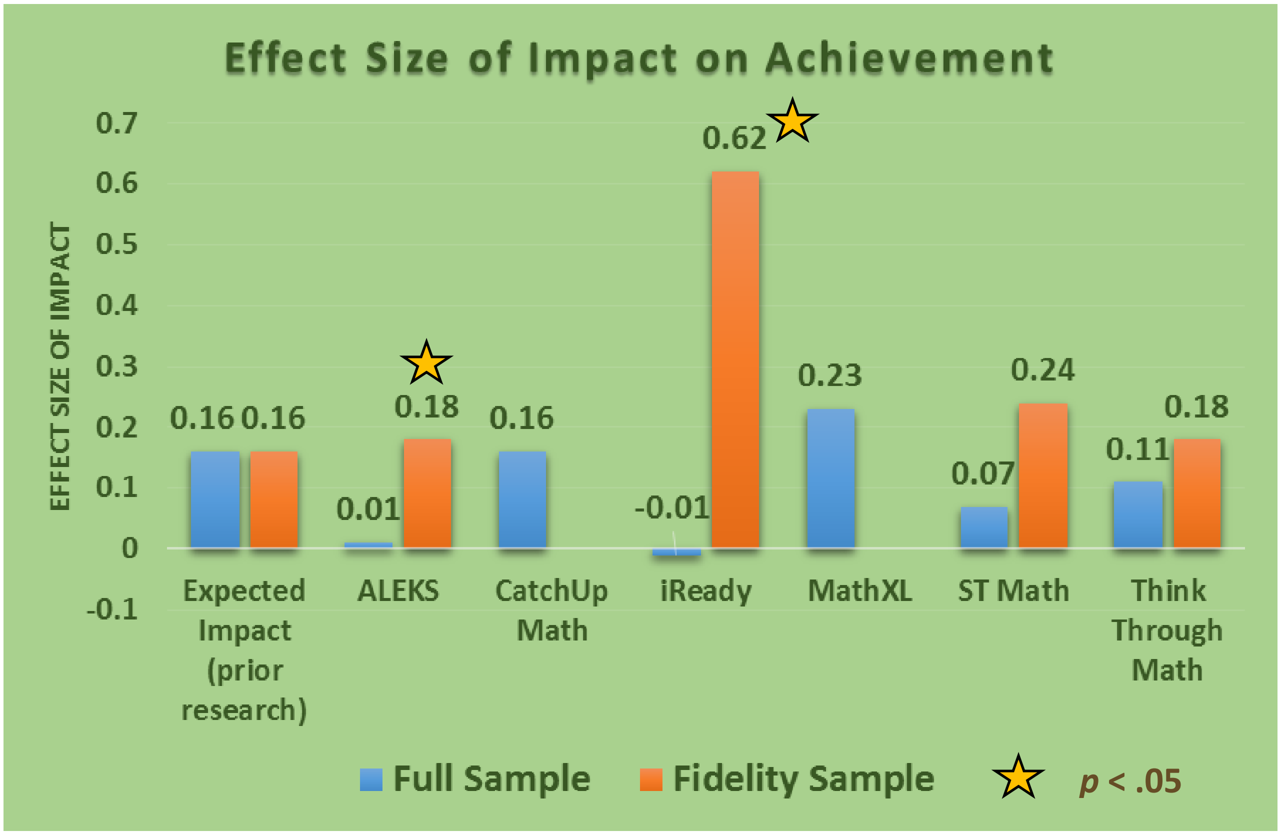


Figure 12. Graph of Results Comparing Effects Across Products

Conclusions

While the results from the analysis of the impact of the K-12 mathematics technology grants demonstrate that five of the educational technology products have promise for improving student mathematics achievement, the greatest barrier to this occurring for most students is usage. Ninety percent of students in the full analytic sample were not meeting recommended usage. When reflecting on the teacher feedback, thirty-two percent of teachers surveyed reported lack of access to computers to be a significant barrier. This 2015-16 academic year, the STEM

Action Center required that school principals sign a letter of commitment to ensure students have access to technology for at least 45 minutes per week to use the software they selected in the second year of the grant program. In addition, usage has gotten off to an earlier start this year, which means that students will have a longer time to use these grants. It is important to wait another year to understand the impact of full implementation of this grant program on student achievement.

Recommendations

Technology changes at a much faster pace than traditional curriculum models (e.g., textbooks). Therefore, it is important to take care not to use these results as support for a decision to get into a long-term contract with any vendor. A lengthy contract for a software product could preclude a district or school from the opportunity to use newer improved products from that vendor or another vendor. What we recommend is a 3 year R&D cycle where products are selected, with district involvement, through an RFP process, products are piloted at small scale while being evaluated for the first year, and then scaled up for 2 years of implementation to understand impact. In addition, few students will want to use the same program for multiple years, because they may get tired of the interface or other design features. Therefore, we recommend 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.

Teacher Feedback

We also collected teacher survey feedback on their experiences implementing the mathematics technology products. We collected data from 2,933 teachers who completed the survey to provide feedback on their experience using the product. This included data for nine of the 11 products. There were two products where we did not receive any teacher feedback, because there were no students using those products during the 2014-15 school year (SuccessMaker and Odyssey Math).

Based on responses to the first survey question about usage of the products, 56 percent of teachers reported using the product as a supplement and 28 percent reported using the product as an intervention (as shown in Table 27). There are some differences in usage by product. For example, teachers using MathXL reported that they used the product with students primarily for homework (53%). Reflex is a product specifically used for math fact fluency, which 30 percent of teachers' confirmed in their report of usage of this product for developing skill fluency.

Table 27. Percent of Teachers Responding about Usage by Product

Categories	Supplement to instruction	Intervention or Differentiation	Selected materials for homework	Practice for developing skill fluency	Review and re-teaching
ALEKS (N=1216)	49	26	16	6	10
Catchup Math (N=5)	40	40	0	0	0
Cognitive Tutor (N=15)	100	13	0	0	0
Ed-Ready (N=12)	17	8	0	8	0
iReady (N=462)	47	42	8	4	1
MathXL (N=60)	25	8	53	3	0
Reflex	34	24	30	29	19

Categories	Supplement to instruction	Intervention or Differentiation	Selected materials for homework	Practice for developing skill fluency	Review and re-teaching
(N=97)					
ST Math (N=830)	70	23	13	10	5
Think Through Math (N=236)	75	36	13	15	8
Total (N=2,933)	**56**	**28**	**15**	**8**	**7**

Fifty-seven percent of the teachers reported overall satisfaction with the product they were implementing (as shown in Table 28). Eleven percent reported being most satisfied with the adaptive features of the product that individualize instruction for the students. Ten percent reported being satisfied with student engagement while using the product.

Table 28. Percent of Teachers with Positive Satisfaction by Product

Categories	Satisfied with provided technology	Learning is adaptive and individualized for students	Students are engaged when using technology	Develops students' knowledge or skills	Student success or positive experience
ALEKS (N=1216)	59	16	3	3	5
Catchup Math (N=5)	0	20	20	0	20
Cognitive Tutor (N=15)	40	0	0	0	0
Ed-Ready (N=12)	0	8	0	0	17
iReady (N=462)	20	7	6	1	2
MathXL (N=60)	53	8	2	0	2
Reflex (N=97)	62	6	20	20	6
ST Math (N=830)	77	5	18	9	7
Think Through Math (N=236)	52	19	22	17	8
Total (N=2,933)	**57**	**11**	**10**	**6**	**5**

Very few teachers reported anything negative about the product, with the greatest number of teachers, 6 percent (as shown in Table 29), reporting technical difficulties with the program. The product with the highest percent of teacher reporting student frustration or difficulty with the product was Cognitive Tutor, a product that no school has selected to use in year 2 of the grant program (2015-16).

Table 29. Percent of Teachers with Negative Feedback by Product

Categories	**Product technical problems**	**Not used the technology yet**	**Student frustration or difficulty**	**Lack of challenge or boring to students**	**Need more time to use the product**
ALEKS (N=1216)	5	9	2	2	2
Catchup Math (N=5)	0	0	0	0	0
Cognitive Tutor (N=15)	7	0	13	0	7
Ed-Ready (N=12)	0	0	0	0	0
iReady (N=462)	5	2	1	2	7
MathXL (N=60)	2	12	5	0	2
Reflex (N=97)	0	3	0	2	1
ST Math (N=830)	7	2	3	2	1
Think Through Math (N=236)	10	1	10	6	1
Total (N=2,933)	**6**	**5**	**3**	**2**	**2**

Lack of access to computers was the largest constraint to implementation reported by 32 percent of the teachers surveyed, as shown in the following table. The next concern was with setting up student accounts and access to student license, which a greater percent of teachers using MathXL (12%) and ST Math (10%) reported compared to other products.

Table 30. Percent of Teachers Reporting Challenges with Technology Integration

Categories	No barriers	Not enough computers	Licenses, accounts, and setup	Lack of home access	No or little use
ALEKS (N=1216)	37	31	2	4	4
Catchup Math (N=5)	60	40	0	0	0
Cognitive Tutor (N=15)	20	27	0	7	0
Ed-Ready (N=12)	33	17	8	0	0
iReady (N=462)	29	29	3	2	4
MathXL (N=60)	37	22	12	7	0
Reflex (N=97)	48	25	0	8	3
ST Math (N=830)	30	37	10	3	3
Think Through Math (N=236)	32	30	6	7	4
Total (N=2,933)	**34**	**32**	**5**	**4**	**4**

Thirty-four percent of the teachers had used the performance management features of the product to monitor their students' progress (as shown in Table 31). A larger percent of teachers using Catchup Math and iReady compared to other products reported using the product to meet student Individualized Education Plans (IEP) or for Response to Intervention (RTI).

Table 31.Percent of Teachers Using Performance Management Features

Categories	Monitor students' progress	Did not Use	Guide instruction	Used to determine product usage	Used for student IEP or RTI
ALEKS (N=1216)	31	21	15	17	4
Catchup Math (N=5)	20	0	0	40	20

Categories	Monitor students' progress	Did not Use	Guide instruction	Used to determine product usage	Used for student IEP or RTI
Cognitive Tutor (N=15)	0	27	0	20	0
Ed-Ready (N=12)	50	8	8	8	0
iReady (N=462)	29	1	9	1	19
MathXL (N=60)	35	8	12	12	10
Reflex (N=97)	57	3	4	9	5
ST Math (N=830)	31	38	11	4	9
Think Through Math (N=236)	61	4	9	6	12
Total (N=2,933)	**34**	**20**	**12**	**10**	**9**

Changes in Mathematics Performance Using Data from Product Assessments

Each product had its own way of assessing student progress. Not all products had data that we could compare from start to finish to determine growth, but for the ones that did we analyzed student performance using an effect size calculation in order to compare student gains in mathematics performance across products. This has to do with the purpose and design of each products. Not all developers have designed their products to cover an entire grade level course. Some developers have designed their products for acceleration or for credit recovery, so students can go at their own pace completing more or less than a course or unit of study. This is why we use the state SAGE assessment as a common measure across products to understand the impact of these education technology products. However, for products that did provide us with a type of pretest/posttest to understand growth over time we conducted an effect size analysis to look at those gains across products.

There were only two products, which had sufficient data for us to use in this analysis of gains in performance over time, ALEKS and iReady. EdReady was a product that had performance data, but on sub-components of curriculum, and some students have multiple pre/post scores because they are completing multiple units of study, so we did not include it in this effect size analysis across products. Similarly, for Reflex, the provider gave us data on beginning and ending mastery, but it was for different units of fact fluency (multiplication, division, etc.), with students with data for multiple units; therefore, we did not use this data. ALEKS and iReady providers also included a benchmark for fidelity of implementation in their data file, so we also included an effect size analysis by product for the sample that met the fidelity of implementation benchmark. In Table 32, we provide the comparison of effect sizes for all students by product and for students who met the fidelity benchmark for ALEKS and iReady. Students in these analyses had to have completed both a pre (diagnostic) measure and a posttest measure.

Table 32. Changes in Math Performance According to Product Assessment Data

Product	Sample Size	Pretest Mean (SD)	Posttest Mean (SD)	Mean Gain Score (SD)	Correlation between Pre/Posttest	Effect Size (Standardized Mean Difference)
ALEKS						
All Students	72,631	25.09 (17.09)	35.49 (22.85)	10.39 (12.67)	0.837	0.47 *
Students meeting fidelity	1,878	25.23 (17.86)	51.09 (26.90)	25.87 (19.21)	0.701	1.04 *
iReady						
All Students	9,104	438.09 (58.29)	455.46 (55.51)	17.38 (26.55)	0.892	0.30 *
Students meeting fidelity	530	436.26 (70.62)	464.64 (60.41)	28.38 (26.65)	0.929	0.40*

Note: "*" means that the difference was statistically significant at $p<.001$ based on results from a paired samples t-test.

Education researchers consider an educationally meaningful effect size to be 0.25 or higher. The gains for ALEKS and iReady exceed this amount for all students who completed a pretest and posttest (0.47 and 0.30 effect size, respectively). The students meeting the fidelity measure made even greater gains with a larger effect size. For ALEKS, the students who met fidelity had an effect size over twice as large (1.04) as the all students group (0.47). For iReady, the effect size for the fidelity group was 0.40 compared to 0.30 for the all student group. All of these differences between pretest and posttest were statistically significant at the $p<.001$ level.

Next, we provide additional information by product to describe this first year of implementation.

ALEKS

Usage

Based on cumulative usage data collected in June 2015, there were 106,530 students given an ALEKS license (as shown in Table 33), but only 77,766 students had evidence of time spent in the program, which is about 73 percent of the licenses assigned. Usage time ranged from 1 minute to about 172 hours of program use, with a mean of about 9 hours. Among these users, 2 percent met the provider's recommended usage.

Table 33. Summary of License Distribution and Usage for ALEKS

Usage Information	Usage Data
Number of licenses assigned	
Number of K-12 students	106,530
Number of districts	26
Number of charter schools	27
Number of all schools	299

Usage Information	Usage Data
Number of licenses used (>0 minute)	77,766
Number of usage time (minutes)	
Mean	526
Min	1
Max	10,337
Percentage of licenses used	73
Percentage of users meeting recommended usage	2

Teacher Survey

Types of Product Usage

The first survey question asked teachers to describe how they use the mathematics technologies for their teaching. In the survey, we provided teachers with examples of typical use, such as a supplement, selected materials for instruction, and selected materials for homework. In Table 34 (and Figure 13), we summarize the 1,216 teacher responses to the survey for this item for teachers who used ALEKS.

Table 34. Common Responses for How Teachers Used the Product (N=1,216)

Categories	Sample Response	Percent
Supplement to instruction	*I have used ALEKS as a supplement to my regular math instruction.*	49
Intervention or Differentiation	*We use ALEKS mostly as an intervention. I love how well it is targeted to each individual student's needs.*	26
Selected materials for homework	*I have used the ALEKS program as selected material for homework.*	16
Review and re-teaching	*Students were able to use ALEKS as a review for materials that had been taught through the year.*	10
Not used yet	*We have not yet had a chance to implement the program.*	10
Selected materials for individualized instruction	*I used ALEKS to create personalized lesson plans and individualized activities that address the needs of specific students.*	9
Assessment	*I used ALEKS to assess my students overall knowledge of math.*	7

Categories	Sample Response	Percent
Practice for developing skill fluency	*I used ALEKS weekly for students to practice their math skills.*	6
Response to Intervention or Small Group Instruction	*I have used ALEKS in my double dose class as a way to help target students gaps in knowledge. They spend half a class period 2-3 times a week working on the RTI 8 course.*	3
Develop and reinforcing concepts	*I used ALEKS to reinforce concepts taught in lessons.*	3
Acceleration	*I teach the Honors Math class and am the coach of the math team. I used ALEKS with the math team to get ready for state competition.*	1

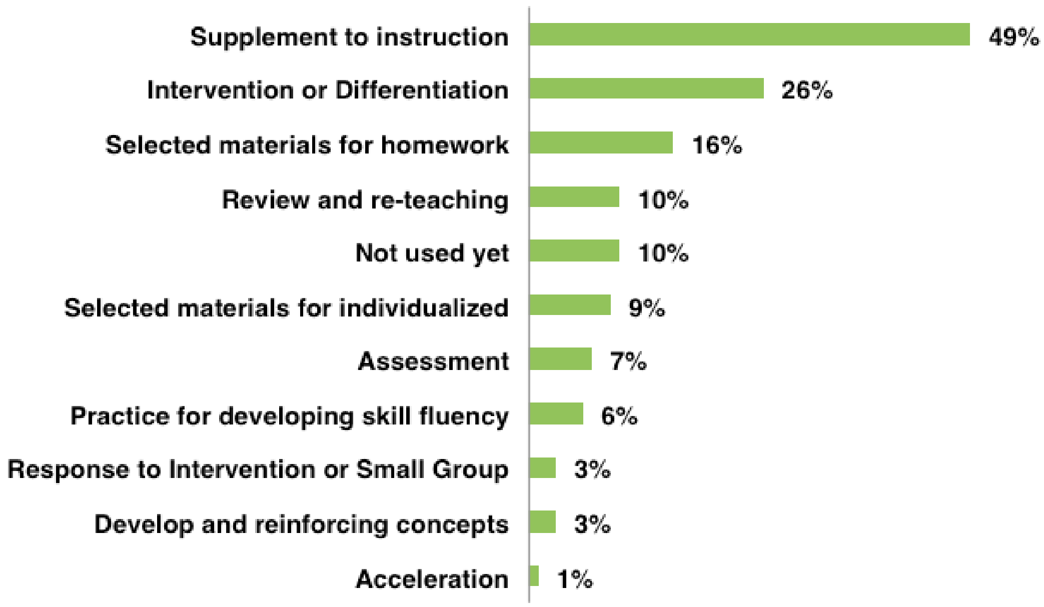


Figure 13. Common Responses for How Teachers Used ALEKS (N= 1,216)

The STEM Action Center had directed the teachers to use the product as a supplement and not as their primary form of instruction, since the state office of education had not reviewed the products for alignment to the state standards. We were pleased to see that many teachers reported use of ALEKS as a supplement to their instruction (49%), but also that some teachers were finding ALEKS to be a helpful intervention to differentiate both instruction and practice for individual students (26%). The following statement from a teacher using ALEKS is an example of how this product supports teachers in differentiating instruction for their students.

> *I have used ALEKS all year. The kids and I have loved ALEKS and the opportunities that it gives individuality. I have used ALEKS in a number of different ways. I have used it as a supplement, intervention, and mainly for homework and being able to push the advanced kids in ways I have never been able to. I have been teaching for 9 years and am so excited about finally being able to push my advanced kids while still bringing up the lower end kids. I can't tell you how many times a student has said, during my instruction time, 'Hey, I just learned this on ALEKS.' They are excited when they come in the door and excited to see their progress.*

This is important that both the higher and lower skilled students can be challenged and successfully learn important mathematical concepts.

The second survey question asked teachers to describe their overall level of satisfaction with the mathematics technology. Many of the categories of teachers' responses to this item reflected positive aspects towards their use of the technologies in their classrooms (shown in Table 35 and Figure 14) and other responses included concerns about the products (shown in Table 36 and Figure 15). We coded these responses separately.

Teacher Satisfaction

Many of the positive comments were general statements about overall satisfaction with the many features of ALEKS (59%). However, the second most common response had to do specifically with how adaptive ALEKS is and how it individually supports student learning (16%), as indicated in the teacher quote below.

I am very happy with the ALEKS program. It is so nice to allow students to be working on their own levels. I like the explain feature for students to use when learning about something they don't understand. All students are engaged and learning.

Differentiating instruction can be a challenge for teachers, so it is important to note that teachers are finding that ALEKS allows this type of differentiated learning opportunity.

Table 35. Positive Responses for Teacher Satisfaction with Technology (N= 1,216)

Categories	Sample Response	Percent
Satisfied with provided technology	*I loved ALEKS. More importantly, the students liked it and used it.*	59
Learning is adaptive and individualized for students	*I find that ALEKS math provides strong support for student through its differentiation. Each student is supported in his or her individual needs.*	16
Provides feedback to students	*Students often commented that they liked the immediate feedback they received after each problem.*	7
User friendly	*I find ALEKS user friendly for teachers and students.*	6
Provides information in reports about students' learning progress	*ALEKS gives me data that I can utilize in real time and shows me areas where we can improve.*	5
Student success or positive experience	*I'm convinced that my students know more mathematics because of their participation in ALEKS.*	5
Develops students' knowledge or skills	*I am very happy with this product because it helps students gain skills at a faster rate than they can in a whole group.*	3
Aligned with state standards	*I am pleased with the content and the alignment to the Utah Core.*	3
Students are engaged when using technology	*I really like ALEKS and the students are engaged when using it.*	3
Customizable features	*I like how we can select test question items and use them to create assessment tools.*	1

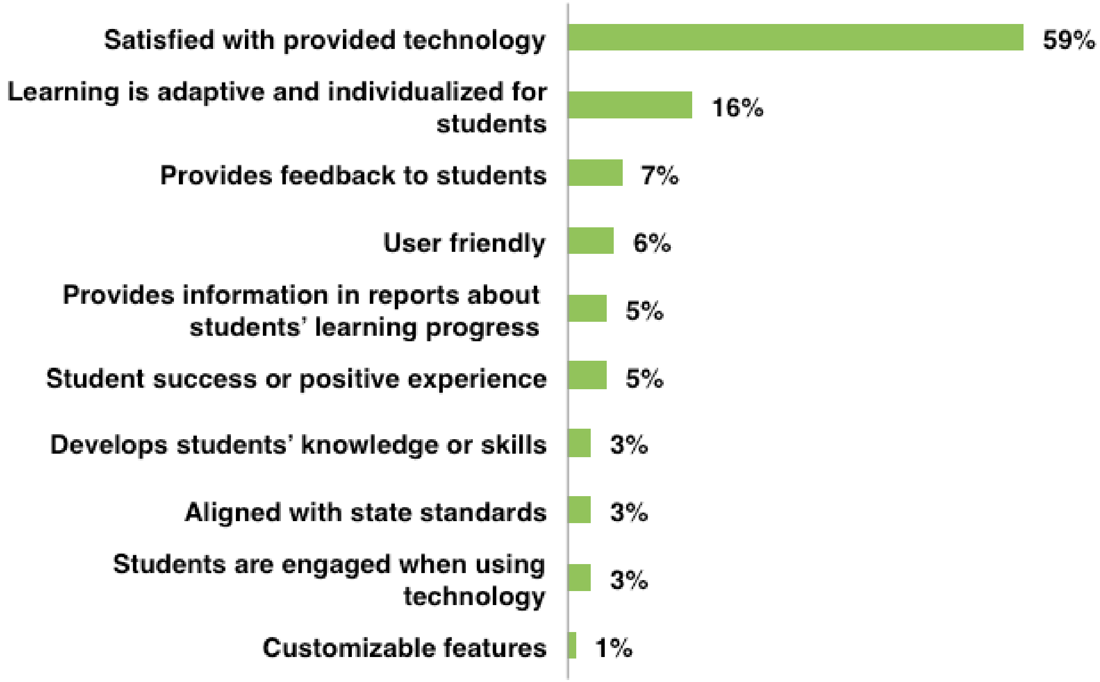


Figure 14. Common Responses for Teacher Satisfaction with ALEKS (N= 1,216)

Teacher Concerns

Some teachers found ALEKS difficult to manage and they wanted more control over the program (5%) as indicated by the following statement:

> *I found the teacher interface to be cumbersome and difficult to navigate. I would like to know how to assign it to be more adaptive to meet students where they are and help them grow rather than just use the standards within a grade level.*

However, many teachers felt that more training or more time to learn the program would help them (3%). Quite a few teachers said that they had not used the program yet (9%).

Table 36. Negative Responses for Teacher Satisfaction with Technology (N=1,216)

Categories	Sample Response	Percent
Not used the technology yet	*I can't answer this question fully as I really haven't used ALEKS enough to form an opinion.*	9
Product technical problems	*I don't feel like ALEKS is teacher friendly. It is a pain to change classes; it is obnoxious to change any setting. I would be more likely to use it if it became easier to navigate.*	5
Need more training	*I believe the technology has promise and concrete conceptual knowledge help, but I need more training and explanation for better implementation and usage in my classroom.*	3
Student frustration or difficulty	*Some problems are very intensive and require a lot of work, if students want to retry they must then do it all over again. This can be discouraging and take a lot of time.*	2
Lack of challenge or boring to students	*Many of the kids think ALEKS is boring and don't get a lot accomplished in the time they are on.*	2
Need more time to use the product	*We have not had the chance to implement the product yet.*	2
Difficult for students below grade level	*It requires too much reading for my lower students to benefit.*	2
Lack of Alignment to Standards	*I wish ALEKS were more aligned with the Utah Core Curriculum.*	2
Dissatisfaction with the technology	*I was not satisfied with the product.*	2
Not customizable	*I would like to have more control over the lessons students are completing.*	2

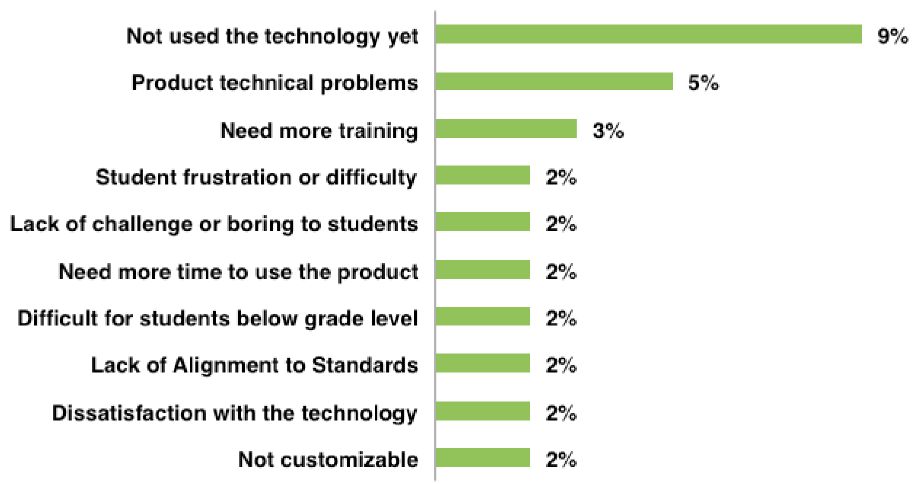


Figure 15. Common Responses for Teacher Concerns with ALEKS (N= 1,216)

Use of Data Reports

The third survey item asked teachers to describe how they used the data reporting features provided with the technology product. Common examples include use of data for monitoring students' progress or informing instructional decisions, what some refer call "performance management." We provide common teacher responses in Table 37 and Figure 16.

Table 37. Responses for Teacher Use of Performance Management Features (N=1,216)

Categories	Sample Response	Percent
Monitor students' progress	*The data from ALEKS is great. It allows me to see which students understand and which ones do not understand. It lets me know which students are ready for new materials.*	31
Did not Use	*I did not use the reports.*	31
Used to determine product usage	*The reports that ALEKS gives are helpful because they tell you how much time students worked, how many concepts they attempted, and how many they mastered.*	17
Guide instruction	*Data is used to help direct our instruction so we know where our students can find success and where we need to increase and improve our efforts.*	15
Monitor class progress	*I use the data to see the overall math level. I have found it to be pretty accurate. This allows me to see if the class as a whole might be struggling with a specific concept.*	8
Used for assessment	*This is program is so closely tied into Utah State Core and will prepare students to master core standards.*	7
Inform students of progress	*Each student has immediate feedback on how well they are doing and where they need more help. The pie graph is also easy to read and I believe it is motivating to help them want to complete more sections.*	6
Used to identify growth by area of standards	*The data is useful in determining which facts have been mastered and monitoring progress*	5
Used for student IEP or RTI	*I have been using ALEKS to develop IEPs, plan individualized goals for students, plan instruction, and monitor progress.*	4
Guide student access to content	*ALEKS displays student data in such a way that you know exactly what the student needs next. It also supplies the student with next step instruction and practice problems.*	3

Categories	Sample Response	Percent
Used to group students for instruction	*I have used the data to create small groups and to create focus groups with students in areas that they are struggling in.*	3
Inform parents of progress	*We report to the parents on a weekly basis regarding student progress in ALEKS. We use the automated weekly report to do this. We also provide parents with a report regarding progress toward yearlong curricular goals.*	2
Used to reward students	*I have used the Progress Report to reward and motivate my students.*	1

Note: IEP refers to a student's Individualized Education Plan and RTI refers to Response to Intervention.

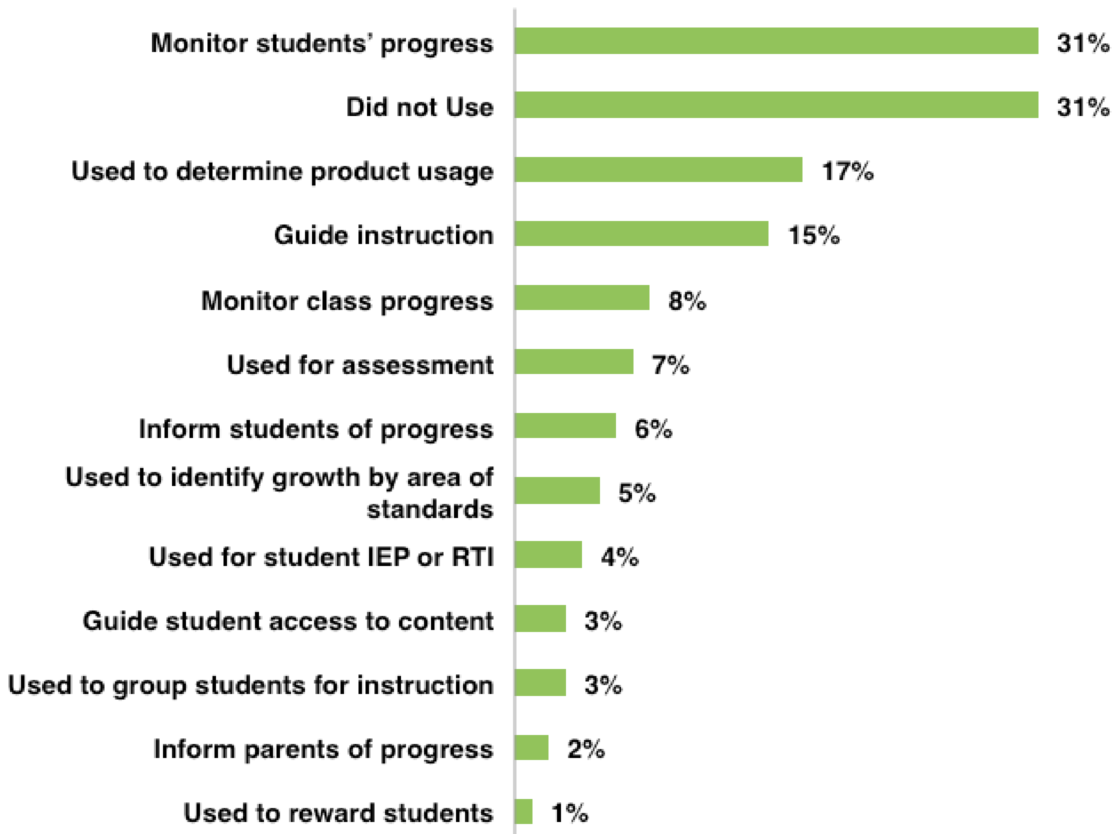


Figure 16. Common Responses for Use of Data Reporting Features of ALEKS (N= 1,216)

Many teachers used the data reporting features provided by ALEKS to monitor their students' progress (31%). Teachers also used ALEKS' various reports to analyze student usage of ALEKS (17%) and to guide their instruction (15%) as illustrated by the teacher statement below.

> *I reviewed the progress assessments to check for student retention and monitor proficiency and progress in content areas. I used information from the student progress reports to enhance my instruction with additional support given in those specific areas that students struggled with most. This information was also helpful in organizing leveled math groups for year-end review.*

Challenges with Technology Integration

The fourth survey item asked teachers to describe any barriers they encountered implementing the technology in their classroom, such as technological problems. We provide common teacher responses in Table 38 and Figure 17.

Table 38. Challenges with Technology Integration (N=1,216)

Categories	Sample Response	Percent
No barriers	*There was no technology barrier.*	37
Not enough computers	*Regular, consistent access to computers is the biggest barrier that we have to utilizing ALEKS more often.*	31
No or little use	*I didn't get a chance to use it enough to make a judgment.*	4
Lack of home access	*Not all of our students have computers or internet access at home so I'm limited in my ability to use it as homework.*	4
Internet connectivity problems	*The internet is slow in the building. Some iPads kick students off and many iPads need to be rebooted several times during the session.*	3
Lack of knowledge about the product	*I'm not sure how to set up some of the reports and the gradebook to get the data I need.*	3
Need for additional training in product functionality	*I would appreciate further training to be more aware of the components I am unfamiliar with in ALEKS.*	3

Categories	Sample Response	Percent
Lack of Teacher Buy-in	*We have some barrier with teacher buy-in but we are working on it.*	2
Licenses, accounts, and setup	*Our main barrier was the delay in gaining access to the program. There are teachers at my school who wanted to use ALEKS a lot at the beginning of the year, but were unable to do so.*	2
Not Customizable	*There are times that I want the students to be working in a specific area, like preparing for a test on targeted topics, and the program will make them do an assessment, which is not a bad thing, but not what I want them to do right then.*	2
Old Technology	*Our laptop lab was/is older and had problems working all the time.*	1
Student Boredom	*My students were not entertained or motivated. When I have them do it more than 40 minutes at a time, they get really bored with it and many are not productive with it then.*	1
Browser problems	*There were glitches when using the Safari web browser with this program.*	1

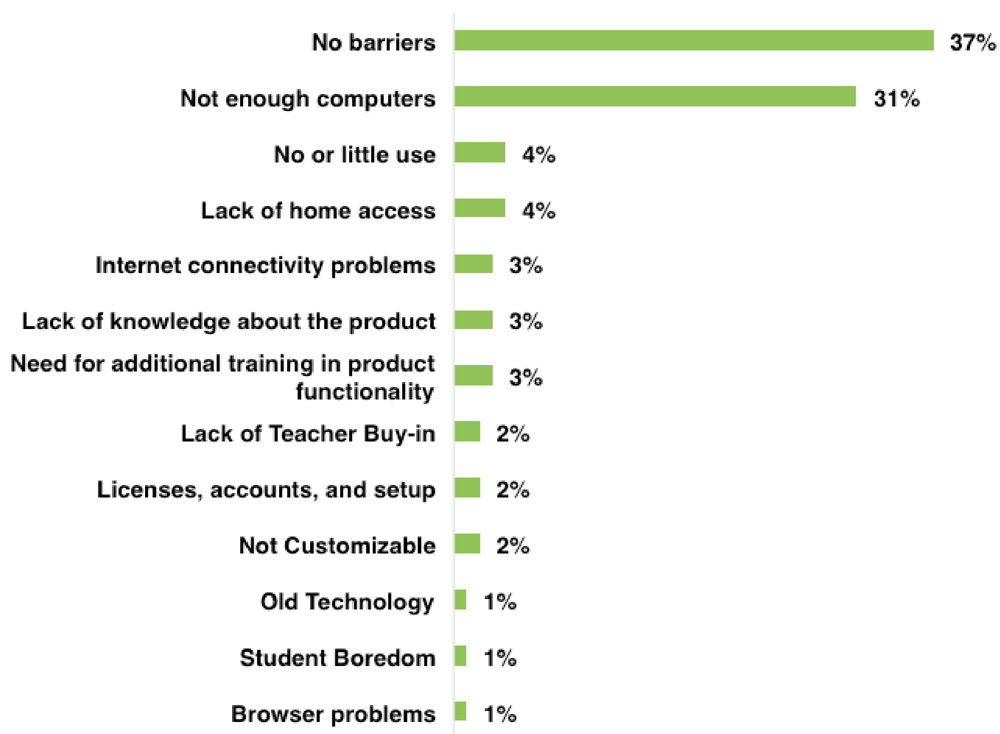


Figure 17. Common Challenges with Technology Integration for ALEKS (N= 1,216)

Over one third (37%) of the teachers had no technology barriers using ALEKS. However, access to a sufficient number of computers for use in the classroom was a significant barrier (31%) as indicated in the following statement from a teacher.

> *We don't have enough computers in our school to do the program like I'd like to. I want to use it every day in my low end classes for about half of the class and then teach a lesson the other half. Not only is it beneficial to do the program every class, but the kids in my remedial classes need a lot of variety. When I have them do it more than 40 minutes at a time, they get really bored with it and many are not productive with it then. We have some computer labs, but they are so old, they die after just a short time in use. It is very frustrating.*

During the pilot in 2013-14, the STEM Action Center had schools complete a technology survey to ensure that schools had sufficient computer equipment to use the licenses they were given. This did not occur in 2014-15, when we saw reduced usage as well as issues such as described in this section with technology access. In 2015-16, the STEM Action Center asked school principals who applied for continued use of the product licenses to sign a letter of commitment to providing at least 45 minutes per week of computer use for each license received to utilize the software.

Summary

Teachers were generally very pleased with ALEKS and many were quite hopeful to use it again with their classes. They especially appreciated how ALEKS individualizes learning for each student and informs teachers of both their students' achievements and struggles. Teachers valued the various insights into their students' efforts including student time using the program, the concepts mastered, and the skills that still needed work. The information helped teachers to make targeted decisions to enhance specific instruction for the whole class and create personal learning opportunities to meet individual students' needs. Based on teacher responses, some parents also appreciated the reports that quickly summarized their student's progress.

ALEKS challenges students to practice skills and master concepts, and encourages students with immediate feedback and by providing resources to help them improve. As with any program, student access to technology is always a concern, but most teachers were finding ways to make ALEKS work for their students. Several teachers were just beginning to use the software, were looking forward to more training with ALEKS, and increased use in the coming school year. A few teachers found that ALEKS did not engage their students or build deep understanding of mathematical concepts. Some teachers wanted more colors on the ALEKS platform, and sound or video components help their students with lower reading skills.

E-mail Feedback

The STEM Action Center shared with us e-mails they received from ALEKS users. We kept the e-mails organized in a documentation file to understand implementation. This unsolicited feedback can be helpful in that it may bring out implementation challenges and successes that teachers did not provide on the survey. There may be hidden agendas behind why a person sent an e-mail, such as desiring more licenses in the future or wanting funding for a particular product vendor. However, they also provide important insight from the voice of stakeholders, such as school principals, who do not complete the surveys. We provide some as examples of the kind of positive and negative feedback received.

Positive Feedback

- **Achievement Gains:** *I decided to try ALEKS as the main method of teaching Secondary 3. I have been thoroughly impressed. We have just completed the SAGE Interim with 68% already proficient or highly proficient. We have 21% that are almost there. We have 10% that will make it, but are a little behind the others.*
- **Achievement Gains:** *I just wanted to write and tell you how much our district is enjoying using ALEKS. Our secondary math teachers are very enthusiastic about the product. We had a second follow-up training with the Mcgraw-Hill group and have been very pleased with the product. Here are a few comments from our teachers:*
    - *One of our rural high schools has found great success with using ALEKS in Secondary II and Secondary III. They are seeing great growth in student understanding as they integrate ALEKS with their regular math program.*
    - *Another high school shared the story that one of the teachers that teaches the same class, Secondary II Honors, in her school does not use ALEKS regularly. This teacher does use ALEKS as a regular part of her curriculum. The teacher that uses ALEKS sporadically had 27 Secondary II Honors kids that WERE NOT PROFICIENT on SAGE Interim and 72 Secondary II Honors students that WERE PROFICIENT. The teacher that uses ALEKS all the time had 14 students that WERE NOT PROFICIENT on SAGE Interim and 87 Secondary II Honors students that WERE PROFICIENT.*
- **Positive Parent Feedback:** *As we've visited with parents about ALEKS they are very excited about this addition to our curriculum. As a district, we feel that ALEKS fills the missing piece for our math curriculum. We are also using ALEKS in 10 of our elementary schools. The teachers and students enjoy it. We are anxious to see the difference in scores at the end of the year when we compare those that have used it and those that haven't. Thank you for the opportunity to use this tool in our district. As more and more teachers share their experiences and successes, we are getting more buy-in from some of the 'wait and see' teachers.*

Mixed Feedback

- **Age Appropriateness:** *The lower elementary teachers are making it work, although it does not seen ideal for that age. However, our kindergarten children are not at all able to make this work for them. Our upper elementary teachers are quite happy with the ALEKS program. It does not seem to be the best option for the younger children. (for grades k-2 or 3).Our upper elementary and older students will really benefit from ALEKS.* (Note: ALEKS is not intended for students in grades K-2 students)
- **Implementation Constraints:** *My teachers and students LOVE using the ALEKS program. The fourth grades are using ALEKS. Since we have been back in school after the holiday break, our computers have been used to practice for and take the SAGE Interim tests. The SAGE writing window is opening soon and the computers will be*

accommodating students taking those tests. This information is to explain why our minutes will be lower than expected. I will forward your e-mail on to those teachers so they can make sure they have done all they should to keep the grant. Thank you for allowing our students to use these programs.

- **Implementation Constraints:** *There are a few causes of having difficulty implementing ALEKS for our 9th grade students, as well as our other students. First, time is a big issue. It is difficult finding time to use ALEKS when our teachers already feel stressed trying to get through our curriculum. Second, computer labs are not always available to schedule. Some days it is possible to schedule one or two classes, but not all classes, which makes it difficult for teachers. Third, teacher buy-in has been difficult because of the previous reasons. I feel we have had the proper training to use the software, and our ALEKS reps have been really good at communicating with us and fixing any problems that have risen. Last year when we were piloting ALEKS, we had some math elective classes set aside for students who were behind in math. The software was terrific for those classes. This year we do not have those courses.*

Cognitive Tutor

Usage

Based on cumulative usage data collected in June 2015 (as shown in Table 39), 286 students were given a Cognitive Tutor license, but only 82 students had evidence of time spent in the program, which is about 29 percent of the licenses assigned. Usage time ranged from 12 minutes to about 21 hours of program use, with an average usage of about 3 hours. Among these users, 67 percent met the provider's recommended usage benchmark.

Table 39. Summary of License Distribution and Usage for Cognitive Tutor

Usage Information	Usage Data
Number of licenses assigned	
Number of K-12 students	286
Number of districts	0
Number of charter schools	3
Number of all schools	3
Number of licenses used (>0 minute)	82
Number of usage time (minutes)	
Mean	163

Min	12
Max	1,234
Percentage of licenses used	29
Percentage of users meeting recommended usage	67

Next, we provide a summary of the feedback teachers provided from their implementation experience.

Teacher Survey

Types of Product Usage

The first survey question asked teachers to describe how they use the mathematics technologies for their teaching. On the survey, we provided teachers with examples of typical use, such as a supplement, selected materials for instruction, and selected materials for homework. In Table 40 (and in Figure 18), we summarize the teachers' responses for this item for teachers who used Cognitive Tutor.

Table 40. Common Responses for How Teachers Used the Product (N=15)

Categories	Sample Response	Percent
Supplement to instruction	*I selected materials that supplemented my instruction in class and put my students in those sections in Cognitive Tutor.*	100
Intervention or Differentiation	*Some remediation--assigned some students off-grade level.*	13
Develop and reinforcing concepts	*I used Cognitive Tutor to supplement in class teaching and to reinforce concepts in the current chapter.*	7

The STEM Action Center had directed the teachers to use the product as a supplement and not as their primary form of instruction, since the State Office of Education had not reviewed the products for alignment to the state standards. Teachers followed this direction as 100 percent of the teachers stated that they used the product as a supplement to their curricula. Of the 15 teachers surveyed, only three mentioned additional usage as an intervention or as reinforcement of concepts taught. The following statement from a teacher using Cognitive Tutor is an example of how often the product was used in class, “The students work one period every 4 days.” This indicates that teachers were able to use the program at least once a week to supplement their instruction.

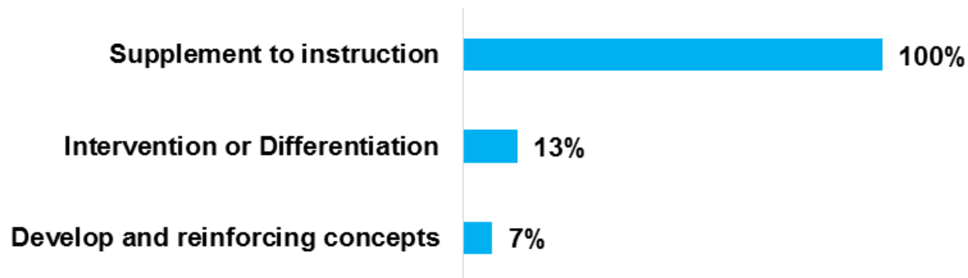


Figure 18. Common Responses for How Teachers Used Cognitive Tutor (N= 15)

Teacher Satisfaction

The second survey question asked teachers to describe their overall level of satisfaction with the mathematics technology. Many of the categories of teachers’ responses to this item reflected positive aspects towards their use of the technologies in their classrooms (shown in Table 41 and Figure 19) and other responses included concerns about the products (shown in Table 42 and in Figure 20). We coded these responses separately.

Table 41. Positive Responses for Teacher Satisfaction with Education Technology (N= 15)

Categories	Sample Response	Percent
Satisfied with provided technology	*I think the program forces students to break down concepts and work for mastery.*	40
Customizable features	*I really like that you can customize modules*	13

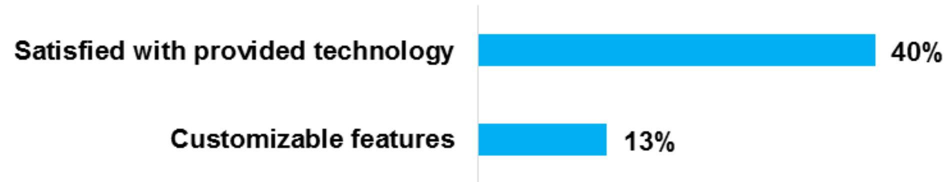


Figure 19. Common Responses for Teacher Satisfaction with Cognitive Tutor (N= 15)

Several teachers mentioned that the program has ample rigor and that it blocks the student from moving forward until they have mastered a concept. This benefit can also hinder a student's progress if additional support does not provide a method to get past this block.

Teacher Concerns

Three teachers indicated that the content of Cognitive Tutor does not directly align with the core and a frustration that too much class time is lost to non-core content. A teacher noted,

> *Cognitive Tutor is great for some topics and a waste of time for others. I picked skills that Cognitive Tutor did well and used them for my students.*

Table 42. Negative Responses for Teacher Satisfaction with Education Technology (N=15)

Categories	Sample Response	Percent
Lack of Alignment to Standards	*There seems to be too much of a focus on non-math related concepts to master what is supposed to be being assessed/taught.*	20
Student frustration or difficulty	*The hard part of the program is that some students get stuck in a section they don't know how to complete and can't move forward until they learn it. They can get frustrated with this and give up.*	13
Need more time to use the product	*I think it would be fabulous if I had the time to do the individual interviews that the program suggests.*	7
Difficult for students below grade level	*The screens were text heavy and the students had an immediate aversion to reading so much fine print.*	7

Categories	Sample Response	Percent
Product technical problems	*It has some technical glitches that make it challenging for the students to use at home.*	7
Dissatisfaction with the technology	*I am not completely happy with the Cognitive Tutor*	7

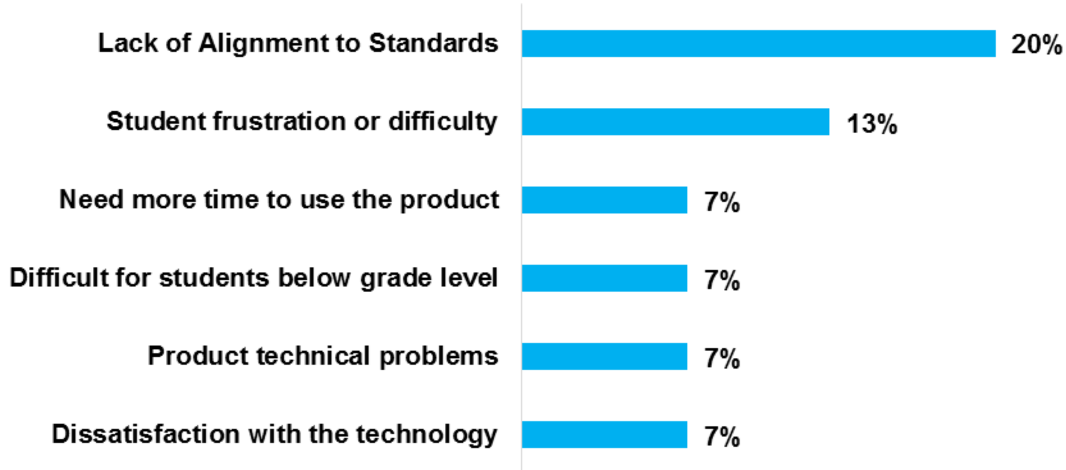


Figure 20. Common Responses for Teacher Concerns with Cognitive Tutor (N= 15)

Two of the 15 teachers also mentioned that the program accepts only certain answers while rejecting equivalent answer in another form (i.e. decimals rather than fractions). This creates a level of frustration for students when they cannot enter a correct answer and do not understand how to move on in the program. One teacher stated,

> *The answers boxes are very inflexible in the answers it is willing to accept. One example is students who want to put in an improper fraction as a decimal have to go four places past the decimal and not round the last digit or they are told they have a wrong answer which confuses them.*

Use of Data Reports

The third survey item asked teachers to describe how they used the data reporting features provided with the technology product. Common examples include use of data for monitoring students' progress or informing instructional decisions, what some people refer to as "performance management." We provide common teacher responses in Table 43 (and Figure 21).

Table 43. Responses for Teacher Use of Performance Management Features (N=15)

Categories	Sample Response	Percent
Used to identify growth by area of standards	*I found many topics the students would get stuck on in the cognitive tutor and knew I would need to review these with the students before their test.*	53
Did not Use	*I have not used the reports.*	27
Used to determine product usage	*Looking at how much time is spent in each area*	20

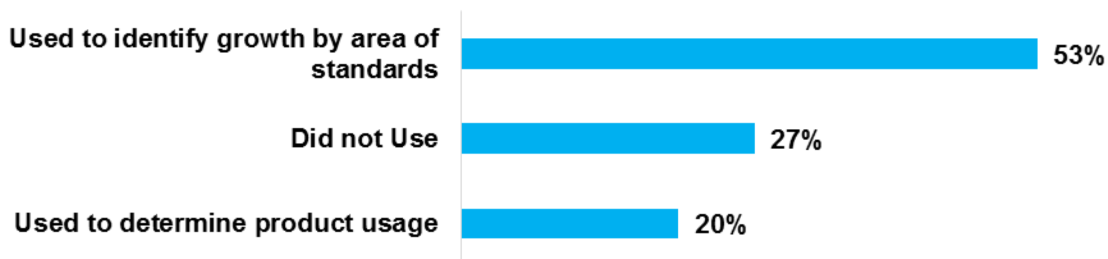


Figure 21. Common Responses for Use of Data Reporting for Cognitive Tutor (N= 15)

The teachers seemed to benefit most from seeing where students spent time on the program. This enabled them to adjust their interaction with the students to better target where they could provide further instruction. We provide an example with the following teacher response:

I love the ability to create a unit with a pretest, teaching, and posttest. I plan on being able to use all of these features in the future. The reports are a great way to show how much progress a student has made in mastering the standards.

Challenges with Technology Integration

The fourth survey item asked teachers to describe any barriers they encountered implementing the technology in their classroom, such as technological problems. We share common teacher responses in Table 44 (and Figure 22).

Table 44. Challenges with Technology Integration (N=15)

Categories	Sample Response	Percent
Not enough computers	*Scheduling of computer labs can be an issue.*	27
Old Technology	*Our computers are so old that there ends up being too many barriers to properly use the Cognitive Tutor Prime.*	20
No barriers	*None*	20
Lack of home access	*Many students couldn't get it to work at home so it made it a challenge to assign it as homework.*	7

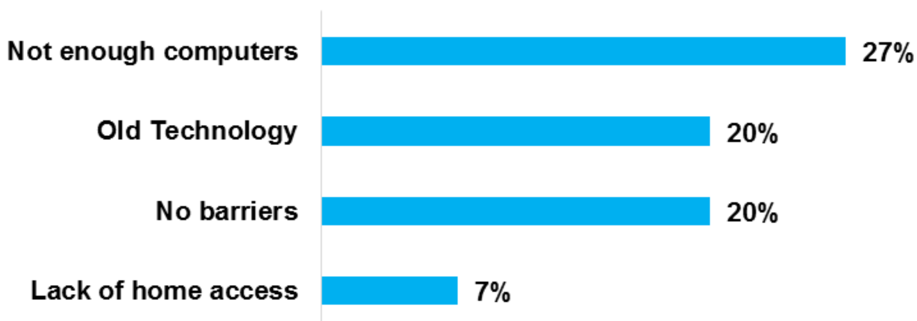


Figure 22. Common Challenges with Technology Integration for Cognitive Tutor (N= 15)

Additionally, 20 percent of the teachers reported a barrier to using Cognitive Tutor was time constraints. As one teacher wrote, *TIME. I have lots of material to teach the students and not a lot of time to teach it to them. We don't have a lot of time to work through this program.*

Summary

This relatively small sample group of 15 provided an overall dissatisfied reaction to the program. Several teachers mentioned enjoying the use of the product but also found frustrations within the product, such as the rigidity of the acceptable answer format or technical glitches within the program especially with the use of JAVA scripting. Several teachers also mentioned time constraints affecting the use of Cognitive Tutor and how much time students waste on topics not aligned with class content.

E-mail Feedback

The STEM Action Center did not receive any unsolicited feedback, by e-mail, from schools using Cognitive Tutor.

Catchup Math

Usage

Based on cumulative usage data collected in June 2015 (as shown in Table 45), there were 917 students given a Catchup Math license, but only 782 students had evidence of time spent in the program, which is about 85 percent of the licenses assigned. Usage time ranged from 1 minute to about 24 hours of program use, with an average usage of about 3 hours. Among these users, 10 percent met the provider’s recommended usage.

Table 45. Summary of License Distribution and Usage for Catchup Math

Usage Information	Usage Data
Number of licenses assigned	
Number of K-12 students	917
Number of districts	3
Number of charter schools	0

Number of all schools	3
Number of licenses used (>0 minute)	782
Number of usage time (minutes)	
Mean	171
Min	1
Max	1,445
Percentage of licenses used	85
Percentage of users meeting recommended usage	10

Teacher Survey

Types of Product Usage

The first survey question asked teachers to describe how they use the mathematics technologies for their teaching. In the survey, we provided teachers with examples of typical use, such as a supplement, selected materials for instruction, and selected materials for homework. In Table 46, we summarize the teachers' responses for this item for teachers who used Catchup Math (also displayed in Figure 23).

Table 46. Common Responses for How Teachers Used the Product (N=5)

Categories	Sample Response	Percent
Supplement to instruction	*We have used it as a supplement and enhancement.*	40
Intervention or Differentiation	*The Catchup Math program has been used in our school as an intervention for students with IEPs who are not performing at grade level or at the level of their enrolled class. It is supplemented with individual, one-on-one instruction from teachers.*	40
Practice for developing skill fluency	*I do daily math centers and my students use this program to practice their math. They love it!*	20

The STEM Action Center directed teachers to use the product as a supplement and not as their primary form of instruction, since the State Office of Education had not reviewed the products for alignment to the state standards. We were pleased to see that teachers reported use of these products for intervention (40%). The participants of this survey primary expressed the benefit of Catchup Math as an intervention, for supplement, and for practice. Such as this teacher:

I used Catchup Math to help my students who were in math lab and other classes to fill in some of the knowledge gaps that they had.

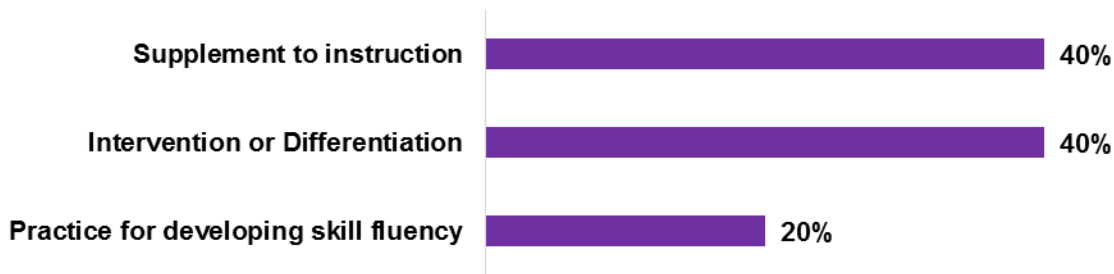


Figure 23. Common Responses for How Teachers Used Catchup Math (N= 5)

Teacher Satisfaction

The second survey question asked teachers to describe their overall level of satisfaction with the mathematics technology. Many of the categories of teachers' responses to this item reflected positive aspects towards their use of the technologies in their classrooms (shown in Table 47 and Figure 24).

Table 47. Positive Responses for Teacher Satisfaction with Education Technology (N= 5)

Categories	Sample Response	Percent
Learning is adaptive and individualized for students	*I like the Catchup math program. I was impressed with the initial pretesting procedure and that it then puts them at the true level the student is at. The students can then move up quickly if they are only lacking in a few areas.*	20
Students are engaged when using technology	*Seeing how excited my kids are when they can play this is uplifting knowing that they want to play math games.*	20

Categories	Sample Response	Percent
User friendly	*The product was easy to learn for staff and students and was able to be put into use quickly.*	20

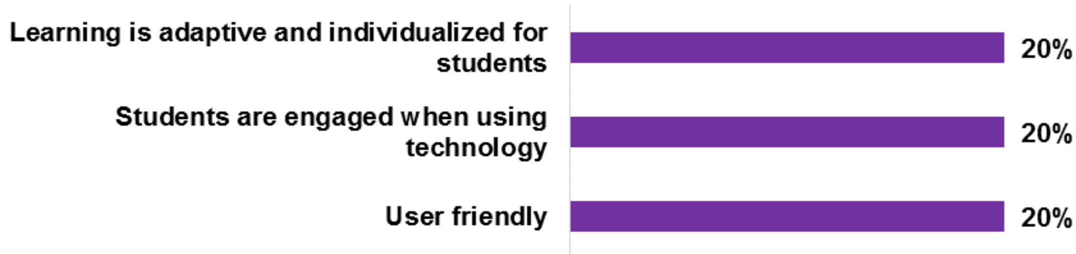


Figure 24. Common Responses for Teacher Satisfaction with Catchup Math (N= 5)

Many of the positive concepts were just general statements about overall satisfaction with the product (80%). However, the other responses had to do with the adaptive and individualized learning, the level of student engagement, and being user friendly. Impressively, the participants who used Catchup Math did not report any negative responses. This evidence demonstrates the need for providing more widespread use of Catchup Math and collecting more information about its use. With such a small sample size, we do not have enough evidence about this program's effectiveness at this time.

Use of Data Reports

The third survey item asked teachers to describe how they used the data reporting features provided with the technology product. Common examples include use of data for monitoring students' progress or informing instructional decisions, what some refer to as "performance management." We provide common responses in Table 48 and Figure 25.

Table 48. Responses for Teacher Use of Performance Management Features (N=5)

Categories	Sample Response	Percent
Used to determine product usage	*We use the usage reports the most to find out how much the students are using it and if they are on task when they should be.*	40
Inform students of progress	*The data from using this program and the reporting features have informed each students individual instruction. It has helped form their levelized learning program*	20
Monitor students' progress	*Data reporting features in the Catchup Math program have been helpful in tracking students' progress through the course . . .*	20
Used for assessment	*We really liked the pre-assessment test at the beginning.*	20
Used for student IEP or RTI	*Data reporting features in the Catchup Math program have been . . . in creating goals for Individualized Education Programs for students in the Special Education program with needs for remedial math.*	20

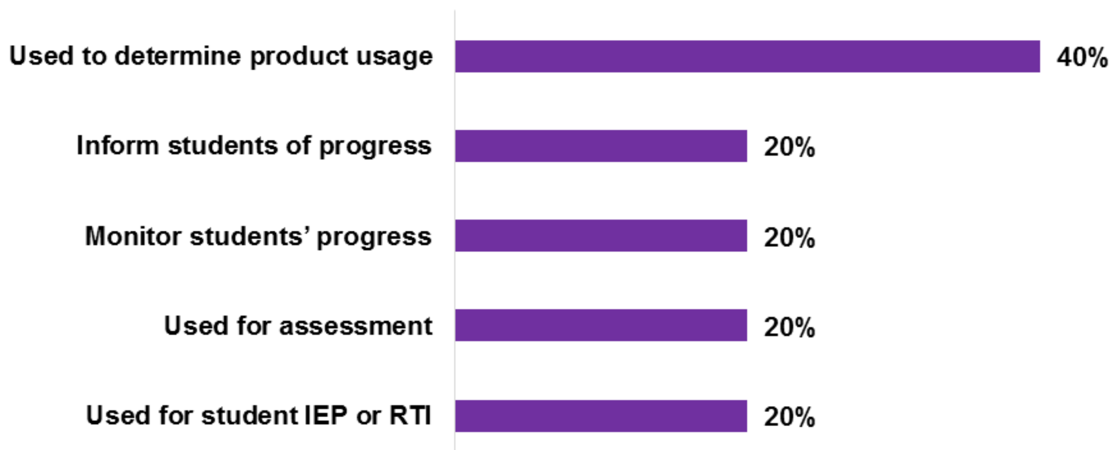


Figure 25. Common Responses for Use of Data Reporting Features of Catchup Math (N= 5)

The participants in this survey shared positive responses about Catchup Math. They were able to use the data to inform students of progress, monitor student progress, assessment, to determine product usage, and for the creation of IEPs. One person expressed appreciation for specific features of Catchup Math:

> *Features that have been the most helpful are reports showing the highest level of productivity and time spent on games, as well as the ability to disable math-learning games for students spending too much time on them. The feature that allows the teacher to view a students work from the students' perspective has also been helpful.*

Challenges with Technology Integration

The fourth survey item asked teachers to describe any barriers they encountered implementing the technology in their classroom, such as technological problems. We share some of the common teacher responses in Table 49 and Figure 26.

Table 49. Challenges with Technology Integration (N=5)

Categories	Sample Response	Percent
No Barriers	*We had no barriers in using the product.*	60
Not Enough Computers	*In the beginning there were usage issues but were quickly resolved by the company. Our main issue at this juncture is the difficulty of finding free time to use it properly due to the constant testing required. Our computer lab has become more of a testing lab and not much use for instructional resource, unfortunately.*	40

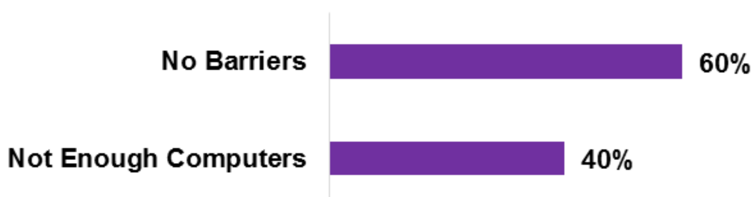


Figure 26. Common Challenges with Technology Integration for Catchup Math (N= 5)

The majority of the participants reported no barriers to using the product. Two of the five participants reported difficulties with obtaining access to computers.

> *In the beginning there were usage issues but were quickly resolved by the company. Our main issue at this juncture is the difficulty of finding free time to use it properly due to the constant testing required. Our computer lab has become more of a testing lab and not much use for instructional resource, unfortunately.*

Summary

Although the sample size is small for this survey of Catchup Math, all of the participants appear to have had very positive experiences with this product. The next step would be to test this product on a much larger sample size to see if it would have positive results on a widespread basis. Due to the small sample size, there is not enough evidence to make conclusions about teacher perceptions of this product.

E-mail Feedback

The STEM Action Center did not receive any unsolicited feedback, by e-mail, from schools using Catchup Math.

EdReady

Usage

Based on cumulative usage data collected in June 2015 (shown in the following table), there were 418 students in K-12 schools using the program. There were an additional 80 users without any school or district/charter information, so these users may be adults or students in alternative education programs. All students given an EdReady license had evidence of time spent in the program. This is because once a student sets up a license and username; they complete a diagnostic assessment, which we count as usage. Then they can use alternative curriculum of their choice to study the areas they are weak in before taking the assessment again. This product is more of an assessment tool. Usage time ranged from one minute to about 24 hours of program use, with an average usage of about 6 hours. The provider does not have a recommended amount of usage, since the tool is primarily for assessment, and students and their teachers can use other resources for instruction in areas of weakness.

Table 50. Summary of License Distribution and Usage for EdReady

Usage Information	Usage Data
Number of licenses assigned	
Number of K-12 students	418
Number of users not in districts	80
Number of districts	4
Number of charter schools	1
Number of all schools	7
Number of licenses used (>0 minute)	498
Number of usage time (minutes)	
Mean	371
Min	1
Max	1,425
Percentage of licenses used	100
Percentage of users meeting recommended usage	N/A

Teacher Survey

Type of Product Usage

The first survey question asked teachers to describe how they use the mathematics technologies for their teaching. We provided teachers with examples of typical use, such as a supplement, selected materials for instruction, and selected materials for homework. In Table 51, we summarize the 12 teachers' responses for this item for teachers who used EdReady (also shown in Figure 27).

Table 51. Common Responses for How Teachers Used the Product (N=12)

Categories	Sample Response	Percent
Selected materials for individualized instruction	*Special Education students use the EdReady Math program as a way to access non-grade level math curriculum, which directly supports the student Individualized Education Plans (IEP).*	33
Other	*I use EdReady for self-paced credit recovery for Secondary Math I and Secondary Math II.*	25
Assessment	*Students have to complete three separate goals in EdReady and then earn a minimum score on a final in my class at the end of each section.*	25
Supplement /Enrichment	*EdReady was used as supplement material.*	17
Not used yet	*I didn't because the quarter ended.*	17
Practice for developing skill fluency	*Students have a weekly assignment to complete 10 topics…each week. It has produced noticeable improvement for the students who have taken the opportunity to utilize it.*	8
Intervention or Differentiation	*EdReady was used as intervention.*	8

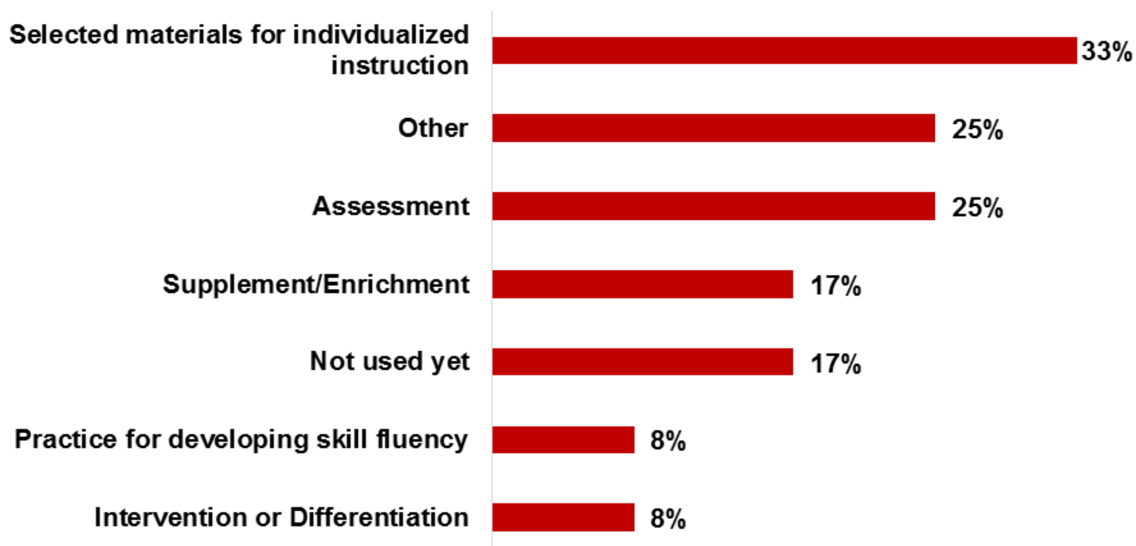


Figure 27. Common Responses for How Teachers Used EdReady (N= 12)

The STEM Action Center had directed teachers to use the product as a supplement and not as their primary form of instruction, since the state office of education had not reviewed the products for alignment to the state standards. We were pleased to see that teachers reported use of these products for assessment (25%), but also that some teachers are finding the products helpful for addressing individual instruction (33%). The other category included ACT test practice, credit recovery and IEPs**.** The following statement from a teacher using EdReady is an example of how these products may support teacher implementation of the Common Core State Standards with students who receive special education services:

> *Weekly expectations of both time spent working in the program, as well as completed topics, are part of their math grade . . .Weekly student/teacher review of progress from EdReady Progress data helps both student and teacher monitor and discuss progress and goals. Student progress data, taken from EdReady Math, is also presented and used in annual student IEP meetings.*

This is important to note, because the new standards require students to be college and career ready and recognizes that students arrive at understandings at different times.

Teacher Satisfaction

The second survey question asked teachers to describe their overall level of satisfaction with the mathematics technology. Many of the categories of teachers' responses to this item reflected positive aspects towards their use of the technologies in their classrooms (shown in Table 52 and Figure 28) and other responses included concerns about the products (shown in Table 53 and Figure 29). We coded these responses separately.

Table 52. Positive Responses for Teacher Satisfaction with Education Technology (N= 12)

Categories	Sample Response	Percent
General Satisfaction	*I was satisfied with this program it helped me in my math classes. The pre-assessment works really well and the design of the lessons are helpful and easy for the students to use.*	75
Student success or positive experience	*Students are finally able to fill in many of the holes that they have been struggling with for so long. I have gotten many positive reports from my students such as, "It helped me to get over my test anxiety."*	17
Customizable features	*I really like EdReady... I like the fact that I can easily create online assessments to supplement classroom activities.*	17
Learning is adaptive and individualized for students	*This program seems to work best with our Special Education population. Edready has been a great resource to help fill in gaps of student understanding.*	8
Aligned with state standards	*I like the fact that I can easily tie it to our classroom curriculum.*	8

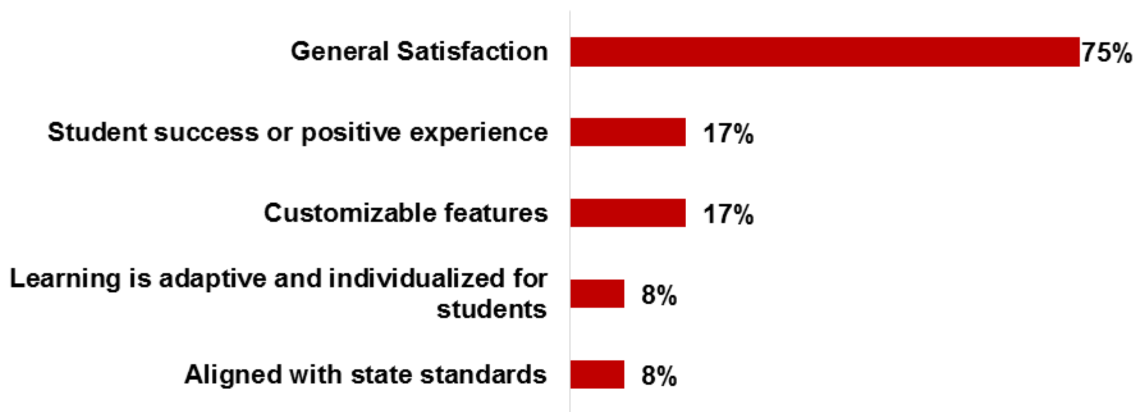


Figure 28. Common Responses for Teacher Satisfaction with EdReady (N= 12)

Many of the positive concepts were general statements about overall satisfaction with the product (75%). However, the second most common responses had to do with specific student success (17%) and the customizable features that teacher employed using the technology (17%).

The following statement is representative of a teacher's report of EdReady for both student success and customizable features:

> *I really like EdReady. The program works extremely well for our credit recovery students. I like the control I have over choosing the topics for them to focus on. I can also set a different target score depending on what students need to work on. I like the fact that I can easily create online assessments to supplement classroom activities.*

This is important to note, because the new standards require students to be college and career ready and recognizes that students vary in conceptual understanding. What one student understands another may struggle to understand and need time and practice with the concept. The focus on individual ways of knowing promotes growth, understanding, and knowledge of such concepts.

Teacher Concerns

As shown in Table 53, the dissatisfaction with the product related to the readability of the texts for some students and different types of question for the assessment compared with the practice questions. These features of supplemental practice may relate to the level of accessibility of a program for students.

Table 53. Negative Responses for Teacher Satisfaction with Education Technology (N=12)

Categories	Sample Response	Percent
Difficult for students below grade level	*Students must also read the assessment questions and many credit recovery students have a problem with reading comprehension as well as math.*	8
Dissatisfaction with the technology	*I found that the questions asked in the assessment for mastery of a topic are sometimes very different or more difficult than the practice problems.*	8

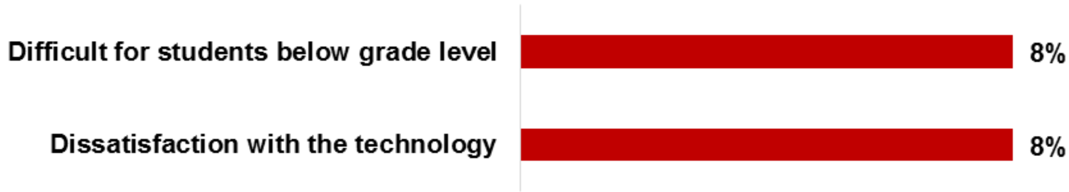


Figure 29. Common Responses for Teacher Concerns with EdReady (N= 12)

Use of Data Reports

The third survey item asked teachers to describe how they used the data reporting features provided with the technology product. Common examples include use of data for monitoring students' progress or informing instructional decisions, what some refer to as "performance management." We provide common teacher responses in Table 54 and Figure 30.

Table 54. Responses for Teacher Use of Performance Management Features (N=12)

Categories	Sample Response	Percent
Monitor students' progress	*I used the individual report data to see the assessments that students had attempted and those that were mastered. This was helpful.*	50
Inform students of progress	*I use the data reporting features on a regular basis to determine the progress of the students.*	25
Inform parents of progress	*Student Progress Data, taken from EdReady Math, is also presented and used in annual student IEP meetings.*	8
Monitor class progress	*I appreciate that I can access both individual student information and class/group data.*	8
Guide student access to content	*How it has them repeat over and over until they understand.*	8
Guide instruction	*I use the charts and graphs to help each student and to adjust my instruction.*	8
Used to determine product usage	*I use the data reporting features on a regular basis to find how much time students are spending logged into the program.*	8

Categories	Sample Response	Percent
Used for student IEP or RTI	*Student Progress Data, taken from EdReady Math, is also presented and used in annual student IEP meetings.*	8
Did not Use	*I don't think we used this feature.*	8

Notable positive concepts from use of the data-reporting feature include monitoring (50%) and informing student progress (25%). The imperative pedagogical practices of frequent feedback and discussion of learning goals influence student learning and academic growth. One teacher reported using the data report from EdReady with students for this purpose:

> *Each week I pull up the student reports to see how much progress they made on their study plans. I then use those scores to update the grades in my class. Weekly student/teacher reviews of progress from EdReady progress data helps both student and teacher monitor and discuss progress and goals*.

This is important to note, because in order for students to be college and career ready they need to identify their strengths and learn how to continually set and achieve new academic goals.

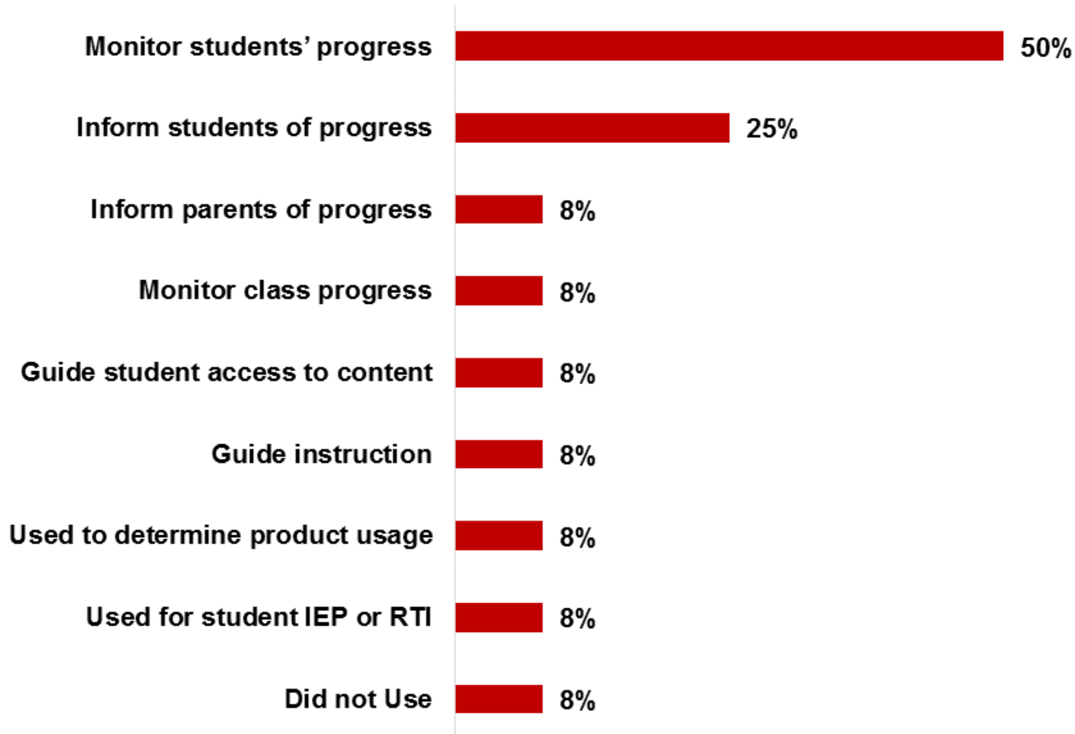


Figure 30. Common Responses for Use of Data Reporting Features of EdReady (N= 12)

Challenges with Technology Integration

The fourth survey item asked teachers to describe any barriers they encountered implementing the technology in their classroom, such as technological problems. We provide common teacher responses in the following table and figure.

Table 55. Challenges with Technology Integration (N=12)

Categories	Sample Response	Percent
No barriers	*None.*	33
Not enough computers	*No in-class computers or mobile labs to utilize. It would be nice to make it a more integrated classroom tool.*	17

Categories	Sample Response	Percent
Internet connectivity problems	*My iPad didn't work sometimes. So we would sometimes not get on this program.*	8
Licenses, accounts, and setup	*Password forgetfulness*	8
Student Boredom	*Some students at the lower math levels (and in some cases lower cognitive levels) get overwhelmed with the sophistication of this program. In programs like this, students are often asked to make decisions about where to go next in the program; a skill sets they may not yet possess.*	8

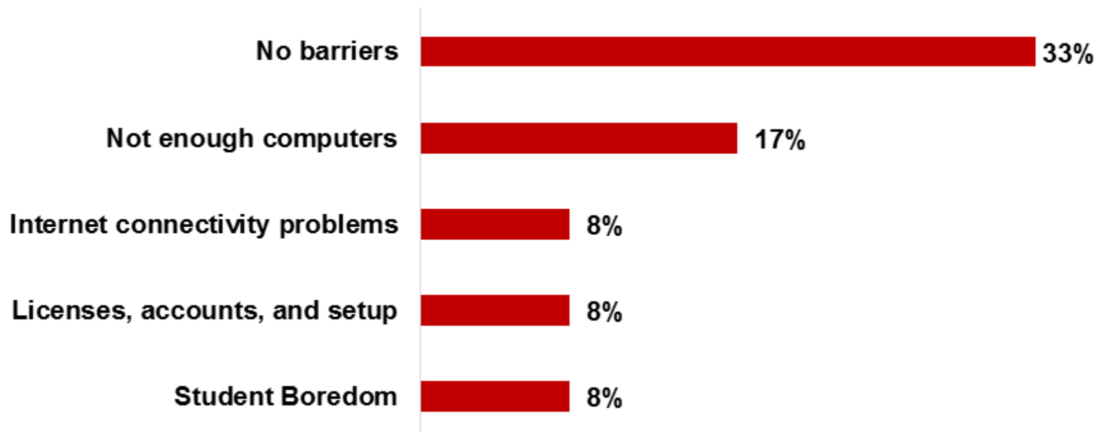


Figure 31. Common Challenges with Technology Integration for EdReady (N= 12)

Most teachers stated zero negative comments about satisfaction with EdReady (33 percent). However, some negatively reported (17%) that lack of access to technology such as computers and tablets an issue with satisfaction. Others reported that many students find the program unengaging (8%). Students identified with lower levels of mathematics proficiency need modifications for their developmental level. For example, one teacher reported this specific need:

> *It's challenging for a teacher to see student progress on a daily basis. Data reporting could be more detailed for those who track daily progress of time and topics.*

This is an important consideration for companies creating supplemental programs for mathematical understanding. In addition, detailed and frequent reporting with positive and critical feedback incorporated for students and their teachers is a necessity to identifying mathematical understanding.

Summary

Based on the feedback of EdReady from teachers most feel that the program is extremely beneficial to their students and their job, facilitating student understanding.   The teachers used the product as a supplement with students who needed individual instruction, differentiation, and adaptations.   The developer could improve the product based on teacher feedback by standardizing practice and assessment problems and adding reading features for students with low reading levels.

E-mail Feedback

The STEM Action Center did not receive any unsolicited feedback, by e-mail, from schools using EdReady.

iReady

Usage

Based on cumulative usage data collected in June 2015 (as shown in Table 56), there were 17,389 students given an iReady license, but only 15,322 students had evidence of time spent in the program, which is about 88 percent of the licenses assigned. Usage time ranged from 2 minutes to about 61 hours of program use, with an average usage of about 6 hours. Among these users, 4 percent met the provider's recommended usage.

Table 56. Summary of License Distribution and Usage for iReady

Usage Information	Usage Data
Number of licenses assigned	
Number of K-12 students	17,389
Number of districts	12
Number of charter schools	6
Number of all schools	74
Number of licenses used (>0 minute)	15,322
Number of usage time (minutes)	
Mean	341
Min	2
Max	3,678
Percentage of licenses used	88
Percentage of users meeting recommended usage	4

Teacher Survey

Types of Product Usage

The first survey question asked teachers to describe how they use the mathematics technologies for their teaching. On the survey, we provided teachers with examples of typical use, such as a supplement, selected materials for instruction, and selected materials for homework. In Table 57, we summarize the teachers' responses for this item for teachers who used iReady (also shown in Figure 32).

Table 57. Common Responses for How Teachers Used the Product (N=462)

Categories	Sample Response	Percent
Supplement to instruction	*Students that are early finishers can then work on computer math and reading lessons that are appropriate for their instructional level*	47
Intervention or Differentiation	*I used iReady once a week with all of my students to help differentiate instruction. I also used it as an intervention with my lowest group of students who do an extra hour of practice each week.*	42
Assessment	*Our class used it to do our assessments on English Language arts, Reading and math.*	18
Selected materials for homework	*Students were encouraged to participate in completing assignments at home. Rewards were earned for each assignment done at home.*	8
Response to Intervention or Small Group Instruction	*We have used the program for Tier 2 and seen improvement with our below grade-level kids*	8
Selected materials for individualized instruction	*The students spend time on iReady during our schedule Chromebook time (once or twice a week for about 30 minutes). They work independently through the lessons and activities assigned to them based off of their diagnostics assessment*	6
Practice for developing skill fluency	*I use it as extra practice in the resource room.*	4
Not used yet	*We've just started. We haven't used it, but are downloading school information so we can begin. We've had an iReady representative come and present to the faculty.*	4
Develop and reinforcing concepts	*Used for test review and to reinforce concepts taught in class. Used also for exposure to concepts not taught yet*	1
Review and re-teaching	*I mostly use iReady as a review for my students as we near year-end.*	1

The STEM Action Center had directed the teachers to use the product as a supplement and not as their primary form of instruction, since the State Office of Education had not reviewed the products for alignment to the state standards. We were pleased to see that teachers reported use of this product as a supplement to their primary instructional programs (47%). Teachers also reported use of this product for intervention and differentiation (42%). The following statement from a teacher using iReady is an example of how this product may support teachers in differentiating their instruction:

> *I think the product it wonderful. I have used the product both in class as a fast finisher, as well as a supplement for students who need extra help. I have also encouraged my students to use it at home as well and have set it up for some students to use it as their daily math homework practice. It has really benefited me in filling in gaps as well as differentiating instruction.*

This is significant, because teachers have the responsibility of ensuring that all students are progressing, regardless of their current level of achievement.

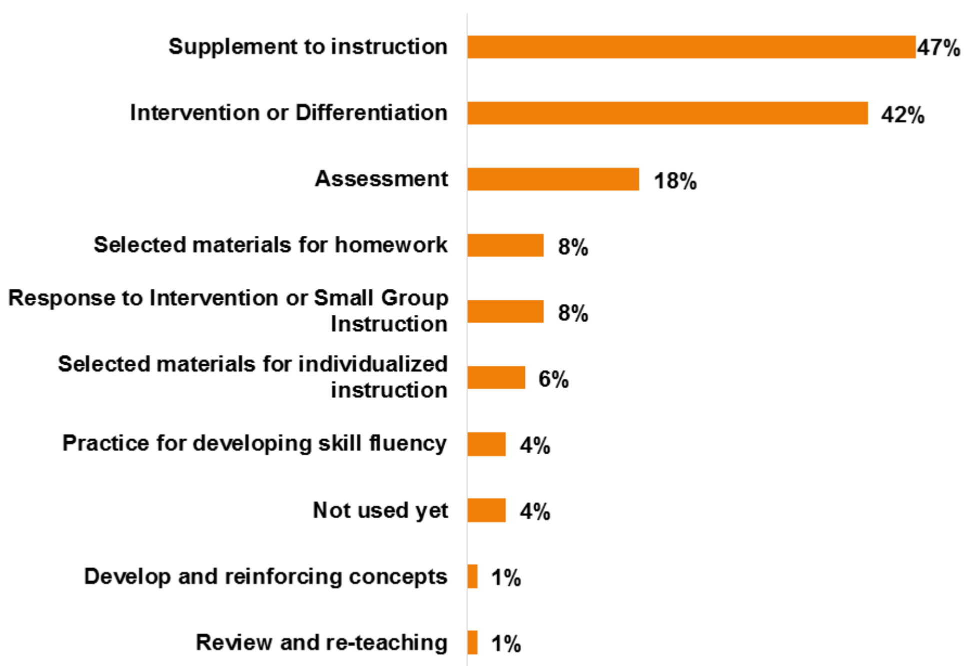


Figure 32. Common Responses for How Teachers Used iReady (N= 462)

Teacher Satisfaction

The second survey question asked teachers to describe their overall level of satisfaction with the mathematics technology. Many of the categories of teachers' responses to this item reflected positive aspects towards their use of the technologies in their classrooms (shown in Table 58 and Figure 33) and other responses included concerns about the products (shown in Table 59 and Figure 34Figure 34). We coded these responses separately.

Table 58. Positive Responses for Teacher Satisfaction with Education Technology (N= 462)

Categories	Sample Response	Percent
Satisfied with provided technology	*It has been a great resource and help*	20
Learning is adaptive and individualized for students	*It was good to have students working at their own level*	7
Students are engaged when using technology	*I felt like the students were very engaged in learning*	6
Provides information in reports about students' learning progress	*I am very pleased. I use the feedback to adjust my instruction*	4
User friendly	*It is easy to navigate and has clear purpose for the students.*	2
Student success or positive experience	*I have watch students go from a 3rd grade level in areas to a 7th grade level. This is an exciting thing for both the student and teacher.*	2
Develops students' knowledge or skills	*I have been very pleased with the targeted practice*	1
Aligned with state standards	*I believe the content is age appropriate and content appropriate*	1
Provides feedback to students	*I like the way it gives the students specific direction and experience using technology as a whole*	1
Customizable features	*I like how you can change your avatar and background. My favorite is the NBA team backgrounds*	1

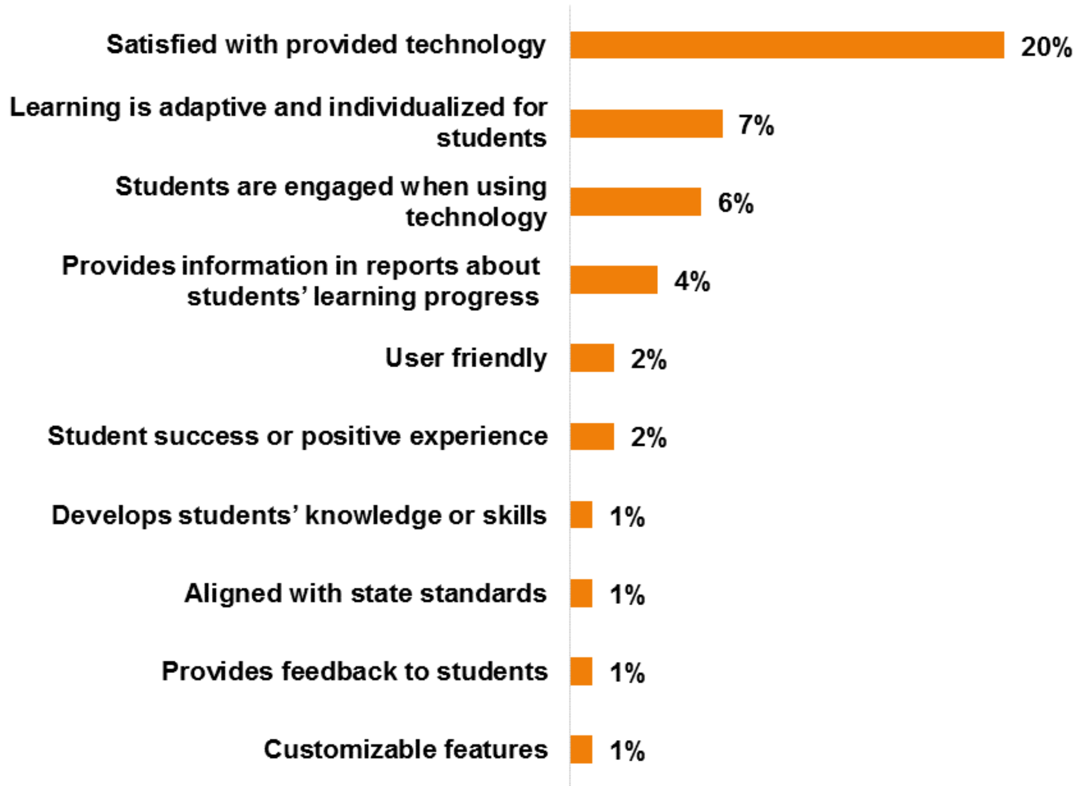


Figure 33. Common Responses for Teacher Satisfaction with iReady (N= 462)

Many of the positive comments were general statements about overall satisfaction with the product (20%). However, the second most common response had to do with the adaptive nature of the program in that it helped individualize instruction (7%). The following statement from a teacher using iReady is an example of how this product may support teachers as they use the report feature, to understand the needs of their students:

> *The reports and data provided by iReady are very targeted. You can look at each individual student by lesson or test. Or you can look at the class as a whole. The main thing I like is that it is very accessible and easy to use for both students and teachers.*

This is important, because teachers need to use data frequently to make appropriate decisions regarding instruction.

Teacher Concerns

The leading cause of dissatisfaction with the product was lack of time (7%). Another cause of dissatisfaction was technical problems associated with the program (5%). The following statement from a teacher using iReady is an example of the frustrations of the teachers regarding technical problems of the product:

> *There are some glitches that are frustrating. For example it will start the student over on the diagnostic test. The students don't like to have to begin again. As a teacher I would like to be able to manipulate their instruction more than I can. For example I would like to be able to override a mini test but have not found a way to do that.*

This is important to note, because teachers need to make decisions as to how to use class time most efficiently. Technical problems slow down the learning process and are discouraging to teachers.

Table 59. Negative Responses for Teacher Satisfaction with Technology (N=462)

Categories	Sample Response	Percent
Need more time to use the product	*It was hard to find the time have my students use the product.*	7
Product technical problems	*It crashes often and my students get worn out having to retake the lesson or quiz when the crash happens.*	5
Difficult for students below grade level	*When students struggle with a math concept they also frequently struggle to read and understand the explanation.*	3
Need more training	*I wish I had more training before using*	3
Lack of challenge or boring to students	*The tutorial is way too slow and students get bored.*	2

Categories	Sample Response	Percent
Not used the technology yet	*Haven't been able to use it enough to give a good answer.*	2
Dissatisfaction with the technology	*A teacher is more valuable than a computer program.*	2
Lack of Alignment to Standards	*It does not fit the core, and it does not allow for the teacher to adequately control the math being presented to fit the core.*	1
Student frustration or difficulty	*My upper students get content that is just too difficult and they get frustrated. They just guess because they don't understand the concept.*	1

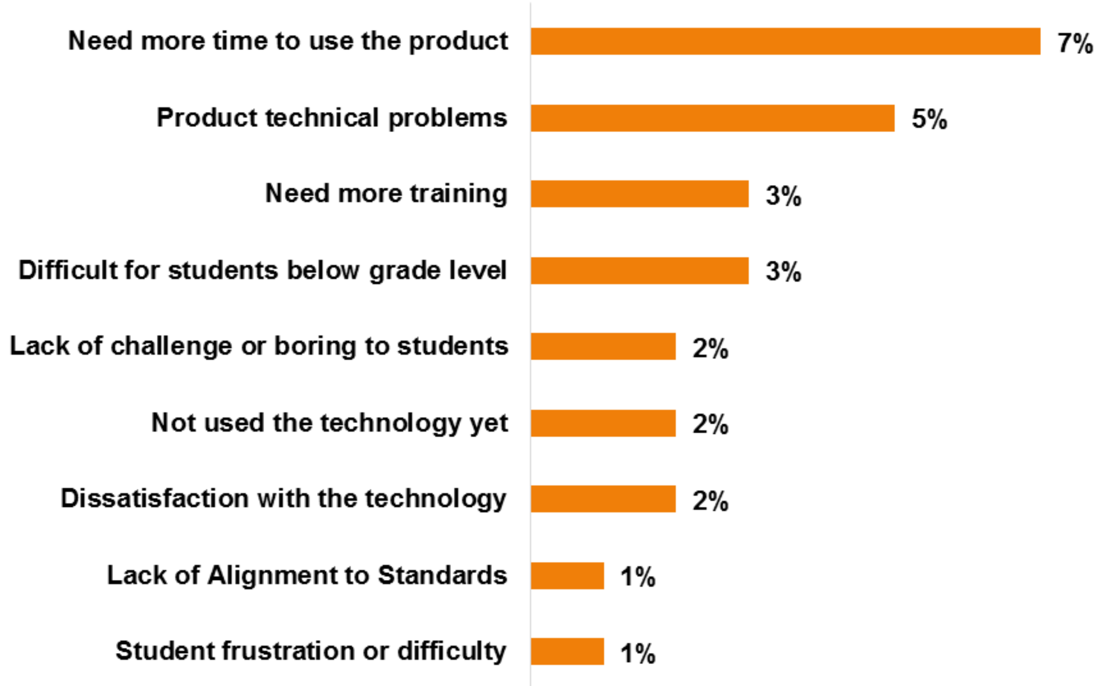


Figure 34. Common Responses for Teacher Concerns with iReady (N= 462)

Use of Data Reports

The third survey item asked teachers to describe how they used the data reporting features provided with the technology product. Common examples include use of data for monitoring students' progress or informing instructional decisions, what some people refer to as "performance management." We provide common teacher responses in Table 60 and Figure 35.

Table 60. Responses for Teacher Use of Performance Management Features (N=462)

Categories	Sample Response	Percent
Monitor students' progress	*I use it as a progress-monitoring tool to see if my students are making growth.*	29
Used for student IEP or RTI	*We were able to use it for Tier 3 intervention and at home help.*	19
Guide instruction	*I adjust my teaching based on the reports and have used some of the suggested lesson plans.*	9
Inform parents of progress	*I mostly used the reporting for IEP conferences to show parents progress and goal points.*	7
Used for assessment	*We have used it to analyze how well students are understanding the lessons they take and how prepared they are for end of level tests.*	5
Used to group students for instruction	*I use the information to group students for teaching.*	5
Used to identify growth by area of standards	*I can look and see where any student is at any time. This is very helpful and a timesaver.*	2
Used to reward students	*I reward the students for increasing their own best score.*	2
Monitor class progress	*I monitor student progress from day to day to see how they are doing.*	2
Guide student access to content	*I use the data to turn on activities/assignments they are ready for and turn off the ones that are too hard for them.*	2
Inform students of progress	*The student graph reports show individual progress, which can be exciting for the students to see. The scores and grade-level equivalent reports have been very useful.*	2
Used to determine product usage	*Checking how many minutes they had been logged on was very helpful.*	1
Have not yet found it useful	*I did not find data useful.*	1
Did not Use	*My teachers have been using it. I haven't.*	1

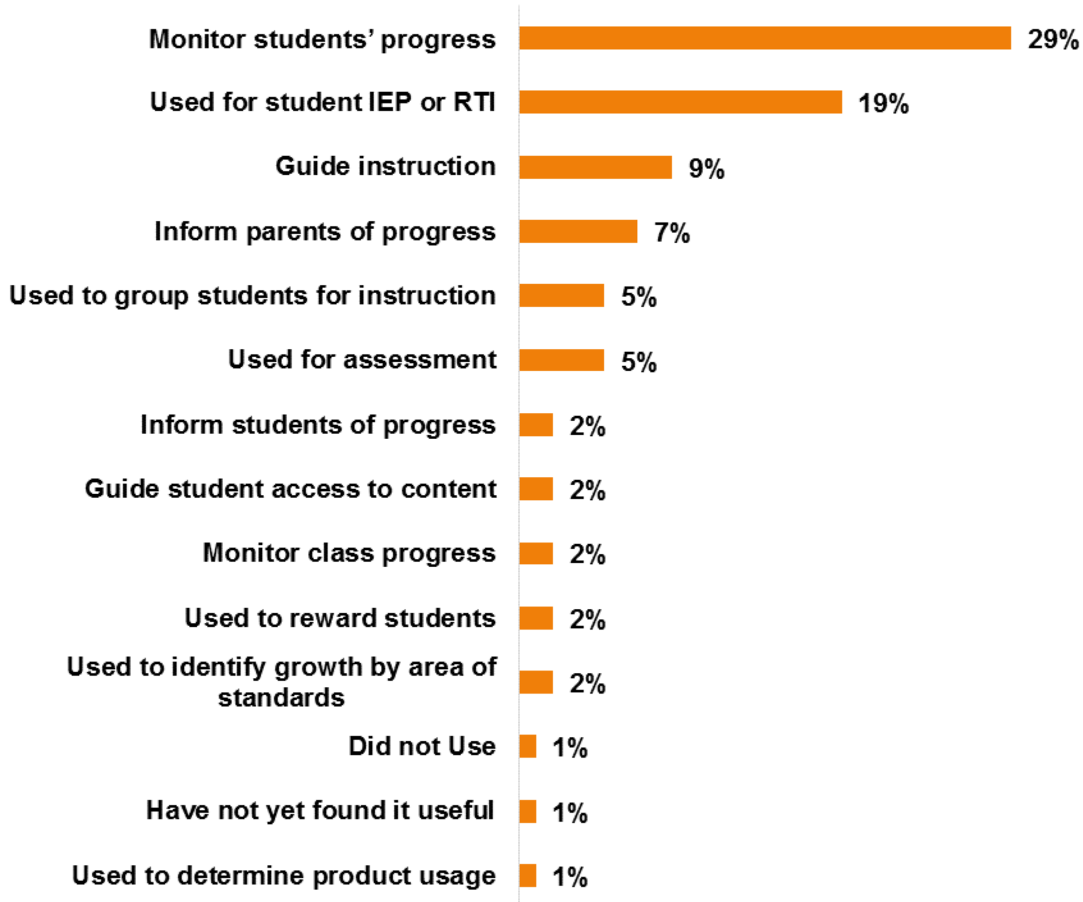


Figure 35. Common Responses for Use of Data Reporting Features of iReady (N= 462)

Teachers reported the highest use of this product for monitoring student progress (29%). Teachers reported that the next highest use of this product was for gathering data for placing students in small groups. Specifically, teachers used the data to form Individualized Education Plans and Response to Intervention Plans (19%). The following statement from a teacher using iReady is an example of how this product may support teachers in monitoring individual student progress:

I found the academic progress to be particularly helpful. I could see what concepts the students had struggled with, and could assign additional lessons. I also used this information to put small groups together for additional support during math time.

This is significant, because teachers have the responsibility to monitor student achievement in order to ensure that all students have unrestricted access to the curriculum. In addition, teachers are required to respond with an intervention to any student who is not progressing academically.

Challenges with Technology Integration

The fourth survey item asked teachers to describe any barriers they encountered implementing the technology in their classroom, such as technological problems. We share common teacher responses in Table 61 (and in Figure 36).

Table 61. Challenges with Technology Integration (N=462)

Categories	Sample Response	Percent
No barriers	*We had full access to iReady.*	29
Not enough computers	*It is sometimes a challenge because we only have 2 sets of laptops to use for the entire school. This will make it challenging to use this product for student lessons.*	29
Need for additional training in product functionality	*Did not have enough training on the program to make it as useful as it could have been.*	4
No or little use	*None.*	4
Licenses, accounts, and setup	*Not all of my students have a license to participate.*	3
Lack of knowledge about the product	*It would help if I knew more about it and what all the features were.*	2
Lack of home access	*Some of my students do not have internet at home.*	2
Not Customizable	*I would have liked to have more control over the strands in the domain.*	2
Old Technology	*We are working with Acer chrome books given to us from a middle school because they were too slow for them.*	2
Student Boredom	*The students' interest varied at times, depending on the lesson.*	2

Categories	Sample Response	Percent
Internet connectivity problems	*The Wi-Fi in our school is so slow that it takes too long for students to get loaded up and started.*	1
Lack of Teacher Buy-in	*It's hard to use my precious 20 minutes a day doing just math. I spent a good deal of the first part of the year using Compose so that my kids could be ready for the Writing test.*	1
Browser problems	*We had some difficulty getting everyone logged on in a timely manner due to blocked pop-ups.*	1

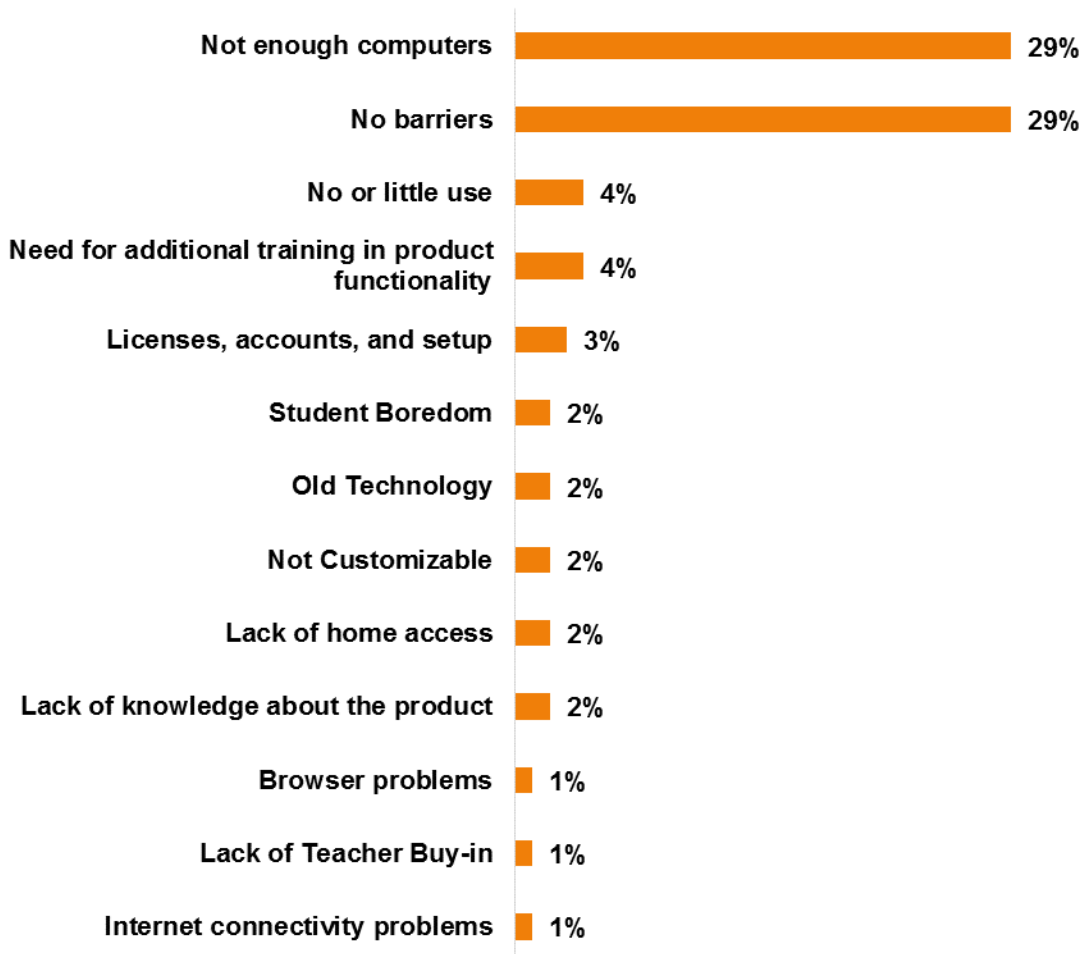


Figure 36. Common Challenges with Technology Integration for iReady (N= 462)

The two most frequent responses to this survey item shared the same response percentage. The two responses were that the teachers experienced few or no barriers (29%) and that there were not enough computers at their schools (also 29%). The following statement from a teacher using iReady is an example of how the school's lack of computer access hindered proper usage:

> *We have limited computer use at our school. To be required to use this program at least an hour or two per week is almost unrealistic. I am weeks into this and still finding time slots to finish diagnostic testing.*

This is important to note, since lack of computer access is the most basic barrier.

Summary

Many of the barriers to successfully using iReady in the classroom are beyond the scope of the software company. Most of the barriers lie within the schools' control. Having the necessary hardware, professional development time, and implementation time are the greatest obstacles to using the product successfully, all within the control of the school and district personnel. In fact, almost half (47%) of the teachers surveyed are using it successfully to supplement their curriculum. However, there is one aspect of the product that could be changed in order to make the product more beneficial to teachers.

Since the software is to be used as a supplement to existing curriculum and not the primary form of instruction, it would be useful if the software could be more adaptable to the needs of individual teachers. Specifically, one teacher suggested that the product be able to give the option to the teachers to have "the ability to limit and/or control the breadth and sequence of the concepts taught so the teachers could focus on essential concepts that the students may need." If the product were more adaptable, it could better fit the needs required by the various situations found in many diverse classrooms whose teachers are using many different instructional programs. However, the more adaptable a product is, the greater the chance that learning how to use the program would make the initial training more complicated. Making the product more adaptable without taking away from its high user-friendly rating would enable the product support teachers in instructing their students.

E-mail Feedback

The STEM Action Center shared with us e-mail they received from either schools or districts who used iReady licenses. We kept the e-mail organized in a documentation file to understand implementation. This unsolicited feedback can be helpful in that it may bring out implementation challenges and successes that teachers did not share on the survey. However, there may be hidden agendas behind why the person sent the e-mail, such as desiring more licenses in the future or wanting funding for a particular product vendor. However, they also provide important insight from the voice of stakeholders, such as school principals, who do not complete the surveys. The STEM Action Center received only one e-mail from a teacher using iReady.

Mixed Feedback

- **Implementation constraints:** *We started the year with the iReady technology for our 6-8th grade program. The teachers are enjoying working with iReady and the students are enjoying it too. We later received information that we had also received the grant for the elementary program. However, due to our need for computers across the school, we have not responded to the other program. We were afraid we would not be able to give it the attention we are required to give. Our students are so focused on using computers for SAGE and SAGE writing, we didn't want to make the commitment. We are getting more comfortable with our technology and the SAGE testing and hope to be more available to use it across the school.*

Math XL

Usage

Based on cumulative usage data collected in June 2015 (as shown in Table 62) there were 3,124 students given a Math XL license, and 3,085 students had evidence of time spent in the program, which is about 99 percent of the licenses assigned. Usage time ranged from 1 minute to about 24 hours of program use, with an average usage of about 10 hours. Note that there is no recommended usage for this program.

Table 62. Summary of License Distribution and Usage for Math XL

Usage Information	Usage Data
Number of licenses assigned	
Number of K-12 students	3,124
Number of districts	5
Number of charter schools	3
Number of all schools	16
Number of licenses used (>0 minute)	3,085
Number of usage time (minutes)	
Mean	613
Min	1
Max	1,439
Percentage of licenses used	99
Percentage of users meeting recommended usage	N/A

Teacher Survey

Types of Product Usage

The first survey question asked teachers to describe how they use the mathematics technologies for their teaching. We provided the teachers with examples of typical use, such as a supplement, selected materials for instruction, and selected materials for homework. In Table 63, we summarize the 60 teachers’ responses for this item for teachers who used MathXL (also shown in Figure 37).

Table 63. Common Responses for How Teachers Used the Product (N=60)

Categories	Sample Response	Percent
Selected materials for homework	*I have used MathXL as my classes primary source of homework assignments.*	53
Assessment	*Gave a pretest and will give a post test.*	27
Supplement to instruction	*Used these programs as supplemental programs for interventions and homework.*	25
Not used yet	*Planning on using it but haven't started yet.*	15
Intervention or Differentiation	*When students have needed intervention for concepts, I have been able to create alternate assignments in MathXL that allow students multiple opportunities to practice the same concept, with detailed explanations for each question and concept.*	8
Selected materials for individualized instruction	*Individual students have been given access to the program to use for individual extra practice and remediation.*	7
Response to Intervention or Small Group Instruction	*We have developed and are continuing to develop MathXL credit recovery classes. These are used as another tool to help students get and stay on track.*	7
Develop and reinforcing concepts	*We have used the program for review assignments for the upcoming Sage Test and through out the academic year.*	3
Practice for developing skill fluency	*I am writing about the MathXL. I use this in place of worksheets.*	3

The STEM Action Center had directed the teachers to use the product as a supplement and not as their primary form of instruction, since the State Office of Education had not reviewed the products for alignment to the state standards. While there were quite a few that used the software for supplemental purposes (25%) there were also a majority that used it for their general homework (53%) and assessments (27%). The following statement from a teacher gives some understanding of the overall ways in which they used MathXL:

Selected materials were used as homework every day this school year. The materials also contained aids for students and families. I also used these materials for formative and summative assessments, in collaboration with other teachers in my school.

This quote is informative as the potential the tool has for teacher collaboration in creating common summative assessments that match with homework given to students.

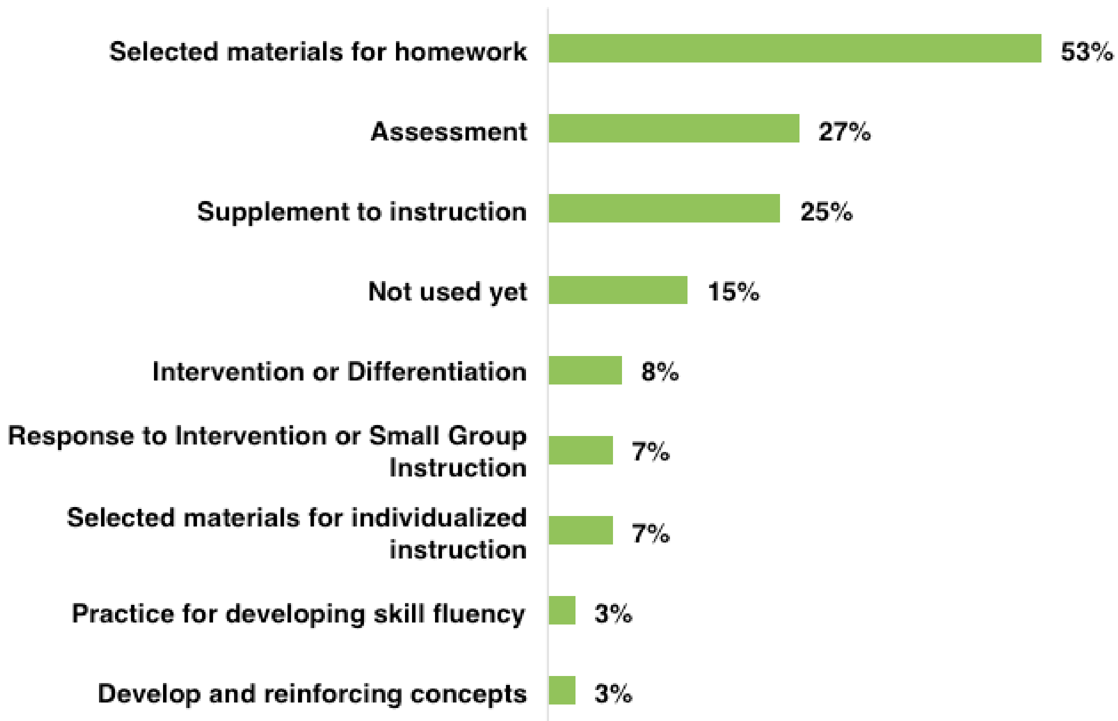


Figure 37. Common Responses for How Teachers Used MathXL (N= 60)

Teacher Satisfaction

The second survey question asked teachers to describe their overall level of satisfaction with the mathematics technology. Many of the categories of teachers' responses to this item reflected positive aspects towards their use of the technologies in their classrooms (shown in

Table 64 and Figure 38) and other responses included concerns about the products (shown in Table 65 and Figure 39). We coded these responses separately.

Table 64. Positive Responses for Teacher Satisfaction with Education Technology (N=60)

Categories	Sample Response	Percent
Satisfied with provided technology	*We are very satisfied with the product. The majority of the students responded positively to the program.*	53
Provides feedback to students	*My students have benefited from the immediate feedback and example problem*	10
Learning is adaptive and individualized for students	*It seems to be a good product, letting students move at their own pace and getting hints on problems when needed.*	8
Students are engaged when using technology	*My students are more engaged in the learning process than ever before.*	2
Student success or positive experience	*I have used this product with remediating students and have found great success.*	2
User friendly	*The interface was very friendly and the question sets were appropriately challenging for student.*	2

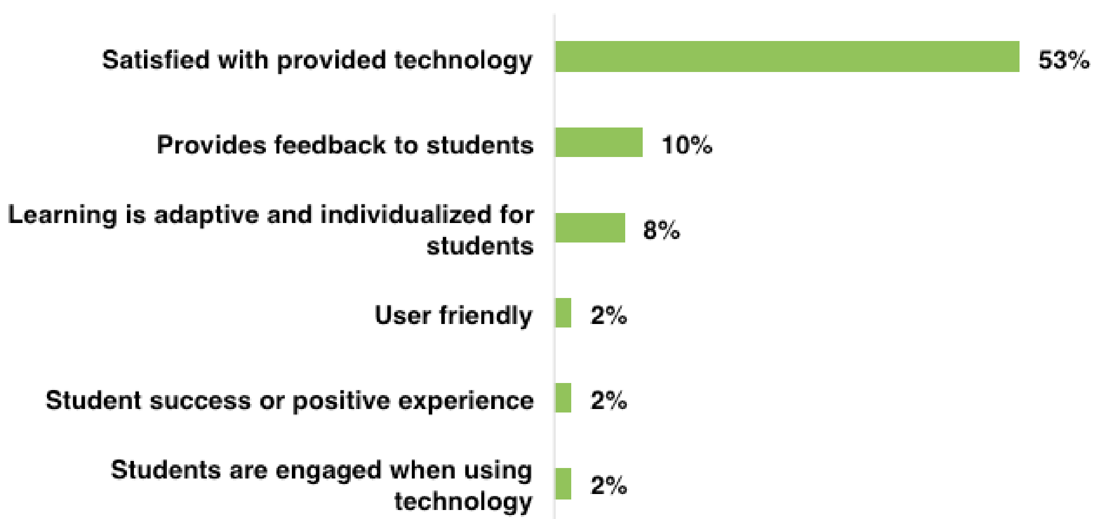


Figure 38. Common Responses for Teacher Satisfaction with MathXL (N= 60)

Many of the positive concepts were just general statements about overall satisfaction with the product (53%). However, the second most common response was in providing opportunities for feedback from students (10%) and the third was the adaptive nature of the software (8%). One teacher stated:

> *I have been very satisfied with MathXL and the flexibility it has given me to differentiate my instruction in the classroom and provide homework support for students.*

This is notable because the personalized feedback and adaptive features of MathXL help the teachers feel that they are able to meet personalized needs and that the software offers a way to differentiate their instruction to students.

Teacher Concerns

There were 12 percent of the respondents who replied they have not used the technology yet and their phrases showed a positive outlook on the potential of the software with phrases such as “excited to use” and “excited to get started”, but because not using the software yet fell under the negative category they are mentioned here. In particular, one instructor mentioned they were “still exploring how to best figure out how to use the features in order to help.” There were a few dissatisfactions from different instructors with a range of topics including access, support, and some frustration because the answer students gave was correct, but not in a format recognized by the software.

Table 65. Teacher Concerns with Education Technology (N=60)

Categories	Sample Response	Percent
Not used the technology yet	*I'm still exploring to best figure out how to use the features in order to help me.*	12

Categories	Sample Response	Percent
Student frustration or difficulty	*The answers are way too particular about the way you enter them. Sometimes students will be told that their answer is wrong when it is indeed correct.*	5
Dissatisfaction with the technology	*I am not too pleased, for I think access is too complicated.*	3
Need more time to use the product	*We haven't had enough opportunity to really use it the way we would like.*	2
Product technical problems	*We like Math XL but have received very little support from Pearson.*	2

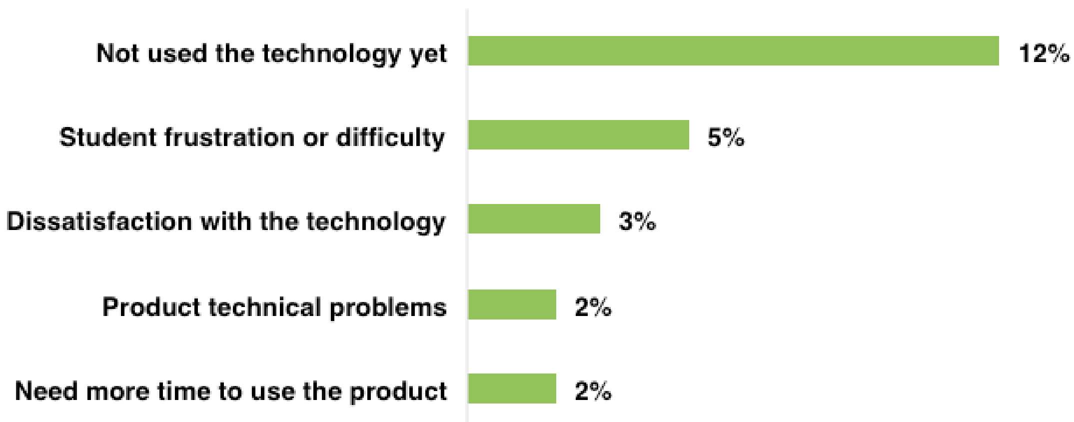


Figure 39. Common Responses for Teacher Concerns with MathXL (N= 60)

Use of Data Reports

The third survey item asked teachers to describe how they used the data reporting features provided with the technology product. Common examples include use of data for monitoring students' progress or informing instructional decisions, what some refer to as "performance management." We share some common teacher responses in Table 66 and Figure 40Figure 40.

Table 66. Responses for Teacher Use of Performance Management Features (N=60)

Categories	Sample Response	Percent
Monitor students' progress	*Gradebook reporting from MathXL has been helpful in monitoring student progress on assignments.*	35
Used to determine product usage	*I did like seeing when students last worked on an assignment, and how long they worked on it.*	12
Guide instruction	*I have used the different reports to guide my instruction and interventionist use.*	12
Used for student IEP or RTI	*I used it for remediation and checked on my students' progress to see if they completed the assignments.*	10
Did not Use	*I plan on using it in the near future, but have not yet.*	8
Monitor class progress	*I really like the grade book so that I can see an overview of each assignment and determine where my classes are in need of more help.*	8
Used to identify growth by area of standards	*I like that I can see scores per individual standard, so I can see EXACTLY what my students are and are not understanding.*	5
Guide student access to content	*Study Plan*	2

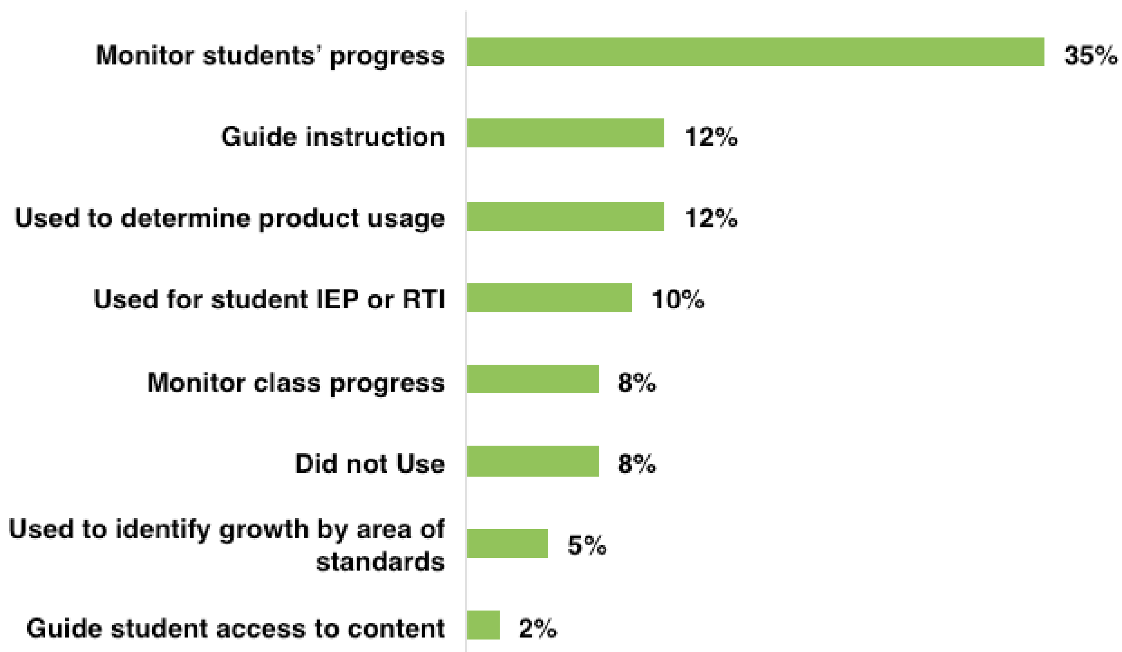


Figure 40. Common Responses for Use of Data Reporting within MathXL (N= 60)

The highest percent of comments came from using MathXL data reporting to help with monitoring students' progress in the course (35%). The other major uses mentioned were in guiding teacher instruction (12%) and gauging the product use of students (12%). One quote from a teacher demonstrated this understanding:

> *The immediate feedback on each students' progress was invaluable. With this information, I was able to single out struggling students and offer additional resources for bettering their understanding. I was able to see what homework assignments the class was understanding or not understanding. I also used this information to congratulate students who were deserving of such praise.*

With large class sizes and other demands on a teacher, one of the major benefits of MathXL comes from helping the teacher see where an individual student is in their math progression and to help generalize this data as a class to improve instruction.

Challenges with Technology Integration

The fourth survey item asked teachers to describe any barriers they encountered implementing the technology in their classroom, such as technological problems. We provide common teacher responses in Table 67 and Figure 41.

Table 67. Challenges with Technology Integration (N=60)

Categories	Sample Response	Percent
No barriers	*None*	37
Not enough computers	*I wish I had better access to computers or some sort of tablet for each student.*	22
Licenses, accounts, and setup	*Not having access to the product until more than an month into the school year, not having enough licenses to use with all of our students in a particular course.*	12

Categories	Sample Response	Percent
Internet connectivity problems	*Sometimes the internet was slow to respond which made it difficult to get the student's assignments done in a timely manner.*	7
Need for additional training in product functionality	*I never received training from the vendor so I did not realize all the flexibility of an individualized study plan for each student until I meet with the vendor in the fall*	7
Lack of home access	*Not every student has regular access to technology at home.*	7
Old Technology	*The classroom set of mini computers were slow and outdated, and it took students longer to log on and progress through the work when given time in class.*	5
Not Customizable	*I like the ability for partial credit, and an design that is less cluttered*	3

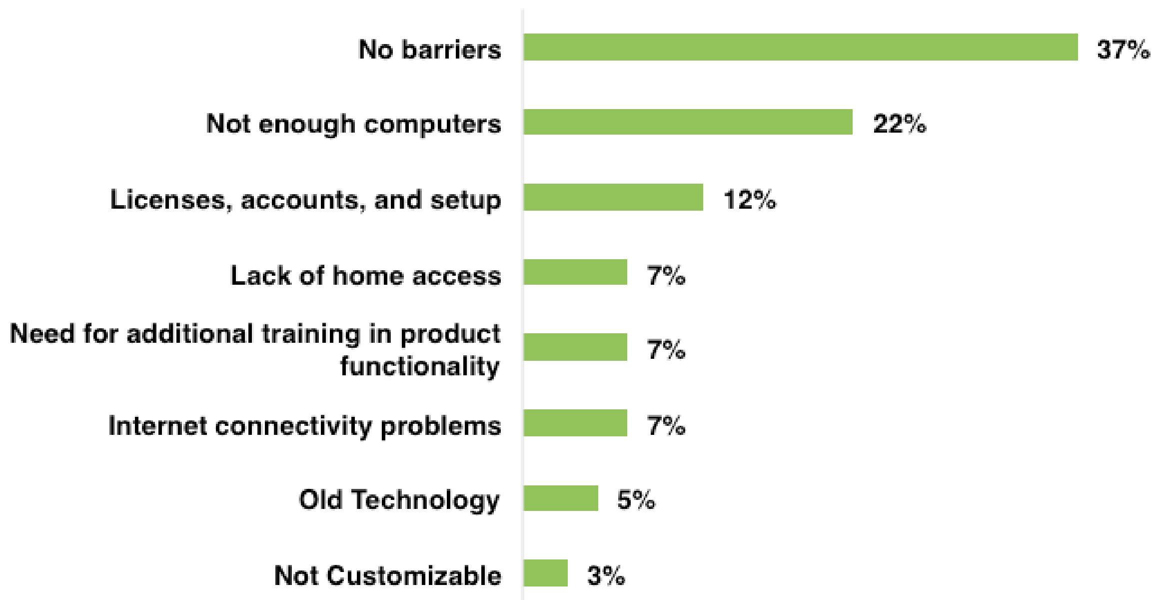


Figure 41. Common Challenges with Technology Integration for MathXL (N= 60)

The highest percentage of respondents in the survey mentioned they had no barriers (37%). However, the next response came from the lack of hardware (22%) or old hardware (5%).

Some teachers had issues with enough licenses, or setting up their accounts (12%). One teacher commented:

> *Getting access to computers for every student every day has been a problem. If students each had their own device that would be better.*

While many of these issues are beyond the control of the software publisher it is still a point of recognition that should be made in order to provide the best support and experience for use in the classroom.

A very common thread was getting started too late into the school year and not having enough licenses as one teacher mentioned:

> *Not receiving as many licenses as we requested made it more difficult to distribute the licenses in an effective manner. Also, not getting access to the product until we were well into the school year made it difficult to find the time to implement.*

There were few comments made regarding not having any training and forced to use the software without any support to fall back on. One teacher mentioned that it took three months for Pearson to get the access codes to them. Whether many of these issues are the publisher's fault or not, the perception of a handful of instructors was that the issues could have been handled much sooner.

Summary

The overall features mentioned by respondents in the survey of the MathXL software were the adaptive use and personalized feedback opportunities that MathXL provided for students. Because of these features, many instructors wished to use the software for homework and assessment purposes to provide an individualized instruction opportunity. Therefore, teachers wished that they had the technology in the classroom at a one-to-one ratio in order to provide more opportunities for students to use the software. This was particularly true for a few respondents who had students who had no technology at home and the only opportunities to use the software came during school hours when hardware was limited.

After looking at the data, we recommend improvements in training and support of teachers on the possibilities of the software. Some of the comments dealt with not understanding some of the possibilities with the feature set of MathXL. As one teacher put: “I never received training from the vendor so I did not realize all the flexibility of an individualized study plan for each student until I meet with the vendor in the fall.” Part of the issue with getting licenses late (as much as 3 months into the school year) hindered some of the productive work the software could provide. As another teacher stated: “If we had been able to start working with the product earlier (in the summer), we would have been able to implement it much better.” Providing opportunities for teachers to begin preparing content through appropriate pedagogical training would create a better overall adoption and implementation of the technology.

E-mail Feedback

The STEM Action Center did not receive any unsolicited feedback, by e-mail, from schools using Math XL.

Odyssey

There was not sufficient data to evaluate this product, Odyssey Math. There were 12 licenses distributed, but only one license used the last month of school. Therefore, there is insufficient data to understand user experience with this product. Due to a lack of interest in this product for year 2 (2015-16) it will not be implemented in the second year of the STEM Action Center grant program. This is an example of another way schools and teachers provide feedback on products, by not selecting to use them in the future. This product may not be appropriate as implemented through the STEM Action Center grant program.

Reflex

Usage

Based on cumulative usage data collected in June 2015 (as shown in Table 68), 4,378 students were given a Reflex license, only 3,421 students had evidence of time spent in the program, which is about 78 percent of the licenses assigned. Usage time ranged from one day to about 147 days of program use, with a mean of 11 days. What is not clear is how much time the student used the product, since each day they get credit for usage, the usage time could be anything greater than a few seconds. The distributor provided a recommended usage benchmark, which was a combination of fluency gains and average number of logins per week.

Table 68. Summary of License Distribution and Usage for Reflex

Usage Information	Usage Data
Number of licenses assigned	
Number of K-12 students	4,378
Number of districts	5
Number of charter schools	3
Number of all schools	20
Number of licenses used (>0 minute)	3,421
Number of usage time (days)	
Mean	9
Min	1
Max	147
Percentage of licenses used	78
Percentage of users meeting recommended usage	44

Note: Usage time for Reflex is in days, but each day the student uses the product it is not clear how much time they used the product.

Next, we provide a summary of the feedback teachers provided from their implementation experience.

Teacher Survey

Types of Product Usage

The first survey question asked teachers to describe how they use the mathematics technologies for their teaching. We provided the teachers with examples of typical use, such as a supplement, selected materials for instruction, and selected materials for homework. In Table 69, we summarize the 97 teachers' responses for this item for teachers who used Reflex (also shown in Figure 42).

Table 69. Common Responses for How Teachers Used the Product (N=97)

Categories	Sample Response	Percent
Supplement to instruction	*I use it at least 3x a week on iPads or in computer labs for each student in my special education classroom. I do it as a supplement to our school wide Math program.*	34
Selected materials for homework	*I assigned it for homework about twice every week.*	30
Practice for developing skill fluency	*I used it to help students become more fluent with math facts.*	29
Intervention or Differentiation	*My students use Reflex Math on a regular basis during our intervention time.*	24
Review and re-teaching	*I had the students using it for review for the core test.*	19
Response to Intervention or Small Group Instruction	*I use Reflex as a math center. I love that it is automatically differentiated.*	5
Assessment	*I started the year using Reflex math as a indicator tool, letting me know the overall mathematical level of my students on their math facts.*	3
Develop and reinforcing concepts	*Reflex was used in the computer lab twice a week for practice and reinforcement of math facts.*	3
Not used yet	*I was overwhelmed with the responsibilities associated with being a first year teacher.*	3

Selected materials for individualized instruction	*I like the individual way they meet the needs of each child.*	2

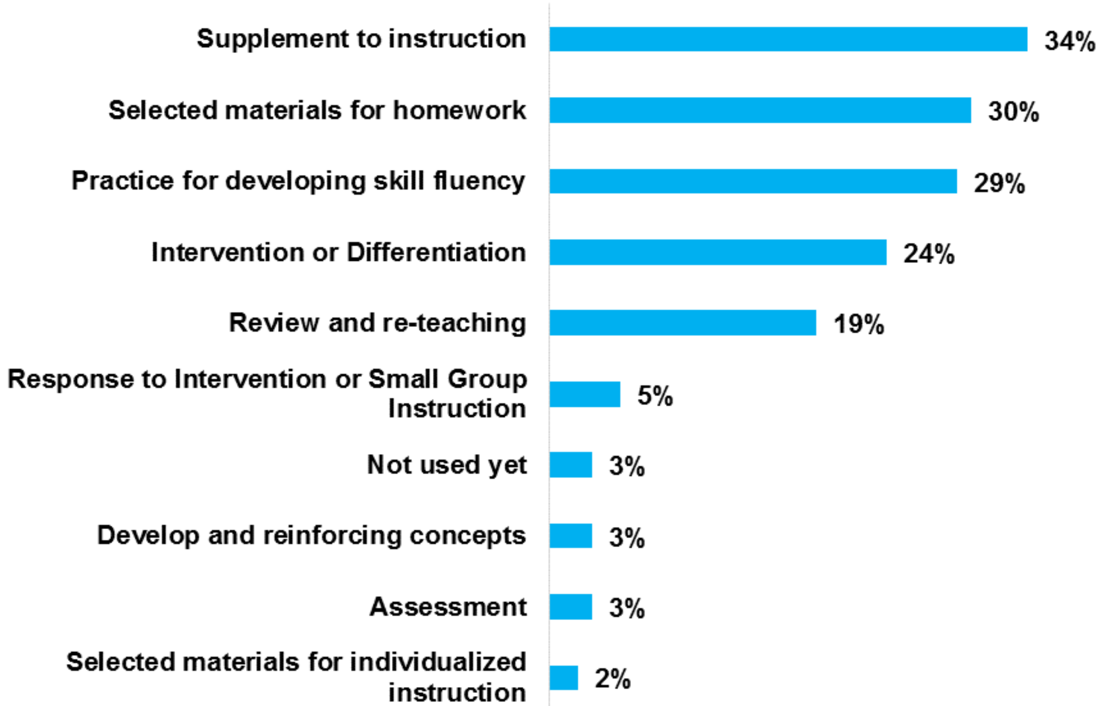


Figure 42. Common Responses for How Teachers Used Reflex (N= 97)

The STEM Action Center had directed the teachers to use the product as a supplement and not as their primary form of instruction, since the State Office of Education had not reviewed the products for alignment to the state standards. We were pleased to see that teachers reported use of this product as a supplement to instruction (34 %). We also saw that many teachers found the product helpful for selecting materials for homework (30%). The following statement from a teacher who used Reflex is an example of how they used the product to supplement the primary form of instruction:

We have used Reflex as a supplement for math, and I've found that it helps immensely with teaching in the classroom. When the students come to the table with those foundational skills they need, it is so much easier to teach them higher-tier math. We would love to continue using this wonderful resource.

This statement is significant since teachers need resources to supplement their primary form of instruction.

Teacher Satisfaction

The second survey question asked teachers to describe their overall level of satisfaction with the mathematics technology. Many of the categories of teachers' responses to this item reflected positive aspects towards their use of the technologies in their classrooms (shown in Table 70 and Figure 43) and other responses included concerns about the products (shown in Table 71 and Figure 44). We coded these responses separately.

Table 70. Positive Responses for Teacher Satisfaction with Education Technology (N= 97)

Categories	Sample Response	Percent
Satisfied with provided technology	*It has made a huge difference in my math instruction.*	62
Develops students' knowledge or skills	*The kids like it and their skills have improved.*	20
Students are engaged when using technology	*It has really helped to engage all types of learners in my classroom.*	20
Provides information in reports about students' learning progress	*I liked using Reflex because it was an easy way to measure student growth, find mastery, and detect holes in student knowledge.*	8
Learning is adaptive and individualized for students	*I like how it matches the level of the students.*	6
Student success or positive experience	*I think that the students improve on their math when they consistently use Reflex.*	6

Categories	Sample Response	Percent
User friendly	*It is easy to use, and offers great incentives for the children.*	1
Aligned with state standards	*It had pertinent questions to the topics we are studying.*	1

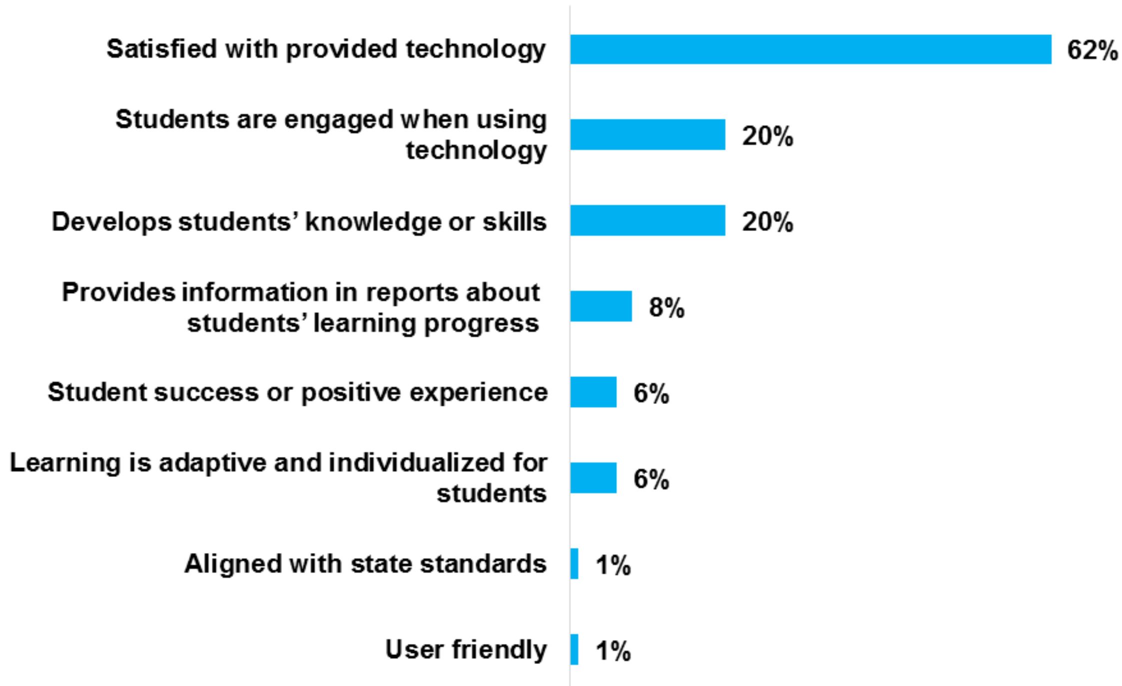


Figure 43. Common Responses for Teacher Satisfaction with Reflex (N= 97)

Most of the positive comments were general statements about overall satisfaction with the product (62%). The second most common responses were that students' skills had improved (20%) and that the students were engaged with the product (20%). The following statement from a teacher who used Reflex is an example of how they used Reflex to help students build skills:

I am so thrilled with the progression of my students using the reflex program. I have taught for 7 years and have never seen students progress so quickly and stay fluent. This *program is far more than memorizing numbers; it teaches the students to understand and recall quickly.*

This statement is significant since teaching students to build and retain skills is a top priority for teachers.

Teacher Concerns

There were limited negative comments regarding the product. A few teachers observed that their students were bored while using the product (2%) and one teacher thought that using the product took too much time (1%). The following statement gives an example of a teacher who observed her students' boredom while using the product:

It didn't prove to be exciting to 6th graders for more than 15 minutes at a time. Half-way through the year they really drug their feet when asked to get on.

This statement is significant since maintaining student interest is a necessary component of good teaching.

Table 71. Negative Responses for Teacher Satisfaction with Education Technology (N=97)

Categories	Sample Response	Percent
Not used the technology yet	*See response to question #1 (not currently using)*	3
Lack of challenge or boring to students	*I really like the program, but the kids get bored because they say it's just the same game in a slightly different form*	2
Need more time to use the product	*It takes too long to do an activity*	1

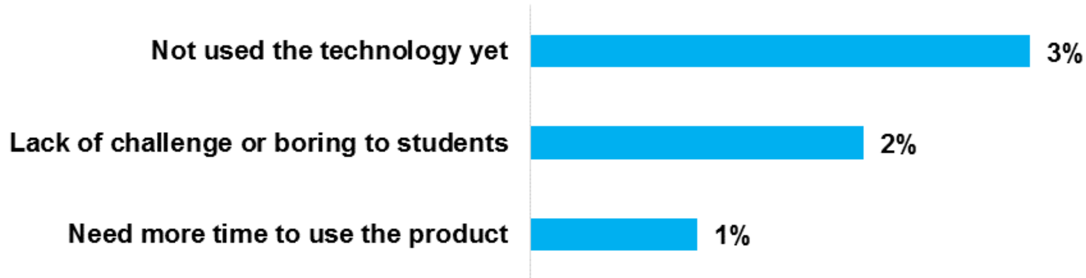


Figure 44. Common Responses for Teacher Concerns with Reflex (N= 97)

Use of Data Reporting

The third survey item asked teachers to describe how they used the data reporting features provided with the technology product. Common examples include use of data for monitoring students' progress or informing instructional decisions, what some refer to as "performance management." We provide some example teacher responses in Table 72 (and Figure 45Figure 45).

Table 72. Responses for Teacher Use of Performance Management Features (N=97)

Categories	Sample Response	Percent
Monitor students' progress	*I am able to look at individual students and identify the math facts they are struggling with and the math facts they have mastered.*	57
Inform parents of progress	*Additional reports have been given out at Parent Teacher Conferences.*	16
Monitor class progress	*I have been using the class reports to know how far along the students are getting on passing their addition and subtraction facts.*	15
Used to determine product usage	*It is helpful to be able to pull up reports that show how much time students spent on the program.*	9
Have not yet found it useful	*I haven't really learned about the data features but I would LOVE to!*	8

Categories	Sample Response	Percent
Used to reward students	*They have to pass of their addition and subtraction to get an award at the end of the year.*	7
Inform students of progress	*The students track their completion rates.*	5
Used for student IEP or RTI	*I use it to help set academic levels of fluency for IEPs.*	5
Guide instruction	*It helps me to know what they have accomplished in order to work with them on their regular math work.*	4
Did not Use	*Not currently using*	3

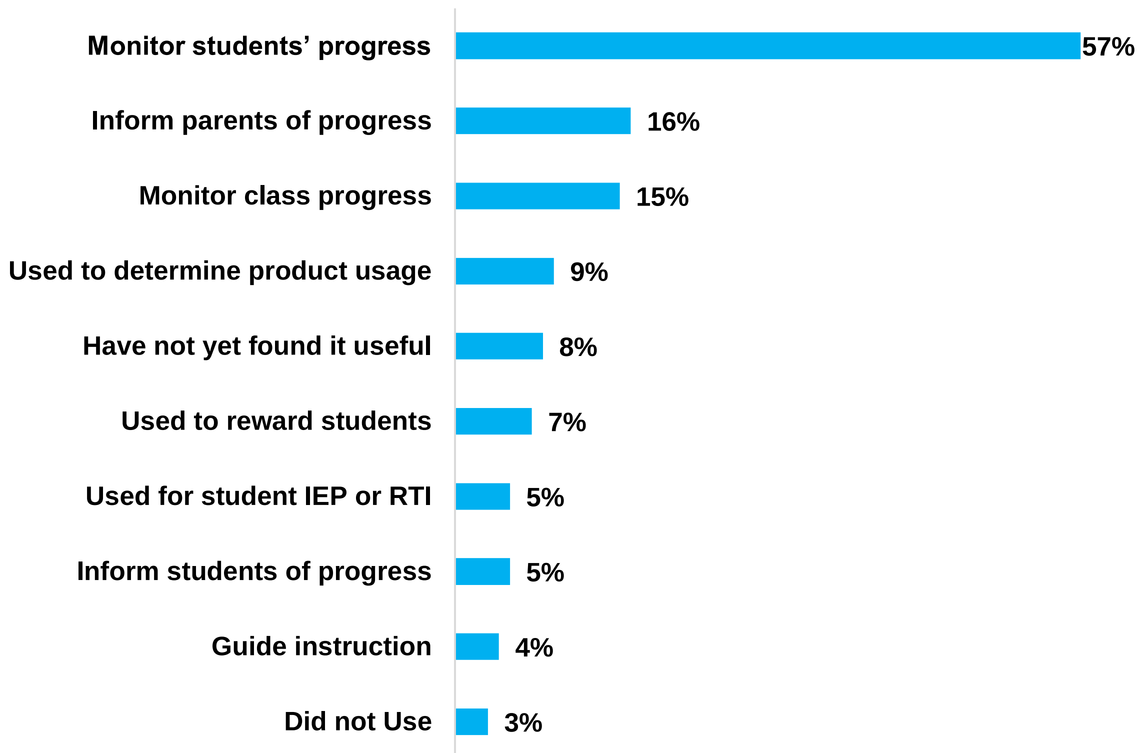


Figure 45. Common Responses for Use of Data Reporting Features of Reflex (N= 97)

Teachers used the reporting features to monitor individual student achievement (57%) and monitor class progress (15%). The following statement from a teacher who used Reflex is an example of how a teacher used the product to monitor student progress:

I have been using the data to monitor student abilities and skills in regards to math fact fluency. I found the data reporting portion of the program to be very helpful and user friendly.

This statement is significant since teachers are expected to monitor the learning of all their students.

Challenges with Technology Integration

The fourth survey item asked teachers to describe any barriers they encountered implementing the technology in their classroom, such as technological problems. We provide example teacher responses in Table 73 (and Figure 46Figure 46).

Table 73. Challenges with Technology Integration (N=97)

Categories	Sample Response	Percent
No barriers	*It took a while for our school technology expert to get REFLEX on the iPads; once she did, there were no barriers.*	48
Not enough computers	*Our barrier is the usage of technology, the limited amount of computers to be used for all grades.*	25
Lack of home access	*Some students don't have internet in their homes.*	8
Old Technology	*Sometimes the program goes slow or freezes because of the netbooks we use*	6
No or little use	*None*	3
Internet connectivity problems	*Sometimes the internet at our school is spotty*	2
Student Boredom	*About half of my students are at 100% fluency and have unlocked all of the games. These students are bored with Reflex*	1

The most frequent response to this survey item was that the teachers experienced few or no barriers (48%). The second most frequent response was that there were not enough computers at their schools (25%). The following statement from a teacher shows an example of how a school's lack of computer access hindered usage:

> *I would love to be able to use the math online programs more than I do. The barrier we face is not enough computers to go around. We have several mobile labs and most teachers like to do Reflex or another program with their students and not everyone can have computers at the same time.*

This is important to note, since lack of computer access is the most basic barrier. The product cannot support student learning if students cannot access the product.

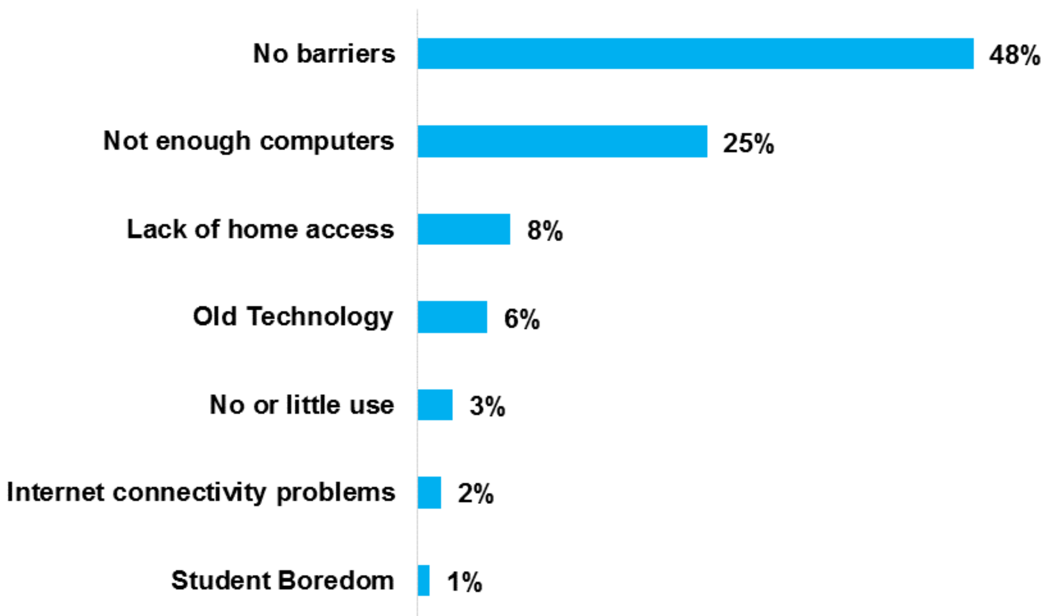


Figure 46. Common Challenges with Technology Integration for Reflex (N= 97)

Summary

For the most part, teachers are pleased with Reflex (62%). Only a few teachers expressed any discontentment with the product (3%). The only recommendation to increase the usefulness of the product is to increase the computer access at participating schools. However, this is beyond the scope of the software company. The results of this survey show no significant shortfalls in the product or teacher use of the product for those participating in the survey.

E-mail Feedback

The STEM Action Center did not receive any unsolicited feedback, by e-mail, from schools using Reflex.

ST Math

Usage

Based on cumulative usage data collected in June 2015 (as shown in Table 74), there were 36,327 students given a ST Math license, and 31,162 students had evidence logging into the program at school or at home, which is about 86 percent of the licenses assigned. Usage ranged from logging in once to logging in 390 times, with a mean of about 21 logins. Among these users, 16 percent met the provider's recommended usage.

Table 74. Summary of License Distribution and Usage for ST Math

Usage Information	Usage Data
Number of licenses assigned	
Number of K-12 students	36,327
Number of districts	12
Number of charter schools	5
Number of all schools	99
Number of licenses used (>0 content)	31,162
Number of lab logins (combined school and home)	
Mean	29
Min	1
Max	390
Percentage of licenses used	86
Percentage of users meeting recommended usage	16

Teacher Survey

Types of Product Usage

The first survey question asked teachers to describe how they use the mathematics technologies for their teaching. We provided teachers with examples of typical use, such as a supplement, selected materials for instruction, and selected materials for homework. In Table 75, we summarize the 830 teachers' responses for this item for teachers who used ST Math (also shown in Figure 47Figure 47).

Table 75. Common Responses for How Teachers Used the Product (N=830)

Categories	Sample Response	Percent
Supplement to instruction	*I have used ST Math as a supplement and for instruction. I have aligned the lessons in ST Math to match what we are learning in class.*	70
Intervention or Differentiation	*I use the program primarily as an intervention since it allows me to meet the needs of my remedial and advanced students concurrently.*	23
Selected materials for homework	*Selected materials for instruction and homework.*	13
Practice for developing skill fluency	*I use ST Math to provide further practice for students, in content areas that have been previously taught in the classroom.*	10
Selected materials for individualized instruction	*I use this as individually targeted instruction.*	5
Develop and reinforcing concepts	*I used it to help reinforce skills taught.*	5
Review and re-teaching	*I am using it as a review for end of year testing.*	5
Response to Intervention or Small Group Instruction	*As an intervention and a supplement for my special needs Resource pull-out students.*	4
Not used yet	*We were trained on the product last week, We will use it with our students shortly.*	2
Acceleration	*At first it started off as a fast finisher for student who were done and needed enriched.*	1

Categories	Sample Response	Percent
Assessment	*I had the students take the placement test because they are 6th graders. It was very helpful to have it find the gaps in their learning.*	1
Problem Solving	*I use it weekly to develop mental math problem and fact solving abilities.*	1

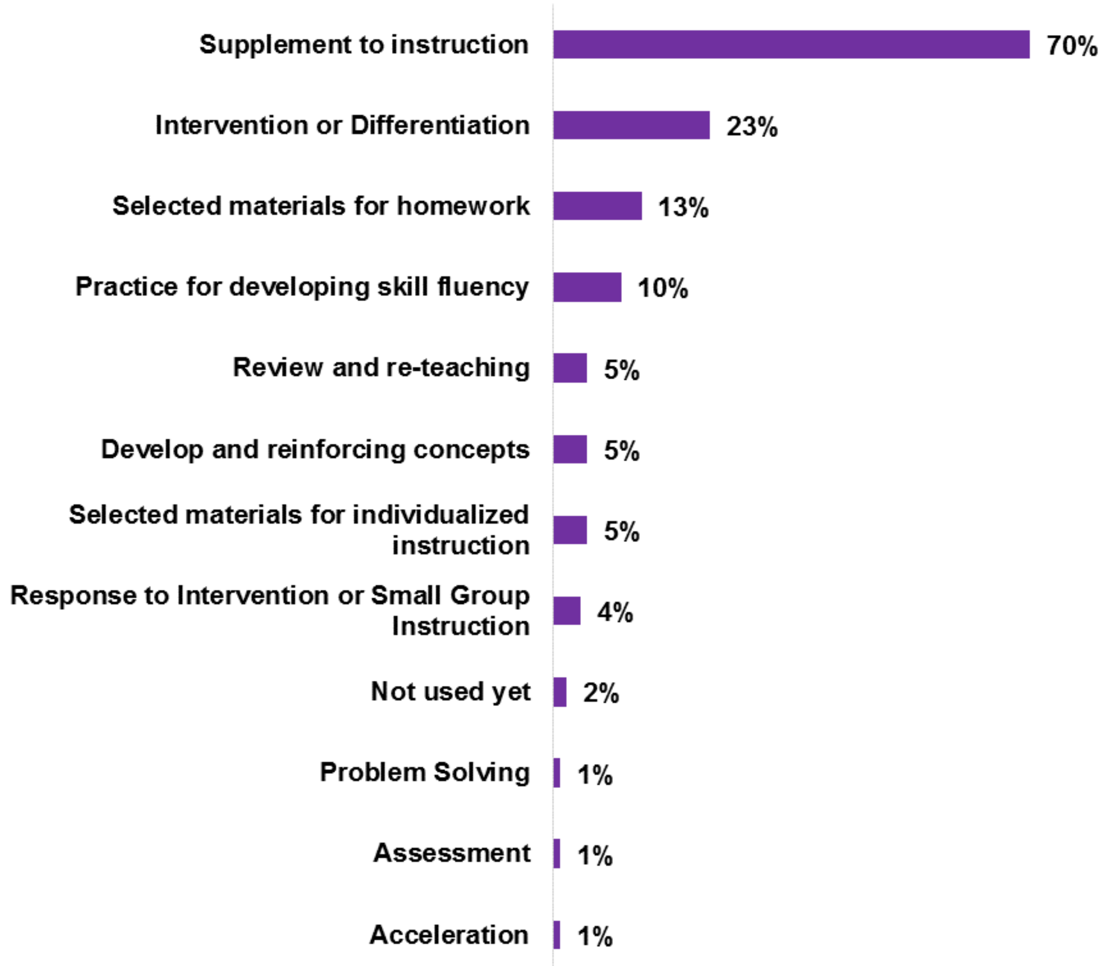


Figure 47. Common Responses for How Teachers Use ST Math (N= 830)

The STEM Action Center directed the teachers to use the product as a supplement and not as their primary form of instruction, since the State Office of Education had not reviewed the products for alignment to the state standards. Indeed, the majority of the teachers responded that they were using the material as a supplement (70%). Yet intervention and differentiation also surfaced as primary purposes for using the program (23%). The following statement from a teacher using ST Math is an example of how they successfully integrated the program into one classroom for a variety of purposes.

> *I use technology in my class every day. I have a 1 to 1 ratio of Chromebooks to students. I use it for instruction, practice, homework, review, re-teaching, and assignment completing.*

This is noteworthy as it shows the variability with which teachers may use ST Math for mathematics instruction.

Teacher Satisfaction

The second survey question asked teachers to describe their overall level of satisfaction with the mathematics technology. Many of the categories of teachers' responses to this item reflected positive aspects towards their use of the technologies in their classrooms (shown in Table 76 and Figure 48) and other responses included concerns about the products (shown in Table 77 and Figure 49). We coded these responses separately.

Table 76. Positive Responses for Teacher Satisfaction with Education Technology (N= 830)

Categories	Sample Response	Percent
Satisfied with provided technology	*ST Math is fantastic. It is a great way to learn math that does not involve needing to be able to read!!*	77
Students are engaged when using technology	*It seems the students really enjoy engaging with the program.*	18
Develops students' knowledge or skills	*I enjoyed how this product was able to help students build a concrete understanding of some of the mathematic principles we were trying to teach the students.*	9

Categories	Sample Response	Percent
Student success or positive experience	*I can tell that it is helping students grasp concepts better and they get to have fun while doing it.*	7
Learning is adaptive and individualized for students	*My students love it and I appreciate that it provides learning and practice opportunities at their own level and progresses with them.*	5
Provides feedback to students	*I think that is provides great math practice for students with immediate feedback on their work.*	2
User friendly	*I like that the program is easy for the students to use. It isn't confusing for them and helps them problem solve on their own.*	2
Aligned with state standards	*It follows Utah Core and helps the students learn the concepts needed.*	1

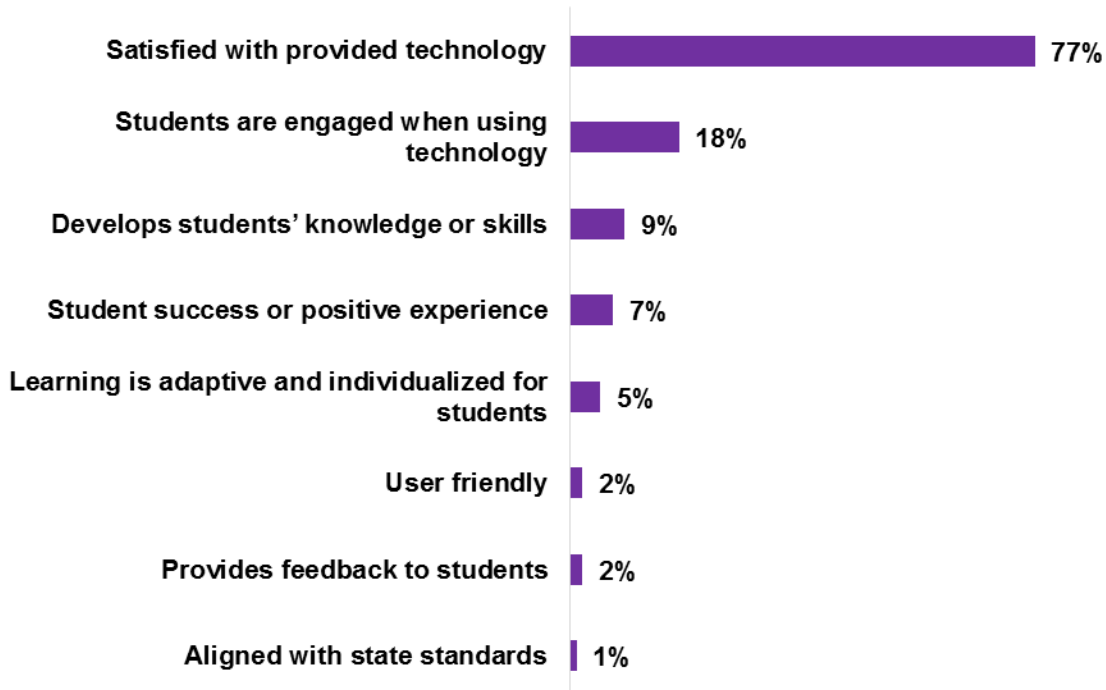


Figure 48. Common Responses for Teacher Satisfaction with ST Math (N= 830)

Many of the positive concepts were just general statements about overall satisfaction with the product (77%). However, the second most common response had to do with the level of student engagement after using the technology (18%). The following is a typical response reflecting both the general satisfaction with the product and student engagement.

I love it and my students love it! They stay very engaged in learning and often times connect what they have learned in class to their ST Math as well as what they have learned in ST math to their in class work.

Teacher Concerns

There were very few negative teacher satisfaction responses for ST Math. The one response that surfaced most frequently (7%) pertained to the difficulty encountered by students remembering their passwords.

The students really seem to enjoy it and learn from it. My only frustration with it is how many of my students forget their login code and I don't have the means to help them remember it. Everything else is great!

Indeed, the most common suggestion from teachers plagued by password issues was a way to record and remember student passwords.

Table 77. Negative Responses for Teacher Satisfaction with Technology (N=830)

Categories	Sample Response	Percent
Product technical problems	*There are a few students though that have difficulty with the password procedure. I have had three students that can't ever remember their passwords. They have had password training umpteen times.*	7
Student frustration or difficulty	*Some children get a bit frustrated when they can't figure out what they are being asked to do but overall they are enjoying the program.*	3
Lack of challenge or boring to students	*My students have become very bored doing ST Math and have come to dread it though. They feel it is repetitive and has no end.*	2

Categories	Sample Response	Percent
Not used the technology yet	*I have not had the chance to really delve into it. I would prefer to get a program like this at the beginning of the year rather than when we are gearing up for SAGE. I hope I can become more familiar with it next yea. I feel I barely touched the surface.*	2
Need more time to use the product	*I liked the idea of the technology, but the class/school schedule is not set up in a way that makes the use of it practical.*	1
Need more training	*My only issue with has been in the challenge activities in which I was unable to help the students and there is no manual for help.*	1
Dissatisfaction with the technology	*I am not very satisfied. I feel like the kids moved too slowly through the program to have a significant impact on learning.*	1

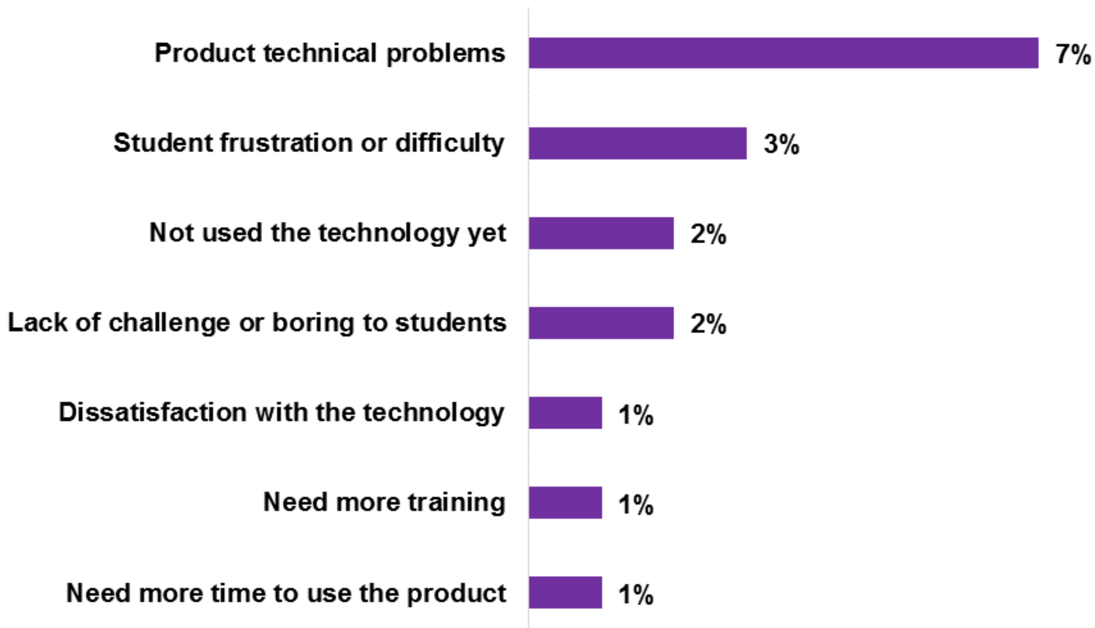


Figure 49. Common Responses for Teacher Concerns with ST Math (N= 830)

Use of Data Reports

The third survey item asked teachers to describe how they used the data reporting features provided with the technology product. Common examples include use of data for monitoring students' progress or informing instructional decisions, what some refer to as “performance management.” We provide examples of teacher responses in Table 78 and Figure 49.

Table 78. Responses for Teacher Use of Performance Management Features (N=830)

Categories	Sample Response	Percent
Did not Use	*I haven't had the students on enough yet to use any data.*	38
Monitor students’ progress	*I personally like the tracker at the bottom of the screen that tells me at a glance how the students are doing on the concept they are presently working on.*	31
Guide instruction	*iReady helps me adjust my lesson plans to accommodate individual needs.*	11
Used for student IEP or RTI	*I am using the data of where the students are struggling and create small intervention lessons on the concepts they are struggling with.*	9
Inform students of progress	*The pre-test and post-tests were particularly helpful and motivating for students to see.*	5
Monitor class progress	*I use the data to create lessons for small groups when multiple students are "stuck" on the same concept.*	4
Used to determine product usage	*I haven't used the data except to see who has been doing ST Math at home.*	4
Used to group students for instruction	*This has provided formative assessment data, helped me to form intervention groups and extra challenge groups. It's been extremely helpful.*	3
Used to identify growth by area of standards	*We used the data to discuss student growth and areas of concern. We liked that we could order the content how we wanted. The size of circles informing teachers of problem areas for each child was extremely helpful.*	3
Have not yet found it useful	*There were several times that I wanted to find additional information from the reports, but felt like the reports were very limited in the information I could retrieve, so I ended up not really using them much.*	3
Guide student access to content	*I love that I can move to the top anything I want them to be practicing. Also, it is very clear who is just not getting it.*	1
Inform parents of progress	*Still learning about the data piece. But this is extremely helpful in progress reports to show parents what their student can do and what they know.*	1
Used to reward students	*I have looked up time spent/lessons completed and the student with the most got a "trophy" on his desk.*	1

Categories	Sample Response	Percent
Used for assessment	*I've been checking their quiz scores. I then meet with those students individually to find out the reason for those low scores.*	1

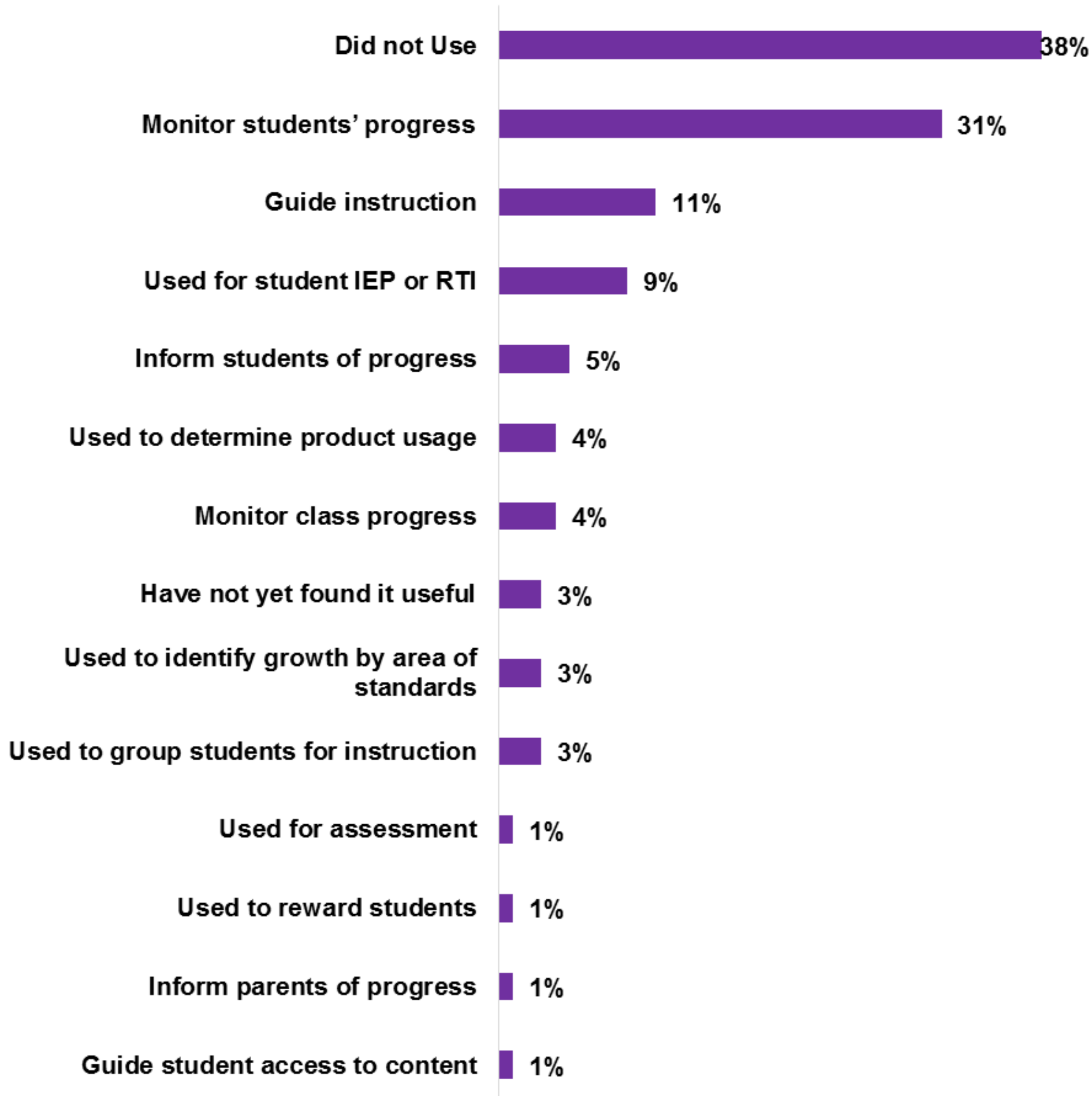


Figure 50. Common Responses for Use of Data Reporting Features of ST Math (N= 830)

Many teachers responded that they used the data to monitor student progress (31%). Yet the majority of responders reported that they were not using the data at all (38%). A common factor in the non-use of data appears to be the timeliness of implementation or the infrequent use of the program.

> *I have not been using the reporting features. I feel like my students were not on the program enough to get enough data.*

From the teacher's responses, it appears that many teachers did not gain access to the program until late in the school year.

Challenges with Technology Integration

The fourth survey item asked teachers to describe any barriers they encountered implementing the technology in their classroom, such as technological problems. We provide example statements in Table 79 (and in Figure 51).

Table 79. Challenges with Technology Integration (N=830)

Categories	Sample Response	Percent
Not enough computers	*Not enough technological devices to use on a regular basis.*	37
No barriers	*None*	30
Licenses, accounts, and setup	*The biggest barrier has been simple enough access (too many password characters) for my younger students to access the program.*	10
Internet connectivity problems	*Unfortunately in the Salt Lake City school district our wifi is highly restrictive which makes using ST Math on the iPads quite tedious.*	4
No or little use	*It's new to our school so we haven't had much time with it.*	3
Need for additional training in product functionality	*I started using the product late in the academic year and am hooked. I just need more training to make sure that I am using it as effectively as possible.*	3
Lack of home access	*Not every student has a home computer, so I probably won't assign it for homework.*	3
Lack of knowledge about the product	*I could use more training but I didn't have troubles in the time I used it. Just forgot.*	2
Old Technology	*Old computers that are slow.*	2

Categories	Sample Response	Percent
Not Customizable	*Program doesn't change based on students lack of progress. A student will do the same lesson over and over without success and the program doesn't take them to a lower lesson. I can manually do this but it would be more effective if the program leveled the students.*	1

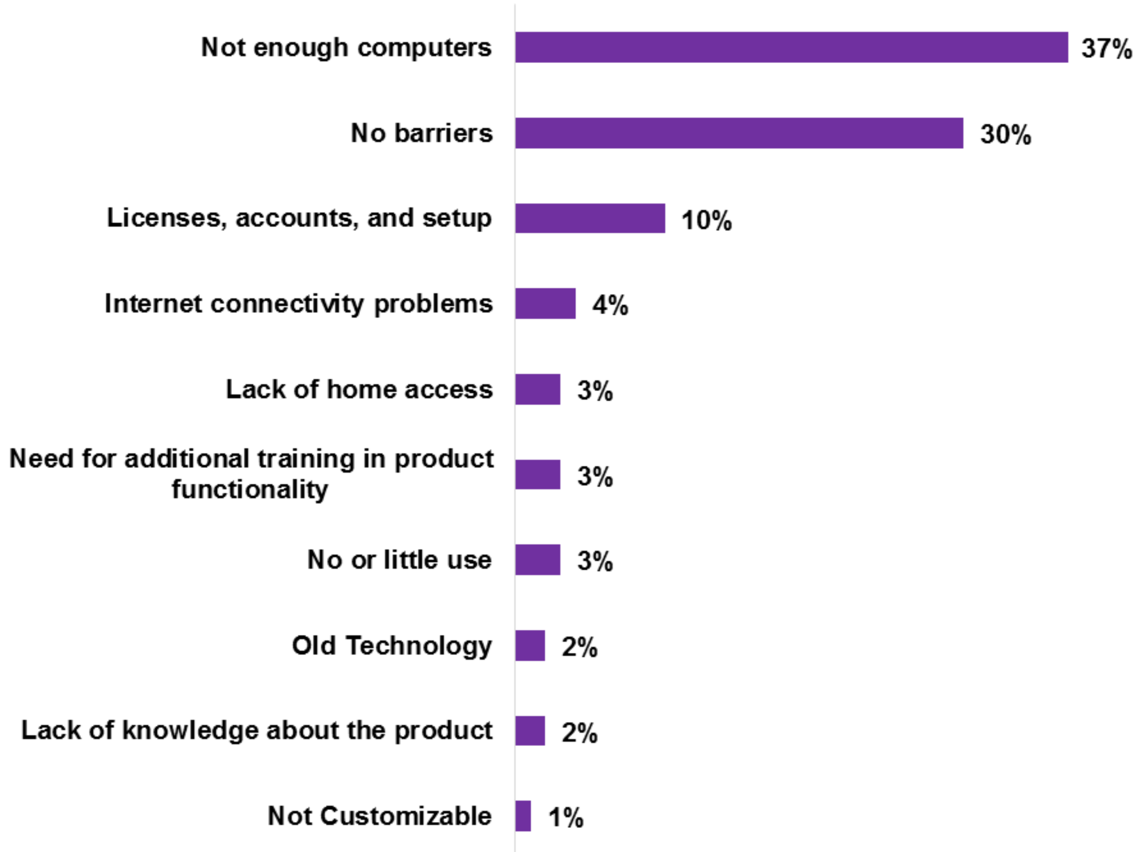


Figure 51. Common Challenges with Technology Integration for STMath (N= 830)

With the availability of computers, many teachers found no barriers to the use of ST Math (30%). Computer availability is the largest barrier to using ST Math (37%). Student passwords are the second largest barrier (10%). The following quite highlights the frustration that educators felt over passwords.

Sometimes I ran into Password Sharing problems, because students would often forget their password & when I tried to re-set them, I didn't know which student was which. I wish there was an easier way to help the students with their password. A lot of students spent too much time re-learning their password, instead of doing math.

Summary

The vast majority of ST Math users found the program generally satisfactory (77%). With exception to assessment, teachers viewed the program as a valuable tool for individuals with limited English language ability. Some mentioned that students who were accustomed to interacting with Jiji the penguin without written instructions were stifled and surprised by a posttest with written instructions. One educator stated, “It was a great program for my students to be able to use no matter the language spoken.” A common thread in many of the complaints about ST Math centered on the student difficulty with passwords. Based on teacher comments we recommend that ST MATH simplify the characters necessary for student passwords.

E-mail Feedback

The STEM Action Center shared with us e-mail they received from either schools or districts who were awarded ST Math licenses. We kept the e-mail organized in a documentation file to understand implementation. This unsolicited feedback can be helpful in that it may bring out implementation challenges and successes that we may not have captured in the survey data. However, there may be hidden agendas behind why the person sent the e-mail, such as desiring more licenses in the future or wanting funding for a particular product vendor. However, they also provide important insight from the voice of stakeholders, such as school principals, who do not complete the surveys. We have reviewed these e-mails, and provide examples of the feedback received.

Positive Feedback

- **Achievement Gains**: T*he other day our school was fortunate to have representatives from ST Math and our District Math Specialists observe our students using ST Math. We are one in nineteen schools in the District to receive this Grant for the year 2014-2015. The STEM Action Center ST Math program focuses on spatial and temporal strategies. We wanted to share with you our schools progress. Our school feels ST math has played an instrumental part of our students problem solving and critical thinking strategies. We are so excited about our progress. Our unofficial results for our whole school shows an increase of 6% in Language Arts, 12% in Math and 10% in Science. This summer our students will continue ST Math program at home using computers or tablets. In addition, students will have the opportunity to come to school and use our computers weekly. Thank you for providing such an awesome program to our school and please feel welcome to visit and see our students working on ST Math.*
- **Student Engagement:** *I heard this story recently from the principal at one of our Title I schools: She had to deal with a fussy kindergarten student who was upset and throwing a bit of a fit. The 6-year old was sitting in her chair, kicking her feet, and crying because her computer lab time was over and she had to STOP using StMath and go back to her class. Isn't one of purposes of the STEM AC grants to help build students' interest in math? Score!*
- **Mathematical Understanding:** *Just wanted to share with both of you a response I had from a teacher today about ST Math. The 5th grade teacher said that one of his students came up to him after returning from computer lab all excited. She said she didn't really get what volume was all about until she now after practicing it on ST Math. The student then grabbed a container, brought it over to her teacher, and proceeded to explain what volume means. So exciting! The teacher was thrilled!*
- **Success with Second Language Learners**: *Students get 20 minutes of ST Math per day. They are using it as low as 1st grade and would love to even use it for Kindergarten, but there weren't enough licenses. The school is a minority-majority school with about 70% minority students. They also have 16% refugees with very little English proficiency. Although ST Math may not prepare them for the word problems on the state assessment, we are pleased that these students with such a significant language barrier can work in an environment where they experience success and continue to progress in mathematics.*

Negative Feedback

- **Need for More Training**: *We really need more training on ST Math, but have had trouble finding a time that worked for the ST Math representative. The teachers are* *limited in the times they are available for PD. When a student needs assistance if it is a level that the teacher hasn't seen before, they don't know how to assist the student, since it is hard to determine what to do quickly just from looking at the screen. It would be great if ST Math had a quick reference guides for different levels that could help them support the students more. However, in general the students are using it at an independent center while the teacher works with another group in small group instruction. We hope to get access to lower levels next year for some of our refugee students.*

SuccessMaker

Implementation of *SuccessMaker* from Pearson was delayed until late spring 2015 due to lengthy contract negotiations. Then there was turnover within Pearson resulting in the loss of the representative the STEM Action Center and an illness of the new representative. We made repeated requests for data on participants given a license and usage, but we did not receive the data until July 2015. At that point, the STEM Action Center realized that no schools who had selected *SuccessMaker* received licenses during the 2014-15 school year as part of the Utah STEM Action Center grant program. The file provided included schools and students who were part of the K-3 legislative initiative for reading that used *SuccessMaker;* this was not the appropriate set of students, since this program was funded under different legislation. A limited number of schools requested a grant of *SuccessMaker* licenses for the 2015-16 school year.

Think Through Math

Usage

Based on cumulative usage data collected in June 2015 (as shown in Table 80) there were 23,764 licenses distributed, but only 18,249 students had evidence of completing lessons in the program, which is about 77 percent of the licenses assigned. Usage ranged from completing one lesson to 978 lessons, with a mean of about thirty-two lessons. Among these users, 32 percent met the provider's recommended usage.

Table 80. Summary of License Distribution and Usage for Think Through Math

Usage Information	Usage Data
Number of licenses assigned	
Number of K-12 students	23,764
Number of districts	8
Number of charter schools	4
Number of all schools	94
Number of licenses used (>0 lesson)	18,249
Number of lessons completed	
Mean	32
Min	1
Max	978
Percentage of licenses used	77
Percentage of users meeting recommended usage	32

Teacher Survey

Types of Product Usage

The first survey question asked teachers to describe how they use the mathematics technologies for their teaching. We provided teachers with examples of typical use, such as a supplement, selected materials for instruction, and selected materials for homework. In Table 81, we summarize the teachers' responses for this item for teachers who used Think Through Math (and in Figure 52).

Table 81. Common Responses for How Teachers Used the Product (N=236)

Categories	Sample Response	Percent
Supplement to instruction	*I use the technology mainly as a supplement to my primary instruction*	75
Intervention or Differentiation	*I use the technology as an intervention for remediation for students who are struggling*	36

Categories	Sample Response	Percent
Practice for developing skill fluency	*Used as classroom guided practice and intervention. Students find it engaging and often work on it at home for fun.*	15
Selected materials for homework	*I use it as supplement practice and homework*	13
Review and re-teaching	*Supplement to in class instruction and skills practice, review and extension*	8
Response to Intervention or Small Group Instruction	*My students use Think Through Math each day guided by an aid, while I take my lower level students and work with them 3 on one for 25 minutes*	6
Develop and reinforcing concepts	*I have my students work on TTM outside of class to help them with concepts that they need reinforcement on or enrichment on since the program will do both.*	4
Acceleration	*I have used TTM as an enrichment program for my higher achieving students. This allows them to move at a much faster pace, given that they often finish the required work quickly and easily.*	3
Selected materials for individualized instruction	*For the last thirty days I've used Think Through Math as a supplement for students to use in class during independent work cycle*	2
Assessment	*I have used T.T.M. to help prepare my students for end of level testing.*	1
Not used yet	*We haven't used it in the last 30 days.*	1

The STEM Action Center had directed teachers to use the product as a supplement and not as their primary form of instruction, since the State Office of Education had not reviewed the products for alignment to the state standards. We found that 75 percent of the time the program was used as a supplement and over 36 percent used it as an intervention (along with 6 percent using it as a Response To Intervention). Fifteen percent of responders to the survey used the product as a tool for practice and fluency. The following statement from a teacher using Success Maker is an example of how these products may support teacher implementation of the Common Core State Standards:

I have used this technology as a supplement to my instruction and as an intervention for those that have struggled in certain areas. I also used this as a review or to prep for the SAGE test.

This is important to note, because the new standards require students to make connections between multiple representations. Having this as a supplement to instruction as well as an intervention fulfills this goal and helps students make connections to new ways of learning math in several different formats.

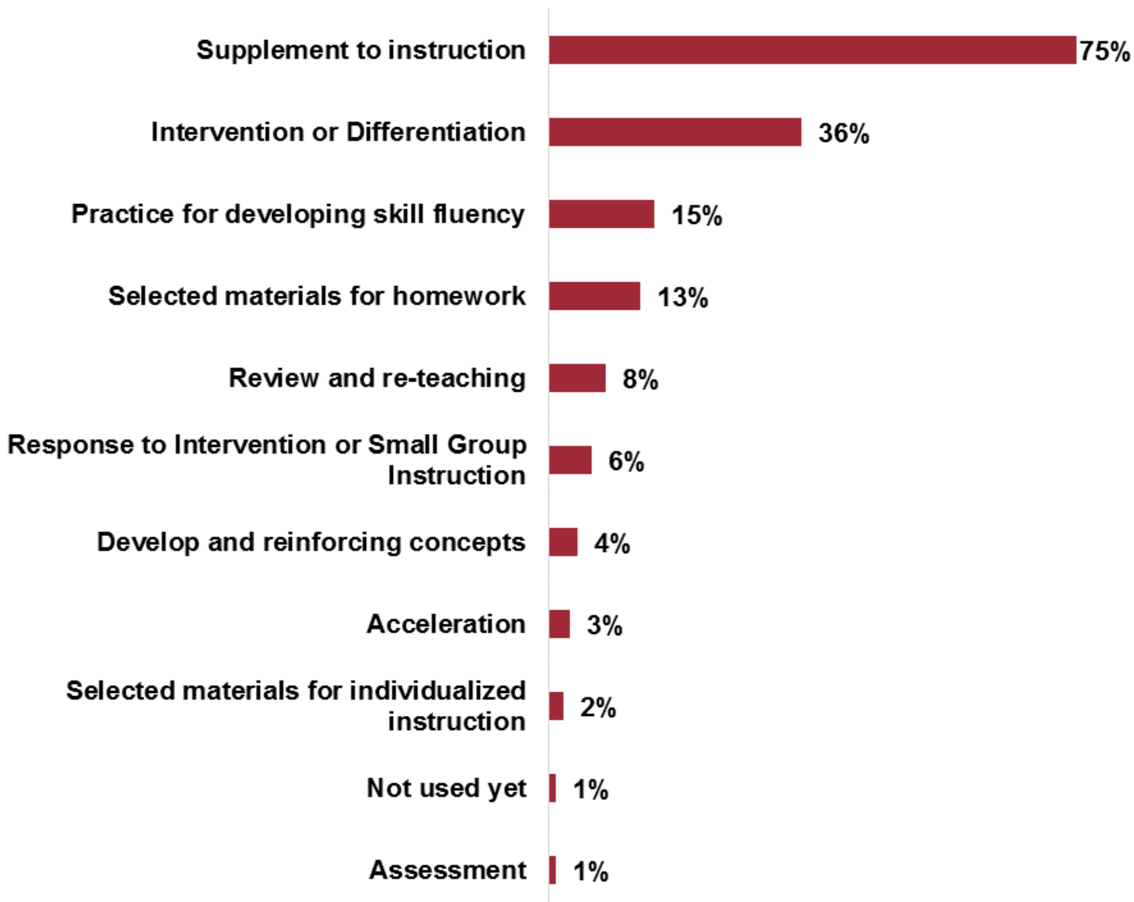


Figure 52. Common Reponses for Usage of Think Through Math (N= 236)

Teacher Satisfaction

The second survey question asked teachers to describe their overall level of satisfaction with the mathematics technology. Many of the categories of teachers' responses to this item reflected positive aspects towards their use of the technologies in their classrooms (shown in Table 82 and Figure 53) and other responses included concerns about the products (shown in Table 83 and Figure 54). We coded these responses separately.

Table 82. Positive Responses for Teacher Satisfaction with Education Technology (N= 236)

Categories	Sample Response	Percent
Satisfied with provided technology	*I am satisfied with TTM. It is a wonderful tool for progress monitoring and differentiating ability levels in a resource setting.*	52
Students are engaged when using technology	*The kids love it and it keeps them interested in math.*	22
Learning is adaptive and individualized for students	*I really like the program, Think Through Math because it differentiates for each student and they are working in their Zone of Proximity where they are stretched just beyond their own ability.*	19
Develops students' knowledge or skills	*We feel it is strengthening math skills.*	17
Provides feedback to students	*It is an excellent tool--we love the motivation and feedback given to students.*	8
Student success or positive experience	*The students like the program and are showing some good improvement.*	8
Aligned with state standards	*It offers questions that match our state core and in the same format as the concepts that are presented.*	3
User friendly	*I LOVE this product. It is easy to use, gives tough questions that the kids need to think about, and helps them better use technology.*	3
Provides information in reports about students' learning progress	*The website and reports are easy to navigate.*	1
Customizable features	*I recently learned about being able to assign a specific path for students and would like to explore that option for future use.*	1

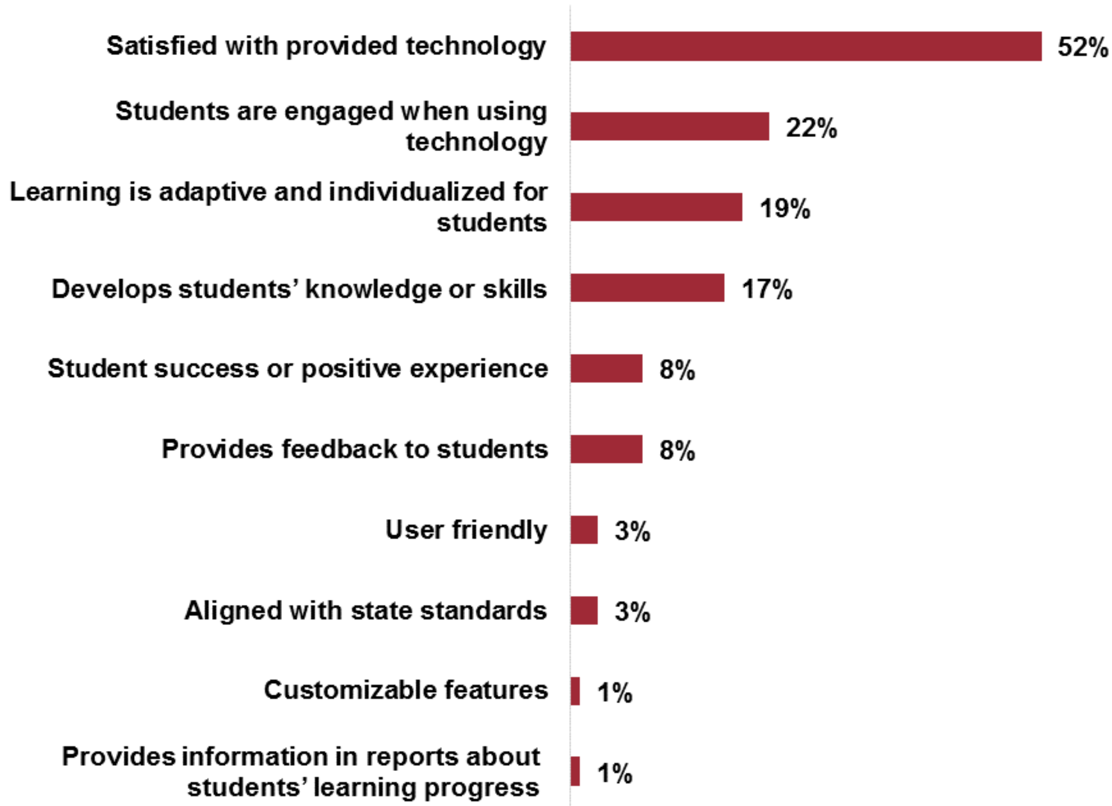


Figure 53. Common Reponses for Teacher Satisfaction with Think Through Math (N= 236)

Many of the positive concepts were just general statements about overall satisfaction with the product (52%). However, the second most common response had to do with the level of student engagement after using the technology (22%). Closely behind these two responses were the learning is individualized (19%) and the product develops knowledge and skills (17%). The following response from one of the responding instructors helps sum up what many felt about the product:

> *I absolutely love this product! I have watched students who have struggled through the year spend time on Think Through Math. They're self-confidence in math has increased. They're basic understanding of math facts have increased as well, which has opened*

doors in understanding the current material. I also love the classroom unity in working to earn points for their classroom goals.

Teacher Concerns

Although the negative responses were minimal in comparison to the positive responses, the two highest recorded categories of dissatisfaction stemmed from student frustration (10%) and product technical problems (10%). One of the responses in regards to the technical problems stated the following:

I have had a difficult time with this program. It is not as user friendly as I would have liked. The level of difficulty of the drop down boxes in even the lower levels is not necessary to teach the concept. I do not use it very frequently in class now due to the difficulties.

Table 83. Negative Responses for Teacher Satisfaction with Technology (N=236)

Categories	Sample Response	Percent
Student frustration or difficulty	*There have been a couple lessons that the students get really frustrated with.*	10
Product technical problems	*I have had a difficult time with this program. It is not as user friendly as I would have liked.*	10
Lack of challenge or boring to students	*Other students find it boring and don't see it as a learning tool.*	6
Difficult for students below grade level	*The majority of my students enjoy working on TTM, however the lower-achieving students seem to have difficulty.*	6
Dissatisfaction with the technology	*I was disappointed that the product would allow students to move on to another topic before mastering the one they were on.*	3
Not customizable	*I do not like the reports at all....I want a single page, concise summary of what a specific student has completed and to what level of success*	2

Categories	Sample Response	Percent
Need more time to use the product	*I LOVE TTM and I only wish there were more time to use it.*	1
Lack of Alignment to Standards	*Program is not aligned to the curriculum map in my class, so some lessons are presented before I teach the concept and some after.*	1
Need more training	*I would like a better diagnostics test and I would to better understand how to use it.*	1
Not used the technology yet	*I do not use it very frequently in class now due to the difficulties.*	1

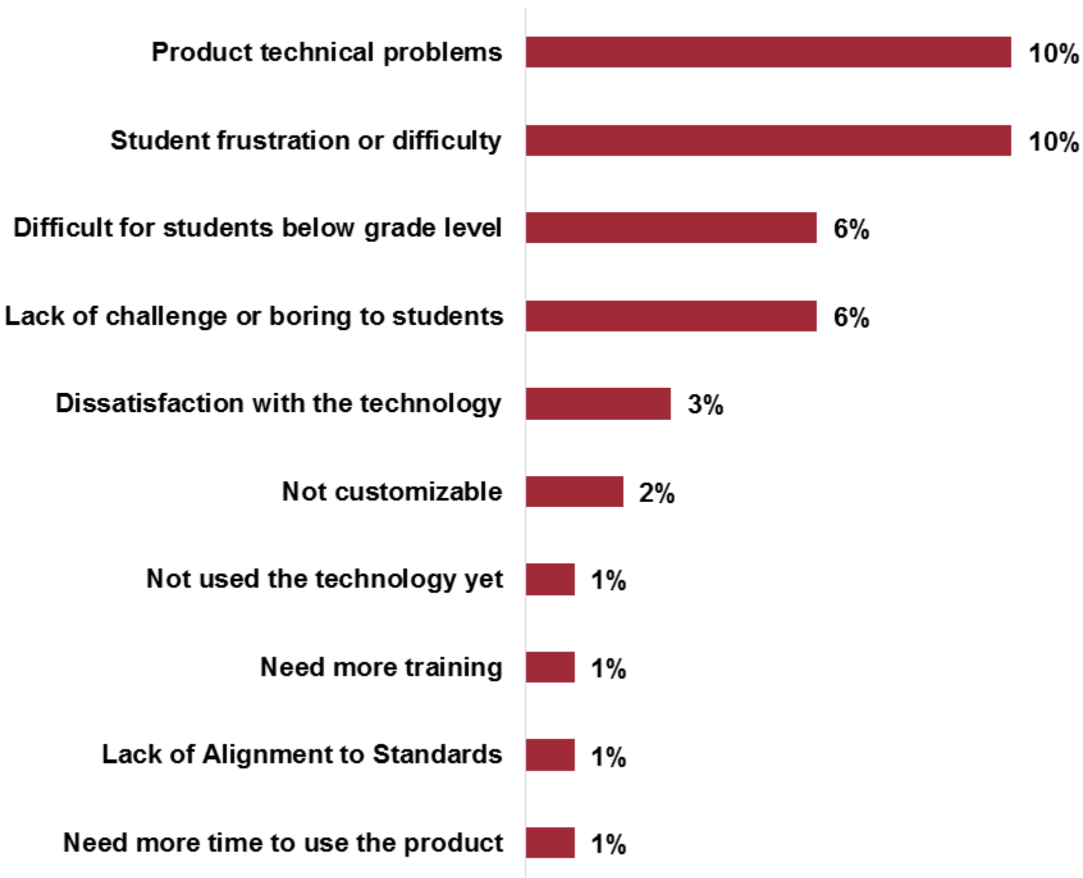


Figure 54. Common Reponses for Teacher Concerns with Think Through Math (N= 236)

Another response encapsulated the student frustrations with the following statement:

> *Sometimes my students have a hard time using what they know in different settings. They do struggle with the math vocabulary and don't always know what to do, even though they understand the concepts.*

Use of Data Reports

The third survey item asked teachers to describe how they used the data reporting features provided with the technology product. Common examples include use of data for monitoring students' progress or informing instructional decisions, what some refer to as "performance management." We provide examples of teacher responses in Table 84 (and in Figure 55).

Table 84. Responses for Teacher Use of Performance Management Features (N=236)

Categories	Sample Response	Percent
Monitor students' progress	*The data helps me know where my students are in their math progress.*	61
Have not yet found it useful	*It was hard to take the information I received and apply it to the students.*	19
Used to identify growth by area of standards	*I have watched reports on skills being mastered at grade level and below grade level.*	12
Used for student IEP or RTI	*Data identified children who were at risk and supplied the standard where a child was struggling.*	12
Guide instruction	*I have used the data to help me drive my instruction.*	9
Used to group students for instruction	*I use the data to see what the students are struggling with. I reteach the concept to them in small groups.*	6
Used to determine product usage	*I use that to see how much my students are using the program.*	6

Categories	Sample Response	Percent
Used to reward students	*We had a school competition for use. The winners received a class party.*	6
Inform parents of progress	*I generate reports for me, my TA, and my student's parents.*	4
Monitor class progress	*I print them off weekly to watch the progress in our room and to track the students.*	4
Did not Use	*We have not used it yet.*	4
Guide student access to content	*Watching student progress / creating and following pathways. The ability to create and manage pathways is extremely helpful.*	3
Inform students of progress	*I like being able to see the time they spend on at school and at home and the progress they make.*	2
Used for assessment	*Student progress in lessons and testing.*	1

The most common response for the use of the reports and management features by the teachers was to check for students' progress (61%). The second highest response was that teachers have not found it useful (19%). Most of the responses that indicated this were because the program was started late in the year. Therefore, many teachers had not figured out the proper formatting for this program in the classroom. Many of the responses were similar to this teacher's response in how they felt about the program:

> *TTM has class and individualized reports based on each of our standards. By reading these reports, it has informed me on how to place my students in math groups, and what I need focus on with each individual student. It is a wonderful program! I can't wait to use this more next year and figure out what else I can do with the program. (I received the licenses at the end of third term this year.)*

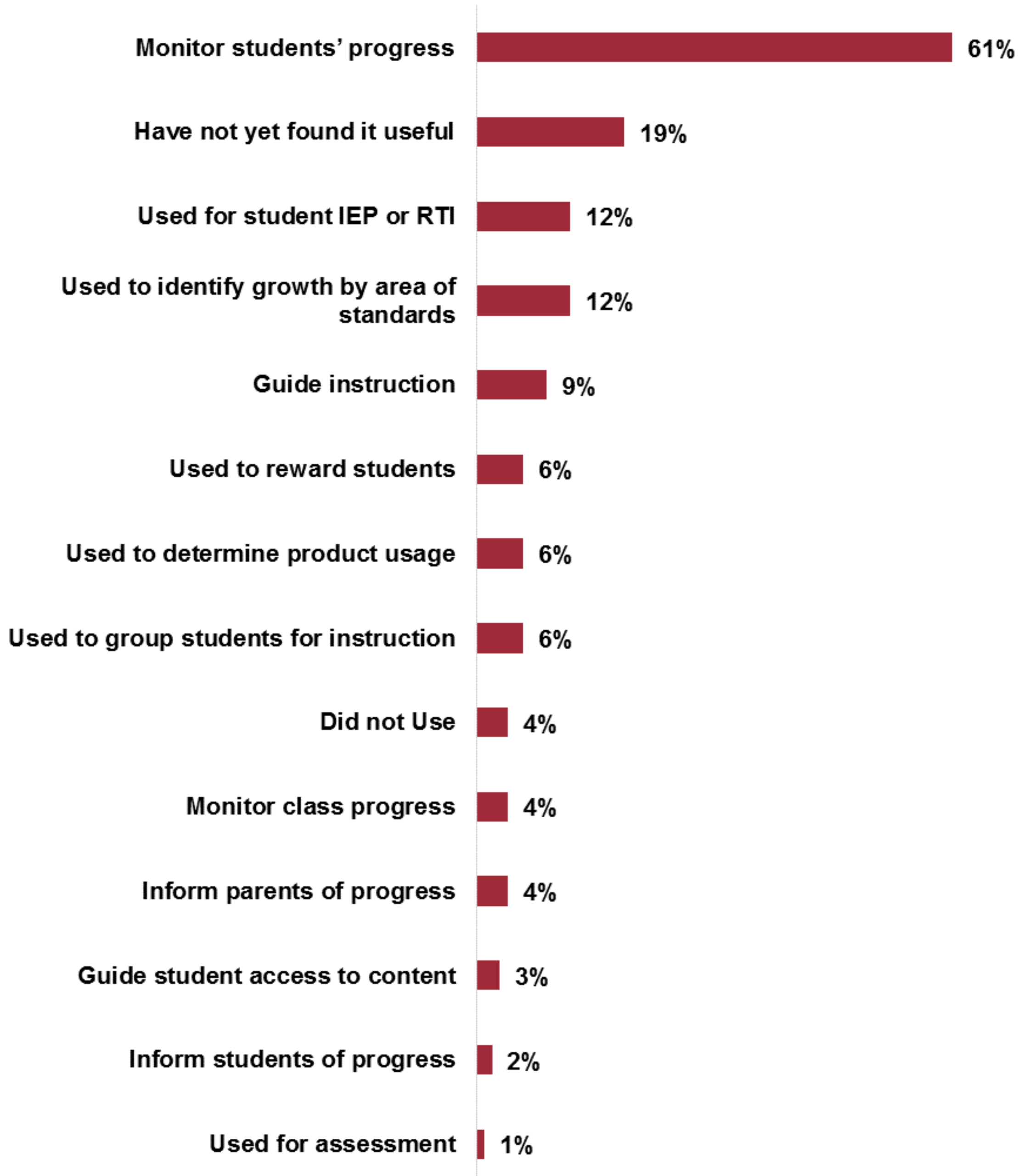


Figure 55. Common Reponses for Use of Data Reports for Think Through Math (N= 236)

Challenges with Technology Integration

The fourth survey item asked teachers to describe any barriers they encountered implementing the technology in their classroom, such as technological problems. We provide sample responses in Table 85 (and in Figure 56).

Table 85. Challenges with Technology Integration (N=236)

Categories	Sample Response	Percent
No barriers	*I have not experienced any barriers; nor have my students reported any problems on their personal devices.*	32
Not enough computers	*Time is always short and access to a classroom size computer lab is limited.*	30
Old Technology	*We have been dealing with old laptops, so logging on and loading TTM often takes up to ten minutes.*	7
Lack of home access	*Some students do not have computers at their homes*	7
Browser problems	*It takes deleting cookies and browser history sometimes to make it go.*	6
Internet connectivity problems	*Sometimes our wireless at school would be down or crash*	6
Licenses, accounts, and setup	*We didn't have licenses until the end of third term.*	6
Need for additional training in product functionality	*I also want to know more about how I can choose content through TTM and have my students work on content that I need to teach in class that week. A summer training would be nice.*	4
No or little use	*There is too much curriculum to cover. This leaves very little extra time.*	4
Student Boredom	*My resource students are not well-motivated for external long-term rewards.*	3
Lack of knowledge about the product	*Inability to control which lessons were being learned.*	1
Lack of Teacher Buy-in	*We also have a couple teachers who don't want to give up class time to use the product.*	1
Not Customizable	*Students cannot change their avatars on the ipads, so one of their immediate rewards is unavailable to them.*	1

Although there were many responses that there were no reported barriers (32%), it is important to note that not enough computers was the main issue for the educational technology barriers (30%). Following that, old technology was the next highest reported issue (7%). Several responses were similar to this response in regards to the technology barriers:

> *My only barriers were internal and not TTM issues. (1) Our computer lab is slow and has a way of increasing students' frustration. (2) Our mobile computer lab was not operational until this past week (March 30th). (3) Our three classroom laptops are old and do not run TTM as well as they should. (4) Again, our server is especially slow in our classrooms, which causes students to not want to work on TTM.*

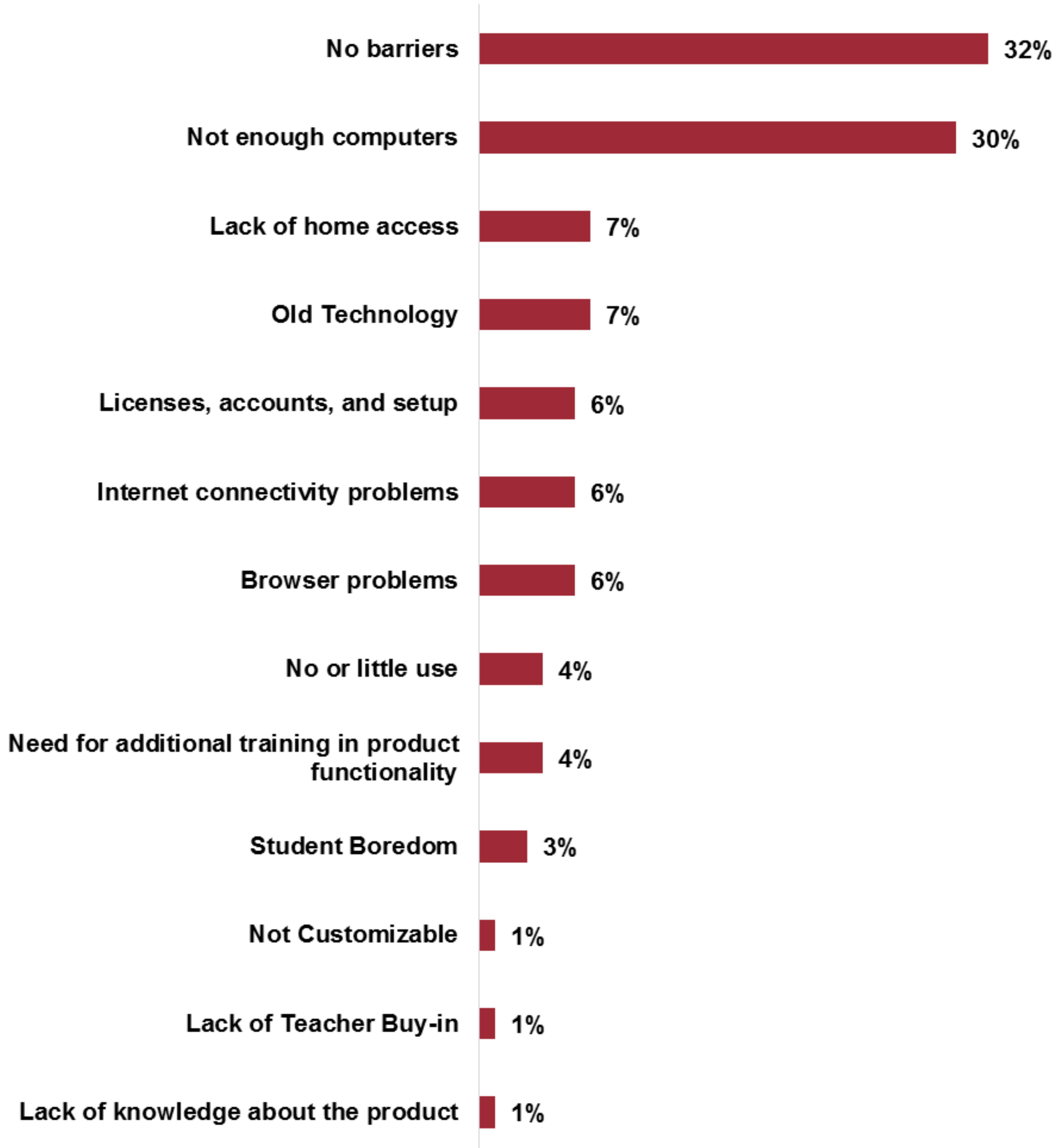


Figure 56. Common Challenges with Technology Integration for Think Through Math

Summary

Although there were some technical barriers including a lack of computers, old technology, technical glitches with the program, the majority of responses were favorable. Most of participants used the Thinking Through Math program as a supplement or intervention, and the majority of the responses were favorable, even when acknowledging the technical issues.

Many of the responses centered on the idea that monitoring student progress was the most important reporting feature. Several used the reports to measure student progress and to adjust teaching whether it was to guide instruction, use as an RTI method, supplement existing instruction, or to inform students and parents of student progress. Due to the significant number of students and teachers using Think Through Math, it is important to consider this feedback.

E-mail Feedback

The STEM Action Center did not receive any unsolicited feedback, by e-mail, from schools using Think Through Math.

Student Mathematics Interest Survey Across K-12 Math Products

Sample

In Table 86, we provide an overview by product of the number of students completing the mathematics interest survey for both elementary and secondary school participants who completed both pre- and post- surveys. Overall, 3,015 students completed both a pre-survey and a post-survey. This was only two percent of the total users. However, it is large enough of a sample to explore differences across products in changes in students' mathematics interest following implementation of the math digital technology products.

Table 86. Number of Students using Technology Products during the 2014-2015 Academic Year

Product, Provider	Total Number of Complete Elementary Surveys	Total number of Complete Secondary Surveys	Total number of K-12 users
ALEKS®, McGraw-Hill	392	1,198	77,765
Cognitive Tutor®, Carnegie Learning	na	—	86
CatchUp®, Hotmath, Inc.	na	—	782
EdReady®, NROC	na	—	498
iReady®, Curriculum Associates	121	781	15,322
MathXL®, Pearson	Na	150	3,106
Odyssey®, Compass Learning	na	—	—
Reflex®, Explore Learning	na	53	4,325
ST Math®, MIND Research	146	88	28,236
Think Through Math®, Think Through Learning	6	80	18,262
Overall	665	2,350	148,382

Note. "—"represents data that was not available at the time of the writing of this report. "na" represents products not used by students in that grade level (elementary/secondary). Due to a delay in finalizing the contract, SuccessMaker® had a delayed start, and we have not yet received their usage data file. Although schools were provided with Odyssey, we have no evidence of students using the program during the 2014-15 school year.

Results

In Tables 87 and 88, we report changes in students' math interest from pre- to post-surveys. For students completing the K-5 survey, there was a statistically significant decrease in how positive they felt about doing mathematics at home for students using ALEKS and iReady. For STMath there was a statistically significant increase in their perception of the difficulty of mathematics and a decrease in their intrinsic interest in math.

There also was a statistically significant decrease in their intrinsic interest in math. There was no significant change overall in their perception of the utility of math, but the percent of students responding "Yes" increased overall and for all products except one. While there were some differences by product, in general we saw the same trends with values decreasing for all items except difficulty and utility.

Table 87. Changes in Mathematics Interest and Engagement (Elementary Students)

Perception Area	Scale or Value	ALEKS (*n*=392)		iReady (*n*=121)		ST Math (*n*=146)	
Average Rating-Scale		Pre	Post	Pre	Post	Pre	Post
Math at School	1 to 5	3.91 (1.19)	3.82 (1.22)	3.97 (1.09)	3.80 (1.17)	4.12 (0.67)	3.80 (0.96)
Math at Home	1 to 5	**3.25 (2.96)**	**2.96** (1.48)**	**3.52 (1.31)**	**3.21* (1.40)**	3.64 (0.99)	3.20 (1.15)
Intrinsic Interest	1 to 5	3.64 (0.88)	3.63 (0.88)	**3.74 (0.81)**	**3.50** (0.84)**	**3.75 (0.55)**	**3.48* (0.59)**
Difficulty of Tasks	1 to 10	5.08 (2.92)	5.36 (2.84)	4.87 (2.61)	4.93 (2.44)	**4.16 (1.77)**	**5.04* (1.77)**
Percent with Yes Value		Pre	Post	Pre	Post	Pre	Post
Utility of Math	Yes/No	92%	95%	96%	96%	90%	93%

Note. The values in the table represent the average score on a scale of 1 to 5, where 5 is very positive (smiley face), 3 is neutral, and 1 is very negative or an item with a scale of 1 to 10 where 1 is very easy and 10 is very difficult. The values in parenthesis are standard deviations. * $p < .05$, ** $p < .01$. The individual results for Think Through Math are not represented, since only seven students completed the survey, which is too small of a sample to test for statistically significant differences.

For the secondary mathematics survey, there was a significant decrease in the perceived value of mathematics and students' expectancy in mathematics (see Table 88). There is no statistically significant difference in the perceived task difficulty, but when broken down into perceived task difficulty and perceived effort, students generally found mathematics less difficult after the intervention. While we are happy to see students finding math less difficult, it is unfortunate that they find mathematics of less value and their own expectancy to be less.

However, these differences were not all statistically significant when looking at the results by product.

For example, perceived task difficulty was an area of statistically significant difference only for students using MathXL. For Reflex, there was no statistically significant difference for any factor; however, Reflex is a math fact, fluency program, so it may be less related to significant changes in perceptions about mathematics. For four products—ALEKS, iReady, ST Math and Think Through Math—students showed significant reduced extrinsic utility value. For ALEKS, iReady, MathXL, and ST Math, student perceptions of their ability in math decreased. These trends match those of the previous year's pilot. We plan to give this post-survey a little earlier in the year during the 2015-16 academic year to see if the results are different. It may be that at the end of the year students in general are less positive about math after completing the state assessment and looking towards their summer break.

Table 88. Changes in Mathematics Interest and Engagement by Product (Secondary Students)

Perception Area	ALEKS (*n*=1198)		Reflex (*n*=53)		iReady (*n*=781)		MathXL (*n*=150)		ST Math (*n*=88)		Think Through Math (*n*=80)		Overall (*n* = 2350)	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Pre	Pre	Post	Pre	Post
Perceived Task Value	**4.77 (1.14)**	**4.65**** **(1.24)**	5.46 (0.94)	5.42 (0.98)	**5.39 (.998)**	**5.21**** **(1.17)**	4.51 (1.06)	4.44 (1.23)	5.39 (0.90)	5.24 (0.94)	**4.79 (1.02)**	**4.50*** **(1.18)**	**5.00 (1.12)**	**4.86**** **(1.23)**
Intrinsic Interest Value	**3.48 (1.62)**	**3.38*** **(1.64)**	4.85 (1.38)	4.72 (1.38)	**4.35 (1.61)**	**4.16**** **(1.70)**	3.47 (1.52)	3.48 (1.47)	4.37 (1.68)	4.30 (1.48)	3.54 (1.48)	3.33 (1.51)	**3.83 (1.66)**	**3.71**** **(1.69)**
Attainment Value	**5.56 (1.11)**	**5.45**** **(1.26)**	5.80 (0.87)	5.72 (1.03)	**6.01 (0.96)**	**5.90**** **(1.11)**	5.62 (1.00)	5.53 (1.13)	6.10 (0.84)	6.08 (0.82)	5.40 (1.08)	5.23 (1.21)	**5.73 (1.06)**	**5.63**** **(1.20)**
Extrinsic Utility Value	**4.87 (1.54)**	**4.71**** **(1.58)**	5.57 (1.33)	5.65 (1.11)	**5.50 (1.22)**	**5.22**** **(1.43)**	3.87 (1.47)	3.76 (1.50)	**5.36 (1.14)**	**4.93**** **(1.39)**	**5.11 (1.52)**	**4.56**** **(1.54)**	**5.06 (1.48)**	**4.85**** **(1.56)**
Expectancy	**4.74 (1.35)**	**4.61**** **(1.46)**	4.77 (1.19)	4.75 (1.29)	**5.29 (1.16)**	**5.15**** **(1.25)**	**4.94 (1.16)**	**4.65**** **(1.26)**	**5.33 (1.04)**	**5.00**** **(1.10)**	4.26 (1.22)	4.38 (1.14)	**4.94 (1.29)**	**4.80**** **(1.38)**
Perceived Task Difficulty	3.59 (1.27)	3.56 (1.34)	3.34 (1.00)	3.28 (1.01)	3.98 (1.18)	3.95 (1.24)	**3.45 (1.34)**	**3.25**** **(1.21)**	3.95 (1.20)	3.85 (1.31)	3.32 (1.03)	3.51 (1.03)	3.71 (1.25)	3.67 (1.30)
Task Difficulty	**3.96 (1.44)**	**3.81**** **(1.50)**	3.83 (1.32)	3.58 (1.32)	**4.54 (1.32)**	**4.40**** **(1.43)**	3.87 (1.35)	3.76 (1.27)	4.37 (1.26)	4.24 (1.38)	3.68 (1.27)	3.80 (1.23)	**4.15 (1.41)**	**4.01**** **(1.47)**
Required Effort	3.30 (1.38)	3.36 (1.41)	2.97 (1.12)	3.06 (1.07)	3.57 (1.38)	3.62 (1.37)	**3.14 (1.50)**	**2.87**** **(1.32)**	3.63 (1.31)	3.55 (1.39)	**3.05 (1.04)**	**3.30*** **(1.05)**	3.38 (1.38)	3.41 (1.38)

Note. Significance level noted for statistically significant changes between pre-survey and post-survey * $p < .05$, ** $p < .01$

K-3 Outcomes

Background

In July 2015, the STEM Action Center asked us to report to the Education Interim Committee of the Utah State Legislature on the outcomes for students in Kindergarten through grade 3. We were not able to include these grades in our overall impact analysis, because students in these grades did not take the SAGE Assessment the prior year (2013-14) so we would not have anything to compare to when looking at the grant implementation year results (2014-15). We made a special request to all of the mathematics technology providers serving K-3 students to provide any performance data they were able to provide for this group of students. Over 22,797 students in grades K-3 received a license through the math technology grant.

Table 89. Summary of K-3 Performance for Students Using ST Math

Product: ST Math®

Provider: MIND Research

Student Users K-3:
- Kindergarten: (waiting for data)
- Grade 1: (waiting for data)
- Grade 2: 3,795
- Grade 3: 3,883

Number of Elementary Teachers Completing Survey: 491 teachers

Percent Satisfied: 99%
Percent Concerned: 1%

For Year 2, over **28,000** Licenses have been Awarded for Elementary Level Students

In Tables A and B, we provide some information on **Percentage Correct** outcomes of student use of ST Math® during the 2014-15 school year based on average prequiz and postquiz scores for objectives and the effect size of the statistically significant increases in understanding.

Table A. Significant Objective Performance Gains for Grade 2 students

Objective	Students	Pre	Post	Gain	Effect Size
Number Line	2,636	45%	64%	19%	0.56
Operations on the Number Line	1,078	69&	78%	9%	0.27
Skip Counting	2,247	79%	92%	13%	0.61
Counting with Groups	1,944	77%	83%	6%	0.23
Addition/Subtraction Situations	1,493	87%	93%	6%	0.28
Measurement	1,119	76%	79%	3%	0.14

Table B. Significant Objective Performance Gains for Grade 3 students

Objective	Students	Pre	Post	Gain	Effect Size
Multiplication Concepts	2,325	58%	90%	22%	0.94
Fraction Concepts	1,242	61%	66%	5%	0.23
Division Concepts	1,936	72%	86%	14%	0.49
Multiplication and Division Situations	1,461	73%	78%	5%	0.16
Rounding three-digit numbers	858	73%	87%	14%	0.48
Perimeter and Area	834	51%	73%	22%	0.82

Example Anecdotal Information from Teacher Survey:
This product is extremely useful for targeting each student's individual needs. The pacing varies from student to student. I am immediately alerted when a student in struggling on a concept. Students are encouraged to ask for my help. Often with computer programs, students feel as if it is just them and a computer. With this program I am always up and walking around to help and encourage as needed. Sometimes students will pair up and help each other. I can motivate students with contests, JiJi origami, and the virtual postcards that ST Math® emails to me. Next year I look forward to starting the year off with the program.

Table 90. Summary of K-3 Performance for Students Using iReady

Product: iReady®

Provider: Curriculum Associates

Student Users K-3: 8,862

- Kindergarten: 1,597
- Grade 1: 2,475
- Grade 2: 2,608
- Grade 3: 2,182

Number of Elementary Teachers Completing Survey: 287

Percent Satisfied: 97%
Percent Concerned: 3%

For Year 2, over **19,000** Licenses have been Awarded for Elementary Level Students

In tables A-D, we provide some information on **Scale Score** outcomes of student use of iReady® during the 2014-15 school year based on average beginning and most recent diagnostic test scores for key objectives covered for students with pre/post data.

Table A. Significant Objective Performance Gains for Kindergarten students

Objective	Students	Pre	Post	Gain	Effect Size
Overall	1,039	353	379	26	0.89
Number and Operations	1,039	345	370	25	0.72
Algebra	1,039	348	377	29	0.79
Measurement	1,039	363	386	23	0.62
Geometry	1,039	362	390	28	0.58

Table B. Significant Objective Performance Gains for Grade 1 students

Objective	Students	Pre	Post	Gain	Effect Size
Overall	1084	383	409	26	0.76
Number and Operations	1084	375	401	26	0.66
Algebra	1084	388	411	23	0.59
Measurement	1084	385	413	28	0.58
Geometry	1084	385	414	29	0.60

Table C. Significant Objective Performance Gains for Grade 2 students

Objective	Students	Pre	Post	Gain	Effect Size
Overall	1226	412	436	24	0.68
Number and Operations	1226	406	433	27	0.68
Algebra	1226	416	436	20	0.53
Measurement	1226	415	438	23	0.47
Geometry	1226	413	438	25	0.50

Table D. Significant Objective Performance Gains for Grade 3 students

Objective	Students	Pre	Post	Gain	Effect Size
Overall	1066	431	452	21	0.51
Number and Operations	1066	424	450	26	0.59

Algebra	1066	438	453	15	0.37
Measurement	1066	441	459	18	0.31
Geometry	1066	426	447	21	0.44

Example Anecdotal Information from Teacher Survey:
I am impressed with how kindergarten friendly iReady® is. We have tried other programs that our students cannot work independently on. The other products end up being a one on one experience with a teacher telling the child how to use the program. With iReady® the students can use it completely on their own. I like the format of teaching and quizzing and then reteaching if necessary. The students like iReady® and remain engaged. The short games and reward tokens help to keep the students interested in progressing through the lessons.

Table 91. Summary of K-3 Performance for Students Using ALEKS

Product: ALEKS®

Provider: McGraw-Hill

Student Users K-3: 3,723 students

- Grades K-2: not applicable
- Grade 3: 3,723 students

Number of Elementary Teachers Completing Survey: 352

Percent Satisfied: 97%
Percent Concerned: 3%

For Year 2, over **20,500** Licenses have been Awarded for Elementary Level Students

ALEKS does not have curriculum for grades K-2. The provider was not able to provide outcome data by objective. In Table A, we provide a summary of the **Mastery** data available for beginning mastery (%), ending mastery (%), and the gain in mastery (%). We also include the effect size of that gain in mastery.

Table A. Mastery Gains for Grade 3 students

Mastery	Students	Pre	Post	Gain	Effect Size
Overall Across all Content	3,723	23%	39%	16%	0.67

Example Anecdotal Information from Teacher Survey:
I really enjoyed the ALEKS® program and how it was formatted a lot like the Sage test. Once my students got familiar with the program, they were able to use it independently. I liked the "explain" option and thought the explanations of each concept was pretty clear. However, for my lower students that struggle the "explain" option was not as effective. I wish that ALEKS® had an audio aspect. This would be helpful, especially for my lower-ability students. I felt that my students were constantly challenged and could improve even on concepts they already understood. There were some things (like decimals) that were in the 3rd grade concepts that are not in our Utah Core Mathematics Standards.

Note: A district informed the STEM Action Center that ALEKS® does not have curriculum for students in K-2. Therefore, several schools have requested to use a different product in Year 2 so that they can meet the needs of their K-2 students. The STEM Action Center has decided to honor these requests for Year 2.

Table 92. Summary of K-3 Performance for Students Using Think Through Math

Product: Think Through Math®

Provider: Think Through Learning

Student Users K-3: 2,534 students

- Grades K-2: not applicable
- Grade 3: 2,534

Number of Elementary Teachers Completing Survey: 97 teachers

Percent Satisfied: 94%
Percent Concerned: 6%

For Year 2, over **13,000** Licenses have been Awarded for Elementary Level Students

Think Through Math does not have curriculum for grades K-2. The provider was not able to provide outcome data by objective. In Table A, we provide a summary of the **Percent of Content Standards in Progress** at the end of the year and the **Percent of Content Standards Passed.** This was the only data available from the provider. We are not able to calculate effect size of any kind of improvement with this type of data.

Table A. Significant Objective Performance Gains for Kindergarten students

Content Standards	Students	Percent in Progress	Percent Passed
Overall Across all Content	2,534	53%	47%

Example Anecdotal Information from Teacher Survey:
My kids love it. I was kind of surprised! They loved seeing how well they were doing. Several kids have used to talk to a teacher feature. I even had a student walk up to me this week and say that he thought Think Through Math® would really help us get ready for the SAGE. That never happens! They really enjoy the avatar, printing a certificate, and donating points. One student was excited when he knew that he could donate points to help the earthquake victims in Nepal! I will be excited to start this at the beginning of next year when I can also use it as an instructional tool as well as review.

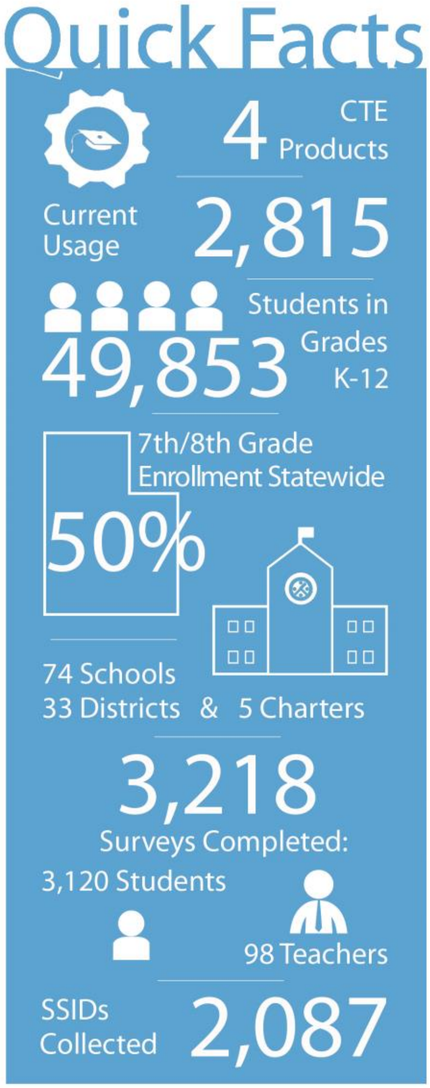
Table 93. Summary of K-3 Performance for SuccessMaker

Product: SuccessMaker® **Provider**: Pearson, Inc. **Student Users K-3**: In May 2015, 1,550 licenses for K-5 had been requested, but none were delivered to schools For Year 2, close to **165** Licenses have been Awarded for Elementary Level Students	The STEM Action Center was in contract negotiations with Pearson contract until late January. Then there was a change in staffing on the Pearson side of the project. We did not get data from Pearson until June 2015. This data was not correct because it included schools in Utah that had purchased the product themselves. In July, the STEM Action Center notified us that Pearson never distributed the requested 1,500 licenses.

Discussion

The STEM Action Center has received e-mails from teachers and school administrators in schools using the K-3 products with overwhelming satisfaction with **ST Math® ®** and **iReady®** and the data on student performance appears to be in agreement with the feedback that students are learning and improving in mathematics understanding using these two products. The STEM AC has received some concerns about **ALEKS®** and **Think Through Math®** since they responded to the RFP for K-5 products, but only had curriculum starting at the third grade level. Schools complained of having to start the school year without a product to use for students in grades K-2. In addition, teachers report that feedback to students in written format within the **ALEKS®** product has been challenging for young students to read; teachers recommend the provider add an audio feature to the program to read the feedback to students. However, STEM AC has received very positive feedback on **ALEKS®** for schools using it with grades 6-12. We look forward to looking at the Year 2 gains in student understanding of mathematics and feedback from teachers after having more time implementing the product.

Grade 7 & 8 Applied Science Grants



The CTE Grade 7 and 8 Applied Science program distributed licenses and equipment to 49,853 students, which is 50 percent of the students in the state enrolled in grade 7 and 8. However, the four providers submitted usage data for only 2,815 students. This grant program involved 33 districts and 5 charter schools for a total of 74 schools. We were able to collect student state identifiers for only 2,087 students and only 3,120 students completed the classroom learning environment survey that we administered online. Ninety-eight teachers completed the satisfaction and concerns survey.

Usage data for Applied Science Products

The STEM Action Center had not piloted this grant program before; therefore, this year was a year of much learning and some challenges. First, there was a delay in finalizing contracts between the vendors and the STEM Action Center. Districts did not start receiving training until January or February. It took some districts until March to receive their materials. Districts shared concerns about such late implementation with the STEM Action Center, making it clear that spring 2015 implementation was more of a pilot and full implementation of the products would be during the 2015-16 school year.

Despite the requirement in the RFP to have the capability of a pre/post unit assessment, the actual process of unit assessment was much more challenging than with the math grants. The technology for the math grants automatically collects usage data and performance data as the students log in to the product. For the CTE Applied Science products, this was not the case. Many of these products were primarily curriculum that teachers accessed through the Internet and then hands on materials and kits that they used with their students. In order for the provider to collect pretest/posttest unit data, the teachers would have to set up an account for their class, enter the names of their students to associate with a UserId given by the provider, and upload the pretest/posttest data. The vendors did not make this clear in their responses to the RFP, so the STEM Action Center did not set this expectation with each district.

In April, once we realized that there was no evidence of usage, the STEM Action Center reached out to the providers sharing the concerns and explaining that this was an expectation of the grant program. Three of the providers –ITEEA, Pitsco and STEM Academy— were able to encourage teachers to upload student names and UserIds and start tracking usage and pretest/posttest data. However, Project Lead the Way did not share any kind of usage data besides summary data of number of teachers and students involved in their program. Therefore, we do not have evidence of how many licenses schools received. We do have evidence of how many licenses were awarded, which we represent in the following tables for each provider and then we share the minimal amount of usage data that we were provided.

In May, the STEM Action Center sent an e-mail to the providers and to the districts explaining that for year 2 (2015-16) there would be an expectation that participants, usage, and pre/post unit test data would be collected. They asked that the district and charter coordinators encourage teachers who received the awards to enter their student data into the provider system in order for us to be able to track distribution and usage. We provide an overview of distribution and usage overall (in Figure 57) and by product for the CTE grant program for spring 2015 in Table 94.

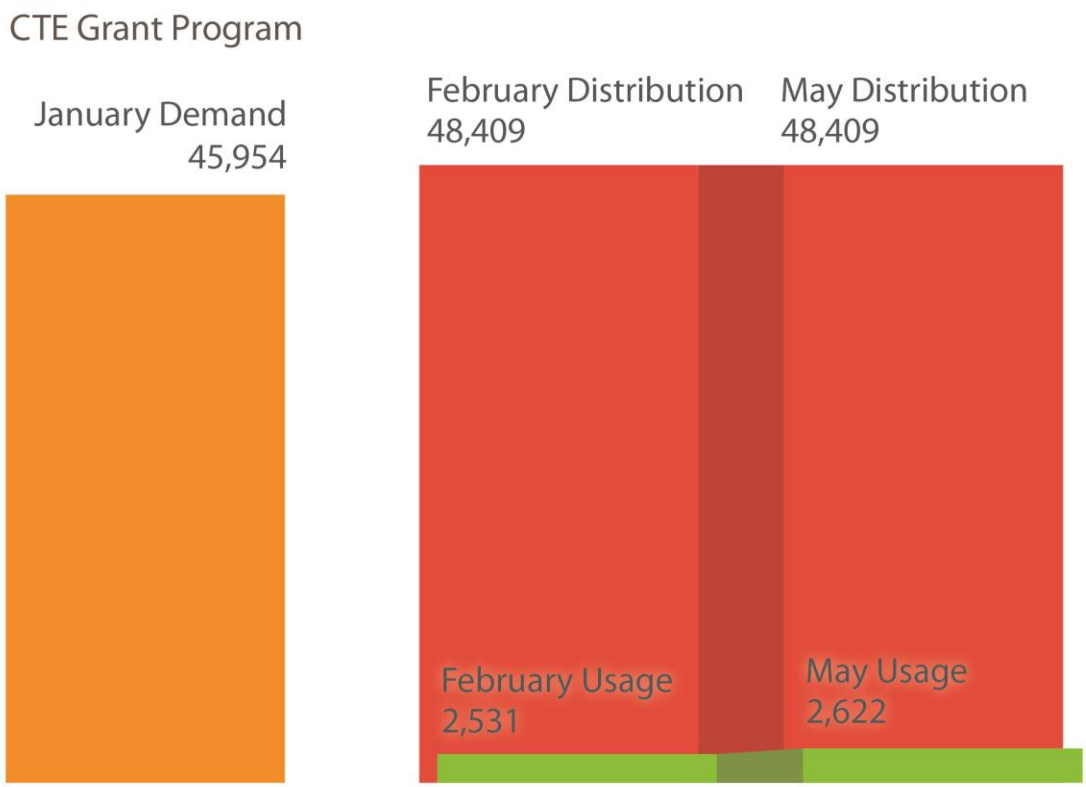


Figure 57. Summary of Spring 2015 Distribution and Usage of CTE Grant Licenses

Table 94. Overview of Usage by Product for CTE Grant Program Spring 2015

Usage Information	ITEEA	Pitsco	Project Lead the Way	STEM Academy	Total
Number of licenses assigned					
Number of K-12 students	24,418	1,789	5,629	18,017	49,853
Number of districts	3	10	7	13	33
Number of charter schools	1	1	2	1	5
Number of all schools	9	Not Available	11	Not provided	Approximately 74
Number of licenses used (evidence of pretest or posttest)	980	498	890	447	2,815
Percentage of licenses used	4%	62%	28%	3%	6%

Next, we provide additional information for each product.

ITEEA

The STEM Action Center awarded 24,418 student licenses to interested districts and charter schools (as shown in Table 95). ITEEA provided data that documented that 980 students used the program by reporting a “PreScore” or “PostScore”, which is about 4 percent of the licenses assigned. We did not receive data that showed both pretest and posttest scores that could be used to determine improvement in understanding. Since clear expectations were not set with teachers to have them enter the pretest and posttest data into the online system, this usage amount may not be accurate. During the 2015-16 school year, clearer expectations will be set for schools who continue to have access to ITEEA.

Table 95. Summary of License Distribution and Usage for ITEEA

Usage Information	Usage Data
Number of licenses assigned	
Number of K-12 students	24,418
Number of districts	3
Number of charter schools	1
Number of all schools	9
Number of licenses used (valid pretest or posttest score)	980
Percentage of licenses used	4%
Percentage of users meeting recommended usage	Not applicable

Pitsco

The STEM Action Center awarded 1,789 Pitsco licenses to interested districts and charter schools. Pitsco provided data that documented that 1,114 students used the program by reporting a "PreScore" or "PostScore" for each student, which is about 62 percent of the licenses assigned (see Table 96). Since clear expectations were not set with teachers to have them enter the pretest and posttest data into the online system, this usage amount may not be accurate. During the 2015-16 school year, clearer expectations will be set for schools who continue to have access to Pitsco.

Table 96. Summary of License Distribution and Usage for Pitsco

Usage Information	Usage Data
Number of licenses assigned	
Number of K-12 students	1,789
Number of districts	10
Number of charter schools	1
Number of all schools	Not Available
Number of licenses used (valid pretest or posttest score)	498
Percentage of licenses used	62%
Percentage of users meeting recommended usage	Not applicable

Not all students used the same content modules. In Table 97, we report the mean and standard deviation of the pretest and posttest scores for students by module and the number of students with data for each test. We also provide results from a paired samples t-test that documents that all of the differences between pretest and posttest are statistically significant.

Table 97. Comparison of PreScores and PostScore across instructional units for Pitsco

Instructional Unit	Descriptive Statistics	PreScore	PostScore	Gain Score (SD)	t-statistic	Correlation between pre/posttest	Effect Size
Alternative Energy 3.4.0	Mean	4.84	52.09	47.26 (19.41)	15.96	0.150	3.17
	Std. Deviation	1.57	19.59				
	N	43					
Biotechnology 3.0.1	Mean	4.36	50.62	46.26 (27.76)	12.69	0.029	2.39
	Std. Deviation	2.42	27.59				
	N	58					
CNC Manufacturing 3.1.0	Mean	4.39	55.04	50.65 (26.29)	14.16	0.031	2.68
	Std. Deviation	1.81	26.28				
	N	54					
Composites 3.0.0	Mean	3.87	62.61	58.74 (24.54)	11.48	0.196	3.04
	Std. Deviation	1.01	24.72				
	N	23					
Eco-Architecture 3.0.2	Mean	4.90	63.25	58.35 (21.74)	17.00	0.492	2.71
	Std. Deviation	1.88	22.58				
	N	40					
Energy, Power & Mechanics 3.1.0	Mean	5.43	55.54	50.11 (29.98)	14.38	0.346	1.91
	Std. Deviation	1.69	30.52				
	N	74					
Engineering Bridges 3.0.2	Mean	4.97	69.43	64.45 (19.85)	19.21	0.646	2.73
	Std. Deviation	2.33	21.27				
	N	35					
Engineering Towers	Mean	5.93	72.75	66.83 (23.23)	23.90	0.512	2.84
	Std. Deviation	1.99	24.18				
	N	69					
Flight Technology 3.2.1	Mean	3.61	47.73	44.13	11.54	0.129	1.90

Instructional Unit	Descriptive Statistics	PreScore	PostScore	Gain Score (SD)	t-statistic	Correlation between pre/posttest	Effect Size
	Std. Deviation	1.84	30.76	(30.58)			
	N	64					
Home Makeover 3.2.1	Mean	5.86	79.31	73.44 (17.84)	22.17	0.202	5.20
	Std. Deviation	1.73	18.11				
	N	29					
Orientation	Mean	4.56	63.03	58.47 (20.68)	40.78	0.384	3.14
	Std. Deviation	2.19	21.42				
	N	208					
Research & Design	Mean	4.86	70.44	65.58 (24.08)	26.12	0.292	3.24
	Std. Deviation	2.18	24.63				
	N	92					
Rocketry & Space 3.0.1	Mean	5.87	60.38	54.52 (27.75)	18.53	0.291	2.34
	Std. Deviation	2.18	28.31				
	N	89					

Note: The mean differences between pretest and posttest were all statistically significant at the $p<.001$ level based on results from a paired samples t-test.

Project Lead the Way

The STEM Action Center awarded 5,629 student licenses for Project Lead the Way to interested districts. Project Lead the Way representatives did not comply with the requested participant and usage data file format. They were to provide a file at the user level so that we could document the district, school, teacher, and student served by this grant program on a monthly basis. They only provided a summary of the number of teachers and students served by the grant program. However, based on the documentation from Project Lead the Way, 890 students used the product, which is 28 percent of the licenses assigned (as shown in Table 98).

Table 98. Summary of License Distribution and Usage for Project Lead the Way

Usage Information	Usage Data
Number of licenses assigned	
Number of K-12 students	5,629
Number of districts	7
Number of charter schools	2
Number of all schools	11
Number of licenses used (documented by provider)	890
Percentage of licenses used	28%
Percentage of users meeting recommended usage	Not applicable

Note. The vendor did not provide information on licenses assigned at the participant level; therefore, we have used the number 5,629, which is the initial requests and the award to the participating districts. This included seven districts and two charters. However, based on the actual licenses used according to the provider there were 890 students in two charter schools and three districts, a total of 11 schools.

STEM Academy

The STEM Action Center awarded 6,973 grade 7 licenses, 5,364 grade 8 licenses, and 10,308 grade 7 Information Technology licenses for STEM Academy to interested districts. Based on the documentation from the STEM Academy, 447 students used the STEM Academy license based on a reported “PreScore” or “PostScore,” which is about 3 percent of the licenses assigned. Since clear expectations were not set with teachers to have them enter the pretest and posttest data into the online system, this usage amount may not be accurate. During the 2015-16 school year, clearer expectations will be set for schools who continue to have access to ITEEA.

The STEM Academy provider gave us a file with a list of 18,017 usernames as documentation of licenses distributed by district, but with no school, student or teacher name attached; therefore, we do not know how many schools participated. In Table 99, we report the number of licenses distributed and used by district.

Table 99. Summary of License Distribution and Usage for STEM Academy

Usage Information	Usage Data
Number of licenses assigned	22,645
Number of K-12 students distributed usernames	18,017
Number of districts	13
Number of charter schools	1
Number of all schools	Not provided
Number of licenses used (valid pretest or posttest score)	447
Percentage of licenses used	3%
Percentage of users meeting recommended usage	Not applicable

Note: Licenses for grade 7 and grade 7 IT may include some overlap of students; therefore, the counts of licenses may not represent unique students, since there may be some duplicates with students receiving two types of licenses. The vendor did not provide names of students, so we were unable to determine the number of unique licenses.

In March 2015, the STEM Academy provided a materials distribution letter that said that they had delivered materials to Salt Lake City, the SESC Consortium, Tooele, Cache, and Granite Districts. This included 1,555 material kits for 7^{th} grade units, 3,568 material kits for 8^{th} grade course; this is 5,123 material kits in total.

Summary of Implementation Experience based on Teacher Survey Responses

We administered a survey to understand from the teacher's perspective their experience using the products for this grant program. Ninety-seven teachers responded to the survey. Project Lead the Way was the only provider who gave us data on the number of teachers provided with a license or access to their product, so we cannot determine the total number of teachers served by this grant program. Therefore, in Table 100 (and Figure 58), we provide a summary of the number of teachers who responded to the survey and usage information by each CTE product. Based on the responses, 76 of the 79 teachers (96%) who responded to the survey had started to use the product; they reported using the product with 3,441 students. Based on the responses, 79 of the 97 (81%) teachers reported participating in professional development from these providers. In terms of the usage period, 19 of the 76 teachers (25%) who reported product usage had used the product for between 1 and 3 months. The teachers implemented the CTE products in different kinds of classes, such as Exploring Technology, Career Technical Education, and Gateway.

Table 100. Summary by Product and Overall of Respondents and Usage

	Project Lead The Way	Pitsco	STEM Academy	ITEEA	Total
Number of Teacher Respondents	25	22	23	27	97
Number of Teacher Reporting use of the Product in their Classroom	22	20	10	24	76
Number of Teachers Reporting that They were Trained How to Use the Product	11	3	3	3	20
Number of Teachers Reporting that they Participated in Professional Development	20	21	14	24	79
Number of Teachers with Usage Amounts					
less than 1 month	3	1	2	4	10
between 1 and 3 months	7	5	2	5	19
greater than 3 months	1	2	2	4	9
not reported	11	12	4	11	38
Teacher Reported Number of Students Served	1,216	762	409	1,054	3,441

	Project Lead The Way	Pitsco	STEM Academy	ITEEA	Total
Number of Teachers Reporting Product Use for Classes					
Exploring Technology	1	6	1	8	15
Career Technical Education	2	2	3	7	14
Gateway	3	0	1	0	4
Other	5	0	2	2	11
not reported	11	12	3	7	33

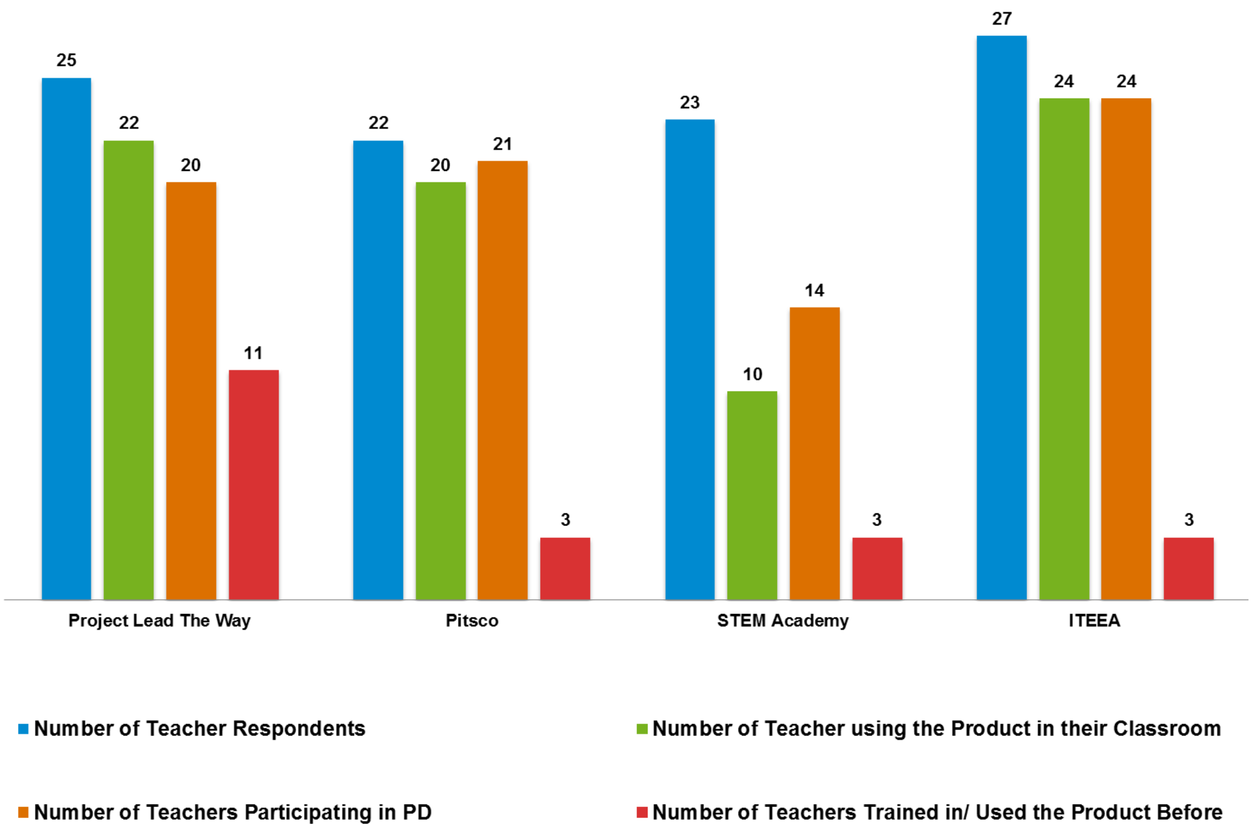


Figure 58. Number of Teachers Using CTE Products based on Survey Responses

Teacher Satisfaction and Concerns

Overall, approximately 82 percent of the teachers were satisfied, very satisfied or extremely satisfied with the product they were using as shown in Table 101 and Figure 58. ITEEA was the only product that some of the teachers (5%) reported “not satisfied”. PLTW had the highest percentage of teachers who were very satisfied or extremely satisfied with the product (73%).

Table 101. Percent (%) of Teachers Responding of Satisfaction with the Product

	Project Lead The Way (n=18)	Pitsco (n=19)	STEM Academy (n=10)	ITEEA (n=21)	Overall (N=68)
Not satisfied	0	0	0	5	1
Somewhat satisfied	17	11	10	24	16
Satisfied	11	47	50	38	35
Very satisfied	67	42	30	24	41
Extremely satisfied	6	0	10	10	6

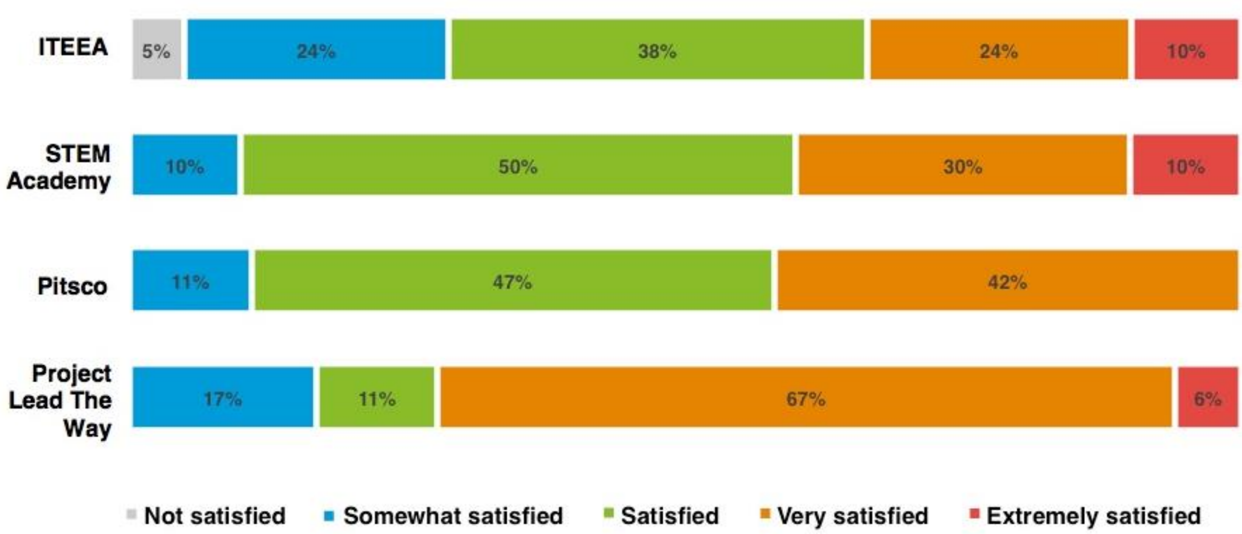


Figure 59. Comparison of Teacher Satisfaction by Product based on Survey Responses

For teachers' satisfaction with the professional development by each provider, overall approximately 73 percent of the teachers answered satisfied, very satisfied or extremely satisfied (as shown in Table 102 and Figure 60). STEM Academy had the highest percentage of teachers (14%) who were extremely satisfied with the professional development training. ITEEA was the only product with which no teacher was dissatisfied with the professional development program.

Table 102. Percent (%) of Teachers Satisfied with PD and Support by Providers

	Project Lead The Way (n=20)	Pitsco (n=21)	STEM Academy (n=14)	ITEEA (n=24)	Overall (N=79)
Not satisfied	10	14	7	0	8
Somewhat satisfied	10	14	29	25	19
Satisfied	30	43	14	42	34
Very satisfied	50	29	36	29	35
Extremely satisfied	0	0	14	4	4

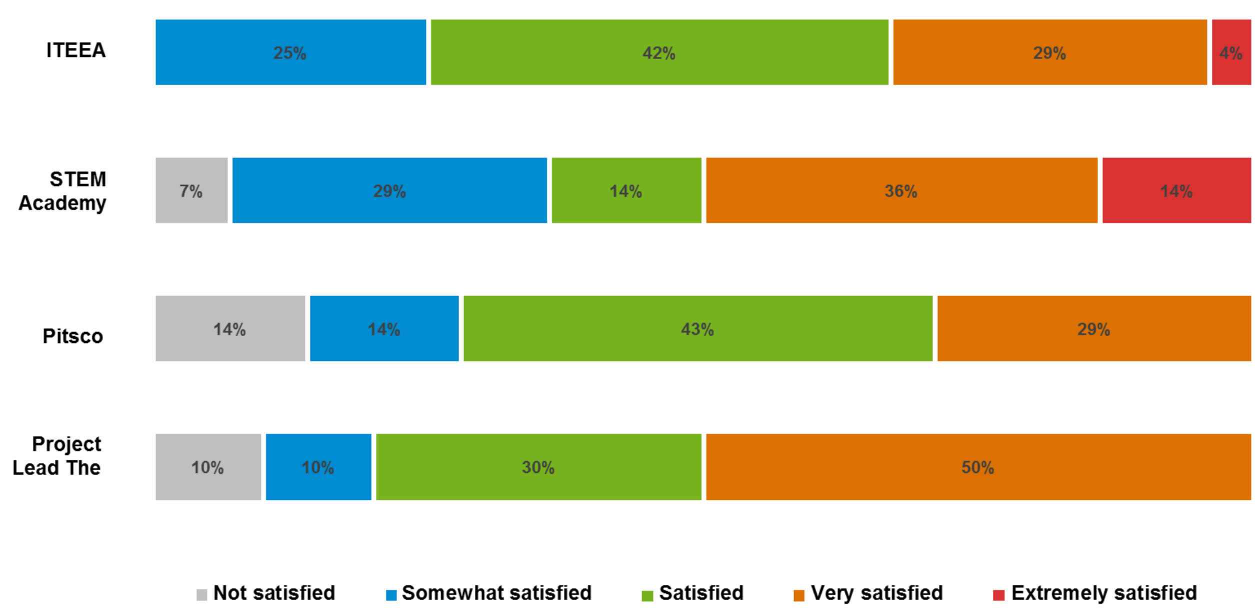


Figure 60. Comparison of Teacher Satisfaction in PD based on Survey Responses

In Table 103, we also provide teachers' feedback regarding the implementation of the product in their classes (also shown in Figure 61 and Figure 62). With regard to the teachers' perceptions about whether the product changed their students' level of engagement in their classes, overall 63 percent of the teachers responded that their students' engagement increased while using the products. Of the four products, PLTW had the highest percentage of teachers who perceived their students' level of engagement has increased (72%) while STEM Academy had the lowest percentage (50%) of the teachers. In addition, overall 88 percent of the teachers reported they would like to recommend the product to a CTE teacher at another school. In particular, 95 percent of the teachers who were using ITEEA wanted to recommend this product. For improving students' development of 21st century skills, a majority of the teachers using ITEEA said the curriculum provided continuous opportunities.

Table 103. Percent (%) of Teachers with Feedback on Student Engagement and Usage

	Project Lead The Way (n=18)	Pitsco (n=19)	STEM Academy (n=10)	ITEEA (n=21)	Overall (N=68)
Student Engagement					
engagement has increased	72	63	50	62	63
engagement has stayed the same	17	32	50	38	32
engagement has decreased	11	5	0	0	4
Usage to Improve Students' Development of 21st Century Skills					
use about once a week	28	26	20	10	21
use about once a month	0	21	10	5	9
use about once a grading period	6	0	10	0	3
use about once a year	0	0	0	0	0
use continuously	67	53	60	86	68
Recommend Product					
Yes	89	79	90	95	88
No	11	21	10	5	12

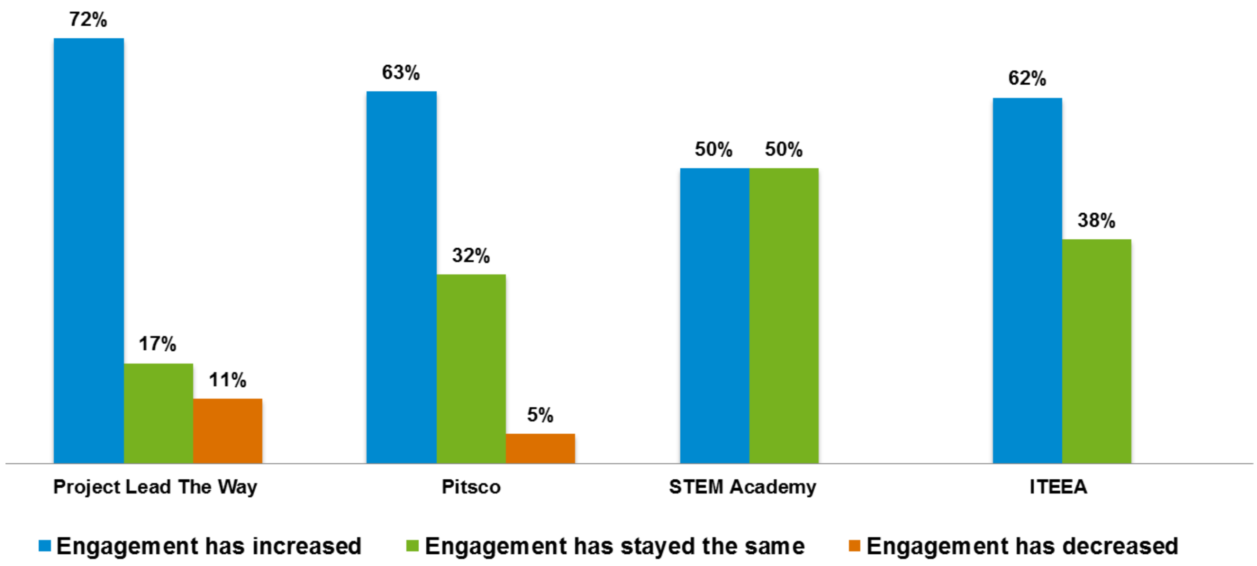


Figure 61. Changes in Student Engagement Reported by Teachers Surveyed by Product

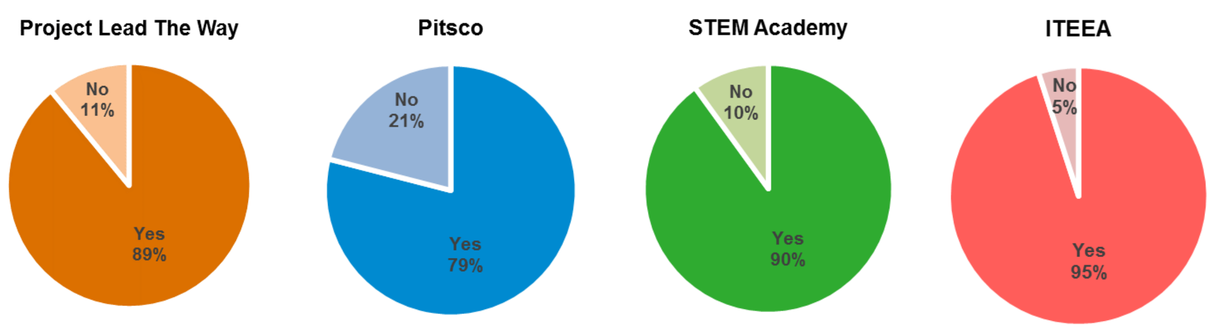


Figure 62. Percent of Teachers Surveyed Who Would Recommend the Product

In Table 104, we show teachers' responses with additional feedback on the product implementation. Using the two survey items, we asked teachers to rate their confidence in their ability 1) to foster their students' development of 21st century skills and 2) to assess their students' development of 21st century skills. For all four of the products, no teacher respondent had no confidence in their ability to promote and evaluate their students' development of 21st century skills. Overall, the teachers seemed to feel more confident in their ability to foster their students’ development of 21st century skills than to assess it. The teachers were also asked to rate their level of engagement with the certain groups, such as local community members and local STEM industry, in making STEM connections in their classes. Overall, over 70 percent of teachers reported no engagement or little engagement with local community members and in local STEM industry. Engagement of the community and industry is an area where the STEM Action Center can leverage relationships with STEM Industries to make connections between schools and industry partners.

Table 104. Percent (%) of Teachers with Additional Feedback on Product Implementation

	Project Lead The Way (n=17)	Pitsco (n=19)	STEM Academy (n=10)	ITEEA (n=21)	Overall (N=67)
Foster Students’ Development of 21st Century Skills					
No confidence	0	0	0	0	0
Moderate confidence	53	63	40	52	54
Extremely confidence	47	37	60	48	46
Assess your students' Development of 21st Century Skills					
No confidence	0	0	0	0	0
Moderate confidence	71	79	60	71	72
Extremely confidence	29	21	40	29	28
Local Community Members					
No engagement	24	26	40	48	34
Little engagement	35	37	40	38	37
Some engagement	29	26	20	14	22
Ongoing engagement	12	11	0	0	6
Local STEM Industry					
No engagement	12	26	20	57	31
Little engagement	41	42	50	33	40
Some engagement	35	26	30	10	24
Ongoing engagement	12	5	0	0	4

The STEM Action Center asked each of the teachers who participated in any of the CTE programs to complete a survey. Using a qualitative research approach, we analyzed data about teacher perceptions of the CTE grant programs based on teacher's responses to four open-ended survey questions. Only those teachers who completed the survey fully were included in the sample. Eighty-five teachers completed the survey fully. We open-coded teacher responses to identify consistent patterns and themes, and generated categories based on the patterns observed (Strauss & Corbin, 1998).

Since teachers used four different products, we provide tables by product summarizing teacher responses for each of the four survey items. Percentages do not always total 100 percent, since some teachers mentioned two or more categories in their response. We have sorted the tables' values from the highest percent response to the lowest percent response.

Teacher Satisfaction with Product Features

The first survey item asked teachers to share a little about the features of the product with which they were satisfied. If they were not satisfied with anything, we instructed them to write "None." Because of this specific instruction, we coded those who did not respond to the question and those who actually wrote "none" in two separate categories.

ITEEA

Based on a review of teachers' responses for ITEEA, 43 percent of teachers were very satisfied with the flexibility of the product, and the variety of learning activities and curriculum available (as shown in Table 105 and Figure 62). They also appreciated the structure and the amount of information (17%) for the topics in which they were interested.

Table 105. Teacher Satisfaction with Product Features for ITEEA (N = 23)

Category	Example	Percent
Flexibility/Variety of learning activities and curriculum	*It is nice to have the flexibility to choose different learning activities that are provided with the curriculum. I have found that with a little tweaking of some of the activities that I was already doing, I didn't have to implement something completely new to me.*	43
Structure/Amount of information	*The lesson plans were defined and included everything that I needed to have to teach the lesson.*	26
Great project ideas	*I liked the project ideas that were shared and that we were encouraged to modify them if needed.*	17
Student Engagement	*I liked the emphasis on the engineering design cycle along with the use of an engineering design journal. Students were learning to brainstorm, problem solve, collaborate, and be a leader. I used the Innovation and Invention curriculum and one of the lesson plans involved building a Rube Goldberg. This was a highlight for the students and many math and science standards were imbedded within the project.*	17
Easy to use/ Usability	*Very clear concise instructions for teachers and lots of open-ended problems solving for students.*	13
Integrates STEM	*I like the engineering approach to the education process and the different areas of learning.*	9
Dissatisfaction with some element	*I feel like the curriculum is good, I just don't know it well enough yet*	4
Adequate training/support	*The resources on line for the lesson plans were well done, and there is way more material than I could fit into the program.*	4

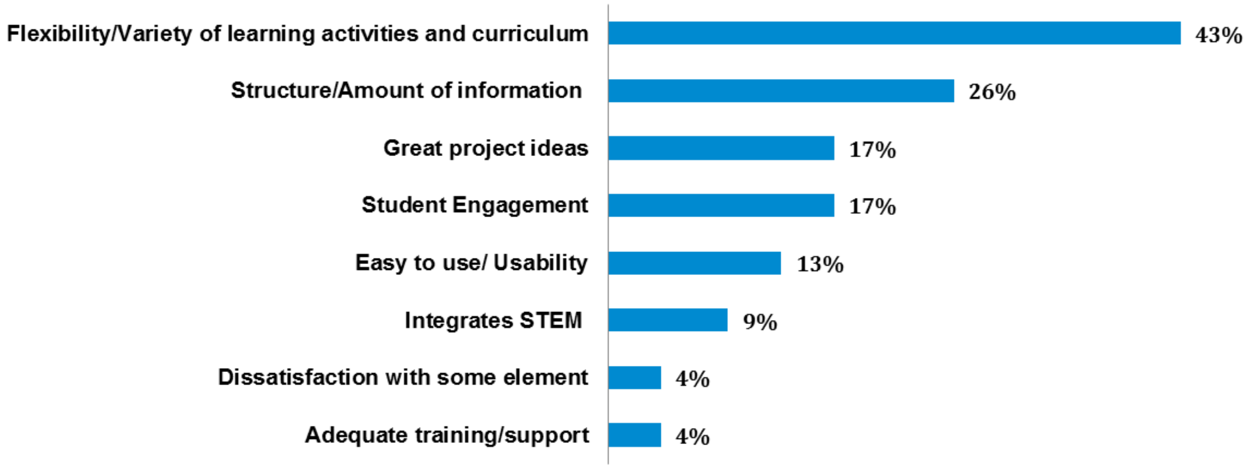


Figure 63. Percent of Teachers Satisfied with ITEEA Product Features

Teachers were also positive about the ITEEA project ideas (17%) and the engagement of students in the projects (17%) that they implemented. Only four percent mentioned adequate training and support as an area of satisfaction.

Pitsco

Based on a review of the teacher feedback for Pitsco, the largest percent of teachers (29%) were most satisfied with the ease of use of the product (as shown in Table 106 and Figure 63). This makes sense because the product is a turnkey model where Pitsco representatives deliver and install the equipment, leaving very little for the teacher to do besides review the curriculum.

Table 106. Teacher Satisfaction with Product Features for Pitsco (N = 21)

Category	Example	Percent
Easy to use/ Usability	*I am satisfied with its usability.*	29
Satisfaction with product & materials	*I am satisfied by the number of 3D printers provided; four printers. The software is somewhat intuitive and the 3D printing quality is good to excellent.*	24
Hands on/ Real world application	*Total hands on from day 1 - Orientation to each day a new project to create, learn, discover, and think about. I love the part when the students come in to class they know what to do, where they left off, and get to work.*	19
Durability and quality of the product	*The quality of the printed models.*	10
Dissatisfaction with some element	*I am satisfied with the print quality, the compact design and the printing interface. I am not satisfied with the non-network capable ports, the fragility of its table/servos, and the non-automated calibration steps.*	10
Integrates STEM	*Great program. Does a wonderful job integrating different subjects.*	5
Organization	*The materials needed for each project were readily available and organized.*	5
Structure/Amount of information	*I am satisfied with the structure & quality of the lesson plans that were provided. In addition, I am satisfied with the digital media that goes along with the materials.*	5
Student Engagement	*The hands on activities / The easy to follow instructions o the computer / The self grading / the fact that my students enjoy it*	5
None	*"None"*	5
No Response	*N/A*	5

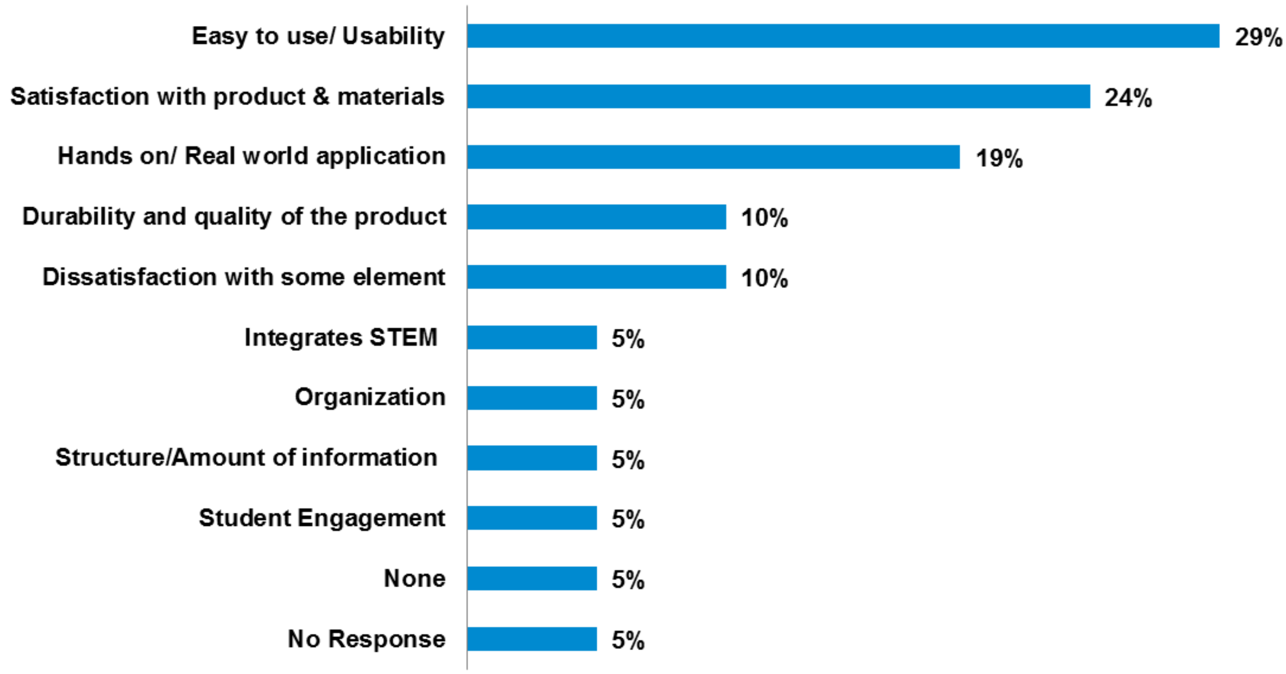


Figure 64. Percent of Teachers Satisfied with Pitsco Product Features

Nineteen percent of the teachers using Pitsco commented specifically about the hands-on activities, which is important to note since this was one of the goals of this grant program. Only five percent mentioned being satisfied with student engagement when using the product.

Project Lead the Way

Based on a review of the teacher feedback for Project Lead the Way, the largest percent of teachers (26%) reported dissatisfaction instead of satisfaction for this question (as shown in Table 107 and Figure 65). Unlike the other products, Project Lead the Way has been in use in Utah, so people may have other positive or negative experiences that could influence their responses to the survey.

Table 107. Teacher Satisfaction with Product Features for Project Lead the Way (N = 19)

Category	Example	Percent
Dissatisfaction with some element	*I don't like companies that make money off of grants and schools by providing a lot of things I got a degree to fulfill. Yes it makes things easier but just a course teaching me how to use inventor would have sufficed.*	26
Durability and quality of the product	*Product is durable and will last with student use.*	16
Adequate training/support	*The training was extensive. I felt comfortable taking it to my students afterwards.*	16
Structure/Amount of information	*I taught the design and modeling component to my class I really liked the structure of all the assignments and the canvas that let the students have access to all the teaching materials. The only thing I didn't like was we had some problems setting up my classes in the canvas so I did a lot of copying at the beginning.*	11
Easy to use/ Usability	*The ease of use and the current relevance to student interests.*	11
Student Engagement	*the students really enjoyed using the Makerbot to create 3 dimensional final products and liked working with the vex robotics and automation kit*	11
Satisfaction with product & materials	*love having calipers to teach the kids how measure small increments*	11
Flexibility/Variety of learning activities and curriculum	*The students have access to all the assignments. They can work on activities at home if they are absent. Activities all planned out.*	5
Did not use materials/Waiting to receive materials	*I liked learning about how to use Inventor but did not use any of the materials form PLTW*	5
Great project ideas	*Great curriculum with good ideas for projects.*	5

However, some responded positively about being satisfied with the durability of the product materials (16%) and the quality of the training that PLTW provided (16%). Five percent of the teachers responded that they had not yet received their materials.

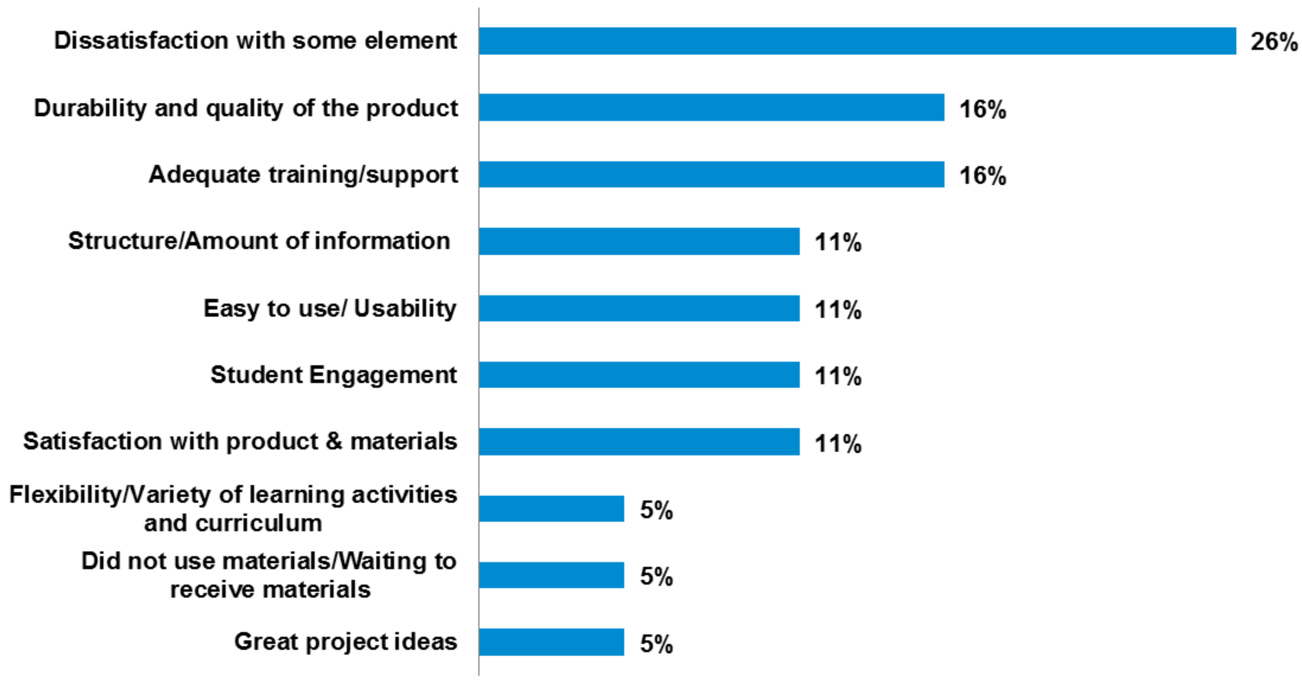


Figure 65. Percent of Teachers Satisfied with Project Lead the Way Product Features

STEM Academy

Based on a review of the teacher feedback for STEM Academy, we found it noteworthy that the largest percent of teachers (36%) did not indicate satisfaction with any element of the product (as shown in Table 108 and Figure 66). Some teachers responded with general satisfaction (18%), while others provided more specific information about the usability (9%) and organization of the materials (9%). Fourteen percent of the teachers shared that they had not yet received the materials.

Table 108. Teacher Satisfaction with Product Features for STEM Academy (N = 22)

Category	Example	Percent
No Response	*N/A*	36
Satisfaction with product & materials	*I was satisfied that the materials were included in the initial start-up*	18
Did not use materials/Waiting to receive materials	*I really liked the training that we were able to attend so that we could be successful in teaching the content to the students. I have not received my materials and I normally present the STEM portion of CTE at the last few months of school so I have not taught any of the curriculum as so yet.*	14
Easy to use/ Usability	*Most of the web site was easy to use.*	9
Organization	*having all of the supplies in one bin rather than spread out in different closets throughout the classroom*	9
Structure/Amount of information	*I was very satisfied with the material and the lesson plans that were provided. The lesson plans gave step by step procedures on how to present the material to the class. I really like this because I am not as familiar with Technology and Engineer as I am in other units within CTE.*	5
Great project ideas	*The projects and materials were great and the rubrics were good.*	5
Flexibility/Variety of learning activities and curriculum	*I liked the variety of activities available and the flexibility of the curriculum. I liked how everything can be linked to standards.*	5
Dissatisfaction with some element	*Many of the PowerPoints were too wordy so we had to be selective in what we used.*	5
Integrates STEM	*The online curriculum is very usefully in teaching STEM*	5
Hands on/ Real world application	*I liked the hands-on activities.*	5

Category	Example	Percent
None	*"None"*	5

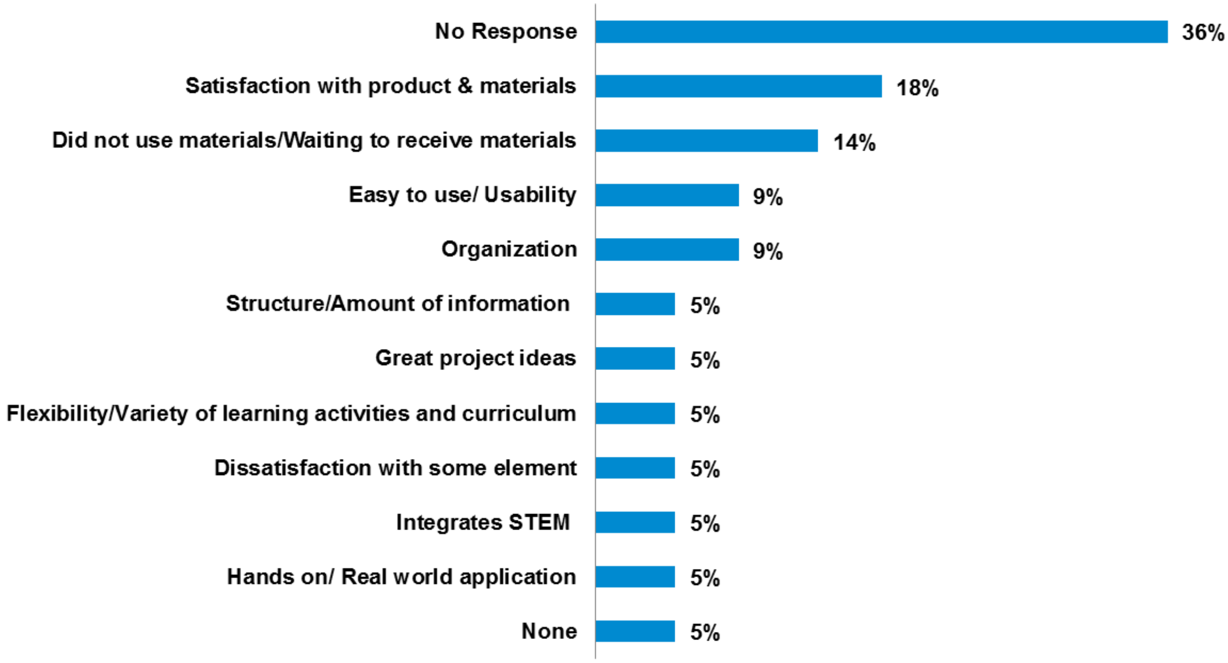


Figure 66. Percent of Teachers Satisfied with STEM Academy Product Features

The comparison of these survey responses by product sheds a little bit of light on the things individuals really liked in one product that may have been missing in another product. For example, 43 percent of those using ITEEA talked about their satisfaction with the flexibility and variety afforded by the curriculum, while those using Pitsco did not mention flexibility and variety, but 29 percent commented on their satisfaction with usability of the ITEEA resources. Another important thing to note is that for STEM Academy, 36 percent of users did not give any response to this question, which is disproportionately large when compared with the other products.

Teacher Concerns with Products

The second survey item asked teachers to discuss any concerns they had with the product Table 109 to Table 112 and Figure 66 to Figure 69. If they had no concerns, we had instructed them to write "None." Because of this specific instruction, we coded those who did not respond to the question and those who actually wrote "none" in two separate categories.

ITEEA

For teachers using ITEEA the most common response for concerns about the product was "None" (30%). The next most common responses were either concerns about the curriculum or content (26%) or the need for more training and time to implement the product (26%). This is reasonable since the implementation of this grant program began so late in the school year.

Table 109. Teacher Concerns with Product Features for ITEEA (N = 23)

Category	Example	Percent
None	*"None"*	30
Curriculum and content concerns	*The lessons are very dry and not put together for teaching (they need to be reworked).*	26
Need more training and time to implement	*a very short time to implement and understand what we were to teach*	26
Inadequate time, supplies, and/or technology	*The curriculum as written has the students producing projects that are junk, and the they don't take anything home. It encourages the use of the latest technology such as 3d printing, but no time is allocated to teach the students how to use solid modeling soft ware or other technology.*	9
Usability of supplies, teaching materials, and website	*There is almost too much stuff. I wish it was a little more organized as to searchability. I wish that you could search it based of topic.*	9
Expense/sustainability	*Having the funding to continue with what we started*	4

Nine percent of the teachers were also concerned about the lack of time, supplies or technology needed. Compared to other products, ITEEA provided teachers with primarily lesson plans and activities. Teachers had to purchase the materials on their own. For the other products, the provider included material kits. This is something to consider for the future, whether curriculum is sufficient or if teachers need materials for high quality applied science instruction.

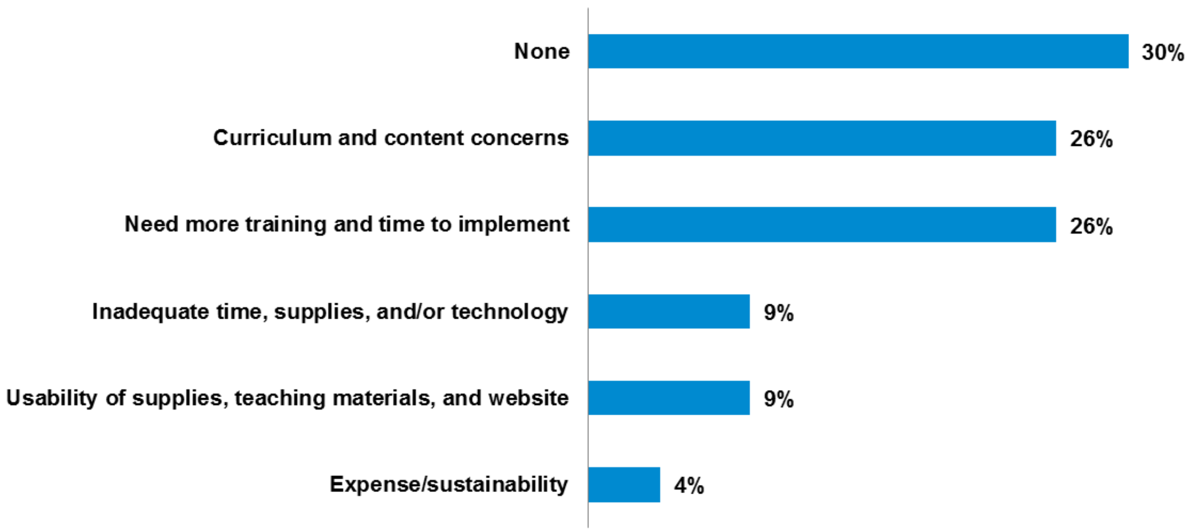


Figure 67. Percent of Teachers with Concerns about Product Features for ITEEA

Pitsco

For teachers who responded about their concerns with Pitsco, 29 percent responded that they lacked time or materials. The materials come in a certain class size set. Many Utah classrooms are larger than typical class sizes in the United States; therefore, some teachers had to find ways to implement the curriculum with limited materials.

Table 110. Teacher Concerns with Product Features for Pitsco (N = 21)

Category	Example	Percent
Inadequate time, supplies, and/or technology	*We were awarded 4 modules. Each module hosts only 2 participants at a time. That means that in a class of 28 students I only have seats for 8 students. Each module takes 7 days to go through. If everything goes smoothly, each student in each of my classes will only have the opportunity of completing one module.*	29
Quality/Durability	*The product is fragile and did not stand-up to heavy use.*	24
None	*"None"*	24
Usability of supplies, teaching materials, and website	*The 3D printers weren't very easy to use, the software wasn't very student friendly, and I had at least one printer stop functioning.*	14
Preparation/ setup time of consumables & product	*How long it takes to set up and use from period to period when I have back-to-back classes.*	10
Curriculum and content concerns	*Curriculum is a little LAX when it comes to real world engineering problems*	10
Burdensome for teachers	*My biggest concern is the fresh consumables the teacher has to plan, and go to the store ahead of time.*	10
Need more training and time to implement	*Requires more training than a 1/2 day. More software demonstration and review required. Frustration with older computers trying to run the software and printer, (out of memory, etc.)*	5
Expense/sustainability	*I can see that in the near future the cost of the consumable supplies might be a limiting factor. A really big deal for me right now is that class sizes must be keep to the limit of 24 students, which all three of our school rotations have 28 or more. This causes a major calendar-scheduling problem. Next year appears to be even bigger but we will just have to wait and see.*	5

Category	Example	Percent
No Response	*N/A*	5

Twenty-four percent of teachers had concerns about the durability of the materials provided by Pitsco. Although Pitsco provided some materials, teachers had to buy other consumable materials, which 10 percent of the respondents reported to be a burden.

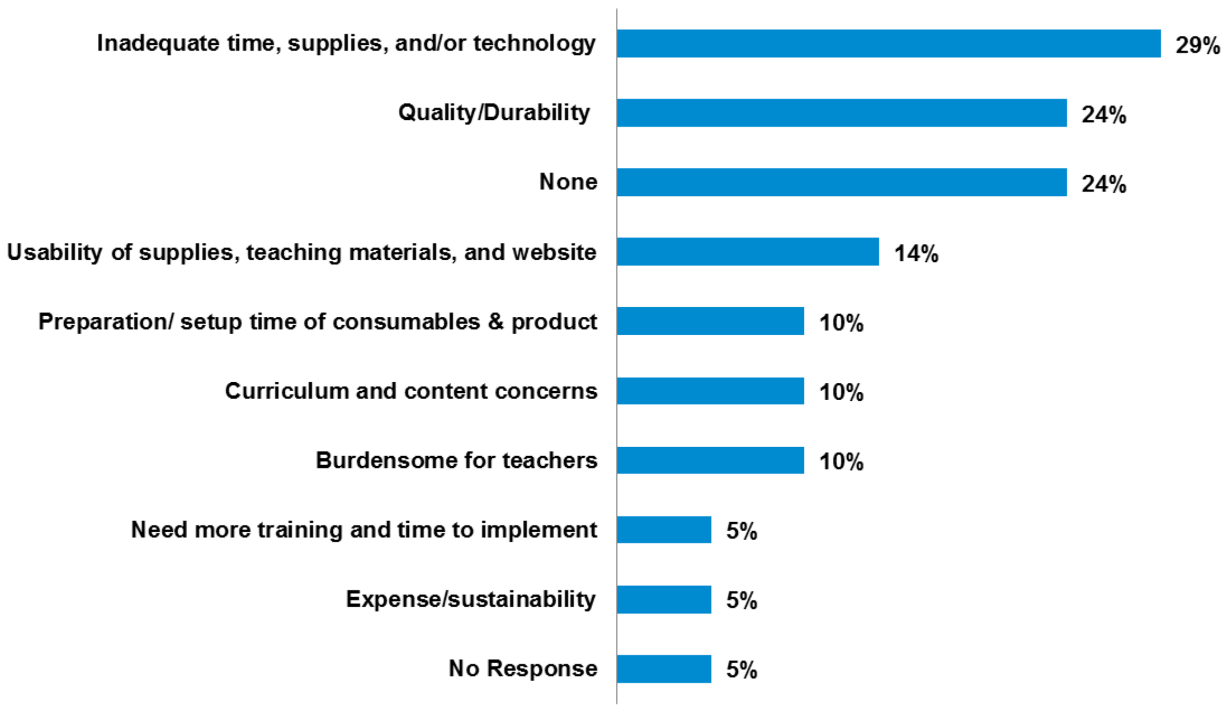


Figure 68. Percent of Teachers with Concerns about Product Features for Pitsco

Project Lead the Way

For teachers who responded to the question about concerns with Project Lead the Way, fifty-eight percent responded “none” to this question about concerns. The ones who did note concerns were mostly concerns about the usability of the supplies (11%), the organization of materials and set-up time required to use the equipment (11%), as well as the quality of the products (11%). The other areas of concern represented a small percent of the teachers, so it is unclear whether they are actual concerns about the product or experiences specific to individual teachers.

Table 111. Teacher Concerns with Product Features for Project Lead the Way (N = 19)

Category	Example	Percent
None	*"None"*	58
Usability of supplies, teaching materials, and website	*These products had hundreds of parts and we are still in a mess trying to organize them. It would have been nice to be able to have materials to organize the parts in before hand.*	11
Preparation/ setup time of consumables & product	*Organizing the VEX robotics*	11
Quality/Durability	*The makerbot cartridges don't function well.*	11
Expense/sustainability	*I don't like how much the state pays for these programs. I would gladly share my lesson materials with others and am not the only one. It seems like a lot of money goes to these companies to make things that are often sub par.*	5
Burdensome for teachers	*Product does take time to arrange the multiple parts for student use. The teacher needs time to do this. We have been given these mid-year. The VEX system is appreciated; but arranging storage for transfer to students takes a lot of time outside of school.*	5
Curriculum and content concerns	*I don't like PLTW, it's designed for a certain group of kids, we did one of the activities how they had it set up and my students were bored and had no interest. I went ahead and prepared something on my own, using the things I had learned and had a lot more success.*	5

Category	Example	Percent
Need more training and time to implement	*It was a big jump to implement the two areas. It will go much smoother next time. I could have used more help sometimes, however I was able to work most the problems out using the internet and ideas from fellow teachers.*	5

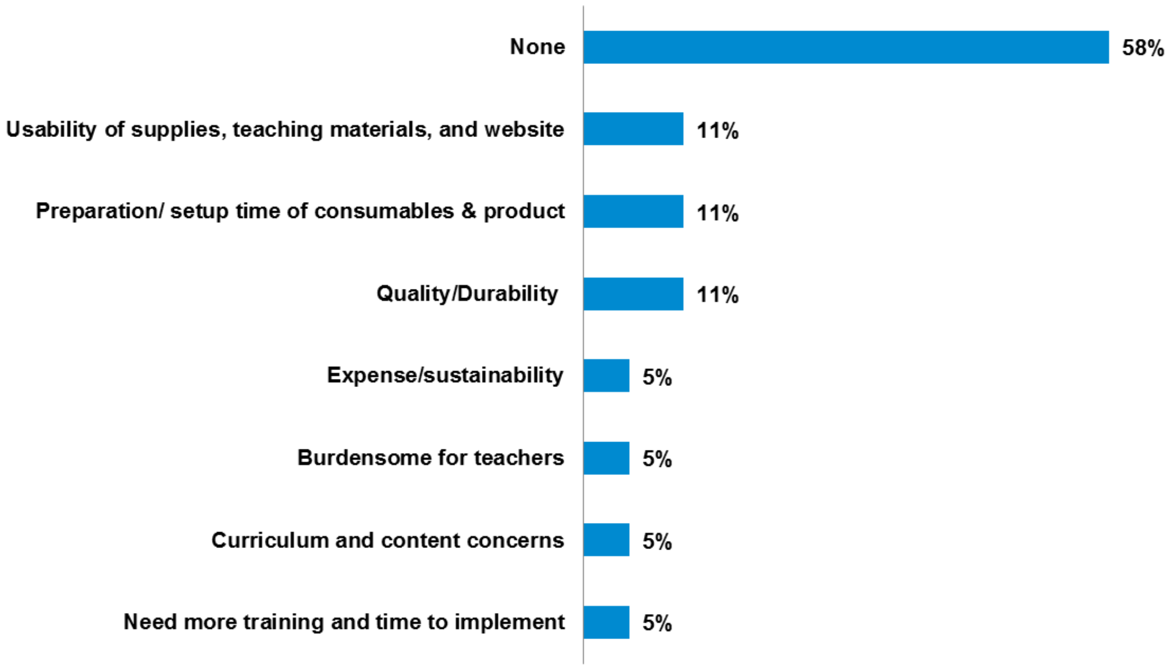


Figure 69. Percent of Teachers with Concerns about Features for Project Lead the Way

STEM Academy

For teachers who responded to the question about concerns about STEM Academy, forty-one percent of teachers either did not answer this question or wrote “None.” The next highest areas of concern were weaknesses noted about the curriculum content (14%) and frustration over not having received the supplies (14%). Nine percent of teachers felt that this program was a burden, which may be less about the product and more about their frustration for having to implement something new.

Table 112. Teacher Concerns with Product Features for STEM Academy (N = 22)

Category	Example	Percent
No Response	*N/A*	23
None	*"None"*	18
Curriculum and content concerns	*The reviews of readings were not that great, and neither were the tests. The grading system used is very unwieldy and I don't use it very often at all. I wish the system could integrate with our grading system in the district. Also for a technology and engineering class there are not very many power tool type activities.*	14
Waiting for materials and/or supplies	*We are still waiting on supplies to be delivered to us. I have used several of the lessons but without the supplies it is difficult to allow for a full rich learning experience.*	14
Burdensome for teachers	*Getting the faculty, and staff to participate in this program. It seems they feel this is one more thing they have to do.*	9
Inadequate time, supplies, and/or technology	*Materials and curriculum is set for groups of 4 with a max class size of 24. All my classes are well in to the thirties. Also a lot of the projects used just tape, paper and glue very little to no machines.*	5
Usability of supplies, teaching materials, and website	*It was difficult to navigate to find student scores on the site.*	5
Expense/sustainability	*My concern is the sustainability of the program and the expense to implement STEM.*	5

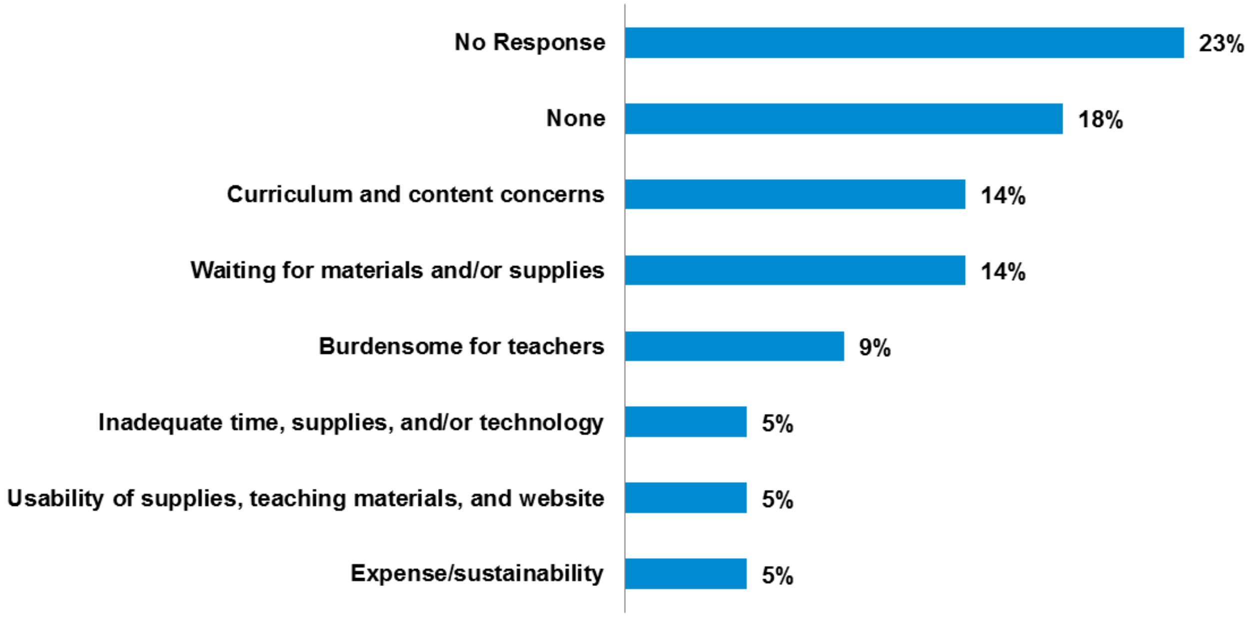


Figure 70. Percent of Teachers with Concerns about Features for STEM Academy

Teacher Satisfaction with Professional Development

The third survey item asked teachers to share a little about the features of the professional development and implementation support with which they were satisfied (Table 113 to Table 116 and Figure 70 to Figure 73). If they were not satisfied with anything, we instructed them to write "None." Because of this specific instruction, we coded those who did not respond to the question and those who actually wrote "none" in two separate categories.

ITEEA

The area of greatest satisfaction for ITEEA PD for teachers was that it was hands on (35%). The trainer and the support they received also impressed a larger percent of teachers (30%). Although this question was supposed to be about satisfaction, 26 percent of teachers responded that they were unsatisfied with implementation of this grant program. This is more than likely due to the late start of the program near the end of the school year.

Table 113. Teacher Satisfaction with Professional Development for ITEEA (N = 23)

Category	Example	Percent
Hands on	*I liked that we were able to do the projects with the kids.*	35
Impressed by trainer/ received help when needed	*The training received was one of the best trainings I have had as a teacher.*	30
Unsatisfied with some specific element	*I feel like the whole implementation process has been very rushed.*	26
Student Centered Philosophy/ Prepared me for use in classroom	*I liked that we were able to take turns teaching some of the lessons.*	9
Enough Time/ Covered lots of materials	*Having a full week to look at it was GREAT!*	9
Ongoing Support	*The support from ITEEA web site as well as the secretary at ITEEA has been great.*	9
Did not answer the question	*I was not able to make it to the full training so I missed out on that.*	9
None	*"None"*	4
The Product Itself/Organization/Available Resources	*The available resources.*	4

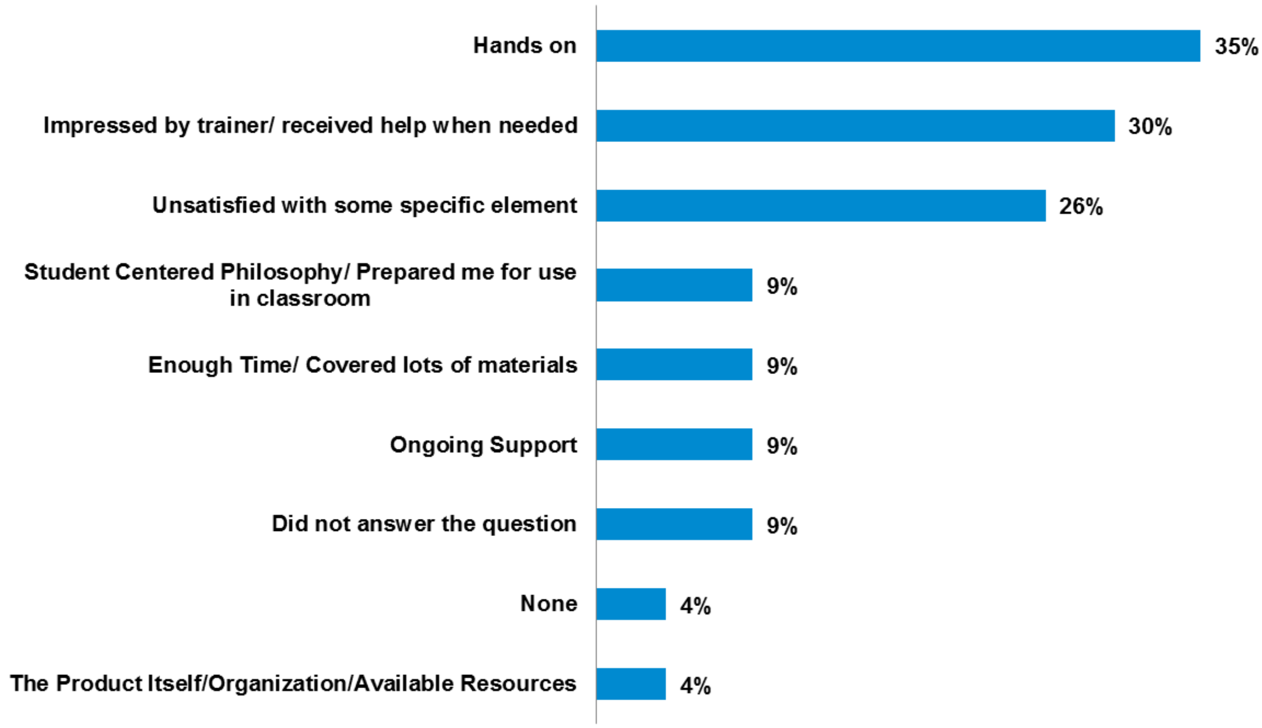


Figure 71. Percent of Teachers Satisfied with ITEEA Professional Development

Pitsco

Nineteen percent of teachers using Pitsco did not report anything that they were satisfied with about Pitsco's PD. An additional 19 percent responded to this question about satisfaction with a comment about their dissatisfaction. The remaining responses of satisfaction were mostly about how impressed they were with the trainer (19%) and how hands on the PD was for them (19%).

Table 114. Teacher Satisfaction with Professional Development for Pitsco (N = 21)

Category	Example	Percent
None	*"None"*	19
Unsatisfied with some specific element	*Glad we were given 1/2 the day to get familiar with the product but it was not enough.*	19
Hands on	*I thought the PD was good because we went through the entire process of designing and then printing.*	19
Impressed by trainer/ received help when needed	*I appreciated Pitsco sending an expert to train us in person.*	19
No Response	*N/A*	10
Student Centered Philosophy/ Prepared me for use in classroom	*The professional development that was provided helped me understand how to use the program in my classroom.*	5
Age Appropriate	*Class activities and materials were well thought out for middle school level, I like the log book.*	5
The Product Itself/Organization/Available Resources	*The product itself.*	5

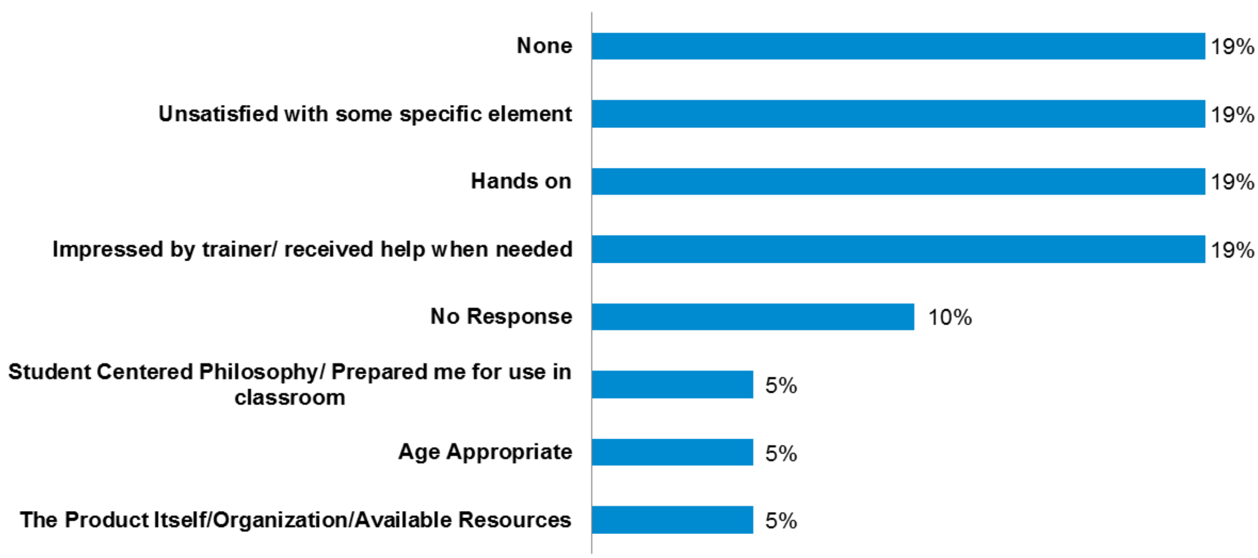


Figure 72. Percent of Teachers Satisfied with Pitsco Professional Development

Project Lead the Way

Thirty-two percent of teachers responded positively about how hands on the PD from Project Lead the Way was. Twenty-one percent responded positively about the ongoing support they are receiving either from their school/district or from PLTW. There was also positive feedback about the trainer and the training they received (16%).

Table 115. Teacher Satisfaction with PD for Project Lead the Way (N = 19)

Category	Example	Percent
Hands on	*We went through the activities just like we teach to our students.*	32
Ongoing Support	*We have reviewed many challenges and the process to remedy the challenges in our monthly district meeting.*	21
Impressed by trainer/ received help when needed	*I like the support given district wide, it makes it seem more like a team rather than flying solo.*	16
None	*"None"*	11
Student Centered Philosophy/ Prepared me for use in classroom	*It was a big work-load but it prepared me to teach the materials.*	11
The Product Itself/Organization/Available Resources	*I liked the training a great deal and the supplies seem very well thought out.*	11
Unsatisfied with some specific element	*The material is fine, but in not satisfied with how they're making money off of something that still needs to be changed before I give it to my kids. I'd rather just make more as a teacher.*	5

Figure 73. Percent of Teachers Satisfied with Project Lead the Way PD

STEM Academy

Thirty-six percent of teachers responding to the survey did not report any feedback about the STEM Academy PD, while another 14 percent responded they had no positive feedback to share about the PD. However, 23 percent of the teachers were pleased with the hands-on nature of the PD, 14 percent were pleased with the student-centered philosophy, and 14 percent were pleased with the trainer who provided the PD.

Table 116. Teacher Satisfaction with PD for STEM Academy (N = 22)

Category	Example	Percent
No Response	*N/A*	36
Hands on	*I liked how engaged and hands-on the professional development was.*	23
None	*"None"*	14
Student Centered Philosophy/ Prepared me for use in classroom	*I like best the student-centered philosophy! Student learn best when they can make real world connections and since these labs were ready made and we had training in many of them, the students enjoyed and looked forward to the experience.*	14
Impressed by trainer/ received help when needed	*Quick turn around time to respond to problems voiced by teachers using the software/program.*	14
Enough Time/ Covered lots of materials	*It was really nice to be able to go through all of the lessons.*	5

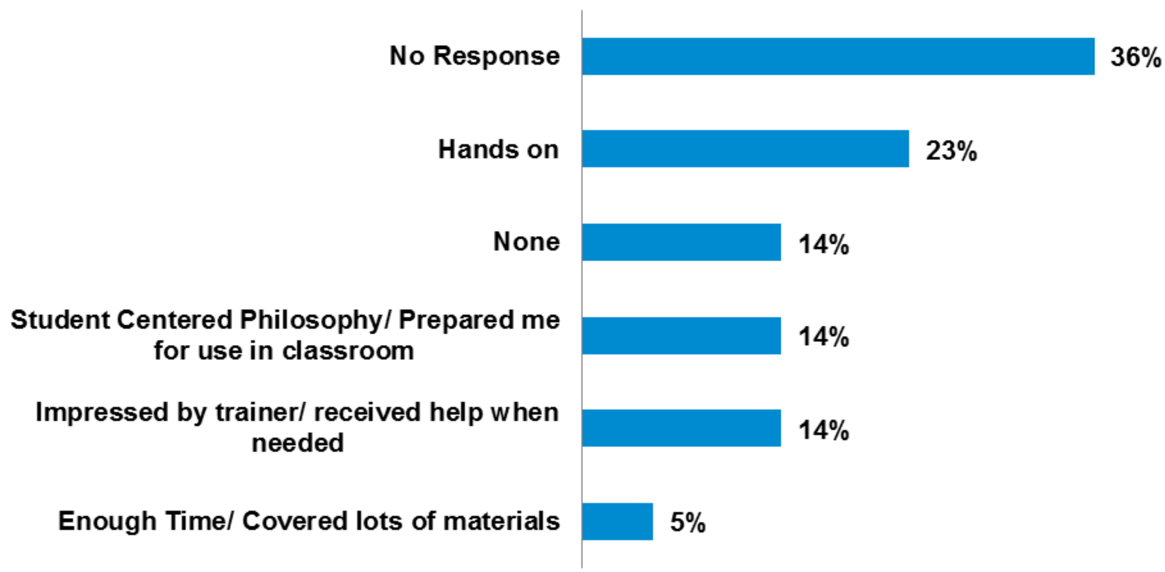


Figure 74. Percent of Teachers Satisfied with STEM Academy PD

It is noteworthy that across all products, respondents were most satisfied with how "hands-on" feature of the professional development. It is also concerning that for two of the products, ITEEA and Pitsco, a high percentage of respondents wrote about some element of the PD and implementation support they were not satisfied with, rather than directly answering the question.

Teacher Concerns with Professional Development and Implementation Support

The final survey item asked teachers to discuss any concerns they had with the professional development and implementation support (Table 117 to Table 120 and Figure 75 to Figure 78). If they had no concerns, we instructed them to write "None." Because of this specific instruction, we coded those who did not respond to the question and those who actually wrote "none" in two separate categories.

ITEEA

Fifty-two percent of teachers using ITEEA had no concerns to share about the PD. The ones who did share concerns mostly discussed the difficulty with implementing the curriculum (13%), the need for more information. (9%), and challenges with the website or software (9%).

Table 117. Teacher Concerns with Professional Development for ITEEA (N = 23)

Category	Example	Percent
None	*"None"*	52
Material was unrealistic/ difficult to implement	*I would have like to have been paid for some time needed to prepare and implement the program outside of contract time.*	13
Needed more information/time/training	*It was a lot of information to consume in the amount of time we got to be trained. Because there was so much great curriculum to help aid my classes it would have been nice to be able to spend one day just exploring what was available not feeling pressure to be learning something. When we are back in our classes it's hard to make time to look though it all.*	9

Category	Example	Percent
Problems with website/Software	*We didn't get to load our actual classes so am just now figuring that out.*	9
Training unhelpful/Not relevant to real classrooms	*Lego was good but ITEEA curriculum is awful. I have a beautiful and well equipped shop,a wind tunnel, a structure tester, a Tetrix Robot, several rocket launchers, a laser engrave, computers and software. ITEEA curriculum is written for schools who have a regular classroom duct tape, scissors, cardboard and hot glue. / If I teacher there curriculum what am I supposed to do with all the above equipment?*	4
Lack of Follow-up	*There has not been any follow up since the initial training.*	4
Hard to implement midyear	*It was hard to implement new curriculum at the semester*	4
Needs to be a summer course/ Hard to miss so much work	*Being out of the classroom for four consecutive days was hard.*	4

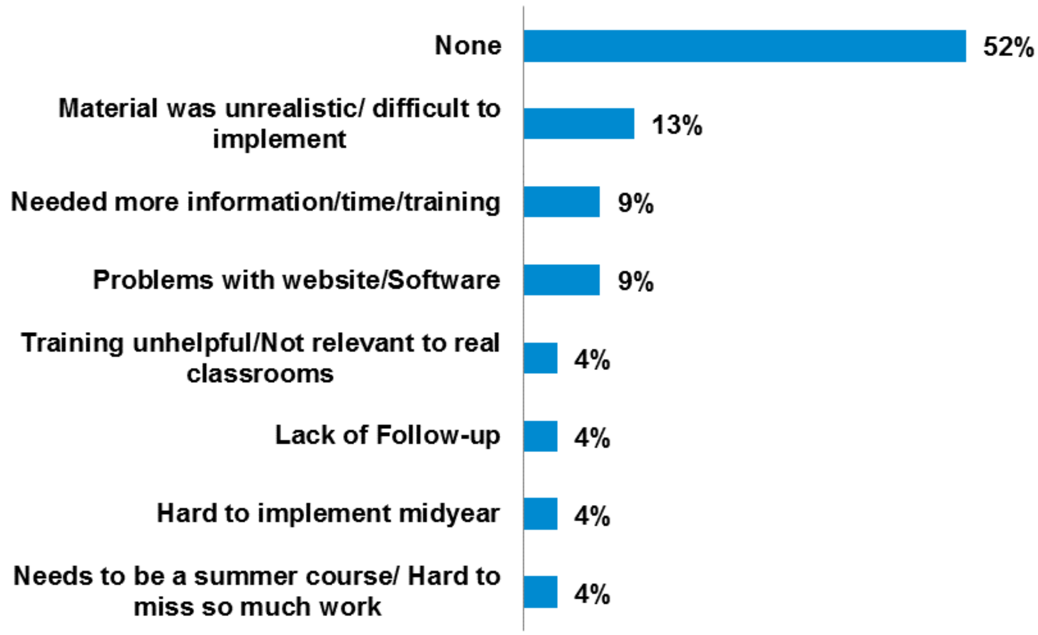


Figure 75. Percent of Teachers Concerned with ITEEA's PD and Support

Pitsco

Thirty-three percent of teachers who responded had no concerns with the PD from Pitsco. However, 29 percent felt that the PD was insufficient. Other concerns included teachers feeling the curriculum was difficulty to implement (10%) and lack of follow-up from the provider to support implementation (10%).

Table 118. Teacher Concerns with Professional Development for Pitsco (N = 21)

Category	Example	Percent
None	*"None"*	33
Needed more information/time/training	*The PD was very basic and did not prepare me and my fellow teachers how to teach 3D printing.*	29
Lack of Follow-up	*I am concerned by how little follow-up there may be with Pitsco Education do deepen my understanding of how to use the 3d printers.*	10
Material was unrealistic/ difficult to implement	*The curriculum that came with it was very lacking and not realistic to age groups. The log books were terrible. Time allotments were not adequate for class sizes.*	10
Problems with website/Software	*Software issues*	5
Hard to implement midyear	*Showing up in the middle of the school year has been a real challenge to try to explain to the existing students why we are changing from what we used to do. It's not what their friends all did.. Biggest complaint " It's not what we signed up for."*	5
Poor instructor	*The trainer was not that well trained himself.*	5
Teachers left uninformed/lack of organization	*Teachers must want to learn the program to help facilitate it or it won't work. I find that with everything I do!*	5

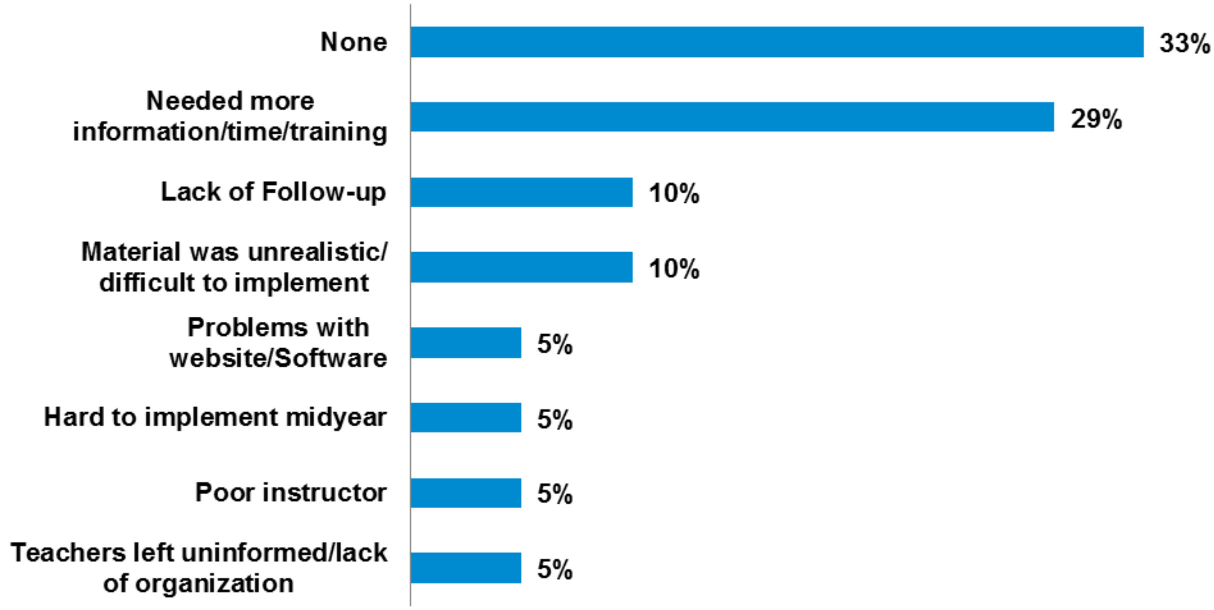


Figure 76. Percent of Teachers Concerned with Pitsco's PD and Support

Project Lead the Way

Sixty-eight percent of teachers who responded to the survey had no concerns about the PD provided by Project Lead the Way. Sixteen percent reported feeling uninformed, but this was more about the STEM Action Center grant program and the data collection requirements rather than the actual PD from PLTW.

Table 119. Teacher Concerns with PD for Project Lead the Way (N = 19)

Category	Example	Percent
None	*"None"*	68
Teachers left uninformed/lack of organization	*Originally, I was not aware of anything other than we were getting more VEX equipment through a grant. It would have been nice to know that the Grant included parts of 4 days of instruction with the survey's and pre and post test. I was not aware of the survey from Utah State or the letter to*	16

Category	Example	Percent
	hand out to students until after I had them take the pre-test. I now have kids opting out and it would have been nice to know what was going on before hand.	
Lack of Follow-up	*I would like to have had more comprehensive support to learn how to use the programs and components by having access to tutorial videos.*	5
Needs to be a summer course/ Hard to miss so much work	*Doing it during the school year and missing so many days of school hindered my current teaching. I think it would have been better if it was done in the summer.*	5
Material was unrealistic/ difficult to implement	*Material is generic and I have to modify a lot of it to help bring it home with my students.*	5

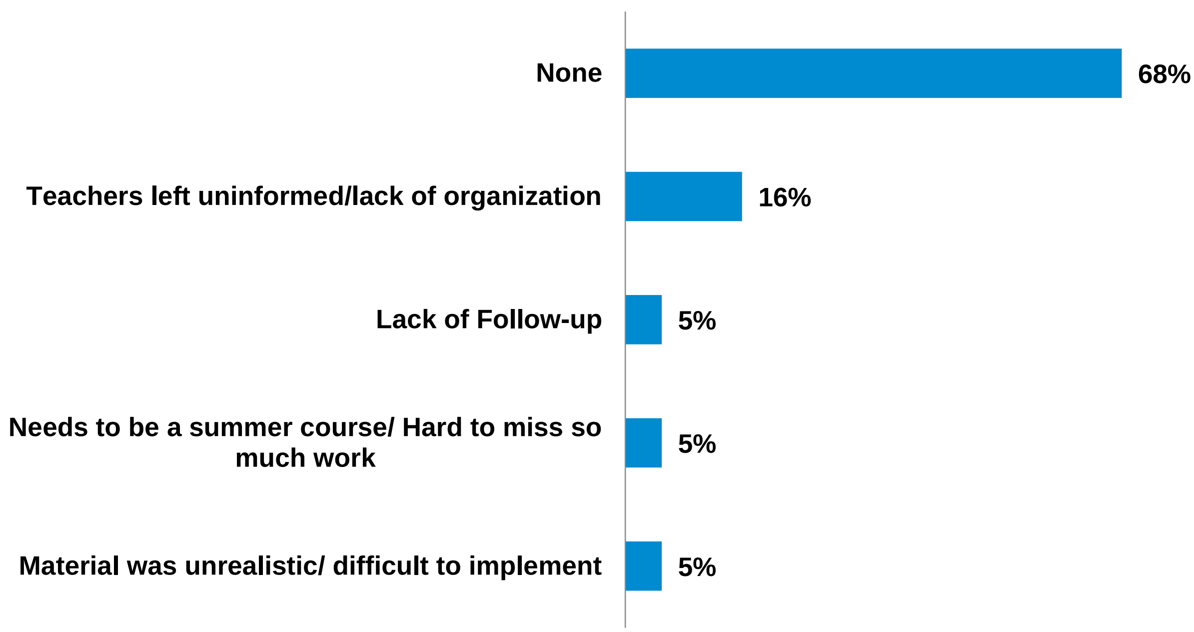


Figure 77. Percent of Teachers Concerned with PLTW's PD and Support

STEM Academy

Fifty-nine percent of teachers responded with no concerns about the STEM Academy PD. Fourteen percent responded that they needed more information and time to prepare for implementation, and another 14 percent responded that they did not feel the time was spent well to prepare them for teaching with the curriculum.

Table 120. Teacher Concerns with Professional Development for STEM Academy (N = 22)

Category	Example	Percent
None	*"None"*	59
Needed more information/time/training	*Needs to be more than two days and involve the leadership team of the school and the administration.*	14
Training unhelpful/Not relevant to real classrooms	*In both professional developments we spent more time hearing what the instructor used to do in his class. We didn't spend time working through the lessons plans together.*	14
Lack of Follow-up	*Materials were not ready to use. Did not go through curriculum enough 2 days is not enough. Continuing training is important to me.*	5
Problems with website/Software	*I still have not been able to have my students enrolled into the courses, without the enrollment it is difficult to achieve differentiated learning and overall productivity from my students.*	5
Hard to implement midyear	*Not being able to start at the beginning of the trimester.*	5
Poor instructor	*Our instructor was not prepared to teach*	5

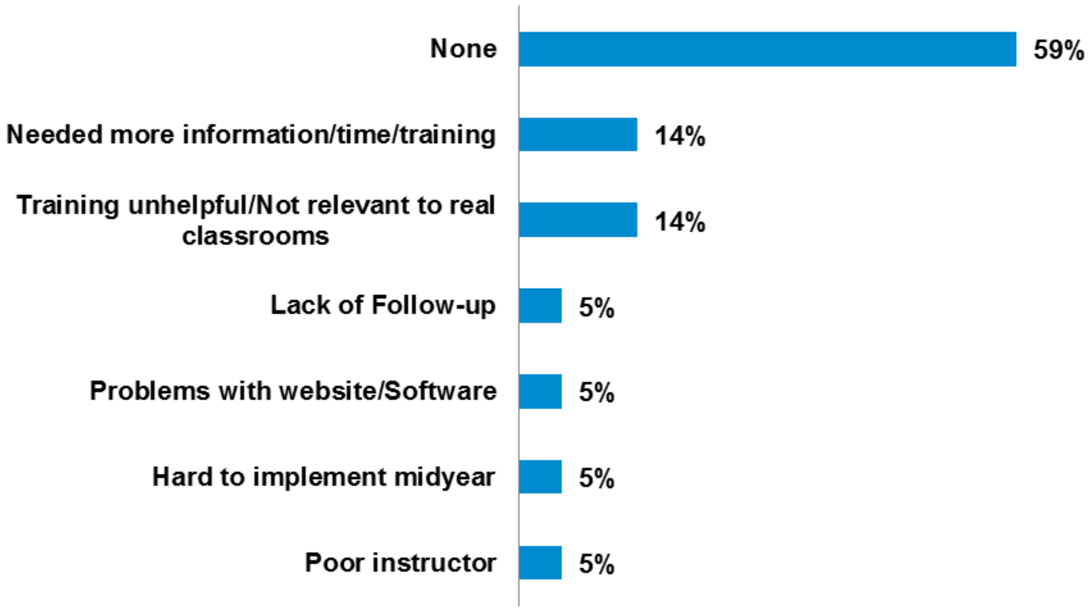


Figure 78. Percent of Teachers Concerned with STEM Academy's PD and Support

Summary

Across all products, the number one response to this question, regardless of product, was "None," indicating that those respondents had no concerns about the professional development or implementation support. For three of the products—ITEEA, PLTW, and STEM Academy—the number of respondents with no concerns in this area was over 50 percent. Aside from this, answers varied from product to product.

When reviewing our findings from our analysis of the teacher survey responses, it is important to note that while many schools received licenses to use one of the CTE products, these licenses and training came late in the school year. Some teachers did not have an opportunity to explore the full features of these products or to implement them with their students. Therefore, we look forward to hearing more from teachers during the 2015-16 school year as they have the opportunity to implement the program more fully.

E-mail Feedback

The STEM Action Center shared with us e-mail they received from either schools or districts who received CTE grants in addition to notes they had taken from site visits to schools implementing those grants. We kept this information organized in a documentation file to understand implementation. This unsolicited feedback can be helpful in that it may bring out implementation challenges and successes. These testimonies provide important insight from implementation.

Positive Feedback

- Creative implementation of **ITEEA:** *The trainings were great Career Lessons. We love the curriculum and layout. It includes such a great program of design, so project based, using what they know. We have renamed manufacturing to "Pinterest to Project" to get more girls successful. We have almost all girls in the 9th grade semester elective class.*
- Engaging Materials from **Pitsco:** *WOW! What a program. I think when you watch the students make the connections (Science, Tech, engineering, and math) through hands-on projects you will see; the teamwork, the follow through, the excitement, you will watch the skills being learned for the 21st century, and so much more in this video. All the ingredients needed for the careers of the 21th century. Right? The fastest growing - best paid careers out there.*

  The 7th grade students learned how to use Adobe Premiere to produce this video (video shared with the STEM Action Center available upon request). Two students collaborated and came up with ideas for the video. They got all but one student in the 7th grade to participate. One student did the video editing and the other student wrote the parts for the students to read. They also taught the students how to use the voice recorder. A lot of time was spent laughing at each other voices. Once they had the images, videos, voice recordings, all on one computer, it all came together. Again teamwork, follow through, and 21st skills is the key. Every student who participated in this program felt like they *learned a lot. It wasn't easy, but time and using problem solving skills enabled them to accomplish the task. The students loved to work together.*

Thank you for not only allowing me to be the first teacher to have the STEM program in my classroom, but because of you, my students have more knowledge then I could of EVER taught them in a semester class. My students asked if they could have more time with the program. I replied "oh yes in 8th grade, you will have a STEM class called Digital Design – Yeah! We are so excited. Students need the consistency and the excitement to learn with the STEM program from 7th grade, 8th grade to high school, and college to career.

I called Pitsco for one week straight and they were always there to help quickly. I also appreciated the STEM Action Center representative, Gina Sanzenbacher, for her tips on the Biotechnology module, which helped so much! I believe when you watch this video you will see and hear this STEM program in ACTION.

Thank you for this opportunity to teach the STEM program.

- Interdisciplinary collaboration for **Pitsco**: *Approximately 140 students are currently using PITSCO, but we will have more next year. We will need a couple of more licenses to equip the room. Math and Science teachers are interested in incorporating some of the curriculum. One science teacher went to the training and is using USTAR funds to start using some curriculum. I have just loved the curriculum and projects. Students have been enthusiastic and happy when asked how they like the Pitsco projects. Currently, we only have enough stations for 22 students, so we will need more next year. When I asked the students what they thought about the new program, one of the girls said, "It's fun but it's hard." I liked that comment.*
- Curriculum from **Project Lead the Way**: *Project Lead the Way is very structured. I love the curriculum. You have to have powerful computers to run the inventor program. I have found the VEX robotics to be great equipment for 7th and 8th grade.*
- Changes in student perceptions for **Project Lead the Way**: *Gateway has helped the CTE program at our school. All CTE classes are standardized across the 9 Junior Highs in our district. 80% of my students take both gateway classes in 8th, 50% take it in 9th grade. Enrollment numbers are increasing shifting perception using math, science, vocabulary. I think the hands on experiences are changing perceptions.*

Mixed Feedback

- Training and Curriculum from **STEM Academy**: *The training was good, but we will probably not implement until next year. Some of the projects in the training were awesome, but there is a lot that we would not use! We could use them in 7th-9th grade classes. However, we cannot incorporate it all into our curriculum We can use it in Intro* *to CTE classes, but not in FACS. The pre/post tests are okay, but we haven't gone through all of the curriculum yet. We need more district support.*

- Implementation successes and challenges for **STEM Academy**: *Testing times for computers and black-out dates have been a problem when using the IT components of STEM Academy. The kits are life savers and easy to manage and keep organized. It has been hard to implement IT curriculum without the infrastructure for computers since implementation of Think through Math (K-12 math grant) and testing take computer space.*
- Lesson Plans from **STEM Academy:** *The "lesson plans" range from being far too open (catapult) to very restrictive (windmill). Again, this seems very random, with no real thought given to sequencing lessons, or building from one to the next. I will say that the catapult project was VERY successful, and resulted in a lot of student problem-solving, creative thinking, and scratching of heads, which I loved. The windmill project (now in session) again is looking to be very successful. The associated lesson plans for teachers are however barely there, with no "behind-the-scenes" content knowledge provided to support the teacher and no description of amounts of materials required, time required, team organizations, etc.*

Negative Feedback

- Lack of Supplies for **STEM Academy**: *We still do not have our equipment and won't for another week or two so there has been no implementation of the JH Stem vendor curriculum. April will start our SAGE testing and is close to the end of the year for implementing new curriculum. The teachers were excited about the curriculum and equipment, but since the training was the beginning of January I can see a lot of frustration. I think that it would be best to allow them to start with the curriculum from the beginning of this coming school year.*
- Website for **STEM Academy**: *The website is poorly organized and confusing for both students and teacher to navigate. The names of the units are not distinct enough to be able to quickly navigate to the correct place. "Exploring Engineering" and "History of Engineering" sounds like the same thing to a 13-year-old. "History of Engineering Section 1 (pages 1-8) Vocabulary" looks just like "History of Engineering Section 1 (pages 1-8) Quiz" to a 13-year-old. Navigating the website is clumsy and clunky. Allowing the teacher to hide or reorganize the website would help alleviate the above problem. Not giving teachers this ability makes for a confusing atmosphere for students.*
- Quality of online textbook for **STEM Academy:** *The online textbook for the class is poorly written, both organizationally and content-wise. I'd be curious where this material was sourced, whether it was vetted by an independent group, and to what extent it was proofread. Grammatical errors are too common, the chosen material presented seems randomly chosen to fill pages, and the book is not well-organized. There is not a well-organized system of priorities which would allow a student to understand "the big idea," secondary information, and supporting or background information. I question what is being presented and why it is being presented as important to these VERY MUCH BEGINNER ENGINEERING STUDENTS. The reading level of the online textbook is inappropriate for an 8th grade student. I would guess the reading level is closer to a 10th*

grade level (or higher). In the student population I work with, where many students are at an elementary grade reading level, the textbook becomes pointless, discouraging and frustrating.

- Crossword puzzles poorly designed for **STEM Academy:** *The crossword puzzles presented are awful. No word banks, not in sequential order, no clues as to which section or page. The crossword puzzles have only been a source of frustration for my students, and I stopped using them, instead choosing to write my own trivia contests for them. The pieces of information chosen as the focus of the crossword puzzle, again, seems randomly chosen, and not based on what is the biggest, most important idea in the reading.*
- Online tests for **STEM Academy:** *The online tests are at too difficult a level, with questions that are too open-ended. The ability to submit those quizzes online sounds good, but my attempt to extract the grades from those online submissions failed miserably. We were e-mailed a "video" with no real explanation how to use this grading tool. The video shot did not match my screen, nor did the actions match what happened when I followed along. The online grading appears to not be working.*
- Download options for **STEM Academy:** *There is no way to download much of the content (tests, online textbook). This is critical, as many of my students do not speak English, and would normally rely on translation using google translate. As a teacher, I would like the ability to download in order to either cut and paste my own quizzes, or create trivia contests using online tools such as Kahoot, etc. Due to the inability to download, I am forced to hand type every word, which is why I used the provided online testing tool, which then failed to perform (see above). My non-English speaking students are just lost.*
- Pre/Posttest for **STEM Academy:** *The Pre- and Post-tests are terrible. What I have seen to date are four-question pre- and post-test quizzes, which honestly reveal NOTHING. Conversely, the unit quizzes are FAR too difficult, with far too many questions.*
- Lack of Materials for **STEM Academy**: *Materials provided so far have been inadequate, or simply not provided at all. I was told that materials provided by STEM Academy are based on teams of FOUR. Managing teams of four is never a good idea (basic teaching best-practices). Teams of four often result in two students working, with two onlookers not at all involved or engaged. I typically default to teams of TWO, or maybe three students. As a result, I have been inadequately supplied with materials.Materials in general are undersupplied, or simply missing outright, forcing me to use my own budget, or scramble at the 11th hour, looking for glue sticks, for example, when the small amount supplied runs out.Materials are only somewhat organized, not by lesson, or unit, but somewhere in between. For example, my students went through most of the supplies provided while working on their catapult projects, but then were short materials when the next project (windmills) was started.*

Classroom Learning Environment for Applied STEM Grants

To examine how students and teachers perceive their classroom learning environments, we created a survey based on the Constructivist Learning Environment Survey (CLES) used in Johnson and McClure (2004). Both students and teachers were asked to answer this survey about the practices that could occur in their CTE class and how often each practice takes place (Almost Never = 1, Almost Always =5). The questionnaire consisted of 10 items in four subscales - Personal Relevance (2 items), Critical Voice (4 items), Shared Control (2 items), and Student Negotiation (2 items). Items in the Personal Relevance scale are associated with the extent to which students perceive that what they do in class relates to their everyday out-of-school experiences. Critical Voice items indicate the extent to which students think that it is beneficial to ask about their teachers' lesson plans and instructional strategies (Taylor et al., 1997). In addition, the items for the Shared Control scale mean the extent to which students have a chance to share with the teacher control and management for learning activities. Finally, items for Student Negotiation are about the extent to which students justify their own thinking to other students and assess other students' ideas (Taylor et al., 1997).

In Table 121 and Table 122, we provide average responses of students and teachers for each subscale of CLES. Overall, the teachers scored higher on the four subscales (79%) than the students (71%) on average. Furthermore, the students perceived their CTE class as having the highest degree of Student Negotiation (77%), while the teachers viewed their class as having the highest degree of Critical Voice (85%). For both students and teachers, the Shared Control scale was rated the lowest (65% and 66%, respectively) among the four scales. STEM Academy had the lowest overall average score for students (67%) but had the highest overall score for teachers (82%), and the other three products were similar to one another for both students and teachers.

Table 121. Average Student Responses Percent for Each Subscale of CLES

Student	Project Lead The Way (n=577)	Pitsco (n=688)	STEM Academy (n=238)	ITEEA (n=915)	Overall (N=2398)
Personal Relevance (PR)	71%	72%	67%	71%	71%
Critical Voice (CV)	74%	73%	68%	72%	72%
Shared Control (SC)	66%	66%	61%	66%	65%
Student Negotiation (SN)	77%	76%	71%	79%	77%
Overall	72%	72%	67%	72%	71%

Table 122. Average Teacher Responses Percent for Each Subscale of CLES

Teacher	Project Lead The Way (n=20)	Pitsco (n=21)	STEM Academy (n=22)	ITEEA (n=24)	Overall (N=68)
Personal Relevance (PR)	82%	82%	84%	77%	80%
Critical Voice (CV)	86%	79%	85%	88%	85%
Shared Control (SC)	62%	67%	76%	65%	66%
Student Negotiation (SN)	84%	83%	81%	83%	83%
Overall	78%	78%	82%	78%	79%

As shown in Table 121 and Table 122, for each area measured by the survey, the level teachers perceived they had set up the learning environment was close to 10 percentage points higher than the level of student perceptions on average. Student Negotiation and Critical Voice were the two areas rated highest by teachers and students across the four products. Shared Control was the lowest area by teachers and students across the four products. These programs were just getting started when we collected this data, so it will be important to see the results at the end of 2015-16 school year, after schools have time to implement the products as intended.

SAGE Assessment Results

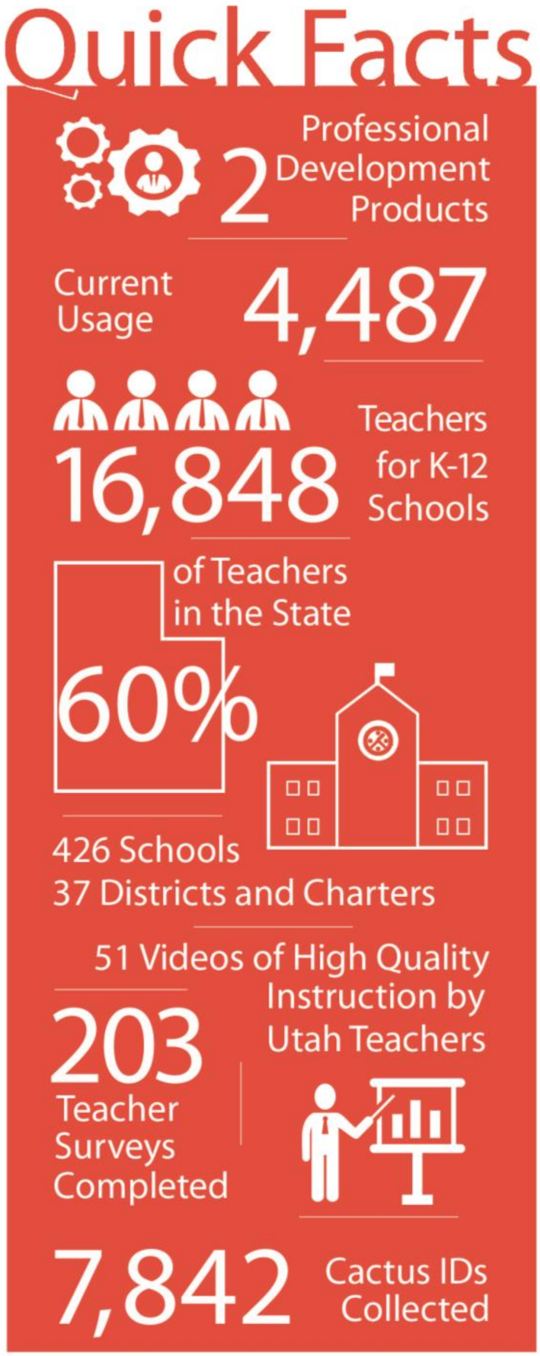
Due to implementation of the CTE grants getting off to a late start, we did not receive many SSIDs for students using the CTE products. Out of the 2,626 SSIDs we received (as shown in Table 123) only 752 of the students had complete data for mathematics to be included in the analysis and even less for science. Due to the small sample size and the minimal usage data available, we recommend that the impact analysis for this grant program be delayed until the end of the 2015-16 school year, when districts have had time to fully implement these grant programs. Any impact, positive or negative, that we might find, could not be attributed to implementation of this grant program given such limited use and such small sample size.

Table 123. Number of Students Using CTE products versus Students with SAGE Data

Product	Number of Students with SSIDs Submitted by Districts	Number of Students with SAGE Data (prior year and Current Year)
ITEEA	128	91
Pitsco	460	333
Project Lead the Way	1,656	234
STEM Academy	382	94
Total	2,626	752

Professional Learning Grants

Summary across Products



There were two products selected through a request for proposal process for video platform based professional development. The providers distributed 16,848 licenses to teachers. This represents 60 percent of teachers in Utah. The teachers represented 37 districts and charters and (426 schools). Based on usage data from the providers, 4,487 teachers logged onto the professional development system and explored the content. One of the providers, School Improvement Network, developed 51 videos of High Quality Instruction by Utah Teachers. We administered a survey to teachers, and received 204 completed surveys. Districts provided us with teacher Cactus IDs for 7,842 teachers, which we use to obtain student level SAGE assessment data to assess the impact of this grant program.

As shown in Figure 79, license distribution really did not get underway fully until March, when only 24 percent of the licenses distributed were in use. By May 2015, this number had not improved much with only 27 percent of licenses distributed used.

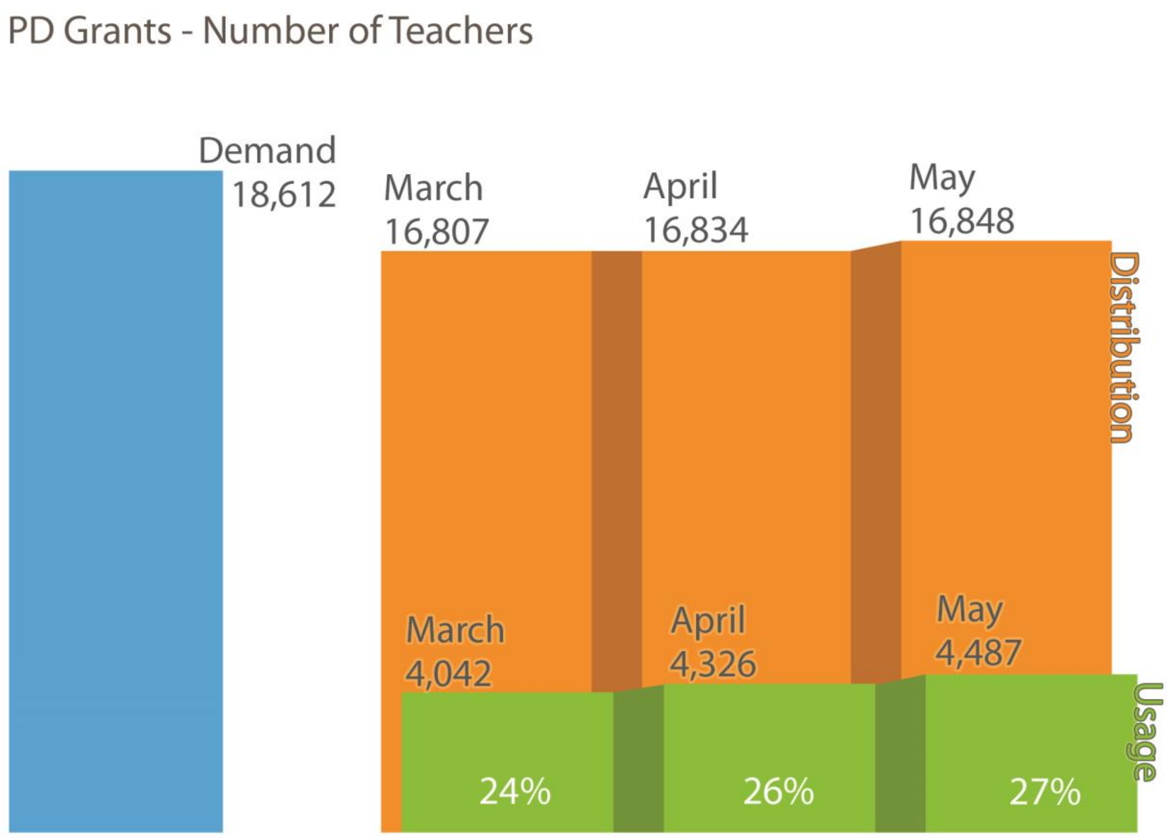


Figure 79. Summary of Professional Development Grant License Distribution and Use

Each product differed in the type of usage data provided as shown in Table 124. For Edivate, the School Improvement Network provided usage data on the number of users logging in, viewing content, and cumulative minutes of use. Scholastic/Teaching Channel provided usage data on the number of users logging in, viewing content, and the cumulative number of activities completed.

Table 124. Summary of Professional Development Grant License Usage Spring 2015

Usage Information	March 2015	April 2015	May 2015
Total Users			
Edivate	16,768	16,768	16,782
Scholastic/Teaching Channel	39	66	Not available
Users Logging In			
Edivate	4,007	4,260	4,421
Scholastic/Teaching Channel	35	66	Not available
Users Viewing Content			
Edivate	1,435	1,553	1,703
Scholastic/Teaching Channel	35	66	Not available
Average Activity Per User			
Edivate	7.63 minutes	8.00 minutes	9.93 minutes
Scholastic/Teaching Channel	Not available	8.48 activities	Not available

Next, we provide a more detailed description of spring 2015 implementation of the PD grants by product.

Edivate by School Improvement Network

Usage

In February 2015, we received the first participant list, which included the names and e-mail addresses of 12,834 teachers documenting licenses delivered. On April 6, 2015, we received the first usage file, which included the information shown in Table 125 (and Figure 80) for

March usage. We received two more usage files over the next two months that reported the same information cumulatively since the start of the program.

Table 125. Usage Data for Edivate Spring 2015

Time Point	Total Users	Users Logging In	Users Viewing Content	Average Minutes Per User
March 2015	16,814*	4,007	1,435	7.63 minutes
April 2015	16,768	4,260	1,553	8.00 minutes
May 2015	16,782	4,421	1,703	9.93 minutes

Note: * The provider corrected the total users in the May 2015 file upload. Data represents cumulative usage at each time point.

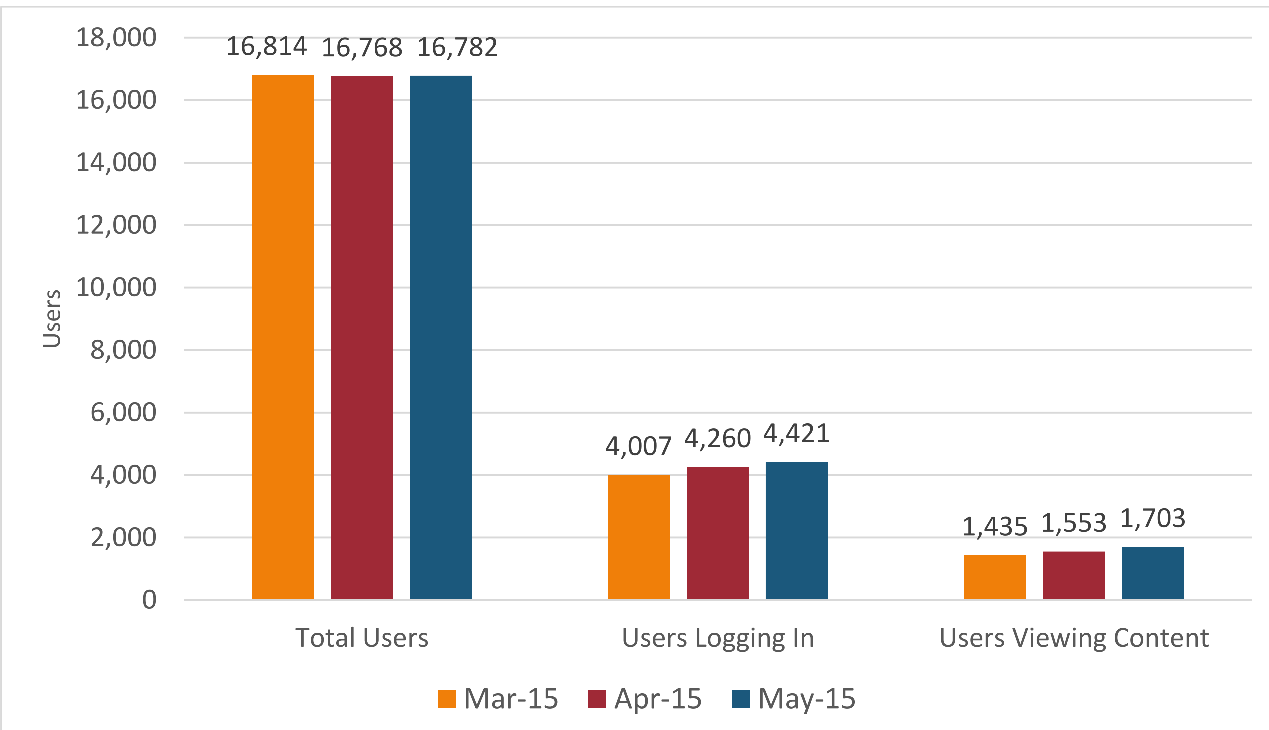


Figure 80. Edivate Users and Usage for Spring 2015

As shown in Table 125, teachers got off to a late start using Edivate with most beginning in March. Usage increased each month. With so few districts/charters having attended their

Bootcamp, this usage level seems reasonable. Since the districts/charters had their Bootcamps this summer and had time to train teachers and integrate Edivate into their PD plans we expect to see improved usage during the 2015-16 academic year.

Teacher Survey

Despite the recognition that Professional Development (PD) is important, most PD is inadequate to meet educational needs. Today there are varieties of technologies that provide new possibilities for PD. In particular, many researchers have studied the effectiveness of video-based PD; however, the results have been inconclusive. We had the opportunity to study teacher perceptions during the beginning stages of the implementation Edivate. We also learned about the challenges of starting a new approach for PD in the middle of the school year. This feedback can inform the scale-up of Edivate across the state during the 2015-16 school year. We administered a survey to users of Edivate spring 2015 to answer the following research questions:

- With what features of the selected products are teachers most satisfied? With what features of the selected products, are teachers most concerned?
- With what features of the professional development, are teachers most satisfied? With what features of the professional development, are teachers most concerned?
- To what extent do teachers believe their content knowledge as changed after using the PD platform?
- To what extent do teachers believe that their ability to engage students has changed?

There were 16,782 teachers and school administrators given access to Edivate by the School Improvement Network. There were 125 teachers and administrators who responded to the survey. Of this amount, only 74 had started using Edivate at the time they completed the survey.

Teacher Satisfaction

Among the 74 teachers using Edivate, 57 described the following features with which they were satisfied (as shown in Table 126 and Figure 81): general satisfaction (44%), quality of the videos (21%), helpful teaching ideas and strategies suggested from the videos (19%), multiple functions of the platform (9%), and ease of use and availability (7%).

Table 126. Satisfaction with Edivate Product (N=57)

Response Category	% of Responses	Sample Response
General satisfaction	44%	"Very satisfied and have found it helpful. Looking forward to hopefully having it available next year."
Quality videos	21%	"Great videos on many topics. Very satisfied."
Helpful teaching ideas and strategies	19%	"Edivate allows the use of videos to see real applications of various teaching strategies while also being of benefit to finding new methods for implementation in the classroom."
Multiple functions of the platform	9%	"I like the tools available to create groups, share information, and respond to reflection questions."
Availability and easy to use	7%	"I like the fact that it is online and available anywhere, anytime"

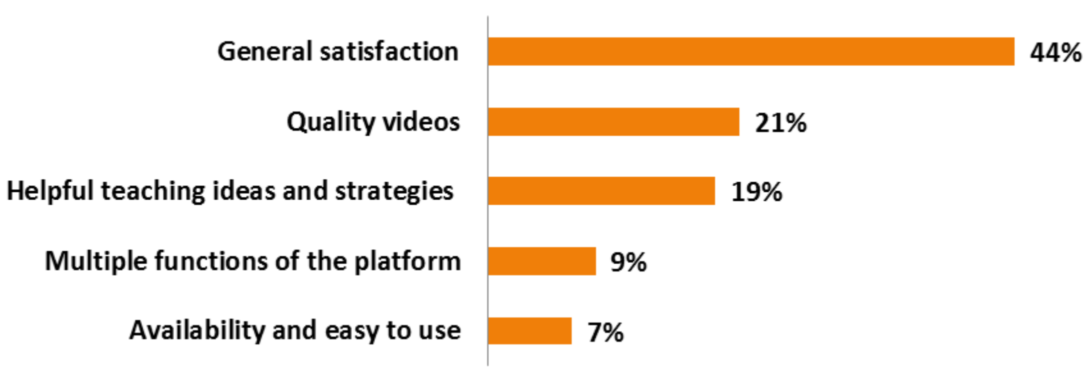


Figure 81. Summary of Teacher Satisfaction with Edivate

Teacher Concerns

As shown in Table 127 (and Figure 82), only 13 of the respondents shared the following concerns: time consuming (38%), not user friendly (38%), inadequate support (8%), duplicated information (8%), and lack of video content of interest (8%).

Table 127. Concerns with Edivate Product (N=13)

Response Category	% of Responses	Sample Response
Not user friendly	38%	"I don't think it is user friendly"
Time consuming	38%	"It's just taking the time to dive into the content."
Inadequate support	8%	"Help people said that they would look into it on two separate occasions, but I never heard back from anyone."
Duplicated information	8%	"Many hours needed to be repeated"
Lack of video content of interest	8%	"The only concern that I have is that there is not much videos or resources related with technology/computer science education."

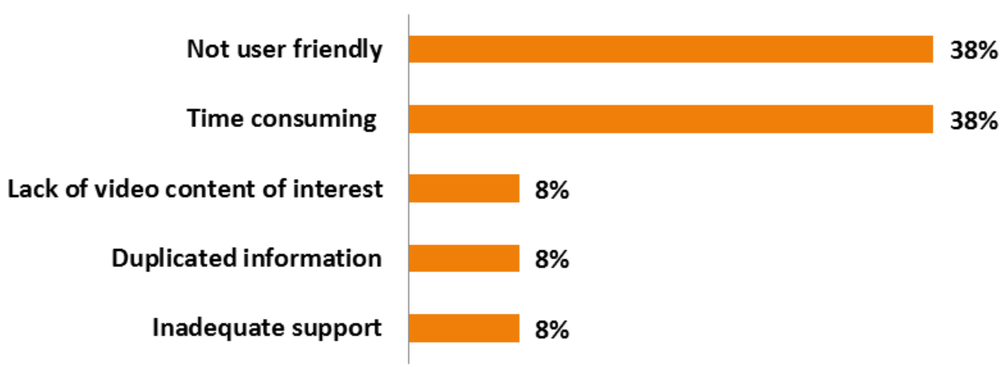


Figure 82. Summary of Teacher Concerns with Features of Edivate

Teacher Satisfaction with Professional Development

For the question concerning teachers' satisfaction with PD from SCINET, only 60 respondents included valid responses. As shown in Table 128 (and Figure 83), responses for satisfaction included general satisfaction (58%), good training provided (28%), good support and follow-up (10%), and features of the platform that helped them find content related to what they teach (3%).

Table 128. Satisfaction with PD for Edivate (N=60)

Response Category	% of Responses	Sample Response
General satisfaction	58%	"They were very good to work with."
Good training	28%	"We had a great training. It was quick and simplified, but enough of an overview to give me an idea."
Good support and follow up	10%	"when we have e-mailed with a question we have always received a quick answer and a follow up"
Good video platform	3%	"very satisfied........I have had success finding specific lessons related to 6th grade core curriculum"

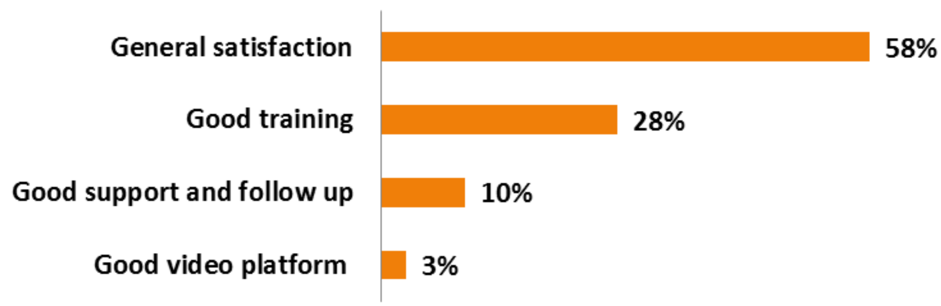


Figure 83. Summary of Teacher Satisfaction with Professional Development for Edivate

Teacher Concerns about Professional Development

A much smaller number of teachers responded with concerns (Table 129 and Figure 84). Eleven responses included the following concerns regarding PD from SCINET: inadequate support available (36%), lack time to participate (27%), not user friendly (27%), and disliking the virtual training (9%). It is important to note that at least one district selected the virtual or self-serve training instead of the other recommended training. In addition, districts are supposed to have a leadership team attend the Bootcamp training, develop an implementation plan, and then they are to train their own teachers providing personalized professional learning experiences. There may have been some miscommunication, as some teachers and administrators received a login and assumed they were supposed to teach themselves. The districts/charters that hosted Bootcamps during summer 2015 had strong plans for communicating with teachers and providing appropriate training to reduce such concerns.

Table 129. Concerns with PD for Edivate (N=11)

Response Category	% of Responses	Sample Response
Inadequate support	36%	"It seemed to be a self-learn, self-implement program. I received no support that I am aware of."
Lack time to participate	27%	"How in the world am I ever going to have the time to learn and do everything that is required"
Not user friendly	27%	"Again I didn't think it was user friendly and hard for me to access what I was looking for."
Dislike of virtual training	9%	"I feel it is trying to replace real training and concrete PD time and is unnecessary"

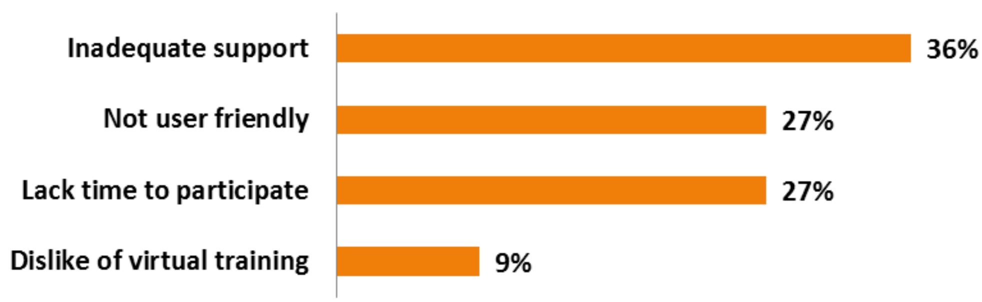


Figure 84. Summary of Teacher Concerns with PD for Edivate

Perceived Influence of PD on Teacher Content Knowledge

When asked how PD influenced teachers' content knowledge, among the 125 respondents using Edivate, 91 indicating no change, 12 indicated "N/A", and one indicated "overwhelmed by the total out there," which was assumed to mean that there was a lot of content in the platform which was overwhelming. The remaining 21 teachers claimed PD positively changed their content knowledge, as it deepened their understanding of the Common Core Standards. In terms of the effect of PD on teachers' ability to engage students, 77 reported little or no use of the product, 29 reported students' engagement increased, and 18 reported students' engagement stayed the same. With such limited usage, there really was not the opportunity for teachers to learn and experience change. We expect with increased usage this next academic year, there will be greater improvements in these areas.

Summary

Results show that a majority of teachers were satisfied with the platform, due to high quality videos, teaching ideas and strategies, and the ability to search for content related to what they teach. Similarly, many teachers were satisfied with the PD, due to effective SCINET presenters, quality of the training they received, features of the platform, and support from the provider. However, note that most teachers found their content knowledge and ability to engage students did not change after the PD, which we believe may be due to the short implementation period. We look forward to hearing from teachers during the 2015-16 school year.

To evaluate the effectiveness of Edivate as a form of professional development it is important to encourage usage and to ensure that there is data available to measure changes in instruction. We would like to recommend that an expectation be set for each participating district/charter to have a certain amount of teachers upload a pre/post video of instruction for us to use to assess changes in instruction. To encourage participation, one option could be to make use of the product the following year contingent upon video uploads. Another option would be to give an incentive to either a school leader or district leader who has the role of implementation support. This could be a stipend that they would receive once the videos were uploaded (pre and post).

We also would like to recommend that videos be at least 20 minutes in length to really measure changes in instruction. It is preferable if they include the first 20 minute of class to catch setting the stage for the lesson and student work (either individual or small group).

Jake Hinckley, the SCINET implementation specialist, has volunteered to post reminders through Edivate about data collection (surveys and videos), which might help remind teachers and administrators to complete these important parts of data collection for the evaluation.

E-mail Testimonials

The STEM Action Center shared with us e-mail they received from either schools or districts in the PD grant program and notes they had taken from site visits to schools implementing the PD grants. We kept this information organized in a documentation file to understand implementation. This unsolicited feedback can be helpful in that it may bring out implementation challenges and successes that we may not have captured in the survey data. These testimonies provide important insight from implementation.

Positive Feedback Testimonials

- **Positive about PD Providers**: *PD committee developed instructional model then SINet Bootcamp was last week. 5 committee members, teacher coaches, and principals attended for 2-1/2 days and developed a 3 year implementation plan. Teachers will go to training in August and then monthly PLC meetings to continue using Edivate. Loved Jake but Amy was amazing too!*
- **Support for Teacher Evaluation**: *PD was great; we had principals and the superintendent in Boot Camp training. We all love how this will work with the new evaluation system that the state office is going to require.*
- **Collaborative Experience**: *I didn't want to let the day end without thanking you for what has been one of the best collaborative experiences we have had. Much of our success is the direct result of Jake. He is a true facilitator of learning. He was able to listen to our*

needs and design 2 days of exactly what we needed... so much so, that we consider him to be a member of our team and look forward to working with him for the next several years

Mixed Feedback Testimonials

- **Delayed Implementation**: *As per our discussion, I wanted to send this e-mail to tell you why we haven't used all the licenses for Edivation. We are being very careful about how we roll out this tool to our teachers in the district. We've met with SCINET several times as a district leadership team to discuss the best way to meet the needs of our district using this tool. After our boot camp training last week, we've decided that we are going to roll out Edivate with new teachers. This way, we will be able to use the tools with a program that we already have in place to help the teachers meet the requirements. This will be our main focus, but if we have some principals that are interested in using the Edivate tools, we will share them.*

Negative Feedback Testimonials

- **Lack of Communication**: *I know that Alpine requested a limited number of licenses from each of these vendors when your "grant" was made available, but I am unable to find anyone here in the district who can tell me exactly how many of each, or how to actually login and use them.*

Changes in Instruction

The goal of this grant program is to provide teachers with high quality videos of instruction, professional development, and opportunities to collaborate and receive feedback with the hypothesis that this type of support will improve instruction. To measure whether instruction has changed, the STEM Action Center asked districts to find teachers willing to volunteer to upload a beginning (pre) and end (post) video of their instruction. The plan was to have a team of hired educators watch the videos, with several people watching the same video to establish interrater reliability, to assess improvement in instruction. A goal was set with the districts and SCINET to find 100 teacher volunteers to upload a pre/post video to measure the effects of Edivate on instruction.

However, there were some challenges this spring in collecting this data. In part, this was due to the limited implementation. Very few teachers were using Edivate sufficiently to warrant measuring changes in instruction. Twenty-four teachers uploaded a video at the start of the spring semester (pre), but only 15 teachers uploaded a video at the end of the spring (post). Some of the teachers uploading at the end of the spring had not uploaded one at the beginning. Unfortunately, out of the 39 videos uploaded, only five teachers had a complete pre and post video that could be used to measure instruction. In addition, it was clear that teachers did not understand that we needed a video of the full class period or at least 20 minutes to best measure changes in instruction. One of the teachers with pre/post videos had very short videos less than three minutes in length.

In Table 130, we provide a summary of videos uploaded with additional detail by district and charter in Table 131. We used the five videos to assess changes in instruction. However, we will use this process and information in collaboration with the STEM Action Center and SCINET to refine the evaluation plan for measuring changes in instruction for 2015-16 school year rather than using the data to understand the effect of Edivate for spring 2015. There is not sufficient data to assess effectiveness for spring 2015. The teachers did not use the product sufficiently or as intended; therefore, it is not appropriate to use this limited data to evaluate the product at this time.

Table 130. Summary of Videos Uploaded

Number of District/Charter Groups in Edivate	Number of Teachers with Pre-Video	Number of Teachers with Post-Video	Total Videos Uploaded	Total Teachers with Pre and Post Video that can be used to evaluate change in instruction
36 Groups	24 Teachers	15 teachers	39 videos	5 videos

Table 131. Details of Videos Uploaded by District

Group (District/Charter)	Teacher/Person Sharing Video	Pre-Video	Post-Video
Alpine	Teacher 1	February 26, 2015	None
Beaver	None uploaded	None	None
Beehive	Teacher 1	January 29, 2015	None
Cache County	None uploaded	None	None
Carbon	None uploaded	None	None
Daggett	None uploaded	None	None
Davis Elementary	Teacher 1	May 15, 2015 (labeled pre)	Does not play, says error in player
Davis Secondary	None uploaded	None	None
Excelsior Academy	None uploaded	None	None
Granite	None uploaded	None	None
Iron	Teacher 1	February 18, 2015	None
Juab	Teacher 1	March 2, 2015	None
Logan	None uploaded	None	None
Moab Charter	Teacher 1	None	May 20, 2015
Monticello Academy	Teacher 1	February 11, 2015	None
(Monticello Academy)	Teacher 2	February 11, 2015	None
(Monticello Academy)	Teacher 3	February 11, 2015	None
Murray	None Uploaded	None	None
North Summit	Teacher 1	January 23, 2015	None
NUAMES	Teacher 1	February 22, 2015	None
(NUAMES)	Teacher 2	February 22, 2015	None
(NUAMES)	Teacher 3	February 22, 2015	None
Nebo	None Uploaded	None	None
Noah Webster	Teacher 1	May 13, 2015 (Note only 7:35 min)	May 20^{th}, 2015 (Note: Only 6:33 min)
North Sanpete	Teacher 1	None	May 27, 2015
Park City	Teacher 1	None	May 18, 2015
(Park City)	Teacher 2	None	May 18, 2015
(Park City)	Teacher 3	None	May 13, 2015
(Park City)	Teacher 4	None	May 13, 2015
(Park City)	Teacher 5	None	May 13, 2015
(Park City)	Teacher 6	None	May 12, 2015
(Park City)	Teacher 7	January 16, 2015	None
Pinnacle Canyon Academy	None uploaded	None	None
Piute	None uploaded	None	None
Providence Hall	Teacher 1	None	May 22, 2015
Provo District Action Team	None uploaded	None	None
Provo	Teacher 1	January 24, 2015 (Note: only 1:56 minutes)	May 24, 2015 (Note: only 2:37 minutes)
Rich	Teacher 1	February 2, 2015	May 21, 2015

Group (District/Charter)	Teacher/Person Sharing Video	Pre-Video	Post-Video
		(Note: 9:00 minutes of a small group)	(Note 20:10 minutes of a small group)
(Rich)	Teacher 2	January 28, 2015	None
(Rich)	Teacher 3	January 27, 2015	None
San Juan	None Uploaded	None	None
South Sanpete	None Uploaded	None	None
South Summit	Teacher 1	January 19, 2015	None
(South Summit)	Teacher 2	January 19, 2015	None
Summit Academy	None Uploaded	None	None
Syracuse Arts	None Uploaded	None	None
Tintic	None Uploaded	None	None
Washington	Teacher 1	March 3, 2015	May 19, 2015
(Washington)	Teacher 2	March 18, 2015	May 19, 2015
(Washington)	Teacher 3	March 18, 2015	None
(Washington)	Teacher 4	March 18, 2015	None
Weber	None Uploaded	None	None

In Table 132 (and Figure 85), we provide an overview of teacher video ratings. For the pre-ratings, the third item regarding student engagement received the highest score of 2.33, while the first item regarding student learning-targets received the lowest score of 1.67. This is an area important in terms of teacher quality, and therefore it is important to note that Edivate includes this focus area within their product, where teachers can continue to develop. For the post-ratings, the third item regarding student engagement also received the highest score of 2.73; since, the focus of the grant program is to engage more students in STEM this is an important outcome. The fourth item regarding differentiation in teaching and the fifth item regarding assessment received the lowest score of 2.00. These are areas that School Improvement Network can consider focusing on for year 2 of implementation of Edivate.

Table 132. Overview of teacher video ratings at pre-, post- and change

Items	Pre-Ratings	Post-Ratings	Rating Change
SCINET #1. Student learning targets were clearly communicated.	1.67	2.07	0.40
SCINET #2. Instructional activities led students towards meeting the objectives.	1.73	2.40	0.67
SCINET #3. Students were actively engaged.	2.33	2.73	0.40
SCINET #4. Teacher differentiated instruction.	2.13	2.00	-0.13
SCINET #5. Assessments effectively monitored student progress.	1.87	2.00	0.13
Average Score of all five SCINET items	1.95	2.24	0.29

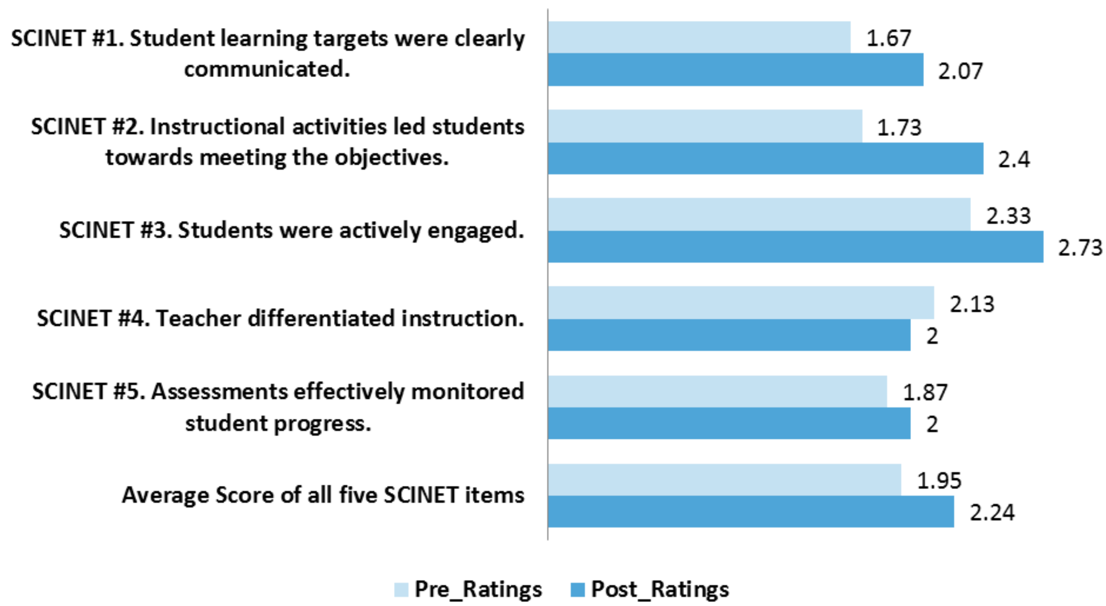


Figure 85. Visual Comparison of Pre- and Post-Ratings for Quality Instruction

For the pre and post comparison, overall there was an increase in the magnitude of the average rating of 0.29 points out of four possible points. For the particular five SCINET items, only the ratings from the fourth item regarding differentiation in teaching decreased, while the ratings from the other items increased. In particular, the second item regarding instructional activities obtained the highest increase in magnitude (0.67). Due to the small sample size, we cannot say whether these differences are greater than what would occur by chance. In year 2 with a larger sample size, we will be able to note any statistically significant differences.

SAGE State Assessment Achievement for Students of Teachers Participating in the PD Grant Program

An underlying hypothesis of this grant program is that as teachers receive professional development and support, their instruction will improve, which will lead to improved student outcomes. An important outcome for students in Utah is achievement measured by the state SAGE assessment. We collected teacher Cactus IDs for teachers who received a license for Edivate. We are currently working with the Utah State Office of Education to receive a state data file with students of teachers who used Edivate flagged. Using these data elements, we can compare achievement of students of teachers using Edivate to similar students in similar schools across the state who did not have teachers participating in Edivate.

According to the usage data provided by School Improvement Network for Edivate users, usage of the professional learning platform averaged approximately 10 minutes. Given the late start of this grant program, and the limited usage, we recommend that the impact analysis for this grant program be conducted at the end of the 2015-16 school year, when districts have had time to fully implement their plan. Any impact, positive or negative, that we might find, could not be attributed to this grant program given such limited use.

Scholastic and Teaching Channel

Usage

We collected usage data starting in March 2015. Scholastic responded by e-mail March 6th that they were working on it, but had a few challenges as described below:

> *Apologies for the delay on this, we are working on it. The challenge is we have UT statewide implementation of our Teaching Channel platform that has been operational for a couple of years now with thousands of users and the participants in the STEM grant are operating within this environment, so it is proving tricky to extract them from the larger group. We are working on it and will figure it out asap.*

The STEM Action Center already knew this could be a challenge, since the Utah Education Network (UEN) already was using Teaching Channel and many teachers in Utah had an account through the UEN program. The difference is that through the STEM Action Center grant program, teachers would have instructional coaching and a learning community to participate in. It took the provider until early May to provide complete usage data for April. We requested cumulative usage data at the end of the year in June, but we never received any more data. This may be due to correspondence between the STEM Action Center and the provider not having sufficient funding in the contract for additional work that schools were requesting. Therefore, the data in Table 133 is the only data we have available.

Table 133. Usage Data for Scholastic/Teaching Channel PD Grants Spring 2015

Time Point	Total Users	Users Logging In	Users Viewing Content	Average Activity Per User
March 2015	39	35	35	NA
April 2015	65	60	60	8.48 activities
May 2015	NA	NA	NA	NA

Note: NA = Not Available

Based on the data provided in May for usage through the end of April we see that teachers completed on average about eight activities. On average, the activity with the greatest usage was playing videos from the library, with each teacher on average playing about three videos. The activities with the least usage were group replies and video comments (as shown in Table 134 134). These activities may be activities that would be more common over time after more exposure with the product. We present data based on usage after only a few months of use.

Table 134. Usage Information for April 2015 for Scholastic/Teaching Channel (N=66)

Type of Usage Activity	Average Amount of Activity	Minimum Amount of Activity	Maximum Amount of Activity
Number of Groups Joined	1.35	0	4
Number of Group Discussions	0.74	0	5
Number of Group Posts	1.02	0	4
Number of Group Replies	0.02	0	1
Answers Submitted	0.03	0	2
Video Library Plays	2.71	0	11
UGC Video Plays	0.91	0	6
Video Comments	0.02	0	1
Video Notes	1.70	0	9
All Activity	8.48	1	23

Teacher Survey

We sent satisfaction and concern surveys to 22 teachers; however, not all teachers completed all questions on the survey. Therefore, for each question, we report the number of teachers who responded and the percent of type of response based on the number who completed the survey.

Teacher Satisfaction with Product

For the first question, where we found that 10 described the following features with which they were satisfied (as shown in Table 135 and Figure 86): general satisfaction (80%), quality videos (10%), and perception of impact on teaching (10%).

Table 135. Satisfaction with Scholastic/Teaching Channel Product (N = 12)

Response Category	% of Responses	Sample Response
General satisfaction	80%	"I like it well enough."
Quality videos	10%	"I love the videos. "
Perception of impact on teaching	10%	"I think that it is a great program that can enhance any teacher or students experience in the classroom."

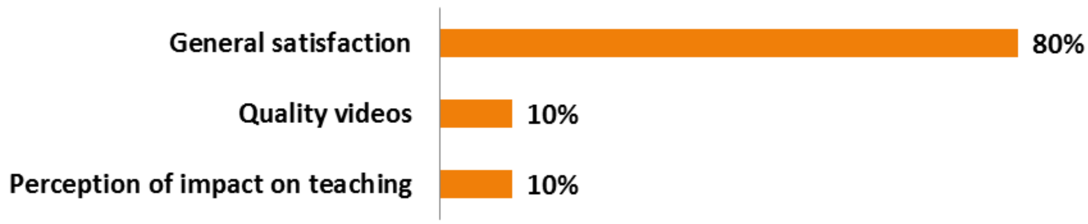


Figure 86. Summary of Teacher Satisfaction with Scholastic/Teaching Channel Product

Teacher Concerns with Product

Only four respondents listed concerns (shown in Table 136 and Figure 87): two teachers had concerns since it took too much time, one teacher was concerned as there was duplicated information, and one teacher was concerned that it put too much emphasis on STEM related content.

Table 136. Concerns with Scholastic/Teaching Channel Product (N=4)

Response Category	% of Responses	Sample Response
Time consuming	50%	"The product takes time to weed through for ideas and the ideas presented in our webinar were for higher aged students"
Duplicated information	25%	"Some of the information was gone over again and again to the point that it was a waste of time."
Inappropriate videos	25%	"I feel that an over-emphasis on STEM subjects will detract from other important subjects that should be taught."

Figure 87. Summary of Teacher Concerns with Scholastic/Teaching Channel Product

Teacher Satisfaction with PD

For the question concerning teachers' satisfaction with PD, there were only seven teachers' responses for us to use to examine teachers' satisfaction with PD with Scholastic/Teaching Channel (as shown in Table 137 and Figure 88). Responses for satisfaction included general satisfaction, satisfaction with the presenter, and features of the platform that helped them find content related to what they teach.

Table 137. Satisfaction with Scholastic/Teaching Channel PD (N=7)

Response Category	% of Responses	Sample Response
General satisfaction	71%	" It was great!"
Good presenter	14%	"the presenter was great"
Good features of the platform	14%	"It is helpful to be able to search and filter by grade and subject"

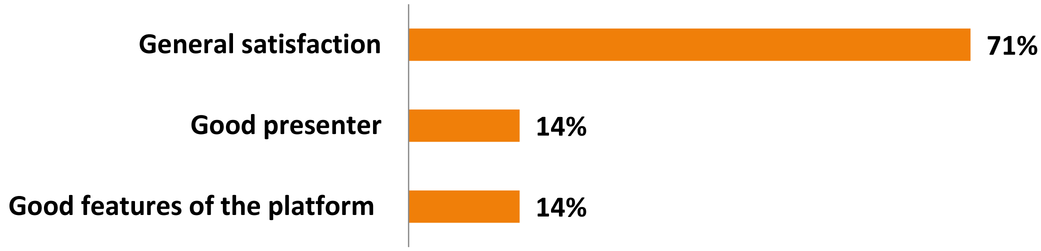


Figure 88. Summary of Teacher Satisfaction with Scholastic/Teaching Channel PD

Teacher Concerns with PD

Seven responses included concerns with the PD from Scholastic/Teaching Channel, including that teachers gained no learning from the PD, that it contained redundant information, and that teachers lacked time to participate (as shown in Table 138 and Figure 88).

Table 138. Concerns with Scholastic/Teaching Channel PD (N=7)

Response Category	% of Responses	Sample Response
No learning from PD	57%	“Not helpful at all”
Lack time to participate	29%	“no time”
Redundant information	14%	“redundant”

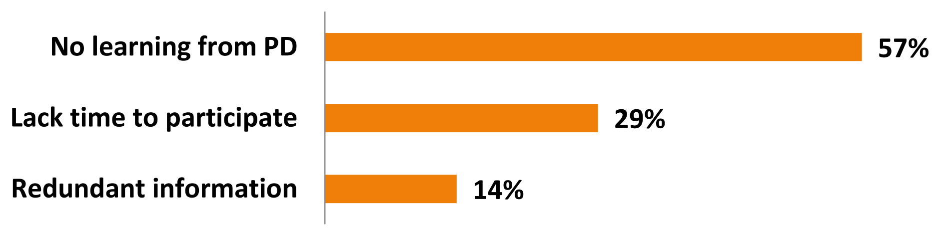


Figure 89. Summary of Teacher Concerns with Scholastic/Teaching Channel PD

Perceived Changes in Teacher Content Knowledge

When asked how PD influenced teachers' content knowledge, among the 22 respondents using Scholastic/Teaching Channel, 17 indicating no change, three claimed PD positively changed their content knowledge, and two indicated "N/A". In terms of the effect of PD on teachers' ability to engage students, 13 reported little or no use of the product, five reported students' engagement increased, and four reported students' engagement stayed the same.

Summary

These preliminary results are important to provide feedback to the providers and to ensure that they structure the future implementation to support teaching and learning. Results show that a majority of teachers were satisfied with the platforms, including the high quality videos. Similarly, many teachers were satisfied with the PD, some reporting the effectiveness of presenters, However, note that most teachers found their content knowledge and ability to engage students did not change after the PD, which we believe may be due to the short implementation period.

Overall, our study of the survey responses has a few limitations. First, this study only has a small sample size. Second, many participants provided "N/A" when reporting their perceptions in surveys. Third, this data is self-report data, which has the potential for bias.

E-mail Testimonials

The STEM Action Center shared with us e-mail they received from either schools or districts using the Scholastic/Teaching Channel product and notes they had taken from site visits to schools implementing the PD grants. We kept this information organized in a documentation file to understand implementation. This unsolicited feedback can be helpful in that it may show some implementation challenges and successes that we may not have captured in the survey data. These testimonies provide important insight from implementation.

Positive Feedback Testimonials

- **Professional Development**: *We had 60 Math and Science teachers trained. Erika was really good and amazing providing a 6hr training to go over terminology, relevance, rigor and a rubric. She did a great job of sharing what STEM would look like in a regular classroom; more than just a cool project 3X per year. Erika modeled lessons and was highly engaging. Working from the initial training, now teachers understand rigor and relevance. Now we want to expand down into the elementary grades possibly 40 teachers per level. To do this we would need sub pay at $70 per teacher per day ~ $2,800 total or perhaps a grade level per year. There are a total of 11,000 students in our district.*
- **Positive about Resources and Traning**: *Good resources (Teaching Channel). Teaching methods are up to date with current research. Webinars are less draining because they are short. Teaching Channel was very helpful. Good ideas, but they just don't seem useful for the lower grade (1st and 2nd). Good reminder. Scholastic webinar presenter is an awesome presenter (Erika Tate). Liked the in person training more*

Negative Feedback Testimonials

- **Miscommunication**: *One of our teachers had a training scheduled for Monday and she was sent an e-mail reminder 3 days prior. It was as if they didn't care and it was very unprofessional. They should finish what they committed to for rest of the year. We had to notify our teachers about Scholastic cancelling with no explanation, after subs were already requested and had to be canceled. There is no way would we ever work with Scholastic again. These trainings have been scheduled since January and they just dropped our training like they had no commitment!*
- **Withdrawal of Support**: *I am reaching out to let you know the disappointment it was to receive this e-mail last week. As a district, we were thoughtful about which platform we used and chose the Teaching Channel and Scholastic because we felt it was the best fit for our educators. We next chose the blended approach in order to provide our teachers with in-person training, as well as the coaching visits. We are unclear why Scholastic pulled their services two-thirds of the way through the year, but we were surprised at this action. Because of this action, there were teachers who were not able to receive the full benefits of the model, who had arranged for substitutes, spent time writing lesson plans, and then one e-mail derailed the project. In the application it states " LEA's will have the option to continue tor a second year if they desire as long as they have demonstrated satisfaction with the use of the platform and have complied with data requests described…." It does not state that services would be retracted during the first year of*

implementation. We are asking for further explanation regarding this action as we have invested a lot of our district funding to support this grant and this action had a negative impact on a large number of teachers.

- **Lack of Communication:** *Scholastic has never followed up with the district. There was a meeting set up for Oct. 15th but no follow through so the district has never implemented due to provider lack of involvement. We will send an e-mail thread for documentation and have chosen not to continue with Scholastic.*
- **Difficulty with Implementation:** *We are having problems getting teachers to stay in PD. We started with 12, and now we are down to 2 in webinar trainings. The terminology is confusing and over all the teachers' heads. We were only sent one log on initially, and had problems with internet and getting everyone on the website. By lesson four, we had a huge rubric of pages and pages of language that were hard to understand. We need to have scaffolds so teachers can understand the terminology and bring them up to speed. We have to watch a 1 hour ppt on our own time and then go over the rubric. We found their materials to be less useful than expected and our teachers dropped the course in alarming numbers. Our main complaints are: (1) Instruction that made assumptions about what the teachers knew (too high level), (2) Instruction that was boring, power points read to us by webinar, and (3) Lack of good examples of STEM lessons on video.*
- **Difficulty Obtaining Teacher Buy-In:** *We could not do the Scholastic PD during our PLCs, because we already dedicated that time to look at assessment data and analysis of that data. It sounded good on paper, but it has been hard to get people after contact time even though Scholastic was very flexible. SAGE scores in our district are extremely low and Scholastic was not as focused especially on secondary math. Our teachers need to focus on secondary math in PD. Scholastic was fine to work with, but our district needs to focus on MATH.*
- **Challenges with Implementation**: *Too much time for all of these trainings. Trainings need to be to the point and brief. Focus on relevant information. Difficult to implement with current curriculum outline (Math). We are still not completely sure what the grants is actually for. We need basics explained better. The webinar is confusing. We need handouts, powerpoint, or something. The training doesn't relate to the lower grades- Seems more appropriate for older grades (middle school?). It is hard to follow the webinar- It goes too fast between screens. We can't keep up. Lots of ideas, but they are not really delving into the ideas. Too many webinars!*

Changes in Instruction

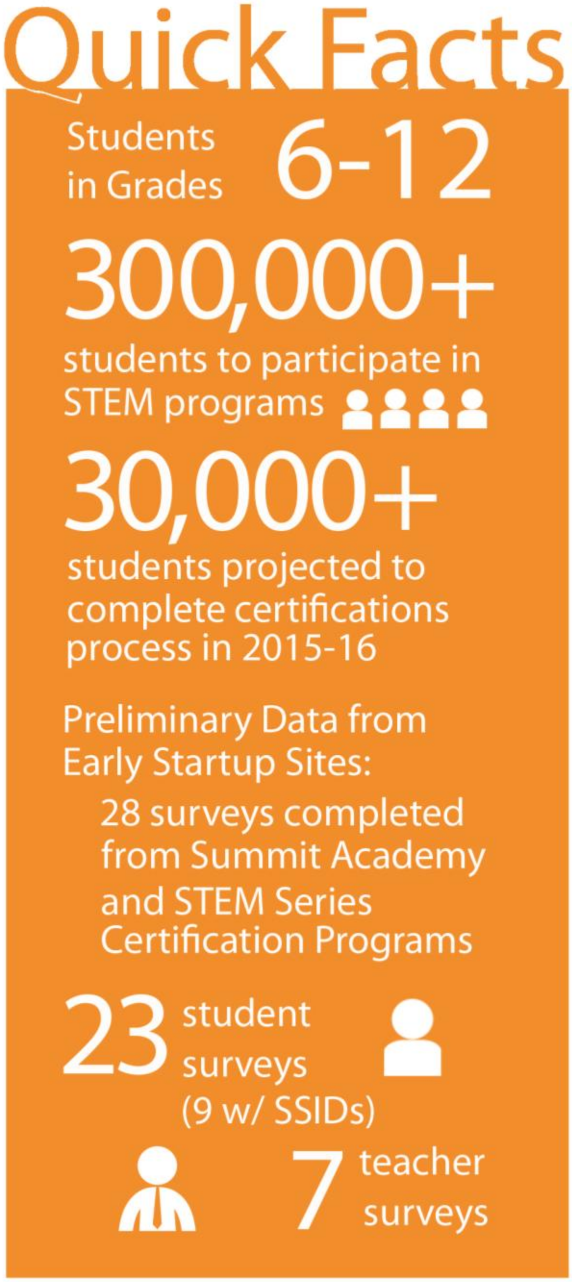
One of the key outcome measures for this grant program was improved quality of instruction. To measure changes in instruction, we asked the provider to work with each school to find one or two teachers to volunteer to videotape their class at the beginning and end of the spring semester. We would then rate these videos to determine if there was any significant change. We repeatedly requested information from Scholastic and Teaching Channel about how many teachers had volunteered and had uploaded videos. We never received a response. We asked the STEM Action Center project lead to follow up and they could not get a response from either organization. Therefore, we were unable to measure whether there was any change in instruction following implementation of this grant program for teachers using Scholastic/Teaching Channel. It is our understanding that schools have not selected to use this project during the 2015-16 school year, so no further collection of data will be possible.

SAGE Assessment

As discussed with the Edivate product, an underlying hypothesis of this grant program is that as teachers receive professional development and support, their instruction will improve, which will lead to improved student outcomes. An important outcome for students in Utah is achievement measured by the state SAGE assessment. We collected teacher Cactus IDs for teachers who received a license for Scholastic/Teaching Channel. We are currently working with the Utah State Office of Education to receive a state data file with students of teachers who used Scholastic/Teaching Channel flagged. Using these data elements, we can compare achievement of students of teachers using Scholastic/Teaching Channel to similar students in similar schools across the state who did not have teachers participating in Scholastic/Teaching Channel.

According to the usage data provided by Scholastic/Teaching Channel, teacher usage in April included eight activities on average. Given the late start of this grant program, the limited usage, and early termination of support for schools we did not conduct an impact analysis for this grant program. Any finding, positive or negative, could not be attributed to implementation of this grant program given such limited use.

High School STEM Industry Certification Grants



The STEM Action Center awarded 11 partnership organizations with High School STEM Industry Certification grants. These programs are for students in grades 6 to 12. Based on the implementation plans from each partnership program, they expect to serve over 300,000 students over time and result in over 30,000 students receiving certifications. During the 2014-15 school year, four partnerships began their work spring 2015, while the rest were in the design phase. From these early start programs we received data from surveys of 7 teachers and 23 students. Only nine of the students were willing to provide their state student identifier (SSID), which is not enough of a sample size to measure impact yet. We will measure impact of this program during the 2015-16 year.

We spoke with awardees by phone in March and April to review evaluation and data collection expectations. We held individual calls with nine of the 11 partnership organizations.

We discovered later that we did not have the correct contact information for the other two. We finally connected with them in July. All of the awardees were positive about the program and the feasibility of data collection.

In April, we sent the awardees directions for uploading a participant list following the template provided to our secure portal. We also sent links to the teacher and student surveys. A parent letter of information was also included, allowing parents the opportunity to decline having their child's data in the evaluation. Data would only be collected spring 2015 from the early start programs implementing programs during the 2014-15 academic year. The majority of programs were in a planning phase and would begin fall 2015.

There were three partnerships who reported that they were starting spring 2015 and 8 partnerships that reported starting summer/fall 2015. Based on the data collected, we provide an overview, in Table 139 (and in Figure 90), of participants, certificates, surveys completed, and SSIDs collected to measure outcomes. As of spring 2015, 168 students completed a STEM industry certification program.

Table 139. Overview of Participants and Data Collected Spring 2015 from Certification Programs

Partnership	Participant List	Internships	Completed Certificates	Teacher Survey	Student Survey	Student SSIDs
Summit Academy	16 participants	0	2	5	15	7
AM STEM	Not provided	0	0	1	6	0
STEM IT Series	31 participants	31	31	1	2	2
Nebo District	Not provided	80	0	0	0	0
Total	**47+**	**111**	**33**	**7**	**23**	**9**

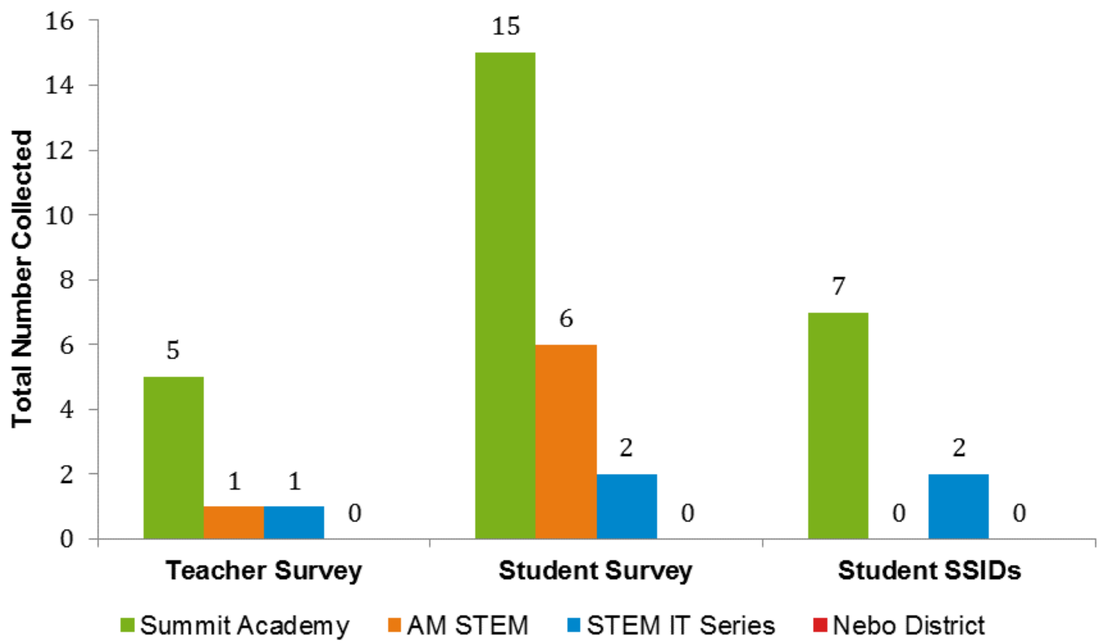


Figure 90. Number of Surveys and Student SSIDs Collected by Product

For the Washington County STEM IT Series partnership, there were 31 participants at the end of May 2015. These participants completed one of four Launchpad industry certifications as shown in Table 140 (and in Figure 91).

Table 140. Students Participating in STEM IT Series Industry Certification Programs

Certification	Number of Completed Certifications
Busy Busy Launchpad	10
Rocketmade Launchpad	6
Velocity Launchpad	9
Y Draw Launchpad	6
Total	31

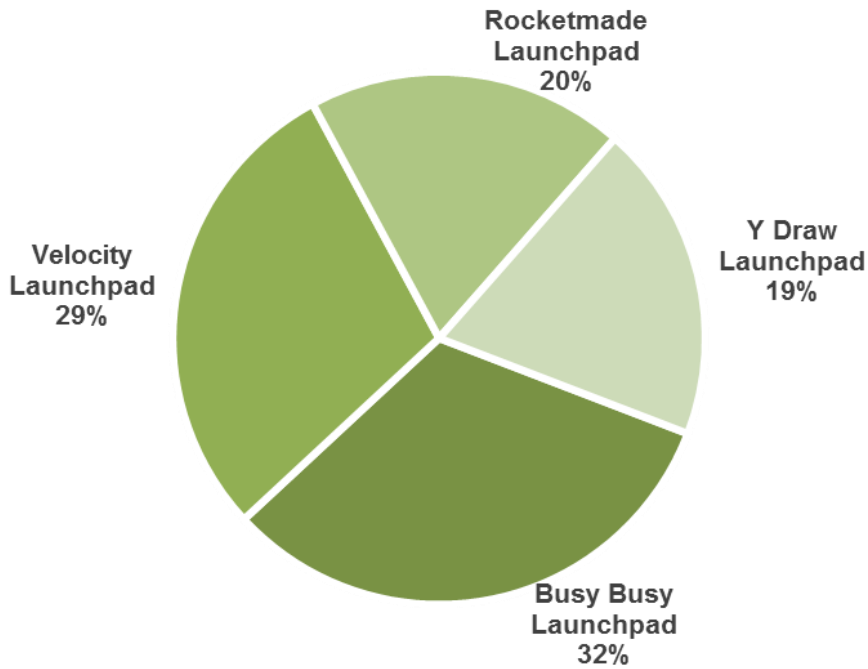


Figure 91. Percent of Students Participating in each STEM IT Series Program

Students also had opportunities to attend internship training through the Washington County STEM IT Series partnership. All of the 31 students received either a 20 or 30 hour training as shown in Table 141 (and in Figure 92).

Table 141. Students Completing STEM IT Series Training Internships

Training/Internship	Number of Completed Internships
Job Developer: 20 hours (10 weeks for 2 hrs/wk)	25
Marketing Training: 30 hours (10 weeks for 3 hrs/wk	6

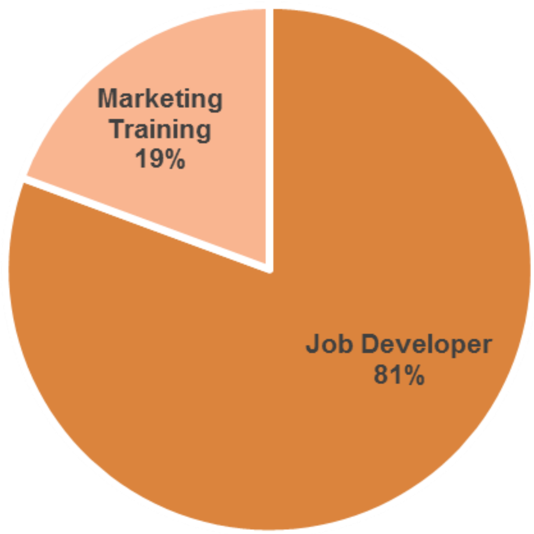


Figure 92. Students Completing STEM IT Series Training Internships

For Summit Academy as of the beginning of June, six students completed the STEM IT Certification course called "PC Pro". Only two of the students passed the certification exam and received a certificate.

All Nebo District high schools offer multiple courses in STEM related subjects. Nebo's Advanced Learning Center (ALC) offers advanced and early college classes in STEM fields. In the 2014-15 school year, 338 students attended ALC. Students do not attend ALC full-time; they are residents of and counted in home high schools counts. The district STEM coordinator, Alison Hansen, has a position new for the district the grant from the STEM Action Center is funding to improve student enrollment in STEM pathways and STEM internship opportunities and participation. Students not enrolled in ALC also have the opportunity to participate in a STEM pathway and an internship program. Therefore, Alison Hansen considers the data collected for the 2014-15 year to be a baseline for the district that they will seek to improve each year. We show in Table 142 the number of students who have completed STEM Career Pathways and internships in a STEM Field.

Table 142. Completion of STEM Career Pathways and Internships for Nebo District

School	STEM Career Pathways Completed	Internships Completed in STEM Fields
Maple Mountain High	32	26
Payson High	23	12
Salem Hills High	18	15
Spanish Fork High	48	9
Springville High	14	18
Total	**135**	**80**

We currently do not have data from the following partnerships, because they do not begin until fall 2015:

- Bear River/Cache County School District
- Granite Region (Pathways to Manufacturing)
- Granite Life Science Certificate Project
- Ogden School District
- Southeast Consortium
- Success Academy
- Tooele School District

However, these districts have been working hard to prepare for implementation. For example, the Southeast Consortium has been working with a provider called the STEM Academy to develop pathways in four manufacturing areas. Currently USOE is working on a state road map that will be ready this fall. USOE has been working with Sandra Hemmert from Granite School District on a similar activity developing the Manufacturing pathways.

Southeast Consortium will develop the program aligned with the standards this fall 2015. Then in January, they will train teachers. They expect students to start fall 2016. There were initially some challenges working with STEM Academy to develop the framework for the curriculum, and the other directors in the Consortium were impatient with STEM Academy. However, since they communicated with STEM Academy they have since had some training. A representative from the STEM Academy invited teachers to attend the training. The STEM Academy contacted teachers involved in the development of pathways with STEM Academy and USU Eastern. Currently they are trying to broadcast the courses to remote areas in the region. According to the project lead for the Southeast Consortium, the Regional directors are a demanding group, so it has kept the STEM Academy on its toes to respond to the requests, and the two key contacts at the STEM Academy have been responsible. The Southeast Consortium would also like to connect to manufacturing businesses, but they still have a lot to do in that arena.

In September 2015 we will send out a link to the grant program directors for the teacher survey, student survey, parent letter of information, and template for submitting the participant list to all grantees for 2015-16 implementation data collection

Teacher Survey Feedback

Seven teachers, who participated in a High School STEM Certification program or a career pathway program, responded to the survey. Five of the seven teachers participated in the

"Summit Academy STEM IT Certification" program and the other two teachers were in the "AM STEM" and "STEM Series" programs, respectively (see Table 143). In addition, there are different types of classes the teachers taught in the programs they participated in, such as computer repair, computer programing (Java Script/HTML), and computer security.

Table 143. Programs in which the Teachers Participated

Program	Number of Teachers (n=7)
Summit Academy STEM IT Certification	5
AM STEM: Washington County District, Dixie ATC	1
STEM Series: Rocketmade, Washington County District, Dixie ATC, Dixie State, USTAR, Velocity Webworks, Busy Busy, Site Select Plus, and Y Draw Inc.	1

In Table 144 (and in Figure 93), we provide teachers' feedback regarding some of the strengths of the High School STEM Certification program or career pathway program they participated in as an instructor. Approximately 71 percent of the teachers reported that the programs help students prepare for their STEM related careers. They also responded that students are able to increase their interest in STEM fields through the programs (57%).

Table 144. Strengths of the High School STEM Certification Program

Category	Sample Response	Percent
Preparing students for their future careers and jobs in STEM fields	*"These certifications will give the students an advantage when entering the job market."* *"Giving young adults and teens exposure to professional work environments at a young age, planting the seeds for a desire to aggressively pursue a career in a technology-related field."* *"It prepares them for future career opportunities."*	71
Increasing student interest and motivation in STEM fields	*"This course will encourage students to continue their education into other programing languages."* *"Student interest is high in this field."*	57

Category	Sample Response	Percent
Allowing students to learn necessary skills and concepts effectively	*"It allows specific classes to have a computer for each student, which allows us to implement a flipped classroom design for courses like the A+ Computer Repair. A flipped classroom allows students to work on individual assignments at home and come to class to work one on one with the teacher on concepts that they are struggling with."*	14
Qualified program director	*"Program director is highly qualified."*	14

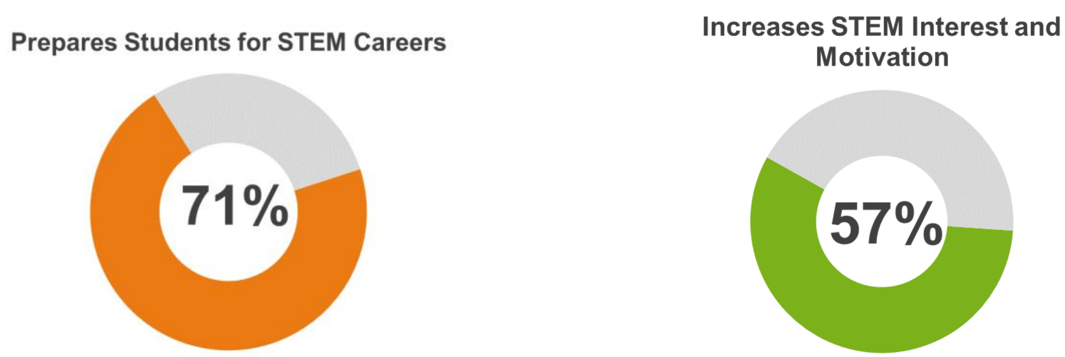


Figure 93. Strengths of the High School STEM Certification Program

In Table 145, we provide an overview of teachers' responses regarding things that can be improved about the High School STEM Certification program or career pathway program. From the survey, approximately 29 percent of the teachers reported that it would be great to give students more opportunities to get hands-on experience. One suggestion would be for programs that offer a computerized self-paced instruction program, to supplement the instruction with more hands on experiences. Another suggestion was to extend the length of the program (29%). In addition, students and teachers seemed to need more supplemental materials and resources for their classes (29%).

Table 145. Areas in Need of Improvement for the High School STEM Certification Program

Category	Percent
Hands-on experience	29
More equipment or supplemental materials for students	29
More time	29
More physical resources for teachers	14
More experienced teachers	14

The grant program was just starting when we administered this survey, spring 2015. We look forward to learning more as the full set of programs get underway fall 2015. Overall, the feedback has been positive. However, there does seem to be a need to have more equipment and materials, additional time for these activities, and more hands on experience. The STEM Action Center can consider whether there are other resources or industry partnerships that they could leverage to enable schools to have additional materials and hands on experiences in their certification program area of study.

Student Survey Feedback

Using a qualitative research approach, we collected data on the perceptions of students that participated in the High School STEM Certification program or a career pathway program through a survey with three open-ended questions. Twenty-three students completed the survey (as shown in Table 146). The first questions asked the participants to select the program in which they were participating. A majority (15 students) were participants in the Summit Academy STEM IT Certification program. The next largest group (6 students) participated in the AM STEM program in Washington County. Only two students responded to the survey from the STEM Series program.

Table 146. Programs in which the Students Participated

Program	Number of Students (n=23)
Summit Academy STEM IT Certification	15
AM STEM: Washington County District, Dixie ATC	6
STEM Series: Rocketmade, Washington County District, Dixie ATC, Dixie State, USTAR, Velocity Webworks, Busy Busy, Site Select Plus, and Y Draw Inc.	2

We open-coded the student responses to the next few survey questions to determine some of the key response categories related to the research questions (Strauss & Corbin, 1998). For each of the three survey items we provide tables summarizing the greatest percent of student response categories. We would like to mention that the percentages do not always add up to 100 percent, since students were able to give more than one answers to each question. For the first question, we asked the students to tell us about careers they wanted to pursue, what they already know about those careers, and why they were interested in pursuing that career path (see Table 147 and Figure 94).

Table 147. Student Responses about Future Career Interests

Category	Percent
Technology/Computers	43
Engineering	26
Medical	9
Design/Architecture	9
Business	9
Aviation	9
Accounting/Finances	9
Athletics	9
Space Sciences	4
Unsure	4
Writing	4
Law	4
Part-time job	4

Category	Percent
Entrepreneur	4

Figure 94. Most Common Student Responses about Future Career Interests

As shown by student responses in Table 147, approximately 43 percent of the students mentioned technology/computer related careers, followed by engineering as their second choice (26%). In this survey question, students mainly answered only what type of career they want to go into and did not answer what they knew about the job, or why they were interested in it.

The second question asked students to discuss what ways they are learning knowledge and skills. In Table 148, we summarize the categories of students' responses.

Table 148. Student Responses about Ways They Are Learning Skills and Knowledge

Knowledge /Skill Category	Percent
Unsure	17
Future career preparation	17
Programming	13
Troubleshooting	9
Using computers	9
Hands-on work	9
Social/talking to others	9
Simulators	9

Knowledge /Skill Category	Percent
Videos	4
Lectures	4
Assignments	4
Web development	4

The majority of the student respondents noted that they are unsure (17%) of the skills and the knowledge they learned through this program. In addition, other students mentioned that they could use this program for better career planning (17%). Although some students were not clear about the skills and knowledge learned, at least they felt they were able to prepare for the future though the program. This is an example of a student who described how this program was preparing them for their future career:

> *I took this class to get an IT certification so that if I make up my mind and want to go into the computer technology field than I would be better prepared for it. I also took this class to try and get a better understanding and set of skills that would add to what I have already learned about the computer technology field.*

In Table 149, we provide an overview of students' responses about recommended program improvements. The majority of the students responded that the program is already in great shape (13%) while the others wanted more options and fields that they can learn about (13%).

Table 149. Student Responses about Future Program Improvement

Improvement	Percent
More options and fields to learn	13
Nothing	13
More computer/programming classes	9
More face-to-face classes	9
Not sure	9
More STEM oriented teachers	9
Improve this survey	4
More learning resources	4

Improvement	Percent
More real-world applications	4
How to manage work colleague	4
More medical technologies	4
Longer program	4
More advanced classes	4
More stable learning experience	4
More interactive classes	4

SAGE Assessment Results

The High School STEM Industry Certification Grant program began spring 2015 with four partnership programs. The rest will begin fall 2015. We had relied on students completing a survey about the program to provide the SSIDs with parent permission to access their SAGE assessment data. Most of these students were 11th or 12th grade students. Unfortunately, many of these students provided an ID that could not be located I the state data file; therefore, we believe they either provided their school ID or some other ID. In addition, many of these students have completed all required tests; therefore, they do not have SAGE data. This is why we were unable to measure the impact of this grant program. We are working with the grantees to collect employment and college enrollment data summer 2016 for students participating in the program during the period from spring 2015-spring 2016. We can provide this information in next year's evaluation report.

Fairs, Camps, and Competitions

The Fairs, Camps, and Competitions grant program involved 2,427 students. The STEM Action Center reviewed 568 applications that included requests from individuals and teams. We administered a survey to all students who received an award. We received 639 completed surveys. Students reported on what they learned and how they plan to share what they learned with others.

The STEM Action Center asked students who received an award from the STEM Action Center to cover part of the cost of a fair, camp, or competition (FCC) to complete a survey after they attended the event and prior to receiving their grant award. We received completed surveys from 639 students. For each of the four survey items, we provide tables summarizing the greatest percent of student response categories. The percentages do not always add to 100 percent, since students at times mention two or more categories in their responses.

Knowledge of Someone in a STEM Career

For the first question on the survey, we asked students to tell about someone they know that works in a STEM career and what they know about that job. Ten percent of the students did not know someone in a STEM career. In Table 150 (and Figure 95), we provide the gender and relationship of the individual students referenced, which might be important for future research.

Table 150. Gender and Relationship of Person in STEM Career

Category	Percentage
Male Relative	43
Male Acquaintance	16
Female Relative	10
Male Teacher	9
Female Teacher	6
Female Acquaintance	3
Gender unknown teacher	3
Gender unknown Acquaintance	2
Gender unknown relatives	2
Female Mentor/coach	1
Male Mentor/coach	1
Gender unknown Mentor/coach	1

Figure 95. Students Reported Person in a STEM Career by Gender of the STEM Person

As is shown by student responses to this first survey question, the majority of students know a person in a STEM Career who is either a male relative or a male acquaintance. Since one goal is to encourage females to pursue STEM Careers, it may be that additional effort is needed in the state to expose students to females who are also in STEM Careers. Of the 90 percent of students involved in these STEM programs that reported knowing at least one person who was working in a STEM field, 60 percent reported interest in the careers of the STEM Professional that they know. However, 9 percent of participants said they were not interested in the career of anyone they mentioned.

This is a noteworthy finding, so we also examined these responses more closely hoping to identify the source of their interest. Of the 385 respondents who expressed interest in a STEM career, 67 percent (40% of the total 639 responses) indicated that their career interest stemmed from their interactions with parents, teachers, mentors, or STEM professionals. Fourteen percent indicated their interest in the careers they mentioned stemmed from previous interests or personal abilities. Five percent indicated that they had interest in the career mentioned, but would prefer to do something else; and four percent indicated that their interest was related to potential salary, job security, or job satisfaction. These findings are not drastically different from the findings of prior research by Sahin, Gulacar, and Stuessy (2014).

Career Interests

The second survey question asked students about their career interests. We placed their responses in one of the following categories shown in Table 151.

Table 151. Student Responses about Future Career Interests

Category	Percentage	Category	Percentage
Technology/Computers	26	Culinary Arts	2
Engineering	23	Agriculture	2
Medical	12	Government	2
Education	9	Inventor	2
Natural Sciences	8	Law	2
Arts	6	Veterinarian	2
Design/Architecture	5	Psychology	2
Other Sciences	5	Research	2
Space Sciences	5	Trades	2
Mathematics	4	Military	2
Robotics	4	Fashion	1

Category	Percentage	Category	Percentage
Business	4	Accounting/Finances	1
Unsure	4	Athletics	1
Chemical Sciences	3	Environmentalist	1
Writing	2	Homemaker	1
Aviation	2		

It was not a surprise that many students selected Engineering (23%) since this is an area of focus for many of the competitions. However, it was surprising how many selected a career in Computer Science (26%). There were a smaller number of FCCs with such a focus. It was also noteworthy that so many were interested in Education (10%). However, many of the student's mentors for their FCCs were teachers from their school.

Learning from Participation

The third question asked students to discuss what they learned through participation in the FCCs. In Table 152 (and Figure 96 and Figure 97), we summarize the categories of students' responses.

Table 152. Student Responses about What They Learned

STEM Content/Skill Category	Percent	Other Category	Percent
Computers/ Programming	23	Collaboration	34
Building/How things work	21	Perseverance/ Self-efficacy	18
Robotics	17	Communication skills	9
Science Knowledge	17	Problem solving	8
Design	7	Leadership	5
Engineering	6	Study/ life Skills	3
Increased desire to pursue stem career	4	Organization/ Time Management	3
Real world application	4	Maintain Composure	3
Math Knowledge	3	Showmanship/sportsmanship	2
Electronics	3	Creativity	2
Vocabulary	1	Overcoming Negative Feelings	1
Scientific Method	1	Use Resources	1
3D printing	1	Safety	1

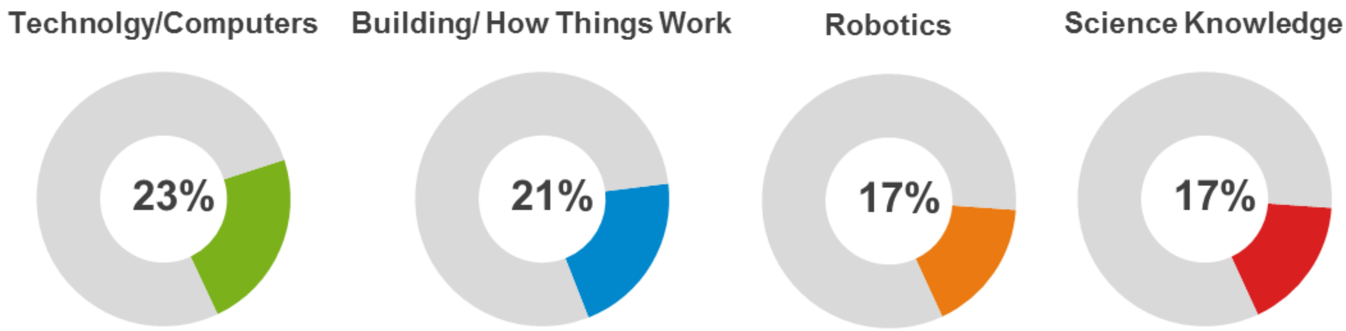


Figure 96. Top Four STEM Content/Skill Areas Students Reported Learning

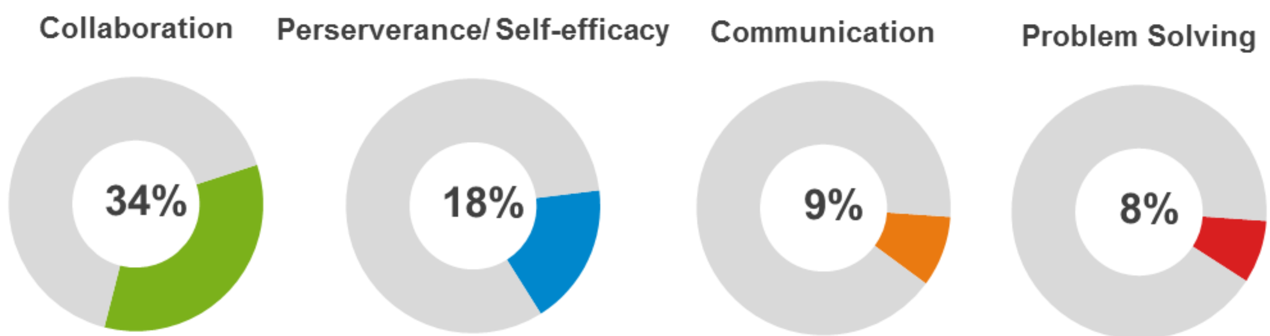


Figure 97. Top Four Non-STEM Related Categories in Which Students Reported Learning

It is beneficial that the most common response was collaboration (34%). While cooperative learning has been used for over two decades (Slavin, 1990), it may be less common for students in schools, which may be why this feature of the program stood out for students. Students also learned STEM content and skills, such as described here:

> *I learned a lot about problem-solving and mechanical concepts like torque, stalling, stability, efficiency, gear ratios, etc. I learned how to work with electronics, motors, pneumatics, sensors, and programming. I learned how important the design process and communication are. But the most important thing I learned was how to work hard.*

While many of the STEM content and skill responses directly related to the FCCs, we found these non-cognitive factors important to include in our analysis. The following is an example of how a student learned the importance of maintaining composure and learning from failure:

> *At the 2015 FLL competition, I learned that nothing is perfect. And everything I, or anyone else, builds will fall short at some point. When something fails then you take what failed, find the problem and then fix or rebuild the part that failed. My motto is failure is the compost for success.*

In addition some of the student responses relate to 21st century skills such as learning perseverance/self-efficacy (18%), communication skills (9%), and problem solving skills (8%).

Sharing What They Learned

The final survey item (see Table 153) asks students to discuss their plans to share what they learned.

Table 153. Student Responses for How They Will Share What They Have Learned

Category	Sample Response	Percent
General Sharing	*I will share with those I meet in my everyday life.*	24
Mentor younger students	*I want to help mentor another team.*	21
Recruiting	*I will tell others about the robotics program and encourage them to join next year.*	15
Teach general/ Unspecified	*I will teach anyone who wants to learn about what I learned at camp.*	13
Share with friends	*I talk about it with to my friends.*	10
Teach family	*I plan teach my little brother about programming and robots because computers interest him as well.*	10
Share with school	*We made up our own game. We taught it to the school gym teacher and she is teaching it to the whole school!*	9
Competing again in the future	*By doing robotics next year.*	7
Through future career/endeavors	*I mainly intend to educate people using the robotics club, and hopefully my own program in the future.*	6

Category	Sample Response	Percent
Publish/ present	*I plan to publish the app I created on the Google Play Store and to present at the Regional Science Fair.*	6
Volunteering/ Service	*I plan to continue volunteering and mentoring with FTC.*	3
Be an example	*I'll be a good example for others to follow.*	2
Unsure/ Don't plan on sharing	*I don't know.*	2
Social Media	*I plan to shout it from the rooftop and on twitter.*	2
Passive sharing	*I will talk to people about my experiences when they ask.*	1
Start a club, team, or organization	*I am going to start a programming club for ages 7-17 in the community room of my county library.*	1
Safety/ conflict resolution	*I will inform others of safety protocols when using robots.*	1

Based on the responses to this final question, 42 percent of respondents indicated a desire to mentor younger students, share with peers, or try to get other students interested in participating. An additional 57 percent of respondents reported a desire to share or teach what they had learned in some other way. These findings are noteworthy, because prior research has shown that sharing, mentoring, and teaching others what they learned has the potential to increase STEM content knowledge and develop some of the 21st century skills essential for success in the emerging job market.

The goal of the STEM education initiative that we studied is to get students interested in pursuing careers in STEM related fields. While students reported an interest in pursuing a STEM career in the future and improved understanding and skills in STEM, what was intriguing was the non-cognitive factors discussed which relate to 21st Century Skills. Although there is less research in this area, some studies have found reports of learning teamwork, problem solving, and communication skills. Our findings support prior research suggesting that people should consider outcomes beyond STEM.

Though many prior studies have implied that participation in FCC generates interest in STEM careers, we discovered that 60 percent of FCC participants reported interest in the STEM career of someone with whom they had interacted previously. The responses of participants in this study show that inspiring the rising generation is not as complicated as we make it. One student indicated,

> *At the district science fair, I had a conversation with an engineer from Boeing. He helps to design defense systems. From that conversation, I learned that there are tons of jobs in the field that I want to go into.*

This shows the potential impact of having people in STEM professions spend time to share what they do with young people.

What students were able to do with the small amount of money they were granted was often exceptional. For example, two students used this grant to devise a way to power Hydrogen fuel cells using Aluminum and Sodium Hydroxide. They won an award from the American Institute of Aeronautics and Astronautics, and took first in their competition, advancing to the Intel International Science and Engineering Fair in L.A. This study demonstrates at least in part how education research contributes to public understanding. Equipped with these findings, policymakers gain a clearer perspective of how grants funding FCCs contribute to overall STEM efforts.

SAGE Assessment Results

There were 155 students with complete SAGE assessment data who were awarded a grant to support their participation in a STEM fair, camp, or competition. This resulted in a very small number of students per grade. We did not feel comfortable evaluating a program with so few students, especially when the amount of time the student is involved varies. The STEM Action Center is using a new software tracking program for this grant during the 2015-16 school year, and we hope this new approach to project management along with coordination through districts will result in a larger number of student SSIDs submitted for our analysis next year.

Chapter 5. Conclusions and Recommendations

As we look back on the first year of implementation of the STEM Action Center grant programs, we would like to share a few conclusions and recommendations to inform year 2 of the work of the STEM Action Center.

K-12 Mathematics Technology Grant Program

The mathematics technology grant program appeared to run the smoothest this past year (2014-15), which may have been due to the program being piloted the prior year (2013-14). The pilot allowed the STEM Action Center to learn about these types of adaptive technology programs, the type of data available, and the strengths and weaknesses of the products. In addition, we were also able to begin to build relationships with local education agencies and the curriculum supervisors at the Utah State Office of Education.

This year there were 11 mathematics products awarded to provide technology for K-12 students. Once challenge of this grant program was that the funding was in three grade ranges: K-5, 6-8, and 9-12. However, we learned quickly that schools do not always purchase product licenses at the grade level of the student. For example, students in grade 5 might need acceleration, so their teacher might assign them to grade six content. While this should not be a challenge, it was a challenge to manage license distribution for some products, which had a different price for licenses at the K-5 level compared to the 6-12 level. To resolve these issues, we worked with the STEM Action Center and the product providers to combine all data for all grades together to evaluate the grant program. However, when it comes to estimating dollars spent for each grade group aligned with the different legislative funding it became a challenge.

Another challenge for the K-12 math grants was contract negotiation. The negotiations with Pearson took the longest, resulting in a significant delay in students getting access to MathXL and students who were to use SuccessMaker never received their licenses. The STEM Action Center can consider whether there are any improvements that can be made in the contract negotiation process, under the constraints of the Governor's Office of Economic Development (GOED).

The pilot was coordinated through school principals in collaboration with interested teachers, which in most cases was a success. In planning for the scale up during the 2014-15 school year, The STEM Action Center decided to coordinate the grants through school districts and charter organizations. From our perspective, this did not go as smoothly as the pilot did. Mid-year when we met with USOE and a group of mathematics curriculum supervisors from districts across the state very few had even visited a school involved in the grant program or were aware of teacher satisfaction or concerns. We also heard feedback from providers of challenges working with district coordinators, due to lack of communication. For example, an entire district never received their requested licenses due to the district coordinator not returning e-mails or phone calls from the providers.

For the 2015-16 school year, we recommended involving the school principal. The STEM Action Center agreed with our recommendation and included a principal letter of commitment that needed to be signed in addition to the superintendent letter of commitment. It included language requesting that the school principal assist teachers in finding a minimum of 45 minutes per week of access to technology to use the software they were requesting. This was our recommendation to remedy the low usage in year 1.

Recommendations

- Start each new grant program with a pilot to inform the process of actual implementation of the grant.
- Negotiate contracts with providers for a per license cost regardless of the grade of the student.
- Determine if the STEM Action Center in collaboration with GOED can consider any improvements in the contract negotiation process to speed up distribution of licenses for future grant programs.
- Involve school principals and school district leadership in the grant application and implementation process.
- Ask school leaders to commit to providing teachers and their students with a minimum of 45 minutes per week of access to technology for licenses requested.

CTE Grade 7 and 8 Applied Science Grant Program

The CTE Applied Science grant program was more challenging to evaluate than the mathematics technology grant program. We believe that one of the reasons is that there was no pilot of this type of program to inform the implementation process. In addition there was turnover in the STEM Action Center staff managing this program mid-year at the time the grants were about to be given to districts and charters.

The first challenge was to understand the participants. For most of the STEM Action Center grant programs, K-12 students are the focus of our evaluation. We began by asking the product providers to upload a list (through our secure portal) of students provided with a license and/or materials through the STEM Action Center grant. The providers notified us that this request would not be possible to meet. Although this was a requirement laid out in the request for proposals, we found out that in order for the providers to have the list of students, the teachers would need to go into their online systems, create a class/course, and upload a list of students.

The STEM Action Center project coordinator e-mailed the district and charter leaders requesting this information, but by the end of the year we had very little evidence of student participants. Therefore, we added an item to the teacher survey asking approximately how many students they shared the materials with in their class. Our recommendation for year 2 is to make the expectation explicit to district/charter leaders and teachers that they enter their students into the online systems for these products in order to track service to students.

The providers were not able to provide us with a list of teachers, so we made a request to each district or charter contact for the grant to send us the names of teachers and their schools so that we could track participation and provide them with a survey. Through repeated attempts at correspondence from the STEM Action Center project coordinator, we were able to get a list of teachers but it was incomplete. In the future, our recommendation is to make the expectation clear with grant awardees that they provide a list of teacher participants for licenses and materials provided as part of the grant. The STEM Action Center has set this expectation for year 2 of the project.

For evaluation purposes, it would help if the STEM Action Center created grants for similar products to compare outcomes across these products. For example, ITEEA is a completely online curriculum and teachers need to provide their own materials; whereas, Project Lead the Way has extensive material kits that support their curriculum. Students are not necessarily receiving similar experiences using the products, since ITEEA is dependent upon teacher selection of activities and collection of required materials, which they may or may not have on hand. In addition, when materials are part of the grant, it is important to have a mechanism to track whether schools/teachers have received their materials. Surveyed teachers reported delays in receipt of materials. Only one provider, STEM Academy, provided documentation of specific materials delivered. In the future, we recommend that the STEM Action Center require documentation from providers that they have delivered the requested materials, and documentation by schools that they have received the materials. If providers are delivering materials to districts to distribute to schools, then we recommend also collecting documentation from districts that they have received the materials.

Recommendations

- Start each new grant program with a pilot to inform the process of actual implementation of the grant.
- Request documentation from the providers of the mechanism for tracking participants and usage in order to explain these expectations to the schools implementing the products.
- Make expectations explicit to district/charter leaders and schools about the types of participation and usage information needed for the evaluation.
- Require documentation from providers that they have delivered the requested materials, and require documentation from schools that they have received the requested materials.

Professional Learning Grant Program

This grant program started smoothly in part due to the small number of providers (two), and because of communication between the STEM Action Center and the providers, sometimes including us as the evaluators. In this manner, we were able to set the expectations for the data needed for the evaluation, including the upload of pre/post videos from teachers. Another benefit this grant program had was the pilot of this type of professional development by the STEM Action Center with four districts in the prior year. This allowed the STEM Action Center to hear from districts the ways in which a video-based professional learning platform could meet the needs in their district.

The largest concern shared by district leaders was the unrealistic expectation that they could start a new professional learning program in their district/charter within a moment's notice. While they were interested in participating, district PD calendars and plans are often set a year in advance. Therefore, most districts requested that they be able to use the products as more of a preview during spring 2015, while they plan for implementation during the 2015-16 school year. While this is a reasonable expectation, it is also a significant waste of resources given the amount of dollars expended on licenses. Therefore, the STEM Action Center should consider alternative timelines for implementation of funding related to professional learning, and districts should not apply for grants if they are not able to implement within the grant window.

Recommendations

- Start each new grant program with a pilot to inform the process of actual implementation of the grant.
- Create professional learning implementation timelines in accordance with typical district constraints around implementation (such as setting the PD calendar a year in advance).
- Set expectations for districts applying for professional learning grants that they fully implement within the set grant window.

High School STEM Industry Certification Grant Program

This program is really just getting started. The main part that was unclear when reviewing implementation plans and having conversations with grantees was the use of funds by some partnerships to develop STEM pathways starting as early as the middle grades. While it is important to develop knowledge and interest in STEM at an early age to have students ready to enter a STEM Industry Certification program by grade 11 or 12, by the time these students reach those grades, the funding for this program and the evaluation of outcomes for the program may be over. Therefore, it makes it difficult to evaluate such different programs designed by the partnerships awarded these grants. Full implementation will occur during the 2015-16 school year, and we will be able to measure outcomes on the SAGE assessment for these middle school and early high school students participating in STEM pathways programs. However, we will not be able to measure whether they participate in or receive a STEM certification. In the future, it may be important to separate these two needs into two grant programs: one focused on recruitment of students into STEM pathways and then another on the STEM Industry Certifications.

Recommendations

- Restrict grant programs to a small set of measurable outcomes, such as STEM Industry Certification by grade 11 and 12 students in high school, and restrict use of funding to support that purpose.
- Consider the need of recruitment of students into STEM pathways as a separate need that might warrant a different grant program with different measurable outcomes.

Teacher STEM Endorsement Grant Program

This is a new grant program, so we did not evaluate it during the 2014-15 school year. However, we will be evaluating student outcomes on the state SAGE assessment and teacher satisfaction and feedback during the 2015-16 school year. Therefore, we do not have any recommendations at this time.

Fairs, Camps, and Competitions Grant Program

The main challenge of this grant program is determining the participants. Students can apply individually or as a team. If they apply individually, it is easy to track their participation through the end when they request their award after turning in receipts. It is when they apply as a team that tracking participants becomes challenging. A team has a mentor, but over the course of the preparation phase for the fair, camp, or competition team members can change. Once it is time for a student to request their award, it may be that they were never on the original list of students who requested an award. This may be because they took the place of another student who left the team or they joined the team late. Therefore, calculating the exact number of students served can be a challenge. The STEM Action Center has realized this challenge and has purchased a grant management software program to use starting October 2015. This should make the tracking of students much more manageable. We look forward to working with the STEM Action Center and this new process for accessing data on participants.

Recommendations

- Incorporate in the grant management software the ability to track student enrollment and exit from the grant program to document the number of students served.

We appreciate the STEM Action Center project staff and leadership for keeping us up to date with ongoing feedback from participants and stakeholders interested in these grant programs and outcomes. This allows us to design the evaluation in a way that meets the needs of all who are involved in STEM in the state. We believe our formative and summative evaluation feedback has informed the process as well as an understanding of the outcomes. We recommend with any future grant program that the STEM Action Center include both formative and summative evaluation components. We look forward to continuing to collaborate and collect data to understand outcomes of year 2 of these grant programs and year 1 of the teacher STEM Endorsement program.

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APPENDIX A. Districts and Schools Participation

K-12 Math Technology Grant Participation

For each product, we provide a list of the districts and school participating in the program along with the number of licenses that the product provider distributed to that district.

ALEKS

District/Charter	School	Licenses Distributed
Alpine School District	American Fork Junior High School (Utah STEM)	338
	Canyon View Junior High School (Utah STEM)	69
	Lehi High School (Utah STEM)	460
	Lone Peak High School (Utah STEM)	149
	Mountain View High School (Utah STEM)	226
	Oak Canyon Junior High School (Utah STEM)	83
	Orem Junior High School (Utah STEM)	248
	Pleasant Grove High School (Utah STEM)	145
	Pleasant Grove Junior High School (Utah STEM)	149
	Timberline Middle School (Utah STEM)	278
	Timpanogos High School (Utah STEM)	119
	Total	**2,264**
	Beaver High School (Utah STEM)	446

District/Charter	School	Licenses Distributed
Beaver County School District	Belknap Elementary School (Utah STEM)	346
	Milford Elementary School (Utah STEM)	143
	Milford High School (Utah STEM)	182
	Minersville School (Utah STEM)	138
	Total	**1,255**
Box Elder School District	Alice C. Harris Intermediate School (Utah STEM)	104
	Bear River High School (Utah STEM)	261
	Box Elder High School (Utah STEM)	27
	Total	**392**
Cache County School District	Birch Creek Elementary School (Utah STEM)	414
	Cache High School (Utah STEM)	201
	Canyon Elementary School (Cache) (Utah STEM)	331
	Canyon Elementary School (Utah STEM)	120
	Cedar Ridge Elementary School (Utah STEM)	15
	Cedar Ridge Middle School (Utah STEM)	822
	Greenville Elementary School (Utah STEM)	436
	Heritage Elementary School (Cache) (Utah STEM)	354
	Lewiston Elementary School (Utah STEM)	374
	Lincoln Elementary School (Cache) (Utah STEM)	313
	Millville Elementary School (Utah STEM)	289
	Mountain Crest High School (Utah STEM)	1,187
	Mountainside Elementary School (Utah STEM)	317
	Nibley Elementary School (Utah STEM)	309

District/Charter	School	Licenses Distributed
	North Cache 8-9 Center (Utah STEM)	1,287
	North Park Elementary School (Cache) (Utah STEM)	360
	Park Elementary School (Cache) (Utah STEM)	310
	Providence Elementary School (Utah STEM)	400
	River Heights Elementary School (Utah STEM)	410
	Sky View High School (Utah STEM)	1,169
	South Cache 8-9 Center (Utah STEM)	1,401
	Spring Creek Middle School (Utah STEM)	944
	Summit Elementary School (Utah STEM)	340
	Sunrise Elementary School (Utah STEM)	381
	Wellsville Elementary School (Utah STEM)	244
	White Pine Middle School (Utah STEM)	739
	Willow Valley Middle School (Utah STEM)	750
	Total	**14,217**
Canyons School District	Alta High School (Utah STEM)	201
	Brighton High School (Utah STEM)	39
	Corner Canyon High School (Utah STEM)	135
	Hillcrest High School (Utah STEM)	224
	Jordan High School (Utah STEM)	122
	Union Middle School (Utah STEM)	182
	Total	**903**
Charter	Hawthorn Academy (Utah STEM)	445
	InTech Collegiate High School (Utah STEM)	114

District/Charter	School	Licenses Distributed
	Lincoln Academy (Utah STEM)	130
	Monticello Academy (Utah STEM)	286
	Mountain Heights Academy (Utah STEM)	6
	Mountain West Montessori Academy (Utah STEM)	91
	Mountainville Academy (Utah STEM)	252
	Navigator Pointe Academy (Utah STEM)	159
	North Davis Preparatory Academy (Utah STEM)	434
	Oakgrove School (Utah STEM)	73
	Oaksprings School (Utah STEM)	1
	Ogden Preparatory Academy (Utah STEM)	226
	Pacific Heritage Academy (UTAH STEM)	220
	Pinnacle Canyon Academy (Utah STEM)	322
	Pioneer High School for the Performing Arts (Utah STEM)	115
	Renaissance Academy (Utah STEM)	349
	Spectrum Academy (Utah STEM)	753
	Summit Academy High School (Utah STEM)	240
	Syracuse Arts Academy (Utah STEM)	276
	Utah International Charter School (Utah STEM)	174
	Utah Military Academy (Utah STEM)	586
	Walden School of Liberal Arts (Utah STEM)	444
	Total	**5,696**
Charter	Academy for Math Engineering and Science (Utah STEM)	439

District/Charter	School	Licenses Distributed
	American Leadership Academy (Utah STEM)	867
	City Academy (Utah STEM)	44
	DaVinci Academy (Utah STEM)	303
	Early Light Academy (Utah STEM)	498
	Total	**2,151**
Davis School District	Bountiful High School (Utah STEM)	407
	Centennial Junior High School (Utah STEM)	783
	Centerville Junior High School (Utah STEM)	355
	Central Davis Junior High School (Utah STEM)	33
	Clearfield High School (Utah STEM)	690
	Davis High School (Utah STEM)	47
	Fairfield Junior High School (Utah STEM)	424
	Farmington Junior High School (Utah STEM)	139
	Kaysville Junior High School (Utah STEM)	1,019
	King Elementary School (Utah STEM)	82
	Layton High School (Utah STEM)	890
	Legacy Junior High School (Utah STEM)	1,579
	Mountain High School (Utah STEM)	238
	Mueller Park Junior High School (Utah STEM)	214
	North Davis Junior High School (Utah STEM)	472
	North Layton Junior High School (Utah STEM)	1,052
	Northridge High School (Utah STEM)	325
	Oak Hills Elementary School (Utah STEM)	64

District/Charter	School	Licenses Distributed
	South Davis Junior High School (Utah STEM)	1,244
	Sunset Junior High School (Utah STEM)	1,183
	Syracuse High School (Utah STEM)	318
	Syracuse Junior High School (Utah STEM)	2,277
	Viewmont High School (Utah STEM)	426
	West Point Junior High School (Utah STEM)	169
	Woods Cross High School (Utah STEM)	56
	Total	**14,486**
Duchesne School District	East Elementary School (Utah STEM)	61
	Total	**61**
Garfield County School District	Antimony Elementary School (Utah STEM)	12
	Bryce Valley Elementary School (Utah STEM)	93
	Bryce Valley High School (Utah STEM)	109
	Escalante Elementary School (Utah STEM)	79
	Escalante High School (Utah STEM)	53
	Panguitch Elementary School (Utah STEM)	236
	Panguitch High School (Utah STEM)	161
	Total	**743**
Granite School District	Cottonwood High School (Utah STEM)	397
	Eisenhower Junior High School (Utah STEM)	62
	Hunter Junior High School (Utah STEM)	328
	Total	**787**
	Canyon View Middle School (Utah STEM)	968

District/Charter	School	Licenses Distributed
Iron County School District	Cedar Middle School (Utah STEM)	1,169
	North Elementary School (Utah STEM)	363
	Parowan High School (Utah STEM)	150
	Total	**2,650**
Jordan School District	Butterfield Canyon Elementary School (Utah STEM)	1
	Daybreak Elementary School (Utah STEM)	133
	Jordan Ridge Elementary School (Utah STEM)	44
	Riverton Elementary School (Utah STEM)	24
	Rosamond Elementary School (Utah STEM)	130
	South Hills Middle School (Utah STEM)	15
	Valley High School (Utah STEM)	464
	West Jordan High School (Utah STEM)	68
	West Jordan Middle School (Utah STEM)	981
	Westland Elementary School (Utah STEM)	143
	Westvale Elementary School (Utah STEM)	122
	Total	**2,125**
Kane County School District	Kanab High School (Utah STEM)	213
	Valley High School (Kane County) (Utah STEM)	67
	Total	**280**
Logan City School District	Logan High School (Utah STEM)	399
	Mt. Logan Middle School (Utah STEM)	101
	Total	**500**
	Delta High School (Utah STEM)	33

District/Charter	School	Licenses Distributed
Millard School District	Delta Middle School (Utah STEM)	386
	EskDale High School (Utah STEM)	14
	Fillmore Middle School (Utah STEM)	128
	Garrison Secondary School (Utah STEM)	10
	Millard High School (Utah STEM)	275
	Total	**846**
Nebo School District	Art City Elementary School (Utah STEM)	327
	Barnett Elementary School (Utah STEM)	99
	Brockbank Elementary School (Utah STEM)	65
	Brookside Elementary School (Utah STEM)	124
	Cherry Creek School (Utah STEM)	99
	Diamond Fork Junior High School (Utah STEM)	1,377
	East Meadows Elementary School (Utah STEM)	116
	Foothills School (Utah STEM)	230
	Goshen Elementary School (Utah STEM)	220
	Hobble Creek Elementary School (Utah STEM)	117
	Landmark High School (Utah STEM)	29
	Larsen Elementary School (Utah STEM)	81
	Maple Mountain High School (Utah STEM)	29
	Mapleton Elementary School (Utah STEM)	244
	Mapleton Junior High School (Utah STEM)	1,187
	Mt. Loafer Elementary School (Utah STEM)	105
	Mt. Nebo Junior High School (Utah STEM)	984

District/Charter	School	Licenses Distributed
	Orchard Hills School (Utah STEM)	96
	Park Elementary School (Utah STEM)	69
	Park View Elementary School (Utah STEM)	73
	Payson High School (Utah STEM)	101
	Payson Junior High School (Utah STEM)	1,353
	Rees Elementary School (Utah STEM)	57
	Riverview Elementary School (Utah STEM)	113
	Sage Creek Elementary School (Utah STEM)	194
	Salem Elementary School (Utah STEM)	69
	Salem Junior High School (Utah STEM)	1,012
	Santaquin Elementary School (Utah STEM)	92
	Sierra Bonita Elementary School (Utah STEM)	621
	Spanish Fork High School (Utah STEM)	23
	Spanish Fork Junior High School (Utah STEM)	1,352
	Spanish Oaks Elementary School (Utah STEM)	105
	Spring Lake Elementary School (Utah STEM)	142
	Springville High School (Utah STEM)	958
	Springville Junior High School (Utah STEM)	1,173
	Taylor Elementary School (Utah STEM)	70
	Westside Elementary School (Utah STEM)	69
	Wilson Elementary School (Utah STEM)	151
	Total	**13,326**
	North Summit Elementary School (Utah STEM)	209

District/Charter	School	Licenses Distributed
North Summit School District	North Summit Middle School (Utah STEM)	26
	Total	**235**
Ogden School District	Ben Lomond High School (Utah STEM)	829
	Bonneville Elementary School (Utah STEM)	115
	Dee Elementary School (Utah STEM)	311
	George Washington High School (Utah STEM)	210
	Gramercy Elementary School (Utah STEM)	376
	Heritage Elementary School (Utah STEM)	705
	Highland Junior High School (Utah STEM)	422
	Hillcrest Elementary School (Utah STEM)	244
	Horace Mann Elementary School (Utah STEM)	298
	James Madison Elementary School (Utah STEM)	247
	Lincoln Elementary School (Utah STEM)	326
	Mound Fort Junior High School (Utah STEM)	629
	Mount Ogden Junior High School (Utah STEM)	1,224
	Odyssey Elementary School (Utah STEM)	306
	Ogden High School (Utah STEM)	606
	Polk Elementary School (Utah STEM)	211
	Shadow Valley Elementary School (Utah STEM)	165
	T.O. Smith Elementary School (Utah STEM)	605
	Taylor Canyon Elementary School (Utah STEM)	458
	Total	**8,287**
	Circleville Elementary School (Utah STEM)	108

District/Charter	School	Licenses Distributed
Piute County School District	Oscarson Elementary School (Utah STEM)	21
	Total	**129**
Diamond Ranch Academy (Private School)	Diamond Ranch Academy (Utah STEM)	167
	Total	**167**
Provo City School District	Centennial Middle School (Utah STEM)	300
	Provo High School (Utah STEM)	559
	Timpview High School (Utah STEM)	891
	Total	**1,750**
Salt Lake City School District	Bonneville Elementary School (Utah STEM)	466
	East High School (Utah STEM)	945
	Highland High School (Utah STEM)	46
	Horizonte Instruction and Training Center (Utah STEM)	831
	West High School (Utah STEM)	52
	Total	**2,340**
San Juan School District	Albert R. Lyman Middle School (Utah STEM)	331
	Monticello High School (Utah STEM)	241
	Monument Valley High School (Utah STEM)	304
	San Juan High School (Utah STEM)	68
	Whitehorse High School (Utah STEM)	326
	Total	**1,270**
Sevier School District	Cedar Ridge High School (Utah STEM)	48
	North Sevier High School (Utah STEM)	224
	Richfield High School (Utah STEM)	792

District/Charter	School	Licenses Distributed
	South Sevier High School (Utah STEM)	431
	Total	**1,495**
South Sanpete School District	Ephraim Elementary School (Utah STEM)	290
	Ephraim Middle School (Utah STEM)	485
	Gunnison Valley Elementary School (Utah STEM)	210
	Gunnison Valley High School (Utah STEM)	174
	Gunnison Valley Middle School (Utah STEM)	1
	Manti Elementary School (Utah STEM)	287
	Manti High School (Utah STEM)	530
	Total	**1,977**
Tooele School District	Anna Smith Elementary School (Utah STEM)	28
	Blue Peak High School (Utah STEM)	65
	Clarke N. Johnsen Junior High School (Utah STEM)	189
	Copper Canyon Elementary School (Utah STEM)	87
	Dugway Elementary School (Utah STEM)	46
	Grantsville Elementary School (Utah STEM)	115
	Grantsville High School (Utah STEM)	258
	Grantsville Junior High School (Utah STEM)	192
	Harris Elementary School (Utah STEM)	63
	Middle Canyon Elementary School (Utah STEM)	61
	Rose Springs Elementary School (Utah STEM)	132
	Settlement Canyon Elementary School (Utah STEM)	78
	Stansbury High School (Utah STEM)	314

District/Charter	School	Licenses Distributed
	Stansbury Park Elementary School (Utah STEM)	108
	Tooele Junior High School (Utah STEM)	1,168
	Wendover High School (Utah STEM)	213
	Willow Elementary School (Utah STEM)	104
	Total	**3,221**
Washington County School District	Arrowhead Elementary School (Utah STEM)	345
	Bloomington Hills Elementary School (Utah STEM)	306
	Desert Hills High School (Utah STEM)	707
	Desert Hills Middle School (Utah STEM)	902
	Diamond Valley Elementary School (Utah STEM)	175
	Dixie High School (Utah STEM)	1009
	Dixie Middle School (Utah STEM)	840
	Enterprise Elementary School (Utah STEM)	166
	Enterprise High School (Utah STEM)	399
	Horizon Elementary School (Washington) (Utah STEM)	354
	Hurricane High School (Utah STEM)	628
	Hurricane Middle School (Utah STEM)	640
	Millcreek High School (Utah STEM)	139
	Panorama Elementary School (Utah STEM)	245
	Pine View High School (Utah STEM)	771
	Pine View Middle School (Utah STEM)	917
	Santa Clara Elementary School (Utah STEM)	213
	Snow Canyon High School (Utah STEM)	767

District/Charter	School	Licenses Distributed
	Snow Canyon Middle School (Utah STEM)	823
	Springdale Elementary School (Utah STEM)	16
	Three Falls Elementary School (Utah STEM)	322
	Utah On-Line School (Utah STEM)	160
	Water Canyon School (Utah STEM)	115
	Total	**10,959**
Weber School District	A. Parley Bates School (Utah STEM)	430
	Bonneville High School (Utah STEM)	582
	Club Heights Elementary School (Utah STEM)	164
	Country View Elementary School (Utah STEM)	607
	Farr West Elementary School (Utah STEM)	1
	Freedom Elementary School (Utah STEM)	28
	Fremont High School (Utah STEM)	357
	H. Guy Child Elementary School (Utah STEM)	271
	Kanesville Elementary School (Utah STEM)	271
	Lakeview Elementary School (Utah STEM)	223
	Lomond View Elementary School (Utah STEM)	26
	Mar Lon Hills Elementary School (Utah STEM)	179
	Midland Elementary School (Utah STEM)	4
	Municipal Elementary School (Utah STEM)	231
	North Ogden Elementary School (Utah STEM)	21
	North Ogden Junior High School (Utah STEM)	524
	North Park Elementary School (Utah STEM)	120

District/Charter	School	Licenses Distributed
	Pioneer Elementary School (Utah STEM)	290
	Riverdale Elementary School (Utah STEM)	135
	Rocky Mountain Junior High School (Utah STEM)	1,054
	Roosevelt Elementary School (Utah STEM)	281
	Roy Elementary School (Utah STEM)	18
	Roy High School (Utah STEM)	1,090
	Roy Junior High School (Utah STEM)	586
	Sand Ridge Junior High School (Utah STEM)	753
	Snowcrest Junior High School (Utah STEM)	331
	South Ogden Junior High School (Utah STEM)	881
	Uintah Elementary School (Utah STEM)	52
	Valley Elementary School (Utah STEM)	360
	Wahlquist Junior High School (Utah STEM)	1,444
	Washington Terrace Elementary School (Utah STEM)	298
	Weber High School (Utah STEM)	46
	West Haven Elementary School (Utah STEM)	29
	West Weber Elementary School (Utah STEM)	331
	Total	**12,018**
Grand Total		**106,530**

Cognitive Tutor

District/Charter	School	Licenses Distributed
Charter	Early Light Academy	86
	Fast Forward Charter High	64
	Utah Connections Acad.	136
Grand Total		**286**

Catchup Math

District/Charter	School	Licenses Distributed
Daggett School District	Manila Jr-Sr High School	93
	Total	**93**
Juab School District	Juab High School	28
	Total	**28**
Park City School District	Ecker Hill Middle School	796
	Total	**796**
Grand Total		**917**

EdReady

District/Charter	School	Licenses Distributed
Duchesne School District	Union High School	1
	Total	**1**
	Kearns Junior High	86

Granite School District	Matheson Junior High	51
	Skyline High School	1
	Total	**138**
Mountain Heights Academy	Mountain Heights Academy	179
	Total	**179**
No district	No school	80
	Total	**80**
Park City School District	Park City High School	86
	Total	**86**
Wayne School District	Wayne High School	14
	Total	**14**
Grand Total		**498**

iReady

District/Charter	**School**	**Licenses Distributed**
Alpine School District	Barratt Elementary School	367
	Bonneville Elementary School	646
	Eagle Valley Elementary School	670
	Grovecrest Elementary School	595
	Manila Elementary school	211
	Mountain Ridge Jr High School	8
	Oak Canyon Junior High School	44
	Total	**2,541**

District/Charter	School	Licenses Distributed
Davis School District	Centerville Junior High School	19
	Columbia Elementary School	169
	Eagle Bay Elementary School	78
	Foxboro Elementary School	34
	Heritage elementary school	24
	Knowlton elementary school	32
	Lincoln elementary school	620
	Parkside elementary school	26
	Reading elementary school	222
	Sand springs elementary school	137
	Washington elementary school	31
	West clinton elementary sch	110
	Total	**1,502**
Duchesne School District	Altamont Elementary School	326
	Con Amore School	20
	Duchesne Elementary School	202
	East Elementary School	123
	King's Peak Elementary School	382
	Myton Elementary School	172
	Neola Elementary School	204
	Tabiona School	83
	Total	**1,512**
	Edith Bowen Laboratory	100

District/Charter	School	Licenses Distributed
Edith Bowen Laboratory	**Total**	**100**
Endeavor Hall Charter School	Endeavor Hall Charter School	43
	Total	**43**
Jordan School District	Blackridge Elementary School	159
	Elk Ridge Middle School	593
	Riverside Elementary School	6
	Total	**758**
Kane School District	Big Water Elementary School	56
	Kanab Elementary School	446
	Kanab Middle School	110
	Lake Powell School	7
	Valley Elementary School	141
	Valley High School	42
	Total	**802**
Legacy Preparatory Academy	Legacy Preparatory Academy	51
	Total	**51**
Millard School District	Delta Early Childhood Center	17
	Delta Elementary School	149
	Fillmore Elementary School	78
	Total	**244**
Murray City School District	Mcmillan Elementary School	517
	Parkside Elementary School	696
	Total	**1,213**

District/Charter	School	Licenses Distributed
North Summit School District	North Summit Elementary School	157
	Total	**157**
Provo School District	Amelia Earhart Elementary Sch	423
	Dixon Middle School	94
	Edgemont Elementary School	646
	Lakeview Elementary School	661
	Provost Elementary School	220
	Spring Creek Elementary School	285
	Timpanogos Elementary School	18
	Wasatch Elementary School	90
	Westridge Elementary School	492
	Total	**2,929**
San Juan School District	Blanding Elementary School	564
	Bluff Elementary School	116
	La Sal Elementary School	17
	Montezuma Creek Elem School	245
	Monticello Elementary School	294
	Tse'bii'nidzisgai Elementary	315
	Total	**1,551**
Sevier School District	Ashman Elementary School	526
	Koosharem Elementary School	14
	Monroe Elementary School	117
	North Sevier Middle School	254

District/Charter	School	Licenses Distributed
	Red Hills Middle School	483
	Salina Elementary School	86
	South Sevier Middle School	345
	Total	**1,825**
Soldier Hollow Charter School	Soldier Hollow Charter School	208
	Total	**208**
Utah Connections Academy	Utah Connections Academy	23
	Total	**23**
Wasatch School District	Heber Valley Elementary School	167
	J R Smith Elementary School	398
	Midway Elementary School	223
	Old Mill Elementary School	362
	Timpanogos Intermediate School	209
	Total	**1,359**
Weilenmann School Of Discovery	Weilenmann School Of Discovery	571
	Total	**571**
Grand Total		**17,389**

Math XL

District/Charter	School	Licenses Distributed
Alpine School District	American Fork High School	187

District/Charter	School	Licenses Distributed
	Lone Peak High School	1
	Mountain Ridge Jr High	11
	Pleasant Grove High School	12
	Polaris High School	55
	Westlake High School	541
	Total	**807**
Jordan School District	Copper Hills High School	66
	Herriman High School	44
	Riverton High School	302
	Total	**412**
Murray School District	Murray High School	135
	Salt Lake Community College	258
	Total	**393**
Park City School District	Park City high School	139
	Total	**139**
Success Academy	Dixie College	47
	Total	**47**
Tuacahn High School for the Performing Arts	Tuacahn High School	83
	Total	**83**
Utah Career Path High School	Career Path High	50
	Total	**50**
Wasatch School District	Wasatch High School	1,193
	Total	**1,193**

District/Charter	School	Licenses Distributed
Grand Total		**3,124**

Odyssey Math

District/Charter	School	Licenses Distributed
Summit Academy	Summit Academy	8 teachers, 0 students
Early Light Academy	Early Light Academy	2 teachers, 0 students
Oakgrove School	Oakgrove School	2 teachers, 0 students
Total		**10 teachers, 0 students**

Reflex

District/Charter	School	Licenses Distributed
Alpine School District	Mountain Ridge Jr High School	4
	Total	**4**
Canyons School District	Albion Middle School	470
	Butler Middle School	252
	Draper Park Middle School	534
	Eastmont Middle School	261
	Indian Hills Middle School	18
	Midvale Middle School	459

District/Charter	School	Licenses Distributed
	Mt Jordan Middle School	555
	Union Middle School	403
	Total	**2,952**
Charter	American Leadership Academy	175
	Early Light Academy	41
	Pinnacle Canyon Academy	119
	Total	**335**
Jordan School District	Copper Canyon Elem School	55
	Daybreak Elementary School	42
	Elk Meadows Elementary School	132
	Heartland Elementary School	28
	Majestic Elementary School	39
	Midas Creek Elementary School	246
	Total	**542**
Park City School District	Ecker Hill Middle School	133
	Total	**133**
Wasatch Co School District	Timpanogos Intermediate School	412
	Total	**412**
Grand Total		**4,378**

ST Math

District/Charter	School	Licenses Distributed
Alpine School District	Westfield Elementary	921
	Total	**921**
Davis School District	Bluff Ridge	173
	Bountiful JHS	29
	CentennialJHS	59
	Central Davis JHS	455
	Eagle Bay	981
	East Layton	223
	H C Burton	305
	Kaysville JHS	26
	Knowlton	119
	Legacy JHS	7
	Meadowbrook	76
	Millcreek JHS	57
	Mueller Park JHS	38
	North Layton JHS*	22
	Oak Hills	79
	Sunset JHS*	6
	Taylor	54
	West Point JHS*	60
	Total	**2,769**
Dual Immersion Academy	Dual Immersion Academy*	132
	Total	**132**

District/Charter	School	Licenses Distributed
Emery School	Book Cliff ES	50
	Canyon View JHS	196
	Cleveland ES	36
	Green River HS	127
	Huntington ES	62
	San Rafael JHS	13
	Total	**484**
Granite School District	Armstrong Academy	907
	Bacchus Elementary	690
	Beehive Elementary	832
	Bennion Elementary	671
	Bonneville JHS	106
	Crestview Elementary	22
	Diamond Ridge	935
	Driggs Elementary	671
	Eisenhower JHS	53
	Elk Run Elementary	702
	Hunter Elementary	622
	Hunter JHS	182
	Kearns JHS	128
	Magna Elementary	527
	Mill Creek ES	54
	Moss Elementary	731

District/Charter	School	Licenses Distributed
	Plymouth Elementary	662
	Rolling Meadows Elementary	446
	Roosevelt Elementary	734
	Silver Hills Elementary	493
	Spring Lane Elementary	469
	Truman Elementary	362
	Westbrook Elementary	634
	Total	**11,633**
IRON CO SCHOOL	Cedar MS	25
	Total	**25**
Jordan	Foothills Elementary	822
	Midas Creek ES	92
	Total	**914**
Juab School District	Mona Elementary	70
	Nebo View Elementary	46
	Red Cliffs Elementary	206
	Total	**322**
Legacy Preparatory Academy	Legacy Prep. Acad.	15
	Total	**15**
North Summit	North Summit Elem	271
	Total	**271**
Oaksprings School	Oaksprings School	84
	Total	84

District/Charter	School	Licenses Distributed
Piute School District	Circleville Elementary	119
	Oscarson Elementary	43
	Total	**162**
Salt Lake Arts Academy	Salt Lake Arts Academy	252
	Total	**252**
Salt Lake City School District	Backman Elem.	672
	Beacon Heights Elem.	651
	Bennion Elem.	310
	Bonneville Elem.	618
	Dilworth Elem.	579
	Edison Elem.	747
	Emerson Elem.	455
	Ensign Elem.	398
	Escalante Elem.	602
	Franklin Elem.	589
	Hawthorne Elem.	506
	Highland Park Elem.	361
	Indian Hills Elem.	57
	Jackson Elem.	758
	Lincoln Elem.	369
	Meadowlark Elem.	696
	Mountain View Elem.	721
	Newman Elem.	512

District/Charter	School	Licenses Distributed
	Nibley Park Elem.	399
	North Star Elem.	754
	Open Classroom	283
	Parkview Elem.	507
	Riley Elem.	340
	Rose Park Elem.	569
	Uintah Elem.	629
	Wasatch Elem.	564
	Washington Elem.	514
	Whittier Elem.	796
	Total	**14,956**
South Summit School District	South Summit Elementary	695
	Total	**695**
Tooele School District	Copper Canyon ES	633
	Dugway HS	31
	Granstville JHS	35
	Middle Canyon ES	97
	Rose Springs ES	74
	Stansbury Park ES	607
	Tooele JHS	569
	Willow ES	13
	Total	**2,059**
	Weilenmann School of Discovery	633

District/Charter	School	Licenses Distributed
Weilenmann School of Discovery	**Total**	**633**
Grand Total		**36,327**

SuccessMaker

Although there were approximately 1,500 student licenses requested, but it took until late spring for the STEM Action Center to finalize the contract with Pearson. By the end of the academic year, there was no evidence from the provider that any students used or received the product through this grant program for SuccessMaker.

Think Through Math

District/Charter	School	Licenses Distributed
Alpine School District	Canyon View	183
	Manila Elementary	115
	Mountain Ridge Junior High	172
	Vista Heights Middle School	214
	Willowcreek Middle School	1,520
	Total	**2,204**
Canyon Grove Academy	Canyon Grove Academy	189
	Total	**189**

District/Charter	School	Licenses Distributed
Canyons School District	Albion Middle School	77
	Butler Middle School	197
	Draper Park Middle School	129
	Eastmont Middle School	255
	Indian Hills Middle School	38
	Midvale Middle School	295
	Mount Jordan Middle School	715
	Union Middle School	1
	Total	**1,707**
Davis School District	Antelope Elementary	440
	Bluff Ridge Elementary	123
	Boulton Elementary	279
	Burton Elementary	449
	Centerville Elementary	27
	Columbia Elementary	386
	Creekside Elementary	98
	Davis Connect	49
	Doxey Elementary	220
	Eagle Bay Elementary	54
	East Layton Elementary	305
	Ellison Park Elementary	243
	Endeavour Elementary	607
	Fairfield Junior High	65

District/Charter	School	Licenses Distributed
	Foxboro Elementary	40
	Fremont Elementary	157
	Hill Field Elementary	134
	Holt Elementary	276
	Kaysville Elementary	400
	King Elementary	76
	Lakeside Elementary	115
	Legacy Junior High	52
	Mountain View Elementary	368
	Mueller Park Junior High	49
	Muir Elementary	369
	North Davis Junior High	631
	North Layton Junior High	20
	Orchard Elementary	416
	Parkside Elementary School	158
	Sand Springs Elementary	51
	Snow Horse Elementary	234
	South Clearfield Elementary	198
	South Weber Elementary	86
	Sunset Elementary	195
	Taylor Elementary	167
	Vae View Elementary	224
	Valley View Elementary	289

District/Charter	School	Licenses Distributed
	Wasatch Elementary School	262
	West Bountiful Elementary	89
	West Point Junior High	358
	Woods Cross Elementary	88
	Total	**8,847**
John Hancock Charter School	John Hancock Charter School	158
	Total	**158**
Jordan School District	Bluffdale Elementary School	26
	Copper Mountain Middle School	1,229
	Daybreak Elementary	605
	Eastlake Elementary School	619
	Elk Meadows Elementary School	153
	Fort Herriman Middle School	7
	Fox Hollow Elementary	25
	Jordan Ridge Elementary School	125
	Oquirrh Hills Middle School	22
	Riverton Elementary School	1
	South Hills Middle School	2
	West Hills Middle School	367
	Total	**3,181**
Juab School District	Juab High School	27
	Juab Junior High School	346
	Mona Elementary	66

District/Charter	School	Licenses Distributed
	Nebo View Elementary	44
	Red Cliffs Elementary	81
	Total	**564**
Logan City School District	Mount Logan Middle School	881
	Total	**881**
Mountain West Montessori Academy	Mountain West Montessori Academy	202
	Total	**202**
Salt Lake City School District	Bryant Middle School	417
	Clayton Middle School	89
	Glendale Middle School	420
	Hillside Middle School	148
	Horizonte	27
	Nibley Park	138
	Northwest Middle School	319
	Salt Lake Center for Science Education	59
	Total	**1,617**
Summit Academy	Summit Academy	91
	Total	**91**
Washington School District	Enterprise Elementary School	1
	Enterprise High School	71
	Fossil Ridge Intermediate School	862
	Hurricane Intermediate	463
	Lava Ridge Intermediate	891

District/Charter	School	Licenses Distributed
	Moved Students	7
	Sunrise Ridge Intermediate School	927
	Tonaquint Intermediate School	710
	Utah On-Line K-8	161
	Water Canyon School	30
	Total	**4,123**
Grand Total		**23,764**

Grade 7 and 8 Applied Science Grant Program

ITEEA Licenses Distributed

District/ Charter	ITEEA Licenses
Alpine School District	3,981
Davis District and Morgan District	20,217
Ogden Prep. Academy	220
Total	**24,418**

Pitsco Licenses Distributed

Pitsco did not provide a participant data file as requested with a list of student users, districts, and schools, so we are not able to provide that information here at this time. We are working with the STEM

Action Center and the provider to ensure that they are able to provide a participant list for the 2015-16 school year. The expectations have also been set with each district and school that they work with the provider to get lists of student users into the online system so that they can generate the participant list.

Project Lead the Way Licenses Distributed

Project Lead the Way did not provide a participant file as requested with a list of student users, districts, and schools so we are not able to provide that information here at this time. We are working with the STEM Action Center and the provider to ensure that they are able to provide a participant list for the 2015-16 school year. The expectations have also been set with each district and school that they work with the provider to get lists of student users into the online system, so that Project Lead the Way can generate the participant list.

However, we did receive a spreadsheet that included the identified the numbers of teachers trained and the numbers of student users. This information was summary information and did not include evidence of usernames or access to materials. However, we provide this summary information here for documentation.

LEA (Local Education Agency)	Design & Modeling Number of Teachers Trained	Automation & Robotics Number of Teachers Trained	Number of Students
Alpine School District			
NA	3	NA	Not implementing
American International Academy			
American International Academy	1	1	37
Beehive Science & Technology Academy			

LEA (Local Education Agency)	Design & Modeling Number of Teachers Trained	Automation & Robotics Number of Teachers Trained	Number of Students
Beehive Science & Technology Academy	0	1	24
Davis/Morgan School District			
North Davis Junior High	1	1	No data available
Central Davis Junior High	1	1	109
Fairfield Junior High	1	1	No data available
Duchesne County School District - not implementing at this time			
Not implementing	Not implementing	Not implementing	Not implementing
Jordan School District			
Fort Herriman Middle School	1	1	Not implementing
Oquirrh Hills Middle School	1	1	Not implementing
West Hills Middle School	1	1	Not implementing
West Jordan Middle School	1	0	Not implementing
Uintah School District			
Vernal Middle School	2	0	283
Weber School District			
Sandridge Junior High School	1	0	0
Rocky Mountain Jr. High	0	0	103

LEA (Local Education Agency)	Design & Modeling Number of Teachers Trained	Automation & Robotics Number of Teachers Trained	Number of Students
Roy Jr. High	0	0	47
T.H. Bell Jr. High	0	0	46
Orion Jr. High	0	0	71
South Ogden Jr. High	0	0	93
Snowcrest Jr. High	0	0	20
Wahlquist Jr. High	0	0	57
North Ogden Jr. High	0	0	0
TOTALS	**14**	**8**	**890**

STEM Academy Licenses Distributed

STEM Academy did not provide us with a participant data file as requested with a list of student users, districts, and schools so we are not able to provide that information here at this time. They did provide us with a list of usernames. However, that is not sufficient documentation that actual students used the program. Just because usernames exist, unless we have student names associated, we cannot know for sure if those students ever received those usernames. However, we provide a summary of the information the STEM Academy provided to understand the number of usernames given to schools and the number of student users with logins:

District	Licenses	Student Users
Cache County School District	**700**	**36**
Granite School District	**5,099**	**361**

Mountainville Academy	**57**	**2**
Murray School District	**475**	**0**
Northeastern Utah (Daggett, Park City, Rich, South Summit, and Wasatch Districts)	**2,286**	**0**
Salt Lake City District	**6,600**	**22**
Southeast Education Center (**Emery, Grand & San Juan** Districts)	**1,652**	**6**
Tooele County School District	**1,148**	**20**
Total	**18,017**	**447**

During the 2014-15 academic year, it was dependent on teachers to put names into the online system to be able to track specific students served. Since this was not an expectation shared with teachers by the district lead, very few teachers entered students into the system.

We are working with the STEM Action Center and the provider to ensure that they are able to provide a participant list for the 2015-16 school year. The expectations have also been set with each district and school that they work with the provider to get lists of student users into the online system so that they can generate the participant list.

Professional Learning Grant Program

Scholastic/Teaching Channel Licenses Distributed

District/Charter School	School	Licenses Distributed
Box Elder School District	Alice C. Harris Intermediate School	1
	Bear River High School	4
	Box Elder Middle School	1
	School District	24
	Total	**30**

District/Charter School	School	Licenses Distributed
Charter	Mountainville Academy	23
	Total	**23**
Jordan School District	Blackridge	1
	Fox Hollow School	1
	Herriman	1
	Jordan Hills	1
	Midas Creek	1
	Mountain Shadows School	1
	Oakcrest School	1
	Rose Creek School	3
	Silver Crest	1
	Sunset Ridge Middle School	1
	Total	**12**
Grand Total		**66**

School Improvement Network Edivate Licenses Distributed

Unlike Scholastic who was able to provide a user-level participant file, School Improvement Network provided a user file of summary information with counts of licenses distributed by district and school. What is not clear is whether Edivate generated these usernames or if actual teachers received these licenses. We have worked with the STEM Action Center and with SCINET to get user-level data with teacher names for teachers who receive licenses for the 2015-16 school year. In the table below, we summarize the licenses distributed during the 2014-15 school year according to the summary level data that SCINET provided.

District/Charter	School	Licenses Distributed
ALPINE SCHOOL DISTRICT	*CENTRAL OFFICE	19
	ALPINE ELEMENTARY SCHOOL	33
	AMERICAN FORK HIGH	15
	AMERICAN FORK JR HIGH	3
	ASPEN ELEMENTARY SCHOOL	23
	BARRATT ELEMENTARY SCHOOL	29
	CANYON VIEW JR HIGH	4
	CENTRAL ELEMENTARY SCHOOL	32
	EAGLE VALLEY ELEMENTARY SCHOOL	42
	FOOTHILL ELEMENTARY SCHOOL	34
	FOX HOLLOW ELEMENTARY SCHOOL	46
	FREEDOM ELEMENTARY SCHOOL	52
	FRONTIER MIDDLE SCHOOL	5
	GREENWOOD ELEMENTARY SCHOOL	1
	GROVECREST ELEMENTARY SCHOOL	35
	HARVEST ELEMENTARY SCHOOL	37
	HIGHLAND ELEMENTARY SCHOOL	38
	LAKERIDGE JR HIGH	2
	LEHI ELEMENTARY SCHOOL	31
	LEHI HIGH	12
	LEHI JR HIGH	69

District/Charter	School	Licenses Distributed
	LINDON ELEMENTARY SCHOOL	35
	LONE PEAK HIGH	1
	MANILA ELEMENTARY SCHOOL	46
	MEADOW ELEM SCH	34
	MOUNTAIN RIDGE JR HIGH	71
	MOUNTAIN TRAILS ELEMENTARY SCHOOL	25
	MOUNTAIN VIEW HIGH	8
	NORTH POINT ELEMENTARY	1
	NORTHRIDGE ELEM SCH	36
	OAK CANYON JR HIGH	13
	OREM HIGH	3
	OREM JR HIGH	7
	PLEASANT GROVE HIGH	2
	PLEASANT GROVE JR HIGH	1
	POLARIS HIGH SCHOOL	3
	PONY EXPRESS ELEM SCH	38
	RIVERVIEW ELEMENTARY	35
	ROCKY MOUNTAIN ELEM SCH	30
	SCERA PARK ELEM SCH	27
	SHARON ELEM SCH	27
	SHELLEY ELEM SCH	34
	SUMMIT HIGH (YIC)	1
	TIMBERLINE MIDDLE	7

District/Charter	School	Licenses Distributed
	TIMPANOGOS HIGH	4
	VINEYARD ELEM SCH	46
	VISTA HEIGHTS MIDDLE	66
	WESTLAKE HIGH	11
	WILLOWCREEK MIDDLE	3
	TOTAL	**1,177**
BEAVER SCHOOL DISTRICT	*CENTRAL OFFICE	2
	BEAVER HIGH	26
	BELKNAP ELEM SCH	29
	MILFORD ELEM SCH	14
	MILFORD HIGH	15
	MINERSVILLE ELEM SCH	13
	TOTAL	**99**
BEEHIVE SCI & TECH ACAD (BSTA)	*CENTRAL OFFICE	22
	TOTAL	**22**
CACHE SCHOOL DISTRICT	*CENTRAL OFFICE	19
	BRICH CREEK ELEM	28
	CACHE HIGH	17
	CANYON ELEM	23
	CEDAR RIDGE MIDDLE	34
	GREENVILLE ELEM	30
	HERITAGE ELEM	27
	LEWISTON ELEM	25

District/Charter	School	Licenses Distributed
	LINCOLN ELEM	24
	MILLVILLE ELEM	22
	MOUNTAIN CREST HIGH	85
	MOUNTAINSIDE ELEMENTARY	23
	NIBLEY ELEM	19
	NORTH CACHE CENTER	52
	NORTH PARK ELEM	24
	PARK ELEM	17
	PROVIDENCE ELEM	26
	RIVER HEIGHTS ELEM	23
	SKY VIEW HIGH	93
	SOUTH CACHE CENTER	60
	SPRING CREEK MIDDLE	32
	SUMMIT ELEM	23
	SUNRISE ELEM	25
	WELLSVILLE ELEM	17
	WHITE PINE MIDDLE	27
	WILLOW VALLEY MIDDLE	34
	TOTAL	**829**
CANYONS SCHOOL DISTRICT	*Central Office	147
	ALBION MIDDLE	48
	ALTA HIGH	133
	ALTA VIEW ELEM	27

District/Charter	School	Licenses Distributed
	ALTARA ELEM	27
	BELL VIEW ELEM	22
	BELLA VISTA ELEM	20
	BRIGHTON HIGH	115
	BROOKWOOD ELEM	23
	BUTLER ELEM	27
	BUTLER MIDDLE	51
	CANYON VIEW ELEM	22
	COPPERVIEW ELEM	32
	CORNER CANYON HIGH SCHOOL	105
	CRESCENT ELEM	33
	CTEC HIGH	34
	DRAPER ELEM	32
	DRAPER PARK MIDDLE	71
	EAST MIDVALE ELEM	35
	EAST SANDY ELEM	24
	EASTMONT MIDDLE	49
	EDGEMONT ELEM	25
	ENTRADA ADULT HIGH SCHOOL	8
	GRANITE ELEM	26
	HILLCREST HIGH	115
	INDIAN HILLS MIDDLE	57
	JORDAN HIGH	105

District/Charter	School	Licenses Distributed
	JORDAN VALLEY	39
	LONE PEAK ELEM	34
	MIDVALE ELEM	49
	MIDVALE MIDDLE	55
	MIDVALLEY ELEM	25
	MOUNT JORDAN MIDDLE	46
	OAK HOLLOW ELEM	32
	OAKDALE ELEM	22
	PARK LANE ELEM	25
	PERUVIAN PARK ELEM	30
	PRESCHOOL	16
	QUAIL HOLLOW ELEM	28
	RIDGECREST ELEM	28
	SANDY ELEM	31
	SILVER MESA ELEM	31
	SOUTH PARK ACADEMY	20
	SPRUCEWOOD ELEM	30
	SUNRISE ELEM	31
	UNION MIDDLE	50
	WILLOW CANYON ELEM	24
	WILLOW SPRINGS ELEM	37
	TOTAL	**2,096**
	*CENTRAL OFFICE	12

District/Charter	School	Licenses Distributed
CARBON SCHOOL DISTRICT	BRUIN POINT ELEMENTARY	10
	CARBON HIGH	44
	CASTLE HEIGHTS ELEMENTARY	27
	CASTLE VALLEY CENTER	9
	CREEKVIEW ELEMENTARY	26
	HELPER MIDDLE	13
	LIGHTHOUSE HIGH	13
	MONT HARMON MIDDLE	32
	SALLY MAURO ELEMENTARY	21
	WELLINGTON ELEMENTARY	18
	TOTAL	**225**
DAGGETT SCHOOL DISTRICT	*CENTRAL OFFICE	1
	FLAMING GORGE ELEM SCH	1
	MANILA ELEM SCHOOL	15
	MANILA HIGH	14
	TOTAL	**31**
DAVIS SCHOOL DISTRICT	*CENTRAL OFFICE	50
	ADAMS ELEM SCH	25
	ADELAIDE ELEM SCH	27
	ANTELOPE ELEM SCH	33
	BLUFF RIDGE ELEM SCH	39
	BOULTON ELEM SCH	24
	BOUNTIFUL ELEM SCH	22

District/Charter	School	Licenses Distributed
	BOUNTIFUL HIGH	73
	BOUNTIFUL JR HIGH	32
	BUFFALO POINT ELEMENTARY	41
	CENTENNIAL JR HIGH	59
	CENTERVILLE ELEM SCH	23
	CENTERVILLE JR HIGH	49
	CENTRAL DAVIS JR HIGH	44
	CLEARFIELD HIGH	89
	CLINTON ELEM SCH	19
	COLUMBIA ELEM SCH	29
	COOK ELEM SCH	35
	CREEKSIDE ELEM SCH	31
	CRESTVIEW ELEM SCH	18
	DAVIS HIGH	109
	DOXEY ELEM SCH	20
	EAGLE BAY ELEM SCH	38
	EAST LAYTON ELEM SCH	24
	ELLISON PARK ELEMENTARY	37
	ENDEAVOUR ELEMENTARY	43
	FAIRFIELD JR HIGH	52
	FARMINGTON ELEM SCH	21
	FARMINGTON JR HIGH	44
	FOXBORO ELEMENTARY	24

District/Charter	School	Licenses Distributed
	FREMONT ELEM SCH	17
	H C BURTON ELEM SCH	37
	HERITAGE ELEM SCH	40
	HILL FIELD ELEM SCH	22
	HOLBROOK ELEM SCH	19
	HOLT ELEM SCH	24
	J A TAYLOR ELEM SCH	14
	KAYSVILLE ELEM SCH	28
	KAYSVILLE JR HIGH	47
	KING ELEM SCH	27
	KNOWLTON ELEM SCH	33
	LAKESIDE ELEM SCH	36
	LAYTON ELEM SCH	27
	LAYTON HIGH	88
	LEGACY JR HIGH	56
	LEO J MUIR ELEM SCH	21
	LINCOLN ELEM SCH	32
	MEADOWBROOK ELEM SCH	19
	MILLCREEK JR HIGH	34
	MORGAN ELEM SCH	29
	MOUNTAIN HIGH	31
	MOUNTAIN VIEW ELEM SCH	34
	MUELLER PARK JR HIGH	36

District/Charter	School	Licenses Distributed
	NORTH DAVIS JR HIGH	57
	NORTH LAYTON JR HIGH	48
	NORTHRIDGE HIGH	91
	OAK HILLS ELEM SCH	17
	ODYSSEY ELEMENTARY	24
	ORCHARD ELEM SCH	28
	PARKSIDE ELEMENTARY	24
	READING ELEM SCH	22
	RENAISSANCE ACADEMY	6
	SAND SPRINGS SCHOOL	44
	SNOW HORSE ELEMENTARY	33
	SOUTH CLEARFIELD ELEM SCH	27
	SOUTH DAVIS JR HIGH	51
	SOUTH WEBER ELEM SCH	29
	STEPS	5
	STEWART ELEM SCH	29
	SUNSET ELEM SCH	19
	SUNSET JR HIGH	46
	SYRACUSE ELEM SCH	39
	SYRACUSE HIGH SCHOOL	96
	SYRACUSE JR HIGH	51
	TOLMAN ELEM SCH	18
	VAE VIEW ELEM SCH	20

District/Charter	School	Licenses Distributed
	VALLEY VIEW ELEM SCH	23
	VIEWMONT HIGH	89
	WASATCH ELEM SCH	22
	WASHINGTON ELEM SCH	15
	WEST BOUNTIFUL ELEM SCH	26
	WEST CLINTON ELEM SCH	34
	WEST POINT ELEM SCH	31
	WEST POINT JR HIGH	56
	WHITESIDES ELEM SCH	19
	WINDRIDGE ELEM SCH	28
	WOODS CROSS ELEM SCH	26
	WOODS CROSS HIGH	74
	TOTAL	**3,192**
EMERY SCHOOL DISTRICT	*CENTRAL OFFICE	4
	BOOK CLIFF ELEM SCH	3
	CANYON VIEW JR HIGH	3
	CASTLE DALE ELEM SCH	3
	CLEVELAND ELEM SCH	4
	COTTONWOOD ELEM SCH	4
	EMERY HIGH	4
	FERRON ELEM SCH	5
	GREEN RIVER HIGH	4
	HUNTINGTON ELEM SCH	6

District/Charter	School	Licenses Distributed
	SAN RAFAEL JR HIGH	4
	TOTAL	**44**
EXCELSIOR ACADEMY	EXCELSIOR ACADEMY	34
	TOTAL	**34**
GRANITE SCHOOL DISTRICT	*CENTRAL OFFICE	91
	*DEPT OF TEACHING & LEARNING	55
	*STAFF DEVELOPMENT-PLAN	2
	ACADEMY PARK ELEMENTARY	4
	ADULT HIGH - UNDER 18	2
	ALTER SAFE SCH-JR HIGH	1
	ALTER SAFE SCH-SR HIGH	1
	ARCADIA ELEMENTARY	3
	ARTEC (NON-CUSTODIAL)	1
	BEEHIVE ELEMENTARY	41
	BENNION ELEMENTARY	8
	BENNION JR HIGH	9
	BONNEVILLE JR HIGH	8
	BROCKBANK JR HIGH	7
	CALVIN S SMITH ELEMENTARY	9
	CARL SANDBURG ELEMENTARY	7
	CENTRAL HIGH	1
	CHURCHILL JR HIGH	3
	COPPER HILLS ELEMENTARY	3

District/Charter	School	Licenses Distributed
	COTTONWOOD ELEMENTARY	3
	COTTONWOOD HIGH	12
	CRESTVIEW ELEMENTARY	6
	CYPRUS HIGH	14
	DAVID GOURLEY ELEMENTARY	36
	DIAMOND RIDGE ELEMENTARY	2
	DOUGLAS T ORCHARD ELEMENTARY	7
	EASTWOOD ELEMENTARY	2
	EISENHOWER JR HIGH	68
	EVERGREEN JR HIGH	8
	FOX HILLS ELEMENTARY	9
	FOX HILLS MAGNET SCHOOL	1
	GEARLD WRIGHT ELEMENTARY	6
	GRANGER ELEMENTARY	14
	GRANGER HIGH	76
	GRANITE CONNECTION HIGH	1
	GRANITE PARK JR HIGH	10
	GRANITE PEAKS HIGH SCHOOL	30
	GRANITE TECHNICAL INSTITUTE (CTE)	1
	GRANITE TRANSITION SERVICES	2
	HARRY S TRUMAN ELEMENTARY	5
	HARTVIGSEN SCHOOL	3
	HEADSTART-PRESCH SP ED	2

District/Charter	School	Licenses Distributed
	HILLSDALE ELEMENTARY	45
	HILLSIDE ELEMENTARY	39
	HMBD. & HOSPITALIZED	2
	HOWARD R DRIGGS ELEMENTARY	3
	HUNTER ELEMENTARY	5
	HUNTER HIGH	92
	HUNTER JR HIGH	12
	JACKLING ELEMENTARY	3
	JAMES E MOSS ELEMENTARY	7
	JIM BRIDGER ELEMENTARY	5
	JOHN C FREMONT ELEMENTARY	4
	JOHN F KENNEDY JR HIGH	12
	JONES CENTER V & A	2
	KEARNS HIGH	16
	KEARNS JR HIGH	5
	LAKE RIDGE ELEMENTARY	3
	LINCOLN ELEMENTARY	13
	MAGNA ELEMENTARY	5
	MILL CREEK ELEMENTARY	4
	MONROE ELEMENTARY	12
	MORNINGSIDE ELEMENTARY	4
	MORNINGSIDE MAGNET SCHOOL	1
	OAKRIDGE ELEMENTARY	4

District/Charter	School	Licenses Distributed
	OAKWOOD ELEMENTARY	8
	OBSERV & ASSESS CT-SR HIGH	1
	OLYMPUS HIGH	16
	OLYMPUS JR HIGH	2
	OQUIRRH HILLS ELEMENTARY	27
	PHILO T FARNSWORTH ELEMENTARY	16
	PIONEER ELEMENTARY	5
	PLEASANT GREEN ELEMENTARY	4
	PLYMOUTH ELEMENTARY	7
	REDWOOD ELEMENTARY	8
	ROBERT FROST ELEMENTARY	32
	ROLLING MEADOWS ELEMENTARY	34
	ROOSEVELT ELEMENTARY	2
	ROSECREST ELEMENTARY	6
	SALT LAKE CO DETNTN CTR-JR HIGH	2
	SCOTT M MATHESON JR HIGH	13
	SILVER HILLS ELEMENTARY	1
	SKYLINE HIGH	9
	SOUTH KEARNS ELEMENTARY	10
	SPEECH ONLY	1
	SPRING LANE ELEMENTARY	2
	STANSBURY ELEMENTARY	9
	TAYLORSVILLE ELEMENTARY	40

District/Charter	School	Licenses Distributed
	TAYLORSVILLE HIGH	110
	TEEN PARENT	2
	THOMAS JEFFERSON JR HIGH	12
	THOMAS W BACCHUS ELEMENTARY	8
	TWIN PEAKS ELEMENTARY	8
	UPLAND TERRACE ELEMENTARY	6
	VALLEY CREST ELEMENTARY	9
	VALLEY JR HIGH	16
	VISTA ELEMENTARY	5
	WASATCH JR HIGH	4
	WEST KEARNS ELEMENTARY	4
	WEST LAKE JR HIGH	66
	WEST VALLEY ELEMENTARY	4
	WESTBROOK ELEMENTARY	8
	WESTERN HILLS ELEMENTARY	9
	WHITTIER ELEMENTARY	6
	WILLIAM PENN ELEMENTARY	21
	WOODROW WILSON ELEMENTARY	59
	WOODSTOCK ELEMENTARY	6
	TOTAL	**1,490**
IRON SCHOOL DISTRICT	*CENTRAL OFFICE	3
	CANYON VIEW MIDDLE	44
	CEDAR HIGH	4

District/Charter	School	Licenses Distributed
	NORTH ELEMENTARY	21
	PAROWAN HIGH	1
	TOTAL	**73**
JORDAN SCHOOL DISTRICT	SILVER CREST ELEM	2
	TOTAL	**2**
JUAB SCHOOL DISTRICT	*CENTRAL OFFICE	4
	JUAB HIGH	31
	JUAB JR. HIGH	19
	MONA ELEMENTARY	17
	NEBO VIEW ELEMENTARY	15
	RED CLIFFS ELEMENTARY	24
	TOTAL	**110**
LOGAN SCHOOL DISTRICT	*CENTRAL OFFICE	6
	ADAMS ELEMENTARY	16
	BRIDGER ELEMENTARY	24
	ELLIS ELEMENTARY	16
	HILLCREST ELEMENTARY	20
	LOGAN HIGH	83
	MT LOGAN MIDDLE	69
	WILSON ELEMENTARY	21
	WOODRUFF ELEMENTARY	28
	TOTAL	**283**
	*CENTRAL OFFICE	15

District/Charter	School	Licenses Distributed
MOAB COMMUNITY SCHOOL	**TOTAL**	**15**
MONTICELLO ACADEMY	MONTICELLO ACADEMY	51
	TOTAL	**51**
MURRAY SCHOOL DISTRICT	*CENTRAL OFFICE	9
	GRANT ELEMENTARY	31
	HILLCREST JR HIGH	58
	HORIZON ELEMENTARY	65
	LIBERTY ELEMENTARY	38
	LONGVIEW ELEMENTARY	32
	MC MILLAN ELEMENTARY	42
	MURRAY HIGH	136
	PARKSIDE ELEMENTARY	54
	RIVERVIEW JR HIGH	69
	VIEWMONT ELEMENTARY	40
	TOTAL	**574**
NORTH SANPETE SCHOOL DISTRICT	*CENTRAL OFFICE	4
	FAIRVIEW ELEM SCH	16
	FOUNTAIN GREEN ELEM SCH	9
	MORONI ELEM SCH	15
	MT PLEASANT ELEM SCH	23
	NORTH SANPETE HIGH	34
	NORTH SANPETE MIDDLE	23
	PLEASANT CREEK HIGH SCHOOL	6

District/Charter	School	Licenses Distributed
	SPRING CITY ELEM SCH	8
	TOTAL	**138**
NORTH SUMMIT SCHOOL DISTRICT	*CENTRAL OFFICE	5
	NORTH SUMMIT ELEM SCH	21
	NORTH SUMMIT HIGH	21
	NORTH SUMMIT MIDDLE	18
	TOTAL	**65**
NEBO SCHOOL DISTRICT	*CENTRAL OFFICE	31
	ART CITY ELEM SCH	4
	BARNETT ELEM SCH	8
	BROCKBANK ELEM SCH	9
	BROOKSIDE ELEM SCH	12
	CANYON ELEM SCH	4
	CHERRY CREEK ELEMENTARY	6
	DIAMOND FORK JUNIOR HIGH	11
	EAST MEADOWS ELEMENTARY	8
	FOOTHILLS ELEMENTARY	7
	GOSHEN ELEM SCH	4
	HOBBLE CREEK ELEM SCH	1
	LANDMARK HIGH	8
	LARSEN ELEM SCH	5
	MAPLE MOUNTAIN HIGH	4
	MAPLETON ELEM SCH	4

District/Charter	School	Licenses Distributed
	MAPLETON JUNIOR HIGH	8
	MT LOAFER ELEM SCH	6
	MT. NEBO JUNIOR HIGH	8
	OAKRIDGE SCHOOL--NEBO	2
	ORCHARD HILLS ELEMENTARY	6
	PARK ELEM SCH	8
	PARKVIEW ELEM SCH	5
	PAYSON HIGH	7
	PAYSON JR HIGH	8
	REES ELEM SCH	14
	RIVERVIEW ELEM SCH	4
	SAGE CREEK ELEM SCH	7
	SALEM ELEM SCH	2
	SALEM HILLS HIGH	9
	SALEM JR HIGH	1
	SANTAQUIN ELEM SCH	9
	SPANISH FORK HIGH	8
	SPANISH FORK JR HIGH	8
	SPANISH OAKS ELEM SCH	4
	SPRING LAKE ELEM SCH	13
	SPRINGVILLE HIGH	3
	SPRINGVILLE JR HIGH	10
	TAYLOR ELEM SCH	6

District/Charter	School	Licenses Distributed
	WESTSIDE ELEM SCH	17
	WILSON ELEM SCH	3
	TOTAL	**302**
NOAH WEBSTER ACADEMY	NOAH WEBSTER ACADEMY	31
	TOTAL	**31**
NORTHERN UTAH ACAD FOR MATH ENGIN & SCI	NO UT ACAD FOR MATH ENGIN & SCI (NUAMES)	39
	TOTAL	**39**
OGDEN SCHOOL DISTRICT	POLK ELEM SCH	1
	TOTAL	**1**
PARK CITY SCHOOL DISTRICT	*CENTRAL OFFICE	5
	ECKER HILL MIDDLE	54
	JEREMY RANCH ELEM SCH	36
	MC POLIN ELEM SCH	33
	PARK CITY HIGH	69
	PARK CITY LEARNING CTR	11
	PARLEYS PARK ELEM SCH	38
	TRAILSIDE ELEM SCH	37
	TREASURE MTN MIDDLE	45
	TOTAL	**328**
PINNACLE CANYON ACAD AGENCY	PINNACLE CANYON ACADEMY	43
	TOTAL	**43**
PIUTE SCHOOL DISTRICT	*CENTRAL OFFICE	3
	CIRCLEVILLE ELEMENTARY	8

District/Charter	School	Licenses Distributed
	OSCARSON ELEMENTARY	3
	PIUTE HIGH	13
	TOTAL	**27**
PROVIDENCE HALL	PROVIDENCE HALL	122
	TOTAL	**122**
PROVO SCHOOL DISTRICT	*CENTRAL OFFICE	77
	AMELIA EARHART ELEM SCH	29
	CANYON CREST ELEM SCH	29
	CENTENNIAL MIDDLE	47
	DIXON MIDDLE	47
	E-SCHOOL	5
	EAST BAY POST HIGH SCHOOL	6
	EDGEMONT ELEM SCH	31
	FRANKLIN ELEM SCH	26
	INDEPENDENCE HIGH	23
	LAKEVIEW ELEM	35
	OAK SPRINGS SCH (ELEM-SEC)	9
	PROVO ADULT EDUCATION	8
	PROVO HIGH	90
	PROVO PEAKS ELEMENTARY	39
	PROVOST ELEM SCH	20
	ROCK CANYON ELEM SCH	29
	SLATE CANYON DTN HOME	14

District/Charter	School	Licenses Distributed
	SPRING CREEK ELEM SCH	33
	SUNRISE PRESCHOOL	17
	SUNSET VIEW ELEM SCH	29
	TIMPANOGOS ELEM SCH	38
	TIMPVIEW HIGH	101
	WASATCH ELEM SCH	45
	WESTRIDGE ELEM SCH	41
	TOTAL	**868**
RICH SCHOOL DISTRICT	*CENTRAL OFFICE	9
	NO RICH ELEM SCH	13
	RICH HIGH	15
	RICH MIDDLE	7
	SOUTH RICH ELEM SCH	14
	TOTAL	**58**
SOUTH SANPETE SCHOOL DISTRICT	*CENTRAL OFFICE	8
	EPHRAIM ELEM SCH	28
	EPHRAIM MIDDLE	28
	GUNNISON VALLEY ELEM SCH	28
	GUNNISON VALLEY HIGH	25
	GUNNISON VALLEY MIDDLE	22
	MANTI ELEM SCH	23
	MANTI HIGH	39
	SANPETE ACADEMY	1

District/Charter	School	Licenses Distributed
	UTAH PREPARATORY ACADEMY (YIC)	10
	TOTAL	**212**
SOUTH SUMMIT SCHOOL DISTRICT	*CENTRAL OFFICE	4
	SOUTH SUMMIT ELEM SCH	37
	SOUTH SUMMIT HIGH	29
	SOUTH SUMMIT MIDDLE	30
	TOTAL	**100**
SAN JUAN SCHOOL DISTRICT	*CENTRAL OFFICE	10
	ALBERT R LYMAN MIDDLE	20
	BLANDING ELEMENTARY	30
	BLUFF ELEMENTARY	9
	LA SAL ELEMENTARY	2
	MONTEZUMA CREEK ELEMENTARY	15
	MONTICELLO ELEMENTARY	17
	MONTICELLO HIGH	23
	MONUMENT VALLEY HIGH	20
	NAVAJO MOUNTAIN HIGH	5
	SAN JUAN HIGH	26
	TSE'BII'NIDZISGAI ELEMENTARY	19
	WHITEHORSE HIGH	21
	TOTAL	**217**
SUMMIT ACADEMY	*CENTRAL OFFICE	3
	SUMMIT ACADEMY ELEMENTARY SCHOOL	35

District/Charter	School	Licenses Distributed
	SUMMIT ACADEMY HIGH SCHOOL	28
	SUMMIT ACADEMY JUNIOR HIGH SCHOOL	24
	TOTAL	**90**
SYRACUSE ARTS ACADEMY	SYRACUSE ARTS ACADEMY	34
	TOTAL	**34**
TINTIC SCHOOL DISTRICT	EUREKA ELEM SCH	6
	TINTIC HIGH	6
	WEST DESERT ELEM SCH	1
	WEST DESERT HIGH	1
	TOTAL	**14**
TRUE NORTH LOGIC	STAFF DEVELOPMENT	175
	TOTAL	**175**
UTAH SCHS FOR THE DEAF AND BLIND	*CENTRAL OFFICE	14
	TOTAL	**14**
UTAH STATE OFFICE OF EDUCATION	CENTRAL OFFICE	2
	TOTAL	**2**
WASHINGTON SCHOOL DISTRICT	*CENTRAL OFFICE	40
	ARROWHEAD SCHOOL	33
	BLOOMINGTON ELEM SCH	27
	BLOOMINGTON HILLS ELEM SCH	26
	CORAL CANYON ELEMENTARY SCHOOL	32
	CORAL CLIFFS ELEM SCH	28
	CRIMSON VIEW ELEMENTARY	30

District/Charter	School	Licenses Distributed
	DESERT HILLS HIGH SCHOOL	69
	DESERT HILLS MIDDLE	44
	DIAMOND VALLEY ELEM SCH	16
	DIXIE HIGH	60
	DIXIE MIDDLE	46
	DIXIE SUN ELEM SCH	32
	EARLY CHILDHOOD PRESCHOOL	28
	EAST ELEM SCH	32
	ENTERPRISE ELEM SCH	21
	ENTERPRISE HIGH	35
	FOSSIL RIDGE INTERMEDIATE	45
	HERITAGE ELEMENTARY	33
	HORIZON ELEMENTARY SCHOOL	31
	HURRICANE ELEM SCH	31
	HURRICANE HIGH	53
	HURRICANE INTERMEDIATE	32
	HURRICANE MIDDLE	40
	LA VERKIN ELEM SCH	29
	LAVA RIDGE INTER	42
	LITTLE VALLEY SCHOOL	27
	MILLCREEK HIGH	23
	PANORAMA ELEM SCH	23
	PINE VIEW HIGH	68

District/Charter	School	Licenses Distributed
	PINE VIEW MIDDLE	44
	POST HIGH SCH (SELF-CONT)	5
	RED MOUNTAIN ELEM SCH	26
	RIVERSIDE SCHOOL	32
	SANDSTONE ELEM SCH	31
	SANTA CLARA ELEM SCH	25
	SNOW CANYON HIGH	67
	SNOW CANYON MIDDLE	52
	SOUTHWEST BEHAVIORAL HEALTH CENTER (YIC)	2
	SPRINGDALE ELEM SCH	4
	SUCCESS ACADEMY DIXIE	8
	SUNRISE RIDGE INTERMEDIATE SCHOOL	56
	SUNSET ELEM SCH	30
	THREE FALLS ELEM SCH	34
	TONAQUINT INTERMEDIATE SCHOOL	36
	UTAH ONLINE HIGH SCHOOL	22
	WASHINGTON COUNTY ONLINE SCHOOL	13
	WASHINGTON ELEM SCH	29
	WATER CANYON SCHOOL	19
	TOTAL	**1,611**
WEBER SCHOOL DISTRICT	*CENTRAL OFFICE	42
	BATES ELEM SCH	32
	BONNEVILLE HIGH	67

District/Charter	School	Licenses Distributed
	CANYON VIEW HIGH	34
	CANYON VIEW PRESCHOOL	6
	CLUB HEIGHTS ELEM SCH	34
	COUNTRY VIEW ELEM SCH	27
	FARR WEST ELEM SCH	40
	FREEDOM ELEM SCH	38
	FREMONT HIGH	88
	GREEN ACRES ELEM SCH	31
	H GUY CHILD ELEM SCH	28
	HOOPER ELEM SCH	28
	KANESVILLE ELEM SCH	36
	LAKEVIEW ELEM SCH	35
	LOMOND VIEW ELEM SCH	26
	MAJESTIC ELEM SCH	48
	MARLON HILLS ELEM SCH	19
	MIDLAND ELEM SCH	33
	MUNICIPAL ELEM SCH	22
	NORTH OGDEN ELEM SCH	31
	NORTH OGDEN JR HIGH	34
	NORTH PARK ELEM SCH	33
	ORION JR HIGH	45
	PIONEER ELEM SCH	28
	PLAIN CITY ELEM SCH	36

District/Charter	School	Licenses Distributed
	RIVERDALE ELEM SCH	27
	ROCKY MOUNTAIN JR HIGH	49
	ROOSEVELT ELEM SCH	35
	ROY ELEM SCH	33
	ROY HIGH	90
	ROY JR HIGH	47
	SAND RIDGE JR HIGH	42
	SNOWCREST JR HIGH	21
	SOUTH OGDEN JR HIGH	41
	T H BELL JR HIGH	36
	TWO RIVERS HIGH	43
	UINTAH ELEM SCH	36
	VALLEY ELEM SCH	28
	VALLEY VIEW ELEM SCH	34
	WAHLQUIST JR HIGH	55
	WASHINGTON TERRACE ELEM SCH	37
	WEBER HIGH	100
	WEBER INNOVATION HIGH	15
	WEST HAVEN SCHOOL	40
	WEST WEBER ELEM SCH	28
	TOTAL	**1,758**
GRAND TOTAL		**16,596**

SCINET Training Participants January through August 2015

# Participants	Blueprint	Boot Camp	Edivate Essentials	Edivate Essentials #2	Implementation Meetings	Total
District						
Alpine	33	225		15	42	315
Beaver	8	50	15		28	101
Cache	25		12			37
Carbon	18		10			28
Canyons					2	2
Daggett	31	14		2	2	49
Davis	15				2	17
Granite					6	6
Iron			8		8	16
Juab	19				1	20
Murray			11		15	26
Nebo			6		6	12
North Sanpete	160			16	4	180
Park City	19	10			24	53
Piute	20	35	15		1	71
Provo	4	9	10		50	73
Rich	4	39				43
South Sanpete				15	20	35
San Juan	20				1	21
Wayne County					2	2
Weber			30	7	1	38

# Participants	Blueprint	Boot Camp	Edivate Essentials	Edivate Essentials #2	Implementation Meetings	Total
Washington	14	40	235	20	30	339
Total	**390**	**422**	**352**	**75**	**245**	**1484**
Charter						
Beehive Academy for Science and Technology	25				2	27
Monticello Academy	24			4	3	31
Noah Webster Academy	27			5	2	34
Northern Utah Academy for Math Engineering and Science	35		5			40
Pinnacle Canyon Academy	3	30		11		44
Providence Hall	7	25		5	2	39
Summit Academy – Bluffdale Elementary	86			2	2	90
Summit Academy – Elementary Schools	150			2	2	154
Summit Academy – High School(s)	35	35		4	2	76
Moab Community Charter	10				2	12
Syracuse Arts Academy	35			3		38
Utah Schools for the Deaf & Blind	40			13	6	59
Total	**477**	**90**	**5**	**49**	**23**	**644**
GRAND TOTAL	**867**	**512**	**357**	**124**	**268**	**2128**

Appendix B. Measuring Changes in Instruction

Video Observation Rubric

Lesson Evaluation

District Name	Teacher Name	Date of Video	Title of Lesson/Video

Rate the lesson's effectiveness

SCINET #1. Student learning targets were clearly communicated.

USOE Standard 6: Instructional Planning The teacher plans instruction to support students in meeting rigorous learning goals by drawing upon knowledge of content areas, Utah Core Standards, practices, and the community context.				
Performance Indicator	**Not Effective**	**Emerging Effective**	**Effective**	**Highly Effective**
6.1 Demonstrates knowledge of the Utah Core Standards and references them in short- and long-term planning	o Not effective Evidence of ineffective performance may include: - Materials are not aligned with standards. - Unfamiliar with Utah Core. - No evidence of long-term planning.	o Aligns daily instruction with the Utah Core Standards. o Selects instructional materials that support standards.	…and o Plans and implements short- and long-term learning experiences that reference Utah Core Standards learning objectives and content. o Organizes and adapts learning experiences and materials to align with the Utah Core Standards. o Adapts pre-determined plans, materials, and timeframes to meet individual learner needs	…and o Plans authentic learning experiences. o Evaluates the effectiveness of planning in response to student learning data and makes needed adjustments.
Rating:	Notes:			

SCINET #2. Instructional activities led students towards meeting the objectives.

USOE Standard 7: Instructional Strategies The teacher uses various instructional strategies to ensure that all learners develop a deep understanding of content areas and their connections and build skills to apply and extend knowledge in meaningful ways.				
Performance Indicator	**Not Effective**	**Emerging Effective**	**Effective**	**Highly Effective**
7.2 Provides multiple opportunities for students to develop higher-order and meta-cognitive skills.	o Not effective Evidence of ineffective performance may include: - Uses mostly memorization, recall, and rote knowledge. - Uses one mode of communication.	o Uses instructional strategies that incorporate higher-order thinking.	…and o Provides learners with explicit instruction to analyze, synthesize, and make decisions. o Provides opportunities for learners to reflect on their own learning. o Provides opportunities for students to generate and evaluate new ideas.	…and o Creates complex, open-ended learning opportunities where learners develop inventive solutions to problems.
Rating:	**Notes:**			

SCINET #3. Students were actively engaged

USOE Standard 3: Learning Environments The teacher works with learners to create environments that support individual and collaborative learning, encouraging positive social interaction, active engagement in learning, and self-motivation				
Performance Indicator	**Not Effective**	**Emerging Effective**	**Effective**	**Highly Effective**
3.3 Utilizes positive classroom management strategies, including the resources of time, space, and attention, effectively.	o Not effective Evidence of ineffective performance may include: - Limited classroom management strategies. - Negative or ineffective strategies. - Ineffective use of time, space, and attention. - Disorganized learning environment. - Frequent digressions.	o Implements classroom management strategies. o Encourages learners to be engaged with the content. o Distributes time, space, and attention to engage learners.	…and o Uses differentiated management strategies focusing on individual learner needs. o Gains and maintains student attention through active engagement. o Adjusts instructional pacing and transitions to maintain learner engagement and support learning.	…and o Fosters each learner's ability to manage and reflect upon his/her own learning. o Fosters each learner's ability to manage and reflect upon his/her own learning.

	- Negative, ineffective, inconsistent use of strategies.			
Rating	**Notes:**			

SCINET #4. Teacher differentiated instruction.

USOE Standard 1: Learner Development The teacher understands cognitive, linguistic, social, emotional and physical areas of student development.				
Performance Indicator	**Not Effective**	**Emerging Effective**	**Effective**	**Highly Effective**
1.1 Creates developmentally appropriate and challenging learning experiences based on each learner's strengths, interests, and needs.	o Not effective Evidence of ineffective performance may include: - No differentiation - Instruction is not developmentally appropriate - Lack of hands-on instruction - Lack of real world application - Emotionally unsafe environment - Teacher dependent problem-solving/scaffolding - Only one answer - Lack of modeling - Unaware of developmental needs	o Creates whole-class learning experiences that demonstrate an understanding of learners' developmental levels.	…and o Identifies appropriate developmental levels of individual learners and consistently and appropriately differentiates instruction. o Incorporates tools of language development into planning and instruction.	…and o Supports learners in setting and meeting their own learning goals, aligned to their diverse learning needs.
Rating:	**Notes:**			

SCINET # 5. Assessments effectively monitored student progress.

USOE Standard 5: Assessment The teacher uses multiple methods of assessment to engage learners in their own growth, monitor learner progress, guide planning and instruction, and determine whether the outcomes described in content standards have been met.				
Performance Indicator	**Not Effective**	**Emerging Effective**	**Effective**	**Highly Effective**
5.1 Uses data sources to assess the effectiveness of instruction and to make adjustments in planning and instruction.	o Not effective Evidence of ineffective performance may include: - Makes teaching decisions in isolation. - No adjustments to instruction based on data. - Sticks to pre-determined plan. - Provides only one learning opportunity. - No pre-assessment or enrichment for advanced learners. - Same assessments for all learners.	o Uses data to evaluate the outcomes of teaching. o Monitors learner performance and responds to individual learning needs.	…and o Designs and targets strategies for instruction based on data. o Uses multiple formative and summative assessments to make ongoing adjustments in instruction based on a wide range of individual learner needs. o Targets intervention and enrichment strategies based on data.	…and o Provides multiple assessment options for the learner to demonstrate knowledge and skills. o Collaborates with colleagues to use a variety of data to reflect and adapt planning and instruction.
Rating:	**Notes:**			

Appendix C. Baseline Equivalence Comparison

Table C-1. Baseline student characteristics after matching for ALEKS for Full Sample

Characteristic	Intervention Students (N=27,190)	Comparison Students (N=27,190)	Difference (SE)	Test statistic	p-value	Effect Size of Difference
Mean Spring 2014 Math Scale Score (Standard Deviation)	426.81 (88.757)	426.82 (88.752)	-.003 (.761)	-.005	.996	.000
Proportion of Students who met proficiency for Spring 2014 Math SAGE Assessment						
Met Proficiency (Proficiency level 3 or 4)	.389	.389	.000	.000	1.000	.000
Proportion of Students at Proficiency Levels for Spring 2014 Language Arts SAGE Assessment						
Met Proficiency (Proficiency level 3 or 4	.414	.418	-.004	-.940	.347	-.010
Student Characteristics						
Proportion Eligible for Free/Reduced Price Lunch	.388	.352	.036	8.694	.000	.094
Proportion Female [a]	.489	.496	-.007	-1.633	.103	-.017
Proportion of Students Classified as English Language Learners	.034	.036	-.002	-1.269	.204	-.036
Proportion of Students Classified as Special Education	.113	.103	.010	3.757	.000	.063
Proportion of each racial/ethnic composition						
White	.791	.756	.035	9.750	.000	.121
Hispanic	.149	.167	-.018	-5.754	.000	-.082

Note: A t-test was used to compare continuous variables and a z-test of proportions was used for all dichotomous variables. Due to the small number of students in each subgroup who were not white and not Hispanic, only White and Hispanic are used in this comparison.

Table C-2. Baseline student characteristics after matching for ALEKS for Fidelity Sample

Characteristic	Intervention Students (N=633)	Comparison Students (N=633)	Difference (SE)	Test statistic	p-value	Effect Size of Difference
Mean Spring 2014 Math Scale Score (Standard Deviation)	450.83 (81.722)	450.84 (81.719)	.005 (4.594)	.001	.999	.000
Proportion of Students who met proficiency for Spring 2014 Math SAGE Assessment						
Met Proficiency (Proficiency level 3 or 4)	.409	.409	.000	.000	1.000	.000
Proportion of Students at Proficiency Levels for Spring 2014 Language Arts SAGE Assessment						
Met Proficiency (Proficiency level 3 or 4	.501	.462	.039	1.380	.168	.095
Student Characteristics						
Proportion Eligible for Free/Reduced Price Lunch	.313	.333	-.020	-.761	.447	-.055
Proportion Female [a]	.586	.520	.066	2.362	.018	.162
Proportion of Students Classified as English Language Learners	.035	.038	-.003	-.285	.779	-.052
Proportion of Students Classified as Special Education	.068	.081	-.013	-.881	.379	-.114
Proportion of each racial/ethnic composition						
White	.825	.761	.064	2.810	.005	.238
Hispanic	.114	.163	-.049	-2.524	.012	-.251

Note: A t-test was used to compare continuous variables and a z-test of proportions was used for all dichotomous variables. Due to the small number of students in each subgroup who were not white and not Hispanic, only White and Hispanic are used in this comparison.

Table C-3. Baseline student characteristics after matching for CatchUp Math for Full Sample

Characteristic	Intervention Students (N=254)	Comparison Students (N=254)	Difference (SE)	Test statistic	p-value	Effect Size of Difference
Mean Spring 2014 Math Scale Score (Standard Deviation)	432.62 (51.52)	432.62 (51.52)	.00 (4.57)	.000	1.000	.00
Percent of Students who met proficiency for Spring 2014 Math SAGE Assessment						
Met Proficiency (Proficiency level 3 or 4)	.465	.465	.000	.000	1.000	.00
Percent of Students at Proficiency Levels for Spring 2014 Language Arts SAGE Assessment						
Met Proficiency (Proficiency level 3 or 4	.673	.516	.157	3.604	.000	.40
Student Characteristics						
Percent Eligible for Free/Reduced Price Lunch	.189	.346	-.157	-3.997	.000	-.50
Percent Female [a]	.469	.500	-.031	-0.699	.484	-.08
Percent of Students Classified as English Language Learners	.016	.024	-.008	-0.644	.522	-.25
Percent of Students Classified as Special Education	.012	.063	-.051	-3.025	.002	-1.04
Percent of each racial/ethnic composition						
White	.807	.799	.008	.227	.818	.03
Hispanic	.161	.134	.027	.858	.390	.13

Note: A t-test was used to compare continuous variables and a z-test of proportions was used for all dichotomous variables. Due to the small number of students in each subgroup who were not white and not Hispanic, only White and Hispanic are used in this comparison.

There were only 33 students using CatchUp Math who met the benchmark for fidelity of implementation, who also had complete SAGE Assessment data. This was too small of a sample to conduct an impact analysis for the fidelity sample. Therefore, no baseline comparison was conducted.

Table C-4. Baseline student characteristics after matching for iReady for Full Sample

Characteristic	Intervention Students (N=3,981)	Comparison Students (N=3,981)	Difference (SE)	Test statistic	p-value	Effect Size of Difference
Mean Spring 2014 Math Scale Score (Standard Deviation)	355.69 (58.74)	355.69 (58.74)	0.00 (1.32)	0.000	1.000	.00
Proportion of Students who met proficiency for Spring 2014 Math SAGE Assessment						
Met Proficiency (Proficiency level 3 or 4)	.426	.426	.000	0.000	1.000	.00
Proportion of Students at Proficiency Levels for Spring 2014 Language Arts SAGE Assessment						
Met Proficiency (Proficiency level 3 or 4	.410	.408	.002	0.181	.857	.01
Student Characteristics						
Proportion Eligible for Free/Reduced Price Lunch	.444	.376	.068	6.168	.000	.17
Proportion Female	.480	.488	-.008	-0.714	.478	-.02
Proportion of Students Classified as English Language Learners	.038	.044	-.006	-1.350	.177	-.09
Proportion of Students Classified as Special Education	.128	.128	.000	0.000	1.000	.00
Proportion of each racial/ethnic composition						
White	.792	.756	.036	3.840	.000	.12
Hispanic	.102	.168	-.066	-8.617	.000	-.35

Note: A t-test was used to compare continuous variables and a z-test of proportions was used for all dichotomous variables. Due to the small number of students in each subgroup who were not white and not Hispanic, only White and Hispanic are used in this comparison.

Table C-5. Baseline student characteristics after matching for iReady for Fidelity Sample

Characteristic	Intervention Students (N=190)	Comparison Students (N=190)	Difference (SE)	Test statistic	p-value	Effect Size of Difference
Mean Spring 2014 Math Scale Score (Standard Deviation)	372.34 (50.03)	372.34 (50.04)	.005 (5.134)	.001	.999	.00
Proportion of Students who met proficiency for Spring 2014 Math SAGE Assessment						
Met Proficiency (Proficiency level 3 or 4)	.400	.400	.000	.000	1.000	.00
Proportion of Students at Proficiency Levels for Spring 2014 Language Arts SAGE Assessment						
Met Proficiency (Proficiency level 3 or 4	.421	.401	.020	.396	.689	.05
Student Characteristics						
Proportion Eligible for Free/Reduced Price Lunch	.400	.368	.032	.641	.522	.08
Proportion Female	.489	.500	-.011	-.214	.834	-.03
Proportion of Students Classified as English Language Learners	.011	.063	-.052	-2.685	.007	-1.09
Proportion of Students Classified as Special Education	.100	.121	-.021	-.653	.516	-.13
Proportion of each racial/ethnic composition						
White	.758	.747	.011	.248	.803	.04
Hispanic	.084	.168	-.084	-2.47	.014	-.48

Note: A t-test was used to compare continuous variables and a z-test of proportions was used for all dichotomous variables. Due to the small number of students in each subgroup who were not white and not Hispanic, only White and Hispanic are used in this comparison.

Table C-6. Baseline student characteristics after matching for Math XL for Full Sample

Characteristic	Intervention Students (N=318)	Comparison Students (N=318)	Difference (SE)	Test statistic	p-value	Effect Size of Difference
Mean Spring 2014 Math Scale Score (Standard Deviation)	560.23 (74.43)	560.22 (74.42)	.003 (5.90)	-.001	1.000	.00
Percent of Students who met proficiency for Spring 2014 Math SAGE Assessment						
Met Proficiency (Proficiency level 3 or 4)	.409	.409	.000	.000	1.000	.00
Percent of Students at Proficiency Levels for Spring 2014 Language Arts SAGE Assessment						
Met Proficiency (Proficiency level 3 or 4	.616	.522	.094	2.394	.017	.23
Student Characteristics						
Percent Eligible for Free/Reduced Price Lunch	.201	.242	-.041	-1.245	.215	-.14
Percent Female [a]	.572	.569	.003	.076	.936	.01
Percent of Students Classified as English Language Learners	.003	.006	-.003	-.565	.569	-.42
Percent of Students Classified as Special Education	.028	.025	.003	.236	.810	.07
Percent of each racial/ethnic composition						
White	.855	.827	.028	.966	.332	.13
Hispanic	.082	.119	-.037	-1.552	.121	-.25

Note: A t-test was used to compare continuous variables and a z-test of proportions was used for all dichotomous variables. Due to the small number of students in each subgroup who were not white and not Hispanic, only White and Hispanic are used in this comparison.

Pearson did not provide a flag in the data file for students who met the fidelity of implementation benchmark; therefore, we were not able to do an analysis of the impact for the fidelity sample, so no baseline comparison table is included for the fidelity sample.

Table C-7. Baseline student characteristics after matching for ST Math for Full Sample

Characteristic	Intervention Students (N=5,858)	Comparison Students (N=5,858)	Difference (SE)	Test statistic	p-value	Effect Size of Difference
Mean Spring 2014 Math Scale Score (Standard Deviation)	345.68 (56.15)	345.68 (56.15)	-.001 (1.038)	-.001	.999	.00
Proportion of Students who met proficiency for Spring 2014 Math SAGE Assessment						
Met Proficiency (Proficiency level 3 or 4)	.419	.419	.000	.000	1.000	.00
Proportion of Students at Proficiency Levels for Spring 2014 Language Arts SAGE Assessment						
Met Proficiency (Proficiency level 3 or 4	.386	.406	-.020	-2.213	.027	-.05
Student Characteristics						
Proportion Eligible for Free/Reduced Price Lunch	.534	.392	.142	15.412	.000	.35
Proportion Female	.503	.491	.012	1.299	.194	.03
Proportion of Students Classified as English Language Learners	.075	.044	.031	7.0922	.000	.34
Proportion of Students Classified as Special Education	.147	.141	.006	0.925	.358	.03
Proportion of each racial/ethnic composition						
White	.569	.747	-.178	-20.307	.000	-.49
Hispanic	.292	.177	.115	14.690	.000	.39

Note: A t-test was used to compare continuous variables and a z-test of proportions was used for all dichotomous variables. Due to the small number of students in each subgroup who were not white and not Hispanic, only White and Hispanic are used in this comparison.

Table C-8. Baseline student characteristics after matching for ST Math for Fidelity Sample

Characteristic	Intervention Students (N=801)	Comparison Students (N=801)	Difference (SE)	Test statistic	p-value	Effect Size of Difference
Mean Spring 2014 Math Scale Score (Standard Deviation)	338.41 (52.35)	338.41 (52.35)	.000 (2.616)	.000	1.000	.00
Proportion of Students who met proficiency for Spring 2014 Math SAGE Assessment						
Met Proficiency (Proficiency level 3 or 4)	.429	.429	.000	.000	1.000	.00
Proportion of Students at Proficiency Levels for Spring 2014 Language Arts SAGE Assessment						
Met Proficiency (Proficiency level 3 or 4	.421	.411	.010	.406	.682	.02
Student Characteristics						
Proportion Eligible for Free/Reduced Price Lunch	.577	.391	.186	7.449	.000	.46
Proportion Female	.481	.501	-.020	-.801	.424	-.05
Proportion of Students Classified as English Language Learners	.096	.041	.055	4.357	.000	.55
Proportion of Students Classified as Special Education	.180	.162	.018	.957	.337	.08
Proportion of each racial/ethnic composition						
White	.527	.755	-.228	-9.512	.000	-.62
Hispanic	.325	.170	.155	7.188	.000	.52

Note: A t-test was used to compare continuous variables and a z-test of proportions was used for all dichotomous variables. Due to the small number of students in each subgroup who were not white and not Hispanic, only White and Hispanic are used in this comparison.

Table C-9. Baseline student characteristics after matching for Think Through Math for Full Sample

Characteristic	Intervention Students (N=6896)	Comparison Students (N=6896)	Difference (SE)	Test statistic	p-value	Effect Size of Difference
Mean Spring 2014 Math Scale Score (Standard Deviation)	384.37 (63.556)	384.36 (63.541)	.011 (1.082)	.010	.992	.000
Proportion of Students who met proficiency for Spring 2014 Math SAGE Assessment						
Met Proficiency (Proficiency level 3 or 4)	.454	.454	.000	.000	1.000	.000
Proportion of Students at Proficiency Levels for Spring 2014 Language Arts SAGE Assessment						
Met Proficiency (Proficiency level 3 or 4	.458	.457	.001	.118	.904	.002
Student Characteristics						
Proportion Eligible for Free/Reduced Price Lunch	.320	.360	-.040	-4.958	.000	-.108
Proportion Female [a]	.478	.489	-.011	-1.293	.197	-.027
Proportion of Students Classified as English Language Learners	.038	.034	.004	1.261	.208	.070
Proportion of Students Classified as Special Education	.136	.118	.018	3.174	.002	.099
Proportion of each racial/ethnic composition						
White	.782	.773	.009	1.271	.204	.032
Hispanic	.139	.156	-.017	-2.815	.005	-.082

Note: A t-test was used to compare continuous variables and a z-test of proportions was used for all dichotomous variables. Due to the small number of students in each subgroup who were not white and not Hispanic, only White and Hispanic are used in this comparison.

Table C-10. Baseline student characteristics after matching for Think Through Math for Fidelity Sample

Characteristic	Intervention Students (N=2814)	Comparison Students (N=2814)	Difference (SE)	Test statistic	p-value	Effect Size of Difference
Mean Spring 2014 Math Scale Score (Standard Deviation)	395.44 (56.799)	395.43 (56.766)	.015 (1.514)	.010	.992	.000
Proportion of Students who met proficiency for Spring 2014 Math SAGE Assessment						
Met Proficiency (Proficiency level 3 or 4)	.598	.598	.000	.000	1.000	.000
Proportion of Students at Proficiency Levels for Spring 2014 Language Arts SAGE Assessment						
Met Proficiency (Proficiency level 3 or 4	.572	.562	.010	.757	.447	.025
Student Characteristics						
Proportion Eligible for Free/Reduced Price Lunch	.251	.307	-.056	-4.683	.000	-.169
Proportion Female [a]	.478	.495	-.017	-1.276	.201	-.041
Proportion of Students Classified as English Language Learners	.018	.019	-.001	-.278	.779	-.033
Proportion of Students Classified as Special Education	.073	.071	.002	.290	.772	.018
Proportion of each racial/ethnic composition						
White	.826	.799	.027	2.595	.010	.108
Hispanic	.099	.133	-.034	-3.983	.000	-.202

Note: A t-test was used to compare continuous variables and a z-test of proportions was used for all dichotomous variables. Due to the small number of students in each subgroup who were not white and not Hispanic, only White and Hispanic are used in this comparison.

Appendix D. Acknowledgements

Drs. Sarah Brasiel and Taylor Martin would like to acknowledge the significant contribution of students in the Active Learning Lab and consultants who assisted with the data collection, data management, data analysis, and writing of this final evaluation report.

Consultants

Dr. Herbert M. Turner, III, is the President and Principal Scientist for Research and leads ANALYTICA's research team. Dr. Turner holds a Ph.D. in Policy Research, Evaluation, and Measurement from the University of Pennsylvania where he also lectures on research methods, statistical programming, and statistical analysis. He has over 25 years of quantitative research experience in the social, educational and health sciences. He provided consultation and research support for the propensity score matching and analysis of the effects of the grant programs on student achievement on the SAGE assessment.

Mackson Ncube is a Scientific Researcher for ANALYTICA. He holds a Master of Science in Statistics, Measurement, Assessment, and Research Technology (SMART) from the University of Pennsylvania where his research focused on systematically reviewing NCLB's Supplemental Educational Service provision. His expertise includes data analysis and registry development. He provided consultation and research support for the propensity score matching and analysis of the effects of the grant programs on student achievement on the SAGE assessment.

Dr. Justus Randolph is an associate professor at the Tift College of Education at Mercer University. He a former Fulbright grantee to Finland, has a PhD in education research and program evaluation, an MEd in international education, and a certification in educational administration. Currently, he is an Associate Professor of Education at Mercer University. He teaches primarily quantitative research methods courses and has been a member on over 20 successful dissertation committees. He is the author of the book Multidisciplinary Methods in Educational Technology Research and Development and tens of scholarly articles. He provided consultation and research support for the propensity score matching and analysis of the effects of the grant programs on student achievement on the SAGE assessment.

Phil Janisiewicz, is a Data Scientist for the Active Learning Lab in the Department of Instructional Technology and Learning Sciences at Utah State University conducting research in data management and data modeling. Phil works as part of the Active Learning Lab Research

and Development team to investigate and implement new models and techniques for predicting student learning and behavior and inferring the relevance and impact of recommendations and personalized content, using a rich corpus of student data. For this project he assisted with data management, development of a secure portal for file uploads from schools and providers, and assisted with the development of files for the USOE data request based on combining elements from multiple files by product. This is a strategic role where he is responsible for identifying new analysis methods and pursuing the execution of projects with a high level of autonomy. For more than five years, Phil has been involved in designing and developing databases, web-based applications, analysis methods, and data visualization techniques. He has also worked to develop and implement data management plans that ensure the confidentiality and protection of data and participant information. The research projects he has participated include projects funded by the U.S. Department of Education, the National Science Foundation, and the Bill and Melinda Gates Foundation. Some of the projects have included data collection across multiple states and by multiple research organizations. He has designed and implemented security and quality assurance measures to meet the highest regulations for data management.

Graduate Research Assistants

Soojeong Jeong is a PhD student in the Instructional Technology and Learning Sciences Department at Utah State University. She earned an M.A. in Education, with an emphasis in Educational Technology from Korea University in Seoul, South Korea. She also holds a B.A. in Education and a B.S. in Mathematics Education, both of which she obtained at the same university. While studying for her masters, Soo participated in many projects related to the use of technology to improve human learning. She also studied how using laptop computers influences college students during class for her master's thesis. In addition, she worked as a math instructor and a private tutor for middle and high school students for about ten years. Currently, Soo is studying how new technologies promote math achievement for elementary and middle school students in the Active Learning Lab. Her main research interests include mathematics education, metacognition, and meta-analysis.

Min Yuan is a Ph.D. student in the Department of Instructional Technology and Learning Sciences at Utah State University. She earned both her B.Ed. and M.S. degrees in Instructional Technology in China. After that, she has taught at a college for four years. Min's research interests include examining teachers' evaluation of online resources, teachers' behaviors in online educational communities, and the effectiveness of digital educational technology. She has several research papers in reputed international journals and conferences. Min has just defended her dissertation, which investigates how people use rubrics to evaluate online resources, and how people perceive the utility of rubrics. Findings from this study are expected to help people distinguish high-quality resources from low-quality ones, and help schools use high-quality resources as supplementary or replacement of textbooks.

Scott Smith is a Ph.D. student in the Department of Instructional Technology and Learning Sciences at Utah State University. He holds an M.S. degree in Mathematics and an M.S. degree in Instructional Technology, as well as a B.S. degree in Mathematics. Scott's research interests are in investigating students' difficulties and misconceptions in learning rational number concepts, and in investigating instructional approaches for remediating rational number learning difficulties. In particular, Scott is interested in applying conceptual change theories to the investigation of rational number difficulties, and in self-explanations and technologies such as virtual manipulatives as instructional means of remediating rational number learning difficulties. He is currently analyzing data for his dissertation and plans to defend his dissertation winter 2015.

Clarence Ames is a Masters student in the Instructional Technology and Learning Sciences Program at Utah State University. He has a bachelor's degree in Public Relations from Central Washington University. He is passionate about educating people who want to learn. His life goal is to empower students and teachers and create a system of education in which the only limitations on breadth or depth of learning are ones' own desire, passion, motivation and assiduousness. He is currently doing his Master's Thesis on the application of Appreciative Inquiry to facilitate improvements in education.

Kevin Lawanto is a Masters level student in the Instructional Technology and Learning Sciences (ITLS) department at Utah State University. He holds a Bachelor of Science degree in Psychology. Kevin's research interest includes neuroscience, particularly in neuroplasticity/ brain plasticity, cognition and metacognition, and e-learning. During his studies, he has co-authored four journal papers and several posters presentation for undergraduate conferences. During his undergraduate study he also had the experience working as a research technician in a behavioral neuroscience laboratory at the Utah Science Technology and Research (USTAR) facility where he involved in conducting rodents behavior analysis, perfusion, brain sectioning, and staining. Currently, he is working as a research assistant in the Active Learning lab in the ITLS department. His Master's Thesis focuses on understanding the development of computational thinking as students learn to program in Scratch, an application developed by MIT and used by students all over the world.

During summer 2015, we had several hourly graduate research assistants provide support in both quantitative and qualitative data analysis. Completing this report on time would not have been possible without their willingness to join our research team for a short period.

Sam Gedeborg is a Ph.D. Student in the School of Teacher Education and Leadership at Utah State University. He holds a Master of Educational Technology and a B.S. in Mathematics, Secondary Education from Boise State University. Sam's interests include online and blended/hybrid instruction, faculty development, technology integration, developmental mathematics, game- based learning, problem-based learning, and adaptive learning platforms. In short, Sam likes to study the effects that technology has upon education and how improvements and progress can be made in the educational landscape through adoption and integration.

Vicki Lyons is a Ph.D. student in the Department of Teacher Education and Leadership with a Mathematics Education and Leadership Emphasis at Utah State University. She holds a M. A. degree in Mathematics Education and a B.S. degree in Mathematics from Brigham Young University. Vicki's research interests are in investigating the effectiveness of teacher use of specific error-handling protocols to influence student's willingness to engage and persevere in finding correct mathematical solutions. Particularly she is interested in the motivational effect of teacher feedback given to students. She is likewise interested in the benefits in competency when students provide multiple solutions to problems and the use of technology at the secondary school level.

Melanie Valentine Durfee is a Ph.D. student in the Department of Teacher Education and Leadership with an emphasis in Mathematics Education and Leadership at Utah State University. She holds an M.A. degree in English and an M.S. degree in Learning and Technology. Melanie holds certifications in and has teaching experience in the following areas: secondary math, English, computer tech, and theater. Melanie's research interests are in making the study of mathematics more accessible to secondary students, in particular, understanding student motivation and self-efficacy. Melanie is interested in exploring the integration of mathematics curriculum in other subject areas in secondary schools, specifically, social studies, English, and theatre.

Melanie Arp is a Ph.D. student in the Department of Teacher Education and Leadership at Utah State University. She holds an M.S. degree in Special Education and a B.S. degree in Elementary Education. Melanie's research interests are in investigating Response to Intervention (RTI) tier 2 and 3 students' construction of mathematical understanding, self-efficacy, and metacognition. In particular, Melanie is interested in applying metacognitive theories such as reciprocal teaching to investigate student self-efficacy and construction of mathematical understanding using graphic organizers and technologies such as virtual manipulatives.

Andrew Glaze is a Ph.D. student in the School of Teacher Education and Leadership at Utah State University. He holds a BA and MA in Mathematics Education from Brigham Young University. He is a former high school math teacher and current junior high school math teacher. Andrew's interests include the use of technology in mathematics learning, and equity issues in education. Currently he is reviewing literature on how technology can improve outcomes for English Language Learners.

Garret Rose has a Bachelor of English degree with a minor in Comparative Religion from California State University Fullerton. He loves to get to know those from different cultures and backgrounds. He has his Level 1 and Level 2 teaching licenses along with a Reading Endorsement, Administrative Certificate, and Master of Education degree (with an emphasis in secondary education and Reading), all from Utah State University. He is currently working on his PhD in Literacy Education and Leadership from Utah State University.

Appendix E. Principal Investigators

Dr. Sarah Brasiel, Co-Principal Investigator

Dr. Brasiel is a Senior Research Associate and the Associate Director for the *Active Learning Lab* in the Department of Instructional Technology and Learning Sciences at Utah State University. Dr. Sarah Brasiel has over 19 years of experience in the education sector. Dr. Brasiel's prior experience includes fifteen years teaching grades 5-12 reading, mathematics, and science (Regular and Special Education). She also has four years of experience as a school and district instructional leader mentoring new teachers, facilitating professional development, providing teachers support with curriculum implementation, and assisting teams of teachers in aligning curriculum to the needs of the students through data driven decisions. This includes two years working with teachers and leaders in a low performing high school to support improvements in mathematics instruction and outcomes for students.

Dr. Brasiel was a co-principal investigator for a large scale randomized control trial studying the effects of *Connected Mathematics 2* curriculum and professional development on mathematics achievement. For three years she led an external evaluation of a large scale inquiry science intervention with over 8,000 students in seven districts in grades 3-6 and their science teachers. Her research interest has focused on improving teacher pedagogical content knowledge and student achievement in mathematics and science. Her research experience includes the following: the use of interviews and surveys for data collection, the analysis of fidelity of implementation using classroom observations (including the training of classroom observers and inter-rater reliability), and the use of quantitative methods to determine program effectiveness using the most rigorous designs possible given the data available (Randomized Control Trial, Propensity Score Matched Control Group using State Data, and Matched Comparison Group using District Data of similar schools). Dr. Brasiel has a Ph.D. in Mathematics Education from The University of Texas in Austin and is credentialed to teach elementary students, mathematics (K-12), and special education (mild/moderate) in California and in Texas.

Dr. H. Taylor Martin, Co-Principal Investigator

Dr. Martin is currently serving a one year appointment as a program director for the National Science Foundation in the Division of Research on Learning in Formal and Informal Settings. She is the Director of the *Active Learning* Lab and an Associate Professor in the Instructional Technology and Learning Sciences Department at Utah State University. Dr. Martin's research examines how people learn from doing, or active participation, both physical and social.

Currently, she is examining how mobile and social learning environments provided online and in person influence content learning in mathematics, engineering and computational thinking. She primarily draws on theoretical frameworks from distributed and embodied cognition. Primary themes of her work have been showing that drawing on the affordances of embodiment improves learning, examining how people marshal external and internal resources to learn, solve problems and develop, and employing learning analytics methods to understand learning processes at a fine-grained level revealing the workings of distributed and embodied cognition.

Dr. Martin's recent research work has focused on two major STEM learning areas: children's learning of rational number and adolescents' learning of programming. There are four online learning environments that have enabled this research work and data collection: Refraction, NumbOp, IPRO, and Scratch. Dr. Martin has published papers and presented at conferences to demonstrate the added value for understanding learning processes of using modeling and visualization techniques to examine data at a fine grain size compared to simple pre-post learning measures. Out of Dr. Martin's reputation in this area of learning analytics, she was asked to join other leaders in the Big Education Data Science Affinity Group charged with developing new knowledge, tools, research, policies, and graduate training programs in this area. This project was co-funded and supported by the Bill and Melinda Gates Foundation and the MacArthur Foundation. In the near future the majority of K-12 students throughout the United States will be learning with digital curriculum and assessments; this provides an opportunity to collect more data than ever before on student learning progress. This data can then be mined, visualized, and used to inform educational decision-making, personalize learning, and achieve improved outcomes for all students. Dr. Martin recently published a book through O'Reilly Media entitled *Educating Data*, as she continues to learn and share about applications of data science in education.

Curriculum Vitae for Dr. Sarah Brasiel and Dr.Taylor Martin are available on the Active Learning Lab website www.activelearninglab.org.