
# Math Matters:
# Transforming Math Education for 21st Century Success

# Quarterly Report

July 30th, 2015

THE PAST FOUNDATION

Math Matters
July 30th, 2015 Quarterly Report
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**MATH MATTERS 4th Quarter Report**
**FORMATIVE EVALUATION**

The Knowledge Capture (KC) Program conducted evaluation during the fourth quarter of implementation for the Math Matters Project, in the period beginning April 17, 2015 to July 20, 2015. A chronology of KC evaluation activities for all work conducted is presented in the Appendix of this report (See *Appendix Table 1: Math Matters Chronology of Knowledge Capture Activities April 16, 2015 to July 20, 2015*).

The Math Matters Program was initiated in August 2014 by the MIND Research Institute, providing access to ST Math software for use in K-12 classrooms in 100 buildings in ten districts and organizations across Fairfield and Franklin counties. As of the third quarter grant report (April 30, 2015), the ST Math implementation process continued to provide onsite Introduction to ST Math Part 1 and Part 2 training in three districts including Columbus City Schools, Hilliard, and Pickerington. Part 1 and Part 2 training was also conducted during summer sessions on June 9th and 17th at the June Academy. Additional support was provided within each district at specific school sites and is presented below in *Table A: Math Matters Implementation Overview, April to June 2015*. This continuing interaction with individual schools offers the districts a tailored approach responding to specific emerging needs identified by the ST Math team through ongoing communication with the districts, and with individual school leaders within each of the nine districts.

Note in Table A, at least five of the nine districts participated in "Data Meetings," (for additional details on the purpose and scope of "Data Meetings," see Appendix: "Math Matters, MIND Research Institute Quarterly Report on ST Math" for descriptions of this and other different types of training and implementation support). Additionally, eight of the nine districts requested follow-up onsite visits by the ST Math Education Consultant or others from the ST Math team during the 4th quarter. Teachers in three districts (Columbus City, Hamilton, and Hilliard) requested onsite "Classroom Modeling" during the 4th quarter designed for teachers to observe ST Math team members facilitate lessons in the classroom working with the class as a whole.

Table A also shows summer training sessions that took place in June, including the "Train the Trainer" certificate program, providing each district with at least two individuals who will have the skills to conduct ST Math teacher training beginning in fall 2015. The ST Math June Academy offered teachers optional summer professional development sessions on two dates in mid-June. These sessions were open to a maximum of (20) teachers per session on each day.

## Table A: Math Matters Implementation Overview
## April-July, 2015

| ST Math Activities | | Fairfield ESC | Lancaster | Liberty Union | Pickerington | Walnut | CCS | Gahanna | Hamilton | Hilliard | Worthington |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| JiJI School Visits | April | | ■ | ■ | ■ | ■ | ■ | | | ■ | ■ |
| Training [Pt. 1 & 2; Abbrev.] | April | | | | | | | | | ■ | |
| | May | | | | ■ | | | | | | |
| | June | | | | | | ■ | | | | |
| Classroom Support [Site Visits] | April | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ |
| | May | | | | ■ | | | | | | |
| | June | | | | | | ■ | | | | |
| | July | | | | | | ■ | | | | |
| Classroom Modeling | April | | | | | | | | ■ | ■ | |
| | May | | | | | | | | | | |
| | June | | | | | | ■ | | | | |
| Data Meetings | April | | | | | | ■ | | | ■ | ■ |
| | May | | ■ | | ■ | | ■ | | | ■ | ■ |
| | July | ■ | | | | | | | | | |
| Implementation Planning Meetings | April | | | | | | ■ | | | | ■ |
| | May | | ■ | | ■ | | ■ | | | ■ | |
| June Academy [6/9 & 6/17] | June | ■ | ■ | ■ | ■ | ■ | | | ■ | ■ | ■ |
| Train the Trainer [6/23-6/25} | June | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

Source: MIND Research Institute, July 30, 2015; email correspondence July 22, 2015, and August 4, 2015.

MIND Research staff offered two types of training: Track A for "Emerging JiJi Users" (2 sessions/day), and Track B designed for "Comfy JiJi Users" (3 sessions/day). Track B sessions were created to strengthen teacher skills with integrating ST Math in their classrooms. Track B participants were provided an overview on deepening student understanding of math, creating a blended learning environment and classroom lesson design using ST Math.

In the 4th quarter of year 1 of the project, the KC team conducted a total of 18 observations of ST Math activities including structured observation of data meetings, classroom support, and classroom modeling, in addition to observing implementation planning meetings with three districts (See *Appendix Table 2: Knowledge Capture Math Matters Observations April-June 2015*). The KC team had the opportunity to conduct structured observation of all ST Math training sessions during the June Academy, as well as the three-day "Train the Trainer" certificate training offered through the Fairfield County ESC.

**Data and Planning Meetings**

ST Math activities reported through the last day of the school year included a total of 52 data and planning meetings in all nine Math Matters districts (see *Appendix Table 3: ST Math Data and Implementation Planning Meetings Reported for each District, September 2014 - May 2015)*. During the 4th quarter of implementation (from March 25th through May 21st), 13 data and planning meetings were conducted in five districts including Lancaster (1), Pickerington (1), CCS (4), Hilliard (2), and Worthington (5). The ST Math Program 4th quarter report indicates that these five districts also began implementation planning for year 2.

Planning meetings were conducted by the ST Math Educational Consultant to update district and building leaders on year-end progress with implementation. These meetings also provided the opportunity to review ST Math data reports, specific challenges encountered during the year, and strategize on particular actions and next steps in ST Math implementation. During these sessions, district and building leaders were also encouraged to send educators for additional professional development during the June Academy to maximize the use of ST Math through standards integration, creating a blended learning model, and integrating ST Math games into classroom lessons.

Additionally, each district was invited to select two educators to attend the ST Math Train the Trainer Program offered through the Fairfield County ESC, held on June 22-24. The trainer certification process was designed to provide district educators with a rigorous, three-day multi-faceted training program. Those successfully completing the certified training will provide program support for classroom teachers, meet training needs as they arise, foster teacher engagement, and continue to grow teacher skills beginning with year 2 implementation.

Review of the ST Math 4th quarter report for: 1) areas of achievement, 2) specific challenges, and, 3) strategies to advance use of ST Math in 2015-16, as reported by the ST Math implementation team. A summary of issues identified by multiple districts is presented below organized into the three general categories.

Achievements 2014-15

- Six districts requested 'classroom modeling' to advance their skills in whole class instruction (see *Appendix Table 4: Onsite ST Math Classroom Modeling, 1/14/15 – 7/2/15*)
- Two districts effectively used station rotation/small group instruction
- One district initiated implementation in year 1 based on a 'train-the-trainer' model

Challenges 2014-15

- Four districts cited the need for more devices as a major challenge to implementing use of ST Math for students
- Four districts reported that teachers found it difficult to meet weekly logon goals, noting lack of adequate time
- Three districts/organizations identified the need for more support for special population classroom teachers, specialists, and students
- Three districts reported that teachers had difficulty in managing the use of more than one math program, noting that teachers need more support to better manage use of multiple programs

Strategies 2015-16

- Three districts will schedule site visits using a Google calendar set up by the ST Math Education Consultant to facilitate onsite support to meet specific needs
- Two districts identified a priority for year 2 will be to focus on creating 'blended learning' environments in their ST Math classrooms

These issues represent components of implementation that will be discussed further in later sections of this report that present findings associated with administrator interviews, teacher focus groups, and teacher surveys conducted by the KC Team.

**Formative Evaluation April to June 2015**

The 4th quarter of Math Matters implementation was a culminating point for formative evaluation of year 1 (see *Appendix Table 5: Knowledge Capture Math Matters Activities August 2014 – June 2015*). During this time period the KC team conducted (71) structured observations. One-on-one interviews were conducted with (20) administrators and program leads, 13 of which occurred during the 3rd and 4th quarters (see *Appendix Table 6: Chronology of Knowledge Capture Math Matters Administrator Interviews Spring 2015*). And in the 4th quarter, (15) focus groups were conducted with (90) participants (see *Table 7: Knowledge Capture Math Matters Focus Groups, April – June 2015*), and (91) teachers participated in an online survey.

The approach to formative evaluation employed in this project follows a *mixed methods research design* outlined in the National Science Foundation Directorate for Education and Human Resources, Division of Research and Learning in Formal and Informal Settings (2010) for conducting qualitative analysis of program implementation. Conducting formative evaluation developed through a mixed methods approach produces real time data in a systematic process designed to document substantive implementation issues and challenges identified by the implementation team as well as by stakeholders. Utilizing real time evaluation data allows for an iterative and responsive process conducted over the course of the project that defines emerging issues identified by participants as implementation is underway.

For the ST Math project, initial data gathered by the KC Team involved feedback gained from Math Matters monthly project team meetings, and structured observation of onsite implementation activities. This early work helped to define specific priority areas for evaluation associated with key grant deliverables. This involved considering opportunities for structured observation of planned implementation activities at school sites, as well as mapping out a schedule for conducting other types of research including one-on-one administrator interviews, teacher focus groups and teacher surveys.

The Knowledge Capture team conducted interviews with ST Math leaders in all nine of the Math Matters districts during the 3rd and 4th quarters of year 1. Administrator interview questions were developed from analysis of early observations of training sessions in schools, as well as district planning sessions with key implementation staff. Analysis of interview data provided insights on expectations and experience of the Math Matters Project from the perspective of building leaders and content area coordinators and other program specialists involved with implementation at the district level.

The final components of the research and evaluation design consisted of teacher focus groups (April to June) and the teacher survey (May to June). Focus group questions and survey questions were also developed through analysis of all data including onsite training observations, and administrator interviews. The ST Math implementation team and the Fairfield County ESC Grants Manager reviewed and commented on the questions. The final question sets for administrator interviews, focus groups, and surveys are presented in the Appendix to this report.

**Administrator Interviews**

During the 3rd and 4th quarter, formalized one-on-one interviews were conducted with project leads within each district. Although six of the nine districts had been engaged in discussion with the KC team prior to March 2015, the interviews initiated in March and April encompassed the final set of interview questions designed to explore common areas across all districts. The district administrator level interviews included program leads, curriculum or math content leads, as well as special program directors. The interview questions are presented in the Appendix to this report.

The one-on-one interview typically lasted from 45 minutes to 1.5 hours at the convenience of the interviewee. Interviews were scheduled before, during, or after the school day to best accommodate administrators' availability. The purpose of the interview involved three key areas:

- Gather background data on the district design for implementation of ST Math, including clarifying initial expectations for ST Math training and ongoing support. Interviewees were given the opportunity to discuss any significant modifications that had already occurred or planned to occur during the last and final quarter of the school year. This included special focus on changes that occurred due to unforeseen challenges and constraints.

- Initiate discussion of potential interest in participation in teacher focus groups (scheduled during April to June). Administrators were also asked to give input to possible options and strategies for time and location to hold teacher focus groups, as well as identifying particular schools within the district, or particular grade levels to include in the focus groups. Administrators were also provided with a verbal description of the focus group process to inform them about how teacher participant data would be used, and clarifying information regarding confidentiality, analysis of aggregate data per human subjects protocols, and use of focus group data to design the year-end teacher survey.

- Administrators were also given details regarding plans for launching an online survey for all teachers to complete at the end of the school term to determine any significant conflicts in scheduling or best strategies for providing teachers access to the survey via a web link (similar to discussion of the focus group design, this also involved reviewing the confidentiality protocols, etc.).

Analysis of interview data identified key aspects of the first year implementation experience including concepts regarding impacts of ST Math for teachers and students, parent response, and planned strategies and program needs for year 2 of the Math Matters Project.

Issues identified in the administrator interviews fell into eight thematic categories:

- Administrator Engagement
- Teacher Engagement
- Teacher Growth
- Student Engagement
- Student Growth
- Parent and Community Engagement
- Technology
- JiJi Culture

*Table B: Math Matters Administrator Interviews – ST Math Achievements 2014-15* presents the eight major themes across elementary, middle and K-12 buildings. Comparing views of Math Matters administrators (n=13) involved with implementation in elementary, middle grades and K-12 buildings offers additional insight on administrators' perspectives of the implementation process based on specific issues associated with grade level implementation. Within these eight overarching themes, administrators across all grade levels primarily focused on achievements involving *Teacher Engagement* and *Student Engagement,* as well as issues associated with *Parent and Community Engagement,* including initial steps taken to communicate with parents about ST Math.

In the area of Teacher Engagement, a majority of district administrators noted teacher buy-in as a feature of implementation (n=7), including the idea of teachers being 'comfortable' with the implementation process (n=3). Additionally, the grassroots spread of ST Math as a major achievement was also cited as a factor in successful implementation (n=4). Teachers using ST Math in a blended learning approach in their classrooms was identified as an aspect of *Teacher Growth* by administrators (n=4). Student excitement about using ST Math was also recognized by administrators as an important factor in expanding use of ST Math (n=6).

Table B: Math Matters Administrator Interviews -
ST Math Achievements 2014-15

| Theme | Sub-theme | ES | MS | K-12 |
|---|---|---|---|---|
| Administrative Engagement | Seeing Value in ST Math Program | ✓ | ✓ | |
| | Alerting High School Teachers about Growth in Student Math Skills | | ✓ | |
| | Competing with other Schools within District | | ✓ | |
| | Holding meetings about ST Math with Building Leaders | | | ✓ |
| Teacher Engagement | Teacher Buy-in | ✓ | ✓ | ✓ |
| | Grassroots Spread of Program | ✓ | ✓ | ✓ |
| | Comfort with Program | ✓ | ✓ | ✓ |
| | Excitement and Gratitude for ST Math | ✓ | ✓ | |
| | Communication among Teachers about ST Math | ✓ | | ✓ |
| | Development of JiJi Culture | | ✓ | ✓ |
| | Completion of Online Modules | ✓ | | |
| | Excitement about Student Progress | | ✓ | |
| | Teachers Demonstrating Persistence | | ✓ | |
| | Using Program Before Training | | | ✓ |
| | Teachers Assigning Summer Homework | | | ✓ |
| Teacher Growth | Teachers Using Blended Learning in the Classroom | ✓ | | ✓ |
| | Teachers Using Facilitation Skills in Other Subject Areas | ✓ | | |
| | Blending with Other Math Curricula | | | ✓ |
| Student Engagement | Prepared for Using ST Math Next School Year | ✓ | ✓ | |
| | Ownership of Learning | ✓ | | ✓ |
| | Excitement about Using ST Math | ✓ | | ✓ |
| | Using ST Math at Home | | ✓ | ✓ |
| | Students Completing Program | | ✓ | ✓ |
| | Prepared for Assessments | | ✓ | ✓ |
| | Students Presenting ST Math to Public | | ✓ | |
| | Attending ST Math Programs Outside School Hours | | ✓ | |
| | Decrease in Behavioral Issues | | ✓ | |
| | Responding to Incentives for Progress | | ✓ | |
| | Improved Persistence and Problem Solving Skills | | ✓ | |
| Student Growth | Title 1 Student Growth | | | ✓ |
| | Growth in STAR scores | | | ✓ |
| Parent & Community Engagement | Parents Received ST Math Intro Letters | ✓ | ✓ | ✓ |
| | Lack of Negative Feedback about ST Math | ✓ | | ✓ |
| | Excitement and Support for ST Math | | ✓ | ✓ |
| | Discussing ST Math at Parent-Teacher Conferences | ✓ | | |
| | Promoting ST Math Access in Community Spaces | ✓ | | |
| | Availability of Parent Letters in Spanish | ✓ | | |
| | Students Presenting to PTSO | | ✓ | |
| | Asking to see Data Reports | | | ✓ |
| | Holding Math Day to Demonstrate ST Math | | | ✓ |
| Technology | Distribution of Devices Successful | ✓ | ✓ | |
| | Replacing other Online Math Programs | ✓ | | |
| | More Technology Available in Buildings | | | ✓ |
| JiJi Culture | Participation in "JiJi Believer" Competition | | | ✓ |
| | Using Social Media to Promote ST Math | | | ✓ |

*Table C: Math Matters Administrator Interviews – Recommended Actions for 2015-16*, presents areas identified for year 2 implementation, and reflects aspects of using ST Math noted by administrators that are important for their districts to target in 2015-16. Ten themes were identified:

- Training
- Data Reports
- Blended Learning
- Summer School
- Effective Use of ST Math
- Parent Engagement
- Sustainability
- Administration
- JiJi Culture
- Technology

Comparing views of Math Matters administrators (n=13) involved with implementation in elementary (ES), middle (MS) and K-12 buildings offers additional insight on administrators' perspectives of the implementation process for 2015-16. Recommendations identified in the administrator perspectives largely fall into the thematic category, "Training." A majority of administrators (n=8) identified goals to increase effective reading and/or use of data reports as a priority for year 2. Finding opportunities for training and implementation of blended learning was also deemed a priority for year 2 by Math Matters administrators (n=8). Additionally, several administrators suggested that training for parents could be strategic in gaining parent support for use of ST Math (n=3).

Table C: Math Matters Administrator Interviews -
Recommended Actions for 2015-16

| Theme | Sub-theme | ES | MS | K-12 |
|---|---|---|---|---|
| Training | Blended Learning Training | ✓ | ✓ | ✓ |
| | Reading Data Reports | ✓ | ✓ | |
| | Follow-up/Refresher Training | | ✓ | ✓ |
| | Learning to Facilitate | ✓ | | ✓ |
| | Summer Planning Time for Curriculum Integration | | ✓ | |
| | Thinking about Computers as Tools | ✓ | | |
| | Creating a Menu for Targeted PD | ✓ | | |
| | Seeing ST Math Usage in Other Schools | | ✓ | |
| | Developing Key Concepts for Facilitation | | | ✓ |
| Data Reports | Using Data Reports Effectively | ✓ | ✓ | ✓ |
| | Assessing Growth in Math Skills | | | ✓ |
| Blended Learning | Finding Opportunities to Implement | ✓ | | ✓ |
| | Connecting Games with Curriculum | ✓ | ✓ | |
| | Students Sharing Thought Processes | ✓ | | |
| | Creating Opportunities for Small Group Activities | ✓ | | |
| | Students Working Together to Solve Problems | ✓ | | |
| Summer School | Summer Curriculum for Students | | | ✓ |
| Effective Use of ST Math | Easier Access to Student Passwords for Teachers | ✓ | | |
| | Having Access to Student Usage History | | ✓ | |
| | Expanding Building Licenses to Accommodate More Grade Levels | | | ✓ |
| Parent Engagement | Training for Parents | ✓ | | ✓ |
| Sustainability | Holding Teachers Accountable | ✓ | | |
| Administration | Educating Principals | | ✓ | |
| | Building a Plan for Year 2 | | ✓ | |
| | Connecting to Other Schools in District | | ✓ | |
| JiJi Culture | Developing JiJi Culture | ✓ | ✓ | |
| | Sharing Positive Student Feedback | | ✓ | |
| | ST Math Night for School Board | | ✓ | |
| | Recognizing Student Progress | | ✓ | |
| | Creating a JiJi Club | | ✓ | |
| Technology | Strategic Distribution of Devices | ✓ | | |

## Teacher Focus Groups

Based on understanding of the project implementation process gained from interview data, observations, and project team input, the next phase of work was conducted with classroom teachers participating in focus groups. This data is designed to explore issues encountered at the classroom level. Draft focus group questions were circulated to the Math Matters Project Team for comment prior to conducting the first teacher focus group (Teacher Focus Group Questions are presented in the Appendix to this report). Teacher focus groups were scheduled from April through June, conducting (15) focus groups, involving (91) teachers in the nine Math Matters districts and the Fairfield ESC (see *Appendix Table 7: Knowledge Capture Math Matters Focus Groups April - June 2015*). This included two focus groups that were held at the Fairfield ESC with K-12 educators participating in the three-day, Train the Trainer sessions (n=21).

Focus groups conducted during the school year were scheduled in eight of the nine Math Matters districts. A total of (48) elementary level teachers and (22) middle grade teachers participated in focus groups during April to June, representing (10) elementary schools and four middle schools. Focus groups generally ranged in size from four to ten teachers, and one included both elementary and middle school teachers. Focus groups were held early in the morning before students arrived, or at the end of the school day once students had left the building. Some focus groups were conducted during professional development days. Most focus groups were conducted at school buildings, but in some districts teachers from multiple buildings met in a centralized location such as a public library or a school district administration building. The duration of a focus group ran from 45 to 90 minutes, depending on the amount of time available to the teachers.

Participation in focus groups was conducted on a voluntary basis, and primarily organized by building and district leaders invested in giving teachers the opportunity to provide feedback on using ST Math. Once informed of the intent of conducting focus groups to gain perspective at the teacher level, district administrators reached out to building leaders engaged in the ST Math implementation process. Building leaders in turn encouraged teachers to take the opportunity to voice their views on their experience with ST Math. Excited by the prospect of sharing their insights on ST Math, several teachers who volunteered to participate in focus groups solicited feedback from their peers and from their students on ST Math, and shared not only their own experience of ST Math, but also comments of others in their building at both the educator and student level during focus group sessions.

Four Overarching thematic categories were used as the organizing framework for analysis of issues that emerged from focus group discussion: 1) Training and Use of ST Math; 2) Achievements; 3) Challenges; and, 4) Recommendations.

Teachers discussed their training opportunities (onsite, off-site, virtual modules, classroom support site visits, etc.) and how they used ST Math with their students (small group instruction, station rotation, etc.). Challenges discussed mainly fell into the categories associated with lack

of time to implement ST Math, lack of sufficient training, limited access to devices, problems with technology, and differentiated learning strategies. Despite the challenges that arose during year 1 of ST Math implementation, most teachers were enthusiastic about ST Math, and were interested in sharing examples of achievements and strategies for using ST Math.

In *Table D: Math Matters Teacher Focus Groups - Achievements April-June 2015*, six thematic categories were identified and are presented to show a comparative view of elementary and middle school issues across the (13) focus groups:

- Student Engagement
- Teacher Engagement
- Opportunities for Communication
- Sharing Strategies
- ST Math and grade-level curriculum
- Parent Engagement

Agreement on key issues relating to student engagement and teacher engagement is reflected in the subset of themes teachers described when discussing their experience of using ST Math. However, areas that stand out are ways in which communication about ST Math has fostered new opportunities for collaboration in learning about ST Math. In particular, some middle school teachers reported that their students were able to assist a substitute teacher in use of ST Math, while others reported that students have sought out their teachers with questions about ST Math via FaceTime™. How teachers communicate with one another about ST Math is also informative in noting that elementary level 'teaching partners' thought that use of ST Math encouraged communication in their joint planning and teaching experience, and middle school teachers noted the increased communication with their administrators in reviewing ST Math Data Reports. Additionally, it should be noted that both elementary and middle school teachers think that informal communication about ST Math encourages teacher buy-in. This particular aspect of ST Math implementation is further explored in analysis of the teacher survey responses in the next section.

Collaboration among teachers is also reported by both elementary and middle school teachers in sharing best practices for using ST Math effectively in the classroom, and in elementary grades is an aspect of working together in grade level meetings or in working with the math coach. Middle school teachers identified their ability to align ST Math with grade-level curriculum and both elementary and middle school teachers think that their students are making connections between ST Math and grade-level content. Elementary teachers noted that their students are collaborating with their peers in sharing strategies for solving puzzles.

**Table D: Math Matters Teacher Focus Groups -**
**ST Math Achievements April-June 2015**

| Theme | Sub-themes | 10 ES | 4 MS |
|---|---|---|---|
| Student Engagement | Students are excited to use ST Math | ✔ | ✔ |
| | Students are motivated by ST Math | ✔ | ✔ |
| | Teachers observe improvement in students problem solving skills | ✔ | ✔ |
| | Students are able explain how to navigate ST Math to substitute teachers | | ✔ |
| | Students utilize FaceTime™ to communicate with teachers about ST Math | | ✔ |
| | Students hold informal conversations about ST Math | ✔ | ✔ |
| Teacher Engagement | Teachers see many benefits from using ST Math | ✔ | ✔ |
| | Teachers are actively engaged with ST Math in the classroom | ✔ | ✔ |
| | ST Math helps teachers understand their roles differently | ✔ | ✔ |
| | ST Math Data Reports are used to measure student achievement | ✔ | ✔ |
| | Teacher tools provided by MIND Research are useful | ✔ | ✔ |
| Opportunities for Communication | Use of ST Math encourages communication among teaching partners | ✔ | |
| | Informal discussion about ST Math encourages teacher buy-in | ✔ | ✔ |
| | Use of ST Math encourages communication between administrators and teachers (data reports) | | ✔ |
| | ST Math is discussed during professional development | | ✔ |
| Sharing Strategies | Teachers share strategies on overcoming obstacles with ST Math | ✔ | ✔ |
| | Strategies for ST Math were discussed in grade-level meetings | ✔ | ✔ |
| | Strategies for ST Math were discussed in math coach meetings | ✔ | |
| | Students share strategies for solving puzzles with peers | ✔ | |
| ST Math and grade-level curriculum | Students make connections between ST Math and content taught in the classroom | ✔ | ✔ |
| | Teachers see alignment of ST Math Aligns with Common Core | ✔ | |
| Parent Engagement | Parents are excited about their students using ST Math | ✔ | ✔ |

In *Table E: Math Matters Teacher Focus Groups – Recommended Changes and/or Actions for Implementing ST Math in 2015-16*, teachers identified issues that are presented in 6 areas:

- ST Math – Suggested Modifications
- Technology
- Resources & Time
- Training
- Communication
- Student Engagement

Particular ST Math features and ideas about changes that could enhance teachers' ability to employ program tools, or allow them to customize the program for individual students was a major topic of discussion across elementary and middle school teachers. This includes the ability to easily adjust the curriculum, access student data for shared students, and increased specificity of alerts. Additionally, teachers observed frustration in students who had to play through puzzles regardless of the pre-assessment score, noting that they want to start with a level that is challenging for them.

Training in 'teacher mode' was identified by elementary teachers as important for year 2, as well as gaining in their ability to read student Data Reports. Middle school teachers felt that they could benefit from learning to work with ST Math in small group instruction, and also wanted to increase their use of teacher resources through training. Many of the elementary teachers were not aware of the ST Math license period (perpetuity) and in discussion, many agreed that they needed more clarity on ST Math license conditions. Elementary teachers also expressed ideas about the value of sharing ST Math strategies with other educators. The latter two ideas have implications for gaining teacher buy-in through increasing willingness to learn the program and use it fully in collaboration with other teachers.

Middle school teachers identified two key areas where they felt students would benefit including ways to explicitly connect puzzles, their solutions and math skills attained. Teachers also think that student motivation would be better maintained if on completing grade level puzzles other materials could be accessed beyond 'challenge games.'

Table E: Math Matters Teacher Focus Groups -
Recommended Changes and/or Actions for Implementing ST Math in 2015-16

| Theme | Sub-theme | 10 ES | 4 MS |
|---|---|---|---|
| ST Math - Suggested Modifications | Teacher ability to adjust curriculum, share students and have specificity with alerts | ✔ | ✔ |
| | Ability to adjust speed of animation to better synch with student pace | ✔ | ✔ |
| | Control options for student playback, saving and requesting help | ✔ | ✔ |
| | Pre-assessments should allow students to skip levels | ✔ | ✔ |
| | Ability to easily create individualized lesson plans | ✔ | ✔ |
| | Easier access to printable student passwords | ✔ | |
| | Shorter passwords | | ✔ |
| Technology | Improve ST Math for iPads | ✔ | ✔ |
| | Access to additional devices | | ✔ |
| Resources & Time | Provide additional game mats, stickers, manuals and worksheets | ✔ | ✔ |
| | Teachers need more time to explore Teacher Resource site | ✔ | ✔ |
| Training | Aligning curriculum | ✔ | ✔ |
| | Providing additional summer training opportunities | ✔ | ✔ |
| | Working with students | ✔ | ✔ |
| | Training colleagues to use ST Math | ✔ | ✔ |
| | Working in Teacher Mode | ✔ | |
| | Reading data reports | ✔ | |
| | Using ST Math in small groups | | ✔ |
| | Navigating Teacher Resource site | | ✔ |
| Communication | Math curriculum coordinators will employ strategies to encourage teacher buy-in | ✔ | ✔ |
| | Clarification on ST Math license conditions | ✔ | |
| | Creating opportunities to share ST Math strategies with other educators | ✔ | |
| Student Engagement | Provide a way to acknowledge "Passing A Cone" | ✔ | |
| | More opportunities for JiJi school visits | ✔ | |
| | Explicitly connect games to specific math skills gained | | ✔ |
| | Provide additional materials for students who have completed grade level beyond challenge games | | ✔ |

Train the Trainer Focus Group Issues

Educators (n=21) from all of the Math Matters districts and the Fairfield ESC participated in two focus groups during Day 2 of the Train the Trainer sessions including math coaches and content or curriculum specialists. Several of the focus group questions (see Appendix) were designed to prompt participants to share their ideas on effectively moving ST Math forward during year 2, while other questions mirrored those asked in the teacher focus groups conducted earlier in the 4th Quarter of Math Matters. Analysis of the focus group transcripts fell into similar thematic categories as outlined above: ST Math Usage, Achievements, Challenges, and Recommendations.

Challenges encountered by this group of educators during year 1 implementation included lack of time to implement ST Math; lack of training (a number of the TTT participants were not among the teachers who had been trained in ST Math and became familiar with ST Math through interaction with classroom teachers); access to devices; contending with competing initiatives; experienced low levels of teacher buy-in; and, encountered problems with technology.

Educators also added their thoughts on issues related to engagement with diverse student populations. For example, some special education teachers noted that older ESL students thought that the puzzles were too childish. Some observed that they thought their gifted students were bored, and higher-level students showed less interest at the prospect of working on ST Math towards the end of the school year. Conversely, when discussing achievements, some educators felt that early student buy-in to ST Math motivated teacher buy-in. Growth in student skills, and student ownership and accountability were also aspects of ST Math achievements identified by educators in the Train-the-Trainer focus groups.

When discussing plans for moving forward with ST Math in year 2, prospective trainers shared strategies they intend to deploy. Ideas that came up in this exchange included the following:

- Hold ST Math refresher courses at the beginning of the school year
- Train new teachers early in the year
- Provide ongoing PD for teachers in how to monitor and use ST Math more efficiently and effectively in the classroom
- Train others in their district for onsite support, e.g., grade-level coordinators in each school building
- Foster student buy-in by creating more opportunities to use ST Math such as creating a "puzzle club" to motivate student progress, and provide ways for them to track their progress daily

.

**Teacher Surveys**

Teachers were given the opportunity to take an online anonymous survey toward the end of spring semester. The survey questions were developed by the KC Team in early May with input from the Math Matters Project Team and FESC Grants Manager during the week of May 11th, with questions in final form on May 15th, when the website survey links were sent out to teachers in the nine districts and the Fairfield County ESC. The final set of questions is presented in the Appendix to this report.

The online survey was accessible for teachers to take during the school day as well as before and after school, and on weekends throughout the last two weeks of May, and was closed just after the school year ended in early June. During that time several notices and reminder messages re-inviting teachers to complete the survey were sent via email. Additionally, the survey was re-opened to teachers attending the June Academy on June 9th and 17th, allowing teachers a final opportunity to complete the survey onsite as part of the training day. A total of (91) teachers responded to the survey, 10% of the (917) teachers actively engaged in use of ST Math in their classrooms during the 4th quarter of Math Matters year 1 (see ST Math 3rd Quarter Report, April 30, 2015). The complete survey analysis is presented in the Appendix. A brief discussion of survey response highlights is presented in this section of the narrative report.

Questions 2, 3, and 4 provide profile data on respondents. A breakdown of the survey participants shows that 78% (n=71) of survey respondents teach at the elementary school level (ES), with a smaller group of 20% of total respondents (n=18) teaching at the middle school level (MS or Jr. HS). Survey respondents included classroom teachers who teach all subjects (n=46), content area teachers (n=37, including math and math intervention), as well as special population teachers (see Qs 3 and 4).

Open-ended questions (Qs 8, 13, and 16) were analyzed thematically and are presented in table format. Teachers were asked in Q8 to identify implementation challenges (n=83). Analysis of survey responses identified four overarching thematic categories:

- Technology
- Time
- Familiarity with the Program
- Student Engagement

The top reported challenge across teacher respondents among all grade levels (ES, MS, Jr. HS, and HS) indicated that they had difficulty with finding and interpreting student Data Reports. Areas of agreement across ES, MS, and Jr. HS include fostering student buy-in, finding time to implement ST Math, tracking student time on ST Math, and technological issues such as access to devices and faulty internet connections.

In open-ended question 13, respondents (n=43) offered a range of definitions for "blended learning in their classrooms." Some teachers at the ES, MS, Jr. HS, and HS defined blended

learning as *a combination of traditional and digital learning strategies implemented in whole group, small group and individually* (%). Teachers at the ES, MS, and Jr. HS level were either *unfamiliar with the term, or said it was not prevalent in their classrooms or buildings* (%). Still others identified a single idea that they associate with blended learning, including small group instruction, or students working at their own pace, etc.

**Question 13: Please describe how you define blended learning for your classroom.**

(n=43 respondents)

| Defining Blended Learning | ES | MS | Jr. HS | HS |
|---|---|---|---|---|
| Combination of traditional and digital learning strategies implemented in whole group, small group and individually | ✓ | ✓ | ✓ | ✓ |
| Unfamiliar with term/not prevalent | ✓ | ✓ | ✓ | |
| Using technology to enhance learning and demonstrate knowledge | ✓ | ✓ | | ✓ |
| Student led learning | ✓ | | | ✓ |
| Incorporation technology-based instruction with direct instruction | ✓ | ✓ | | |
| Student learning content independently online with teacher facilitating learning | ✓ | ✓ | | |
| Homework done at school | | ✓ | | |
| Students working in stations | | ✓ | | |
| Small group instruction | ✓ | | | |
| Used during specific class periods ["Daily 5"] | ✓ | | | |
| Students working at their own pace/differentiated instruction | ✓ | | | |
| Cross-curricular instruction | ✓ | | | |
| N/A | ✓ | | | |

Analysis of responses to Q 16 (n=54) yielded four thematic categories for organizing benefits of ST Math for students. They include:

- Benefits to Diverse Student Populations
- Building Math Skills
- Student Engagement
- Creating 21st Century Learners

ES teachers identified a greater number of specific benefits for their students than did MS, Jr. HS, or HS teachers. Teachers at the ES, MS, and HS level identified a key benefit for students involves skill building in math reasoning and logic. Teachers across grade levels in various groupings identified specific benefits to diverse student populations that include giving ELL students the opportunity to "dive in" to using ST Math, providing gifted students with enrichment, and offering lower performing students the potential to fill knowledge gaps and build math skills through visualization.

In the following section, exploration of survey responses in context of ideas associated with blended learning goals is presented. This preliminary analysis will be expanded further in the final report due October 30, 2015.

## Benchmarks for Successful Implementation of Blended Learning Programs

During the 2015-16 academic year, K-12 teachers in nine districts in Fairfield and Franklin counties in Ohio have been involved with year 1 implementation of the Math Matters program designed to support transitioning to a blended-learning model for math instruction in K-12 classrooms. In this preliminary analysis of administrator and teacher views gathered through interviews, focus groups and surveys, we have identified three significant areas associated with successful execution of blended learning for students in math instruction. These initial findings will be further explored to identify key benchmarks associated with this pivotal transition in the final report due October 30th, 2015.

Blended learning combines traditional classroom instruction with digital modes of learning. Generally this approach is one that offers diverse implementation strategies designed to maximize existing learning resources (classroom, access to computers and other devices, digital infrastructure, etc.) integrated with facilitation of student-centered learning. Implementation strategies for the Math Matters Straight A Program offer a structured process to transition to a blended learning environment that allows for individual school districts to identify and advance a particular path toward attaining these strategic goals for innovation in math instruction that best suit their needs.

In the following discussion, three important aspects of the year 1 experience have been identified based on teacher and administrator perspectives. These reflect particular ways in which ST Math and the implementation design for classroom use have advanced and can potentially sustain ongoing, active use by teachers and students. These include:

- Strong engagement and articulated support by instructional leaders and classroom educators
- The right technological tools and support for consistent use of ST Math
- Formal and informal collaborative development to support blended learning

In the following discussion, these proposed benchmarks are briefly explored to present preliminary understanding of significant and emerging dimensions of the impact of ST Math and related goals of the Math Matters program.

**Benchmark #1:**
**Building and Sustaining Stakeholder Buy-in**

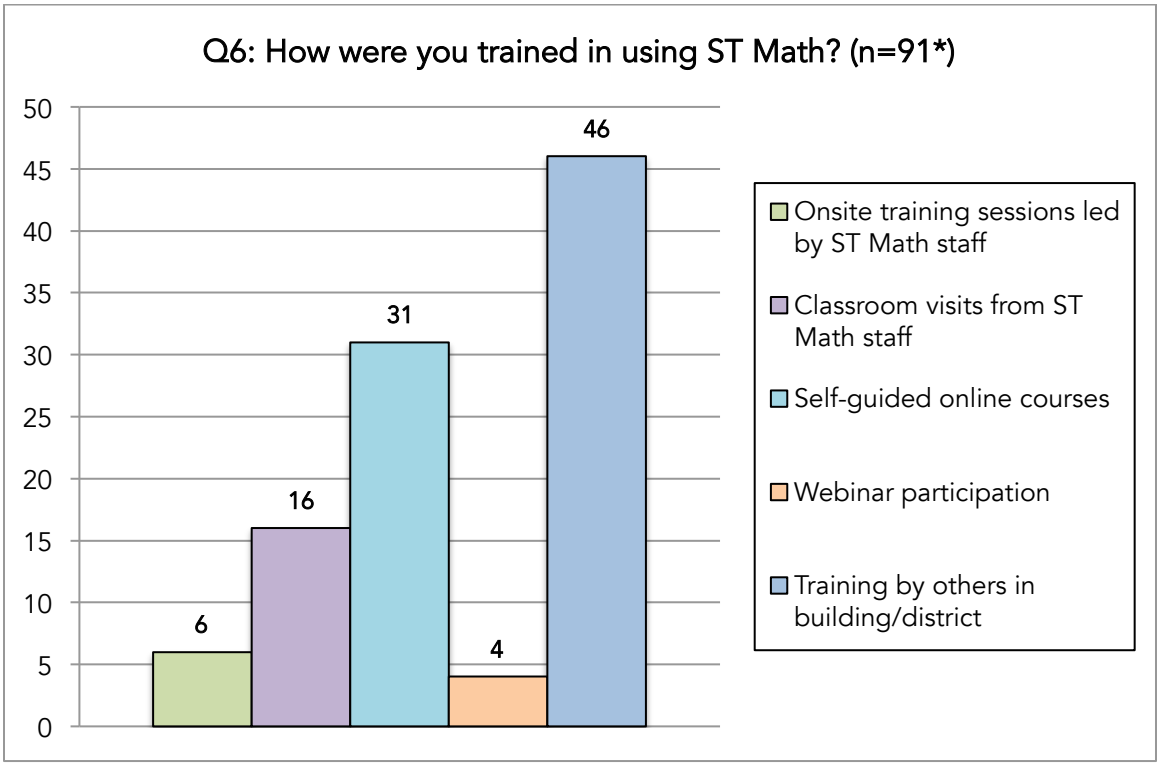
The first significant benchmark centers on garnering interest and gaining committed buy-in among key stakeholders. Building stakeholder support entails planning for all phases of implementation in ways that systematically recognize the role of key individuals who are vital to enthusiastic adoption of blended learning models. This includes planning for involvement of district and building leaders, classroom teachers, intervention and other special education staff, content specialists, educators in technology, and technical support staff.

The data shows that in this year 1 process, teachers have by and large committed to the new challenges and rewards of a blended curriculum. Administrators noted that they sought out teachers who are engaged with their students and could help others to see value in opportunities presented in the Math Matters program and ways to build capacity for successful implementation.

> **1001-27:** *"[...] I've asked her to be part of the Train the Trainer session because she's just really powerful in moving forward in the work she's doing with the Title [1] kids. So she was really instrumental in getting other people moving. In fact, she said to me at one point, "I hope I'm not in trouble for this, but I've already gotten five other people in our building moving on this […]"*

Teachers have expressed extraordinary excitement about the program, going to great lengths to train themselves and maintain proficiency in new technologies. Q6 of the survey shows that among survey respondents (n=91), 51% of respondents stated they were trained by someone in their building or in the district, and 34% completed the self-guided courses (note: several districts provided support for both self-guided course completion and follow-up onsite professional development; also, some districts compensated teachers for time in completing the self-guided courses; in other cases, teachers may have used the self-guided courses to reinforce ST Math instructional practices following onsite-training).

In this group of (91) teachers, only 7% (n=6) of teachers stated that they received onsite training, and 18% (n=16) experienced classroom site visits, affirming the view that teachers are largely inclined to explore use of the ST Math program as an initial step to considering ST Math for classroom instruction.




*Respondents were asked to choose all that apply.

Teachers expressed the view in focus group discussion that student buy-in is also a factor in gaining teacher buy-in and building interest in individualized learning and "game" centered education offered by ST Math. One administrator commented on the visible student excitement at the prospect of using ST Math, contributing to an impression of the positive impact of the program.

> 1008-58: "*When I would visit buildings and talk about ST Math, or when I would go to a building and when the kids would find out that they were going to computer lab for ST [Math], they were extremely excited. That was probably one of the highlights, was getting to see the students.*"

**Benchmark #2:**
**The Right Technological Tools and Support for Consistent Use of ST Math**

Districts engaged with year 1 implementation of Math Matters ranged on a scale of difficulty with deployment of new devices configured for ST Math, as well as in shifting scheduling practices to allocate available computer resources including access to computer labs and carts. Additionally, digital infrastructure (broadband access) and tech support also framed a complex set of constraints that presented significant challenges for some districts. This resulted in delayed deployment of new devices and a cascading series of start dates for teacher training and student rostering to enable use of ST Math in the classroom.

In considering these factors, teachers who participated in this study largely cited difficulties associated with particular aspects of ST Math that are primarily addressed in onsite training scenarios or through online resources and hotline assistance. Still, teachers will very likely need a few basic skills, or routine tech support as technological glitches in the online system itself can affect their ability to teach well using online learning resources. The International Association for K-12 Online Learning's (iNACOL) National Standards documents that teachers will need to be able to communicate via a variety of mediums, explore, identify, and use a variety of online tools to meet student needs, and be able to do basic troubleshooting--such as helping students reset passwords, download plug-ins, and so forth.

In Q8 of the survey, teachers identify both technology issues and time constraints, some of which are linked directly to mastering use of program features (e.g., rostering students, password training).

**Question 8 (excerpt): What were your top three challenges in your initial implementation of ST Math in your classroom?** (n=83 respondents)

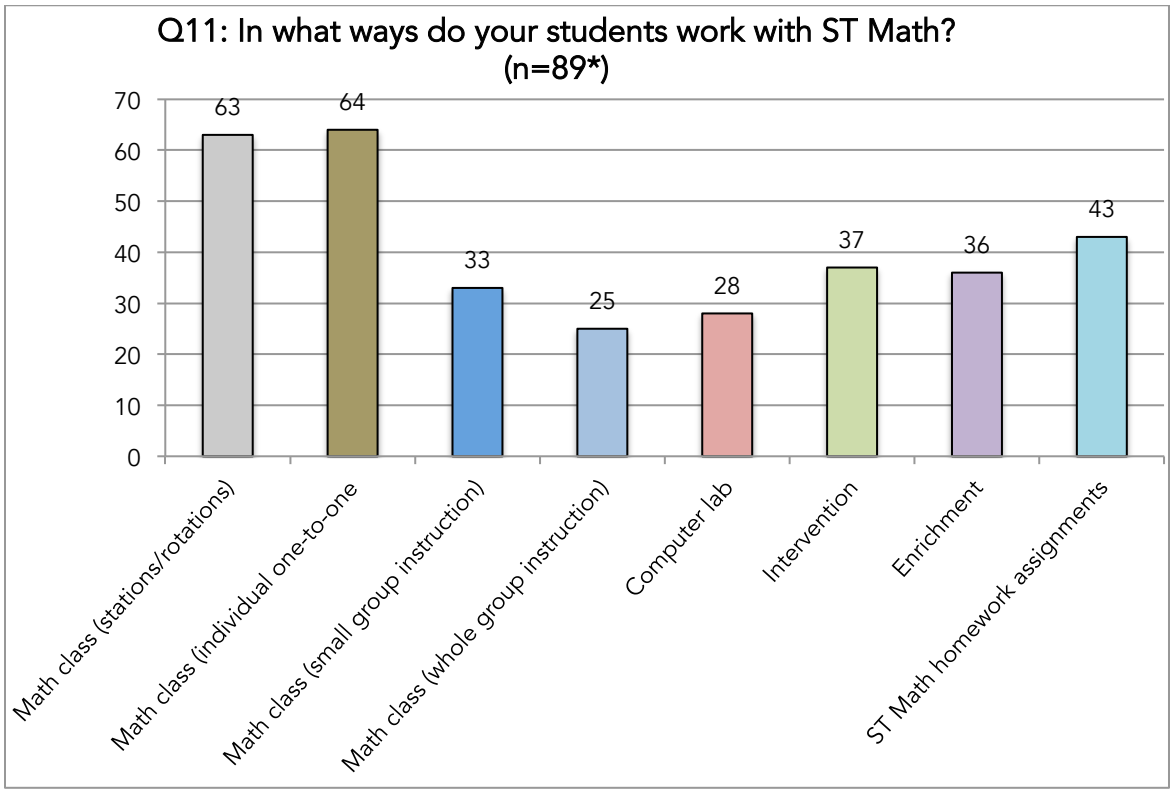
| Themes | Sub-themes | ES (n=68) | MS (n=12) | Jr HS (n=3) | HS (n=1) |
|---|---|---|---|---|---|
| Technology | Student log in/log out issues | ✓ | ✓ | | |
| | Internet unable to support ST Math | ✓ | ✓ | ✓ | |
| | Devices unable to support ST Math | ✓ | ✓ | | ✓ |
| | Preparing devices to use ST Math | ✓ | | | |
| | Activation code issues | ✓ | | | ✓ |
| | Not enough devices available | ✓ | ✓ | ✓ | |
| | Not enough devices available due to testing | ✓ | | | |
| Time | Finding time to implement ST Math | ✓ | ✓ | ✓ | |
| | Finding time for teacher to explore ST Math | | ✓ | | |
| | Rostering too time consuming | | ✓ | ✓ | |
| | Password training too time consuming | ✓ | | ✓ | |
| | Scheduling intervention students | ✓ | ✓ | | |
| | Working with students during rotation | | ✓ | | |
| | Tracking student time on ST Math | ✓ | ✓ | ✓ | |
| | Unable to meet recommended time | ✓ | | | |

From the perspective of administrators, these issues are compounded by related constraints that come into play when teachers have to troubleshoot tech glitches stemming from unanticipated infrastructure issues or with system access.

> 1001-51: *"So what that creates is this awkward moment where our teachers have to be in two buildings, but we have to set up an awkward technology interaction for them."*

1001-55: *"Pretty much I went to [MIND Representative] and [Educational Consultant] and between the two of them, and I'll call them [ST Math] "tech support", they figured out the best way to arrange that. And it was just to create a separate account on our end, and this is where it got a little tricky. I had to go explain the situation to our technical people because we enter through a portal and they had to, each individual teacher, they have to go create a 2nd ST Math icon with the IP address. And so that's a very technical issue."*

In Q11 of the teacher survey (n=89), the data shows a relative comfort with technology with just over 70% of respondents reporting regular use of the program in a station/rotation model (n=63), and in 1-to-1 student use of computers/tablets to access ST Math (n=64).



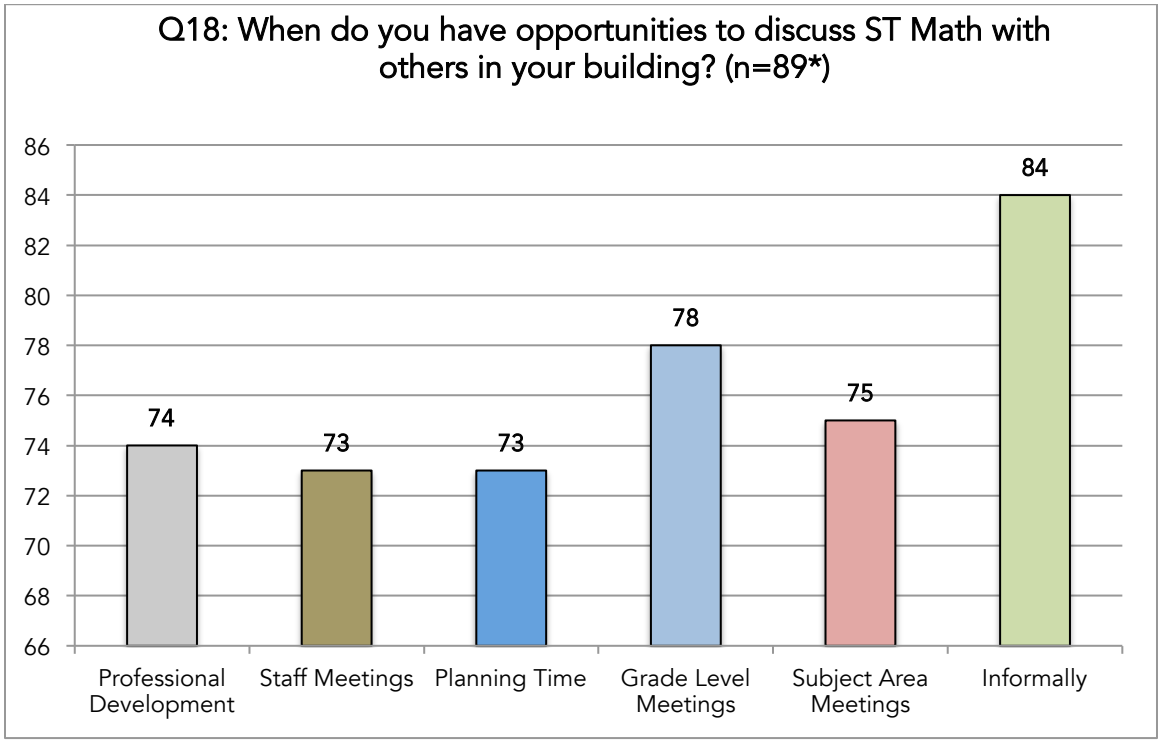

The year 2 implementation plan will also incorporate a new level of digital support with the use of Google calendar to schedule onsite visits to provide ongoing support for teachers, and to coordinate work with newly certified program leads in each district.

**Benchmark #3:**
**Formal and Informal Collaborative Development to Support Blended Learning**

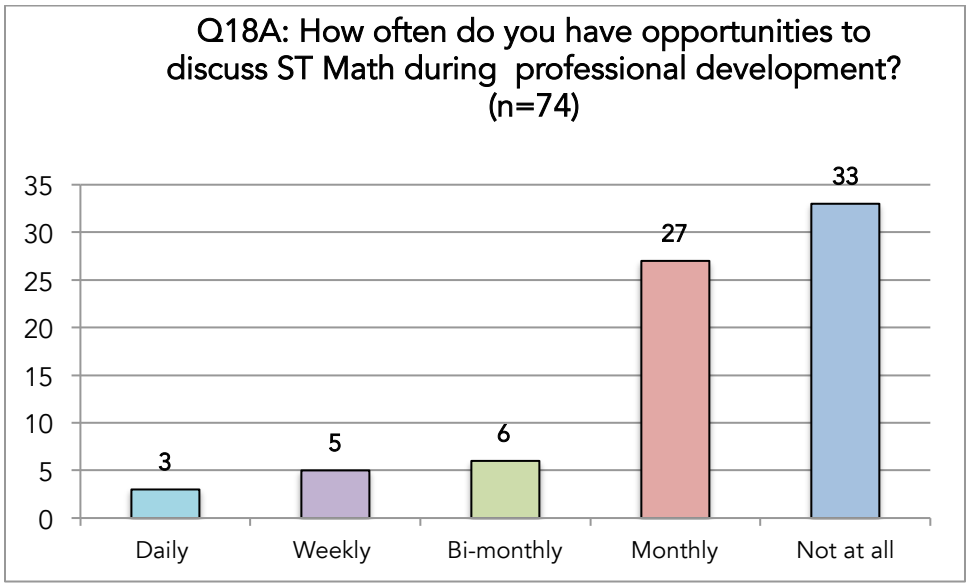
Creating blended learning environments requires that teachers experience structured development opportunities to increase competencies that support success in facilitation of math instruction. Year 1 implementation in most districts incorporated a significant allocation of resources and time supported by grant funding for formalized professional development and

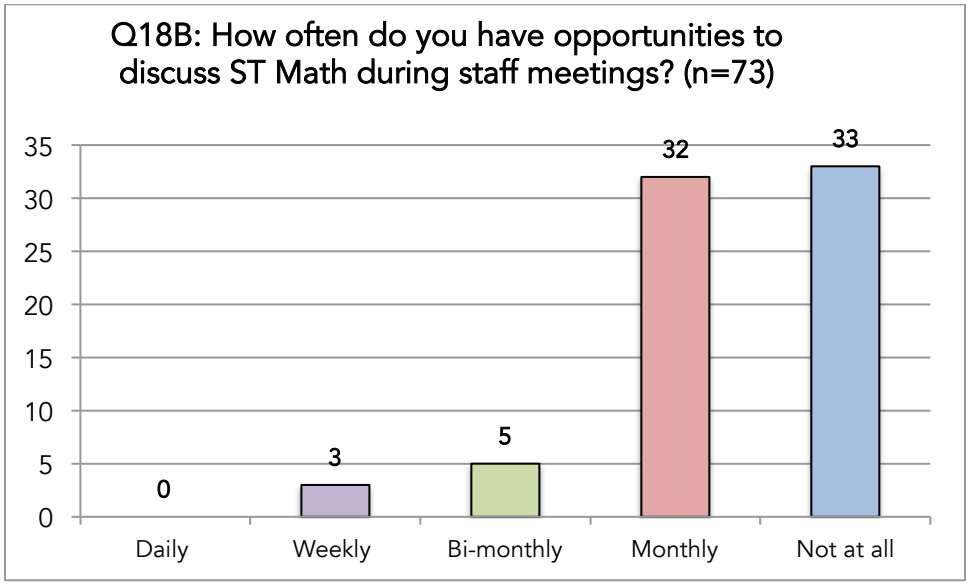
follow-up training during early stages of implementation. In year 2 implementation, in addition to ongoing ST Math support, staff would further benefit from regularly held, structured time to work together to identify lessons learned, share practices, and jointly explore areas for further improvement and innovation.

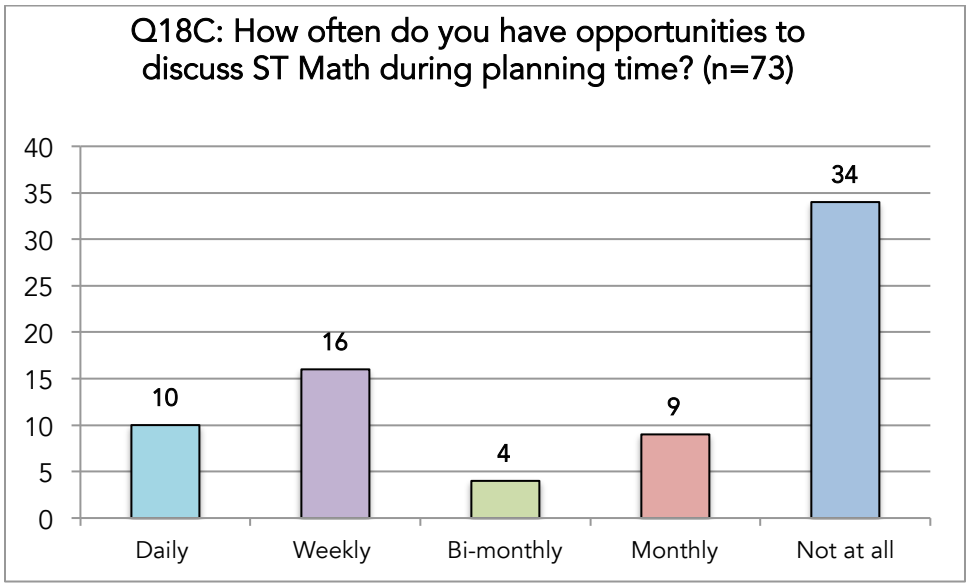
In particular, the data suggests that as their schools developed blended-learning programs, teachers and administrators lacked dedicated collaboration time to discuss strategies for ST Math. In Q18 (n=89 respondents), 94% of respondents reported that a major way to speak with their peers about ST Math occurs informally during the course of the school week.

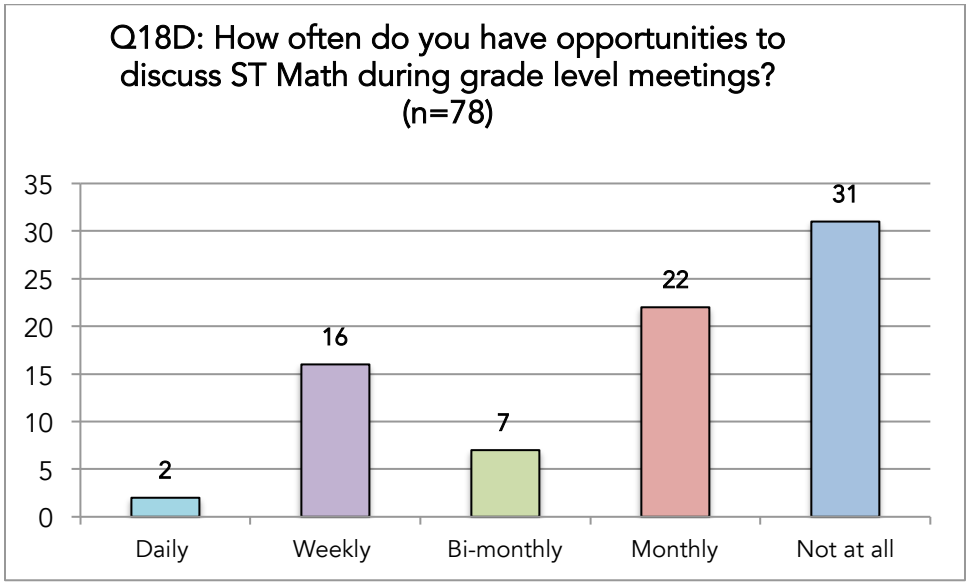



In the following tables (18A, 18B, 18C, and 18D), it is clear that just under half of respondents do not discuss ST Math during PD days, staff meetings, planning time for classroom work, or during grade level meetings.


Q18A: How often do you have opportunities to discuss ST Math during professional development? (n=74)
35
30
25
20
15
10
5
0
3
5
6
27
33
Daily
Weekly
Bi-monthly
Monthly
Not at all


Q18B: How often do you have opportunities to discuss ST Math during staff meetings? (n=73)
35
30
25
20
15
10
5
0
0
3
5
32
33
Daily
Weekly
Bi-monthly
Monthly
Not at all




The data presented in these four tables suggests that the infrastructure to discuss program implementation strategies among faculty can be considered an untapped supporting component to supplement efforts to advance program integration with classroom instruction. Expanding modes of formal communication as an underlying feature of implementation can ensure success in year 2 for teachers and administrators, providing systematic and productive platforms for communication that enhance building upon the momentum gained in year 1.

**Achievements and Challenges**

ST Math Program implementation in year 1 demonstrates an enormous interest and commitment to establishing a blended learning environment in math instruction. This has been developed both through intentional design, as well as grassroots buy-in by key stakeholders committed to the tenets of blended learning and growing excitement among teachers and students. One administrator shared surprise at discovering the level of student engagement in year 1 with ST Math:

> 1008-82: *"Like I said we've had a lot of home sessions. One of the, I guess, great "aha" moments was over Christmas break when I reviewed stats and looked at when students had been on. A lot of our students were on the program on Christmas Eve and Christmas day, and throughout Christmas. And we had a lot of snow days and the students were logging on during those off days. That was a great, and we've shared that with staff and principals. That tells you that the kids enjoy the program when they're logging on in their off times."*

A final view from an administrator in sharing expectations for year 2 suggests that implementation challenges will be different in the coming year.

> 1008-92: "*[…] starting on day 1, kids will be in the system. The program will be ready to run. The kids will remember where they were and they'll be excited to move onto the next level so I think that's part of it too is the kids are going to see. Now I'm in some different material or now the games are different. I think that's going to be exciting for the next two or three years."*

In the final report (October 30th, 2015), these issues will be further developed in context of the 2014-15 achievements, as well as in providing an in-depth discussion of the key challenges and strategies for sustaining the momentum and widespread engagement with the Math Matters program for math instruction.

# Knowledge Capture
# APPENDIX
# Math Matters

## Knowledge Capture Tables



## Interviews, Focus Groups and Survey Questions



## Math Matters Interviews

**Matter Matters Focus Groups**
Educator Focus Group Bullet Point Reports (15)
April-June 2015

**Math Matters Survey Report**
May-June 2015

**ST Math Implementation Observations**
Fairfield and Franklin Counties Elementary Schools Bullet Point Reports (5)
April 28 to June 17, 2015

Fairfield and Franklin Counties Middle Schools Bullet Point Reports (1)
April 28 to June 17, 2015

Fairfield and Franklin Counties K-12 Bullet Point Reports (3)
April 28 to June 17, 2015

Fairfield and Franklin Counties K-12 June Academy and Train the Trainer
Bullet Point Reports (5)
June 9 to June 25, 2015

**Math Matters, MIND Research Institute Quarterly Report on ST Math**
July 30, 2015
Submitted directly to the Fairfield ESC
This report is included here for reference only