Evaluation of the Science, Technology, and Engineering Leadership Program, Year Two

Office of Shared Accountability

January 2013

Natalie L. Wolanin and Julie H. Wade

Montgomery County Public Schools

OFFICE OF SHARED ACCOUNTABILITY

Dr. Susan F. Marks, Acting Associate Superintendent
850 Hungerford Drive
Rockville, Maryland
301-279-3553

Dr. Joshua P. Starr
Superintendent of Schools

Dr. Kimberly A. Statham
Deputy Superintendent of Teaching, Learning, and Programs

Table of Contents

List of Tables iii
Executive Summary v
Background and Evaluation Questions v
Summary of Key Findings v
Recommendations vii
Background 1
Literature Review 2
Scope of the Study 4
Methodology 4
Study Sample 5
Data Collection Activities 5
Summary of Data Analysis 6
Description of the STELP Year Two 7
Invitation and Enrollment of Participants 7
Training Sessions for Teacher Leaders 7
Formation of Teams and Selection of Topics 8
Product Development 9
Findings 9
1. What was the context of the Science, Technology, and Engineering Leadership Program? 9
Characteristics of the Participating Teacher Leaders 9
Characteristics of Schools with STELP Teachers 11
2. To what extent was the training of teacher leaders implemented as planned? 12
Training Schedule and Attendance 12
Training Sessions 12
Product Development 12
3. What was the impact of the STELP training sessions on teacher leaders? 13
Teacher Leaders' Perceptions of Training Sessions 13
Summary of Teacher Leaders Responses to Open-ended Questions 15
Teachers Leaders' Perceptions of Knowledge and Skills Gained 18
Reflections 19
Final Online Professional Development Modules 21
4. When and how were the online products made available to MCPS teachers? 23

Discussion and Recommendations 23
References 25
Appendix A: Training Sessions' Feedback Surveys 26
Appendix B: Program Evaluation Unit Project Rubric 46
Appendix C: STE Staff Interview 49
Appendix D: STELP Training Plan Peer and STE Specialist Review 50
Appendix E: Training Session Schedule, Attendance and Outcomes 52
Appendix F: Participants' STELP Reflection 54

List of Tables

Table 1 Evaluation Activities Using Guskey's Model for Evaluating Professional Development 5

Table 2 STELP Online Professional Development Design Teams and their Assigned Topics 8

Table 3a Science, Technology, and Engineering Leadership Program: Characteristics of Participating School Staff 10

Table 3b Science, Technology, and Engineering Leadership Program: Previous Training and Leadership Experience of Participating Elementary and Middle School Staff 11

Table 4 Science, Technology, and Engineering Leadership Program: Characteristics of Elementary and Middle School Participants 11

Table 5 Science, Technology, and Engineering Leadership Program: Teacher Leaders' Perceptions of Training Provided in Three Sessions 13

Table 6 Science, Technology, and Engineering Leadership Program: Teacher Leaders' Perceptions of Training Provided in Three Sessions 14

Table 7 Science, Technology, and Engineering Leadership Program: Teacher Leaders' Perceptions of Training Provided in Three Sessions 14

Table 8 Science, Technology, and Engineering Leadership Program: Teacher Leaders' Perceptions of Training Provided in Three Sessions 17

Table 9 Science, Technology, and Engineering Leadership Program: Teacher Leaders' Perceptions of Training Provided in Three Sessions 18

Table 10 Science, Technology, and Engineering Leadership Program: Teachers' Perceptions of Technology Skills in Two Sessions 18

Table 11 Science, Technology, and Engineering Leadership Program: Teachers' Understanding of Science Standards and Practices 19

Table 12 Evaluation of STELP Online Professional Development Product Modules (N = 7 reviewed products) 22

This page is intentionally left blank.

Executive Summary

The Office of Shared Accountability (OSA) conducted an evaluation of the implementation of the second year (2011–2012) of the Science, Technology, and Engineering Leadership Program (STELP) in Montgomery County Public Schools (MCPS). The study was requested by the Office of Curriculum and Instructional Programs (OCIP). Funding for STELP, including the evaluation study, is provided by a grant from the Howard Hughes Medical Institute (HHMI) to MCPS.

Background and Evaluation Questions

The goal of STELP is to improve instruction in science, technology, and engineering and help students achieve science, technology, engineering, and mathematics (STEM) literacy (MCPS, 2010). This evaluation report addresses the second year of STELP. The focus of this evaluation was on implementation of the program in terms of continued training of a group of teacher leaders to develop online professional development modules for other MCPS science, technology, and engineering (STE) educators to view. Year two included both new and returning teacher leaders and built upon the professional development modules created in year one. The evaluation addressed the following questions:

1. What was the context of the Science, Technology, and Engineering Leadership Program?
2. To what extent was the training of teacher leaders implemented as planned?
3. What was the impact of the STELP training sessions on teacher leaders?
4. When and how were the online products made available to MCPS teachers?

Summary of Key Findings

1. What was the context of the Science, Technology, and Engineering Leadership Program?

Characteristics of the participating teacher leaders. A total of 47 teachers participated in the second year of STELP. Of the 47 teachers, 30 participated in the first year of STELP as well. The participants represented a variety of positions in both elementary and secondary schools. Almost everyone had more than five years teaching experience (98%), and the majority reported having experience teaching science (92%). Teachers who participated in STELP were from 22 elementary schools, 15 middle schools, and 1 high school.

2. To what extent was the training of teacher leaders implemented as planned?

Training schedule and attendance. Five whole-group training sessions and a separate training for new participants were held in year two. Optional supported work sessions for completion of the professional development products also were available.

Training sessions. Training sessions were designed to provide participants with a greater understanding of science, technology, and engineering instruction and professional development, as well as the technical skills needed to create online professional development products. Training content was aligned with the stages that the teacher leaders had achieved in the

planning and creation of their professional development products. For example, it was decided that the May session would be dedicated for groups to solely work on their products. Participant feedback surveys helped program staff improve and modify trainings accordingly.

Product development. The original STELP plan projected that the online products would be completed and launched at the end of year one. However, at the completion of the first year of STELP, the professional development products had not fully met the criteria for the program. The revised program plan specified that the products would be completed during year two of STELP, after teacher leaders received further training and additional time for the completion of their work. Seven of the eight products were launched and shown to science resource teachers at the beginning of September 2012.

3. What was the impact of the STELP training sessions on teacher leaders?

Teacher leaders' perceptions of training sessions. Large percentages of participants responded with positive perceptions about the training. The statements they agreed with included: clear goals, objectives met, trainers knowledgeable and prepared, a comfortable environment, opportunities to reflect, questions were answered, and helpful information and skills gained. A majority also reported that the peer review feedback on their professional development product and the training plan were helpful; and that the article discussion on science standards was beneficial. Almost all agreed that the STE instructional specialist assigned to their group was helpful. The most dominant challenge reported by participants was time to get everything done followed by videotaping challenges. Nearly all participants agreed that the expectations were clear and that the expectations for next steps were clearly communicated.

Teacher leaders' perceptions about their technology skills. Participants' comfort level with various Movie Maker technology skills greatly increased from the first session to the fifth session. Participants already had a fairly high comfort level with flip-style camera technology and PowerPoint.

Teacher leaders' understanding of science standards and practices. Participants' self-measurement of their understanding of science standards and practices increased greatly from the first session to the fifth session. These included: articulate look-fors in evaluating student proficiencies, how K–8 technology standards are relevant to their STE teacher role, and how the practices of science and engineering and the framework for science education are relevant.

Participant reflections. At the end of the school year, many participants gave specific examples of how the STELP professional development impacted their instruction including using discourse in their classroom and sharing information at school staff meetings. The opportunity to network and work with other MCPS professionals was most often mentioned as a benefit.

Final online professional development modules. The STELP participant teams turned in their final products in June 2012. A subgroup of participants served as editors for the final products. Seven of the eight product modules were launched and shown to science resource teachers at the beginning of September 2012. An evaluation protocol was developed, based on

the rubric created by STE staff, to use while viewing each of the online product modules to determine if they met the key expectations that were established. After viewing the seven products, all products were found to be highly proficient in the description of the practice, showing the impact on student learning, showing instructional strategies and using multimedia; only one product was found highly proficient with navigation.

4. When and how were the online products made available to MCPS teachers?

All the online product modules were combined into one product in a single location so that teachers may launch whichever product they wish to view using one main page. The product modules were initially shared with science resource teachers via a Webinar they participated in at the beginning of September 2012.

Recommendations

The following recommendations are suggested by the year two findings:

- Resolve technical issues and logistical difficulties on existing product modules (e.g., the navigation and pace of slides, unclear font, inoperable website links, etc.).
- Encourage wide-spread use of the modules among MCPS STE teachers and staff.
- Collect data on who is viewing the modules, via the product modules.
- Promote viewer feedback on the product modules and use the feedback to continue improving and expanding the product modules.
- Continue providing time for team work, clear expectations, a time line, a training plan, and continued education on science practices and standards, for upcoming trainings as teacher leaders continue their work on developing and creating online product modules.
- Monitor ways in which teacher leaders are sharing their STELP information with their school staff and ways in which they are improving their own, or their schools', teaching of science technology and engineering.

This page is intentionally left blank.

Evaluation of the Science, Technology, and Engineering Leadership Program, Year Two

Natalie L. Wolanin and Julie H. Wade

Background

The overarching vision for science, technology, and engineering (STE) instruction in Montgomery County Public Schools (MCPS) is that all students achieve full literacy in these areas. Students who are literate in science, technology, engineering, and mathematics (STEM) are knowledgeable, informed citizens who are able to think critically about concepts and solve problems. MCPS supports this vision by engaging all students through seamlessly integrated instruction that is project/problem and standards based (MCPS, 2012).

The Science, Technology, and Engineering Leadership Program (STELP) was introduced in MCPS in 2010. The program aims to grow instructional capacity in MCPS by training and supporting a cadre of teacher leaders to design and deliver online professional development. Building on the skills and knowledge developed through the Elementary Science Leadership Program (ESLP), as well as tapping into the expertise of content specialists in secondary schools, STELP is preparing a group of teacher leaders to develop online materials to support inquiry-based instruction within effective, research-based teaching practices. With the creation of these resources, STELP aims to build a professional development network in science, technology, and engineering for wide use across MCPS.

The ultimate goal for the three years of STELP is to improve instruction in science, technology, and engineering and, in turn, help students achieve STEM literacy (MCPS, 2010). This goal is in alignment with the mission of MCPS, "To provide a high-quality, world-class education that ensures success for every student through excellence in teaching and learning," and with Goals 1 and 2 of Our Call to Action: "Ensure success for every student," and "Provide an effective instructional program" (MCPS, 2012).

Research reported in *Taking Science to Schools* and *Ready, Set SCIENCE: Putting Research to Work in K–8 Science Classrooms* (Michaels, Shouse, & Schweingrube, 2007; National Research Council, 2007*)* is the basis for the National Research Council's *Framework for K–12 Science Education* released July 2012. This framework, in turn, is the springboard for the development of the Next Generation of Science Standards (NGSS) managed by the nonprofit organization, Achieve, Inc. These standards are scheduled to be released in spring 2013. The strands of scientific proficiency represent learning goals for students and address the knowledge and reasoning skills that students must acquire to be considered fully proficient in science. They are also a means to that end: they are practices that students need to participate in and become fluent with in order to develop proficiency.

The year one evaluation plan projected that the trained teacher leaders would complete professional development products within the first year of the program, and that the products would be launched during the summer or fall of 2011. However, program administrators recognized the need for further skill development and time for teacher leaders to refine and complete their products. The program schedule was extended to allow more time for teacher leaders to refine and finalize their online products during year two.

This report addresses the evaluation of the second year of STELP, focusing on the continued training of a cadre of teacher leaders to design and deliver online professional development product modules for other MCPS STE educators to view. This second year also provided an opportunity to upgrade the product modules, as the national documents evolved. The year two evaluation assesses the implementation of the STELP training protocol that was delivered to the participating teacher leaders. In addition, the online professional development product modules are reviewed and assessed according to a rubric reflecting effective online professional development in science, technology, and engineering. The objectives for the second year of STELP were—

- continue the training and support of a group of teacher leaders by providing skills and knowledge to produce online professional development products that are based on a rubric reflecting characteristics of effective online professional development in science, technology, and engineering; and

- publish the online professional development products created by STELP participants for use by MCPS teachers.

The evaluation was requested by the Office of Curriculum and Instructional Programs (OCIP) and conducted by the Office of Shared Accountability (OSA). Funding was provided by a grant from the Howard Hughes Medical Institute (HHMI) to MCPS.

Literature Review

In a recent nationwide study, Wei, Darling-Hammond, and Adamson (2010) reported that teachers rated professional development in their subject area as their highest priority for further training. Consistent with this finding, teachers in an earlier study reported that professional development focusing on content knowledge was one of two elements that had the greatest effect on their knowledge and skills, and led to changes in instructional practice (Garet, Porter, Desimone, Birman, & Yoon, 2001).

In challenging budgetary times, it has become increasingly important to make the most efficient and effective use of limited resources in all areas of education, and professional development is no exception. Dahlberg and Philippot (2008) conducted a study to explore the perceived needs and perceptions of teachers regarding their professional development. The researchers concluded that there is no one-size-fits-all model to meet the professional development needs of teachers, arguing that professional development should be differentiated according to the varying needs and career stages of teachers. They advocate for a collaborative approach to determining

professional development agendas, suggesting that, "Teachers, the ones who work most closely with the curricula and students, often know best where gaps in their own pedagogy and knowledge exist" (Dahlberg & Philippot, 2008, p. 22).

As administrators have sought to stretch professional development dollars while providing teachers with accessible and meaningful professional development opportunities in their subject areas, interest in online professional development has grown (Dede, Ketelhut, Whitehouse, Breit, & McCloskey, 2009; National Research Council, 2007; Sawchuk, 2009). The flexibility of online professional development, as well as the capacity to tailor it to meet varying needs, makes it an attractive option in many school systems. As increasing numbers of teachers have participated in online professional development activities in recent years, evaluative research has not kept up with the growing use of these online models (Dede, et al., 2009).

Dede and colleagues (2009) at the Harvard Graduate School of Education conducted a review of studies of online teacher professional development and noted that evidence of effectiveness was often lacking or anecdotal. In response to the scarcity of empirical findings, they developed a research agenda to help guide the study of online professional development toward a framework that would integrate theory and evidence-based practice. Among their recommendations are "research methodologies that do not simply replicate methods used in studying face-to-face professional development, but instead take advantage of the unique data collection possible in online programs" (Dede et al., 2009, p. 20). Their report also points out that since teachers apply what they learn over time, data should be collected over time as well. Consistent with the evaluation model constructed by Guskey (2000), Dede and his colleagues (2009) recognized the various levels of experience and learning to be addressed in an evaluation of professional development. They maintained that more and better measures implemented over time would help build understanding of what teachers learned in professional development, how they applied the new knowledge and skills to practice, and what changes resulted (Dede, et al., 2009). Consistent with the recommendations of Dede and colleagues (2009) in their "Research Agenda for Online Teacher Professional Development," this evaluation includes data collected over time so that information about teachers' use of the knowledge and skills gained from the professional development may be better understood.

An evaluation of the first year of STELP was published in February 2012 (Wolanin & Wade, 2012). The report assessed the year one implementation of the project through multiple surveys of participants, interviews with program administrators, and document reviews. Participants were positive in their perceptions of the training and reports about skills and knowledge they had learned. Feedback from the participants was used to develop recommendations for year two, including clarifying the STELP vision and understanding of STELP strands, collecting regular updates on the products' progress, and providing opportunities for teams to work on their products.

Scope of the Study

The evaluation addressed the second year of the Science, Technology, and Engineering Leadership Program. The focus of the year two evaluation was on implementation of the program in terms of continued training of a group of teacher leaders to develop online professional development modules for other MCPS science, technology, and engineering educators. Year two included both new and returning teacher leaders and built upon the online professional development modules created in year one. Toward this end, the evaluation addressed the following questions:

1. What was the context of the Science, Technology, and Engineering Leadership Program?
    a. What were the characteristics of the teacher leaders who participated in STELP, including degree and experience?
    b. How many participated in year one?
    c. What were the characteristics of the schools with participating teacher leaders?

2. To what extent was the training of teacher leaders implemented as planned?
    a. How was year two of the program organized and administered?
    b. Was the training schedule followed as planned?

3. What was the impact of the STELP training sessions on teacher leaders?
    a. What were teacher leaders' reactions to training, including the process for creating professional development products?
    b. What knowledge and skills did they gain?
    c. Did they have the resources and support needed to apply what they learned?
    d. How did they use the new information, to develop online products to meet the required criteria?

4. When and how were the online products made available to MCPS teachers?
    a. What was the method of disseminating the products (e.g., website, SharePoint)?
    b. When and how were teachers informed of the products' availability?

Methodology

Participation in STELP was limited to a group of teacher leaders selected by program staff, so a nonexperimental design utilizing a variety of data collection methods was applied. Data collection methods included the following:

- Reviews of program documents and training records and materials, including professional development plan, session agendas, session handouts, session attendance records
- Interviews with the STE project manager and instructional specialists
- Surveys of teacher leader participants after each training session
- Evaluation of online professional development modules

Study Sample

In the second year of the evaluation, all teacher leaders enrolled in STELP comprised the study sample. A total of 47 school-based staff members participated during year two, representing 31 elementary schools, 15 middle schools, and 1 high school in MCPS. Participants consisted of elementary, science, technology, engineering, and staff development teachers.

Data Collection Activities

To address the first evaluation question, "What was the context of STELP," data were drawn from teacher leader participant feedback surveys, program records, and MCPS records to describe the participants and their schools.

Assessment of the second evaluation question, "To what extent was the training of teacher leaders implemented as planned," included a review of documents and interviews with program staff to determine the program training plan and schedule of training activities.

To address the third evaluation question, "What was the impact of the STELP training sessions on teacher leaders," Guskey's (2000) model for evaluating professional development was used. Four of Guskey's sequential levels were addressed in the second year of the evaluation: participants' reactions, participants' learning, organization support and change, and participants' use of new knowledge and skills. Table 1 outlines the levels of Guskey's model along with the evaluation activities that were used to address each level.

Table 1
Evaluation Activities Using Guskey's Model for Evaluating Professional Development

Level of evaluation	Instrument/activity	Data collected
1. Participants' reactions	Surveys of participants (administered after each training)	Participants' satisfaction and reactions to professional development
2. Participants' learning	Surveys of participants (administered before and after training)	Participants' knowledge of effective science, technology, and engineering instruction; skills and knowledge required to plan and create online professional development resources
3. Organization support and change	Surveys of participants (administered after each training)	Organizational support and teacher leader needs in the project
4. Participants' use of new knowledge and skills	Surveys of participants (administered after each training); review of online products	Participants' reported use of new knowledge as they created professional development products; review of online products

Based on program goals and objectives and professional development materials and curricula, OSA evaluators collaborated with staff from OCIP to develop the evaluation instruments. The following instruments were developed during the second year of the evaluation:

- Surveys of the teacher leader participants administered at the end of each group training session—the surveys assessed teacher leaders' perceptions of the training received in the program (Appendix A).
- Evaluation rubric for reviewing the end of year final professional development modules—OSA staff developed their evaluation rubric based on the rubric developed by OCIP staff (Appendix B).
- End-of-year interview of STE program staff—the interviews assessed staffs' perceptions of the trainings provided and the product development process by teacher leader teams (Appendix C).

Summary of Data Analysis

Procedures included a descriptive statistical analysis of teacher leaders' survey data and a descriptive summary of the following:

- Characteristics of participants
- Attendance at professional development sessions
- Participants' reflections provided to STE program staff
- STE program staff interviews
- Professional development product module evaluations

Description of the STELP Year Two

Invitation and Enrollment of Participants

The cadre of teacher leaders who participated in year one were invited to return in year two. In addition, new teachers were recruited to expand the number of technology education and middle school teachers, and to replace teachers who did not return. New teacher leaders attended an introductory training session in September, prior to the regular schedule of training sessions. A total of 47 teachers signed on to participate in year two of STELP; 30 of those teachers were returning participants from year one. The teachers who did not return either had a change in position or position responsibilities.

Training Sessions for Teacher Leaders

In addition to the new participant training held in September, five professional development sessions were held in the second year: October 2011, December 2011, February 2012, April 2012, and May 2012. Attendance at the beginning was high for these sessions with approximately 38–40 of the 47 participants attending the first two sessions, and then approximately 31 of the total 47 participants attending each of the final sessions.

In the new participant training session, teacher leaders learned about the vision for STE in MCPS, identified proficiencies in science and engineering, and learned technology skills needed for STELP, such as the use of video recording during classroom instruction and the use of Windows Movie Maker and Microsoft PowerPoint.

In the first session, held in October 2011, teacher leaders were assigned their professional development team for the year, and they reviewed and provided feedback on the products developed in year one. Teacher leaders also learned about the charge of STELP, science and engineering proficiency, and how the strands for science and engineering proficiency and the MCPS STE vision aligns to the Framework for K–12 Science Education and the NGSS. In December, participants received camcorders, training plan templates, and task time lines. They also worked on their team projects; received tips for collecting good video and creating presentations; and listened to the guest speaker, Dr. Stephen Pruitt, Vice President of Achieve, Inc., talk about the framework, practices, and standards. In February, they continued to learn about the NGSS, as well as worked on their team projects and reviewed peers' training plans. In April they received new camcorders (the initial camcorders had many audio difficulties), and worked on their team project and reviewed peers' presentations. The final scheduled session in May was dedicated time for teams to work on their product modules.

Formation of Teams and Selection of Topics

Eight teams, comprised of five to seven teachers, were formed at the first training session in October and were based on participants' requests. The teams were each assigned one of the science and engineering framework practices, listed in Table 2, and were expected to develop an online STE professional development product about that practice. Each practice corresponds to one of four learning strands developed by the National Research Council (NRC) Committee on Science Learning. Some repeat participants worked on the same practice as year one and some worked on a new practice in year two. Also, each team was assigned an STE staff member as a support and "go to" resource person throughout the year. Each team self-assigned roles for their members such as: coordinator, check for understanding developer, quality controller, PowerPoint expert, Movie Maker expert, and any other roles they deemed useful.

Table 2
STELP Online Professional Development Design Teams and their Assigned Topics

Science & Engineering Framework Practice #	Framework Practice Name	Target Proficiency Strand
Practice 1	Asking Questions and Defining Problems	Strand 1: Know, use, and interpret scientific explanations of the natural and design world
Practice 2	Developing and Using Models	Strand 1: Know, use, and interpret scientific explanations of the natural and design world
Practice 3	Planning and Carrying Out Investigations	Strand 2: Generating and evaluating scientific evidence or technological solutions
Practice 4	Analyzing and Interpreting Data	Strand 2: Generating and evaluating scientific evidence or technological solutions
Practice 5	Using Mathematics and Computational Thinking	Strand 2: Generating and evaluating scientific evidence or technological solutions
Practice 6	Constructing Explanations and Designing Solutions	Strand 1: Know, use, and interpret scientific explanations of the natural and design world
Practice 7	Engaging in Argument from Evidence	Strand 4: Participating productively in practices and discourse of science and engineering
Practice 8	Obtaining, Evaluating, Communicating Information	Strand 4: Participating productively in practices and discourse of science and engineering

Product Development

Eight teams were to produce eight online professional development product modules based on a rubric of elements that are characteristic of effective online professional development in science, technology, and engineering. Each product module represented one of the eight science practices. Products were a continuation of products created from year one. Some products used video clips and presentations from year one, and some were recreated using new video clips. Presentations were created using advanced features in Microsoft PowerPoint and Windows Movie Maker and then combined for a cohesive product using Articulate Studio '09, where viewers may select the professional development module they want to view. Teams created training plans to be used for planning their professional development product. The draft training plans were presented for review by peers and an STE specialist (Appendix D). The training plan was a "5E" (engage, explain, explore, evaluate, and extend/elaborate) training plan and included the following criteria:

- Varied assessment strategies before, during, and after professional development
- Variety of opportunities for viewer of the professional development to engage with, explore, process, and reflect on content
- Accurate and adequate content about session topic (specific science and engineering practice)

Findings

1. What was the context of the Science, Technology, and Engineering Leadership Program?

Characteristics of the Participating Teacher Leaders

A total of 47 teachers (31 elementary school, 15 middle school, and 1 high school) participated in the second year of STELP; although 4 participants withdrew midyear because of personal or professional reasons. Of the 47 teachers, 30 participated in the first year of STELP as well.

The participants represented a variety of positions in both elementary and secondary schools. Of the 47 who participated, 28% taught Grades 3 through 5, and 21% taught middle school science. Almost everyone had more than five years teaching experience (98%), and the majority reported having experience teaching science (92%). Three of the middle school teachers also were science resource teachers, and two of the middle school teachers also were technology resource teachers. Characteristics of those who agreed to participate in STELP are summarized in Table 3a.

Table 3a
Science, Technology, and Engineering Leadership Program:
Characteristics of Participating School Staff

	Total Teacher Leaders (*N* = 47)		Elementary Teacher Leaders (*N* = 31)		Secondary Teacher Leaders (*N* = 16)[b]	
Current position	*n*	%	*n*	%	*n*	%
3–5 teacher	13	27.7	13	41.9	0	0.0
MS science teacher[a]	10	21.3	1	3.2	9	56.3
Staff development teacher	7	14.9	6	19.4	1	6.3
K–2 teacher	7	14.9	7	19.4	0	0.0
Tech and engineering teacher	5	10.6	0	0.0	5	31.3
Special education teacher	2	4.3	2	6.5	0	0.0
HS science teacher	1	2.1	0	0.0	1	6.3
ES science teacher (multi grades)	1	2.1	1	3.2	0	0.0
Focus teacher	1	2.1	1	3.2	0	0.0
Total years teaching						
1–4 years	1	2.1	1	3.2	0	0.0
5–15 years	34	72.3	21	67.7	13	81.3
16+ years	12	25.5	9	29.0	3	18.8
Years teaching science						
None	4	8.5	0	0.0	4	25.0
1–4 years	34	72.3	22	71.0	12	75.0
5–15 years	0	0.0	0	0.0	0	0.0
16+ years	9	19.1	9	29.0	0	0.0
Years teaching technology						
None	31	66.0	22	71.0	9	56.3
1–4 years	5	10.6	3	9.7	2	12.5
5–15 years	6	12.8	4	12.9	2	12.5
16+ years	5	10.6	2	6.5	3	18.8
Years teaching engineering						
None	34	72.3	23	74.2	11	68.8
1–4 years	7	14.9	4	12.9	3	18.8
5–15 years	4	8.5	3	9.7	1	6.3
16+ years	2	4.3	1	3.2	1	6.3
Degree or certification in science, technology, or engineering						
No	29	61.7	27	87.1	2	12.5
Yes	18	38.3	4	12.9	14	87.5

[a]Three are also middle school science resource teachers and two are technology resource teachers. One middle school science teacher is from a K–6 elementary school.
[b]One secondary teacher leader was at the high school level; all others were at the middle school level.

Nearly two thirds (64%) of year two participants also participated in year one, with almost three fourths (74%) of the elementary school teacher leaders having participated in year one of STELP (Table 3b). Forty percent of participants reported holding a current leadership role at their school such as team leader, resource teacher, or leadership team, and an additional 23% reported having some other leadership or professional development role such as a specified school program coordinator or leader or a Gifted and Talented (GT) liaison for the school.

Table 3b
Science, Technology, and Engineering Leadership Program: Previous Training and Leadership Experience of Participating Elementary and Middle School Staff

	Total Teacher Leaders (*N* = 47)		Elementary Teacher Leaders (*N* = 31)		Middle School Teacher Leaders (*N* = 16)	
	n	%	*n*	%	*n*	%
Participation in year 1 STELP leadership/PD role	30	63.8	23	74.2	7	43.8
Team leader, RT, SDT leadership team	19	40.4	13	41.9	6	37.5
Other school leader (i.e. PBIS/green school leader, GT liason, content specialist, subject coordinator)	11	23.4	8	25.8	3	18.8

Note. PD = professional development; SDT = staff development teacher; PBIS = positive behavioral interventions and supports; GT = gifted and talented.

Experience with online training. Of the 17 teacher leaders who were new to STELP this year, 5 reported having taken an online course, and 3 reported having participated in a Webinar as their participation in any kind of online training; the remaining did not respond.

Characteristics of Schools with STELP Teachers

Teachers who participated in STELP were from 22 elementary schools, 15 middle schools, and 1 high school. Characteristics of the schools represented are shown in Table 4.

On average, as a group, schools with teachers participating in STELP had proportions similar to MCPS averages in terms of students receiving Free and Reduced-price Meals System (FARMS) services (35% for STELP elementary schools and 37% for MCPS) and students receiving English for Speakers of Other Languages (ESOL) services (21% of STELP elementary schools and 21% for MCPS; 4% for STELP middle schools and for 5% for MCPS). However, STELP schools at the middle school level had a lower proportion of FARMS recipients than MCPS (23% compared to 33%). Just as there is a wide range of proportions of FARM recipients in MCPS schools, there is a wide range among schools with teachers participating in STELP (2–74% for elementary school; 1–56% for middle school). Additionally, the range of ESOL recipients in elementary schools with participating STELP teachers is 2–60%, and 0–9% for the middle schools.

Table 4
Science, Technology, and Engineering Leadership Program: Characteristics of Elementary and Middle School Participants

School-level characteristics		Elementary STELP (22 schools)	Elementary MCPS	Middle STELP[a] (15 schools)	Middle MCPS
Number of students	Mean	539	531	862	815
	Range	261–1036	94–1036	580–1338	380–1338
% of students eligible for FARMS	Mean	34.9	36.6	23.0	32.7
	Range	2.2–73.8	1.0–94.6	1.4–55.5	1.4–61.5
% of students enrolled in ESOL classes	Mean	20.6	21.3	4.3	4.6
	Range	2.1–59.6	0.0–72.9	0.1–8.5	0.0–12.1

Note. Based on 2012 MCPS data.
[a]Middle school only is shown; table does not include one participant from high school so as to not skew findings.

2. To what extent was the training of teacher leaders implemented as planned?

Training Schedule and Attendance

The program plan specified that a new participant training would be held in September. Additionally, whole-group training sessions would be held in October, December, February, April, and May. Optional supported work sessions for completion of the professional development products would be offered in May and June. All of these sessions were held as planned; attendance is shown in Appendix E.

Precise attendance counts for each session are unknown. The attendance counts are based on the number of feedback surveys returned; therefore, attendance may be underestimated. These counts show that attendance at each of the training sessions was fairly high with a lower attendance for sessions held later in the school year. A range of 31–40 teacher leaders attended the sessions from September through April. Attendance at the May session and the end of the year optional work sessions was not recorded.

Training Sessions

The purpose of the training sessions was to provide teacher leader participants with a greater understanding of science, technology, and engineering instruction and professional development as well as the technical skills needed to create online professional development products. The stated learning outcomes for each of the training sessions are shown in Appendix E. The training session agendas were planned to align the training content with the stages that the teacher leaders had achieved in the planning and creation of their professional development products. For example, it was decided that the May session would be dedicated for groups solely to work on their products. Also, findings from the participant feedback surveys helped program staff improve and modify trainings accordingly. For example, in response to participants' feedback, the STE staff stated at the December session that they would schedule large blocks of time in all of the sessions for teams to work on their products, and they would focus on providing clear outcomes and time lines. The session feedback surveys were summarized by the evaluators and provided to program administrators after each training session.

Product Development

The original STELP plan projected that the online products (also called modules) would be completed and launched at the end of year one. However, at the completion of the first year of STELP, the professional development products were determined not to have fully met the criteria for the program. Technical difficulties, time, challenges collecting quality video clips, and lack of a clear understanding of the expectations for the finished product were the primary issues that prevented the launch of products at the end of year one. Program managers determined that more time and training were needed by the teacher leaders to create high-quality professional development products. Thus, the time frame for the program was adjusted. The revised program plan specified that the professional development products would be completed during year two of STELP, after teacher leaders received further training and additional time for the completion of their work.

In year two, not only were the products revised to resolve technical issues and present a higher quality of professionalism, all of the modules were upgraded as the project evolved in accordance with developments in national standards. In year one, the modules focused on the four proficiency strands as outlined in Ready, Set, Science and the K–12 Framework for Science Education. The products in year two provided further details under the original four strands, and were aligned with the NGSS.

The leadership teams turned in their final product modules at the end of the school year in June 2012. STE program staff, along with a team of chosen STELP participants, then worked through the summer on fine-tuning the products and resolving technical issues. They also formatted the product modules, using the program Articulate Studio '09, and created one cohesive location where teacher participants would be able to access and view any of the modules. Seven of the eight products were launched and shown to science resource teachers at the beginning of September 2012.

3. What was the impact of the STELP training sessions on teacher leaders?

Teacher Leaders' Perceptions of Training Sessions

In surveys administered after the October and December training session, teacher leaders were asked to indicate their level of agreement with questions about the training session. Teacher leaders' perceptions of the trainings are summarized in Table 5.

Across the two sessions, large percentages of teacher leader participants responded with positive perceptions about the training, with 100% agreeing with most of the statements. The statements included: clear goals, objectives met, trainers knowledgeable and prepared, a comfortable environment, opportunities to reflect, questions were answered, and helpful information and skills gained.

Table 5
Science, Technology, and Engineering Leadership Program:
Teacher Leaders' Perceptions of Training Provided in Three Sessions

	% Respondents Strongly Agree/Agree	
	October 2011 (*N* = 37)	December 2011 (*N* = 38)
The goals of today's training were clear.	97.3	100.0
The objectives of today's training were met.[a]	100.0	92.1
The trainers were knowledgeable and well prepared.	100.0	100.0
An environment was created in which I felt comfortable taking risks.	100.0	100.0
Opportunities were provided for me to process and reflect upon the application of the knowledge and skills learned.[b]	100.0	94.6
My questions during the training today were answered adequately.[b]	100.0	97.4
As a result of today's training, I have gained information and skills that will help me in this role.	100.0	97.3

Note: Includes staff who attended the October session, but later dropped out of the program.
[a]October *N* = 35.
[b]October *N* = 36, December *N* = 37.

At the February training session, all participants (100%) reported that the training plan was very or somewhat helpful; almost all (95%) participants reported that the peer review feedback on their professional development product was very or somewhat helpful (Table 6). More than four fifths of participants (83%) reported that the article discussion on science standards was very or somewhat helpful. Finally, almost all (97%) of participants at the April training session said that the STE instructional specialist assigned to their group was very or somewhat helpful.

Table 6
Science, Technology, and Engineering Leadership Program:
Teacher Leaders' Perceptions of Training Provided in Three Sessions

	% Responding Very/Somewhat Helpful	
How helpful was….	February 2012 (*N* = 40)	April 2012 (*N* = 30)
the training plan in developing your online PD?	100.0	N/A
the feedback provided by the peer review in developing your online PD.[a]	95.0	N/A
today's article discussion on Science standards in further understanding the goals of STELP?	82.5	N/A
the STE Instructional Specialist assigned to your group?	N/A	96.7

Note. PD = professional development; N/A = not applicable (did not administer question).
[a]The agenda was modified during the April administration not to include peer review so that participants could have a longer time to work on their products so this question is not applicable in April.

In order to help plan for upcoming training sessions, teachers were asked at the February training session how useful they would find training on certain technical skills. Almost three fourths (73%) of the participants said that learning about editing and storing on Movie Maker would be very or somewhat useful (Table 7). Using the flip-style camera was found to be the least useful, with under one third (32%) rating it very or somewhat useful.

Table 7
Science, Technology, and Engineering Leadership Program:
Teacher Leaders' Perceptions of Training Provided in Three Sessions

	% Responding Very/Somewhat Helpful
How useful would you find training for ...	February 2012 (*N* = 37)
editing using Movie Maker.	73.0
storing using Movie Maker.	73.0
retrieving video clips using Movie Maker.	60.5
using Microsoft PowerPoint for online PD products.	56.8
using flip-style camera technology.	32.4

Summary of Teacher Leaders Responses to Open-ended Questions

In each of the training session surveys, teacher leader participants were asked a variety of open-ended questions about STELP. Additionally, after the last session was completed, participants were sent a reflective survey by the STE program staff. Teacher leaders' responses to the open-ended survey questions and the program staff's open-ended reflective questions are summarized below.

Important aspects of training. At the end of four training sessions, teacher leader participants were asked, in an open-ended question, to identify the most important thing gained from the trainings. The top mentions for each training session are shown below.

Most important from October training (*N* = 34)

- Learning about the science practices and strands (38%)
- Having a clearer direction and understanding of the project (26%)

Most important from December training (*N* = 40)

- Guest speaker Dr. Stephen Pruitt (27%)
- Receiving a time line (19%)
- Working with their team (16%)

Most important from February training (N = 40)

- Gaining a clear vision and clear expectations (62%)
- Having a training plan (35%)
- Working with their team (33%)

Most important from April training (*N* = 29)

- Working with their team (48%)
- Working on their PowerPoint (31%).

Suggestions for improving the training. In four of the five training sessions, participants were asked for any suggestions they had to improve the trainings. The number of participants, during each session, who responded to this question were: 18 in October, 23 in December, 19 in February, and 17 in April. Many of those responding to this question submitted individual suggestions (50% in December and 68% in February) that were not suggested by others. However, *more time* was suggested throughout the trainings, with a larger amount suggesting it in October (39%) and April (41%). Other suggestions made throughout the year were: more clarity and specifics (28% in October), more breaks and resources (22% in December), and a better camera and peer feedback (26% in February). Two participants made a final comment in May that they felt a couple days of training in a row might have been helpful.

Challenges. In four of the five training session surveys, teacher leader participants were asked, "Are there any other challenges you are facing in your teacher leader role as you work with your team and develop your online product?" Time was the dominant area of concern. Of the 21 teacher leaders naming a challenge in the first survey, 48% reported that there was "not enough time to get everything done," and "time is always a challenge." These time concerns

were reported by 39% of the 23 teacher leaders who stated challenges in the second survey, 35% of the 26 in the third survey, and 27% of the 26 in the fourth survey. Some examples that the participants cited were: "just balancing and finding time;" "there are so many priorities at school that I often wish for more time to devote to this;" "uninterrupted time to work with my team is difficult to arrange;" and "our team worked diligently today, but did not progress to the point of having a solid training plan. It will now have to be done outside of training, which is difficult since time is already at a premium."

The other dominant area of concern across the training sessions was videotaping. At the beginning, there was more concern about finding the time to collect videos, and more comments were related to collecting quality videos. Almost one third of the teacher leader participants responding to each of the surveys, named videotaping as a challenge: 33% of 21 in October; 35% of 23 in December; 31% of 26 in February; and 27% of 26 in April. Some examples of the participants' comments about the challenges of videotaping were "collecting a variety of artifacts from ALL grades;" "Worried about recording quality (i.e., movement, noise, lighting);" "Just figuring out how to know when to video and take pictures and when not to;" and "I'm concerned about collecting artifacts when there are so few opportunities to do so." Some other examples of challenges mentioned were: technical difficulties, getting everyone in the team together, team agreement, and understanding the science practices or product.

Other comments. In the surveys, teacher leaders were asked to elaborate on any of the statements they rated. Additionally, some teachers provided other undirected comments throughout the survey. Themes of comments pertaining to the trainings could be extracted:

- The October trainings' comments included: needing more clarity about the final product or next step; they gained helpful information on the science strands and standards; and appreciated time to revisit past projects and process information. There also were a few participants who thought the training was more organized and clearer compared to last year.

- The December training's comments included: that teacher leaders ran out of time to accomplish their tasks; they enjoyed the new time line and checklist provided; and the expectations and group direction was clearer.

- The February training's comments included: enjoyed the time given to work with their group, found the training plan helpful, said their team had more of a focused direction, and found the assigned article very informative and interesting, but perhaps not related directly to the task at hand. Additionally, many found the peer feedback helpful, although a couple of respondents commented that it was awkward or that they would have preferred more mixed up groupings for feedback.

- The April training's comments were mixed between feeling that their team made a lot of progress and feeling like they ran out of time and were not as productive as they felt they should be.

- The May training's comments included praises for a great professional development experience

Progress reported during training. At the first two training sessions, participants were asked about the clarity of expectations for the professional development products. Just about everyone (95% in October and 100% in December) agreed that the expectations were clear (Table 8). With the exception of a few participants in the first session, everyone in all the sessions agreed that the expectations for next steps were clearly communicated. For the last two to three training sessions, all or nearly all, participants agreed that: they felt good about their team's progress; they felt good about the direction of their final product; expectations for what their team was to accomplish were clear; and that the training session helped their team's progress.

Table 8
Science, Technology, and Engineering Leadership Program:
Teacher Leaders' Perceptions of Training Provided in Three Sessions

	% Respondent Strongly Agree/Agree				
	October 2011 (*N* = 37)	December 2011 (*N* = 38)	February 2012 (*N* = 38)	April 2012 (*N* = 31)	May 2012 (*N* = 31)
The expectations for this professional development product are clear.[a]	94.6	100.0	N/A	N/A	N/A
The expectations for next steps were clearly communicated.	91.9	100.0	100.0	100.0	100.0
I feel good about the progress my teacher team has made so far.	N/A	N/A	100.0	87.1	96.8
I feel good about the direction my team's final product is headed in.	N/A	N/A	100.0	90.3	96.8
The expectations for what our teacher team is to accomplish for this project is clear.	N/A	N/A	100.0	100.0	N/A
I believe today's session will help/has helped with our teacher teams' progress as we develop our professional development topic and product.	N/A	N/A	100.0	93.5	N/A

Note. N/A designates not available because not asked.
[a]December *N* = 35.

Teacher leader participants also were asked in the last three training sessions about their perception of their team's progress; their responses are reported in Table 9. In February, the majority (77%) felt they were ahead or right on schedule; in April the participants were split between being right on schedule (48%) and feeling they were behind schedule (58%). Finally, in the last structured training session in May, more than half of the participants felt they were ahead or right on schedule with over one third (37%) feeling they were behind.

Table 9
Science, Technology, and Engineering Leadership Program:
Teacher Leaders' Perceptions of Training Provided in Three Sessions

How would you describe your team's progress on your PD product?	February (N = 35)	April (N = 31)	May (N = 30)
Ahead of our planned time line	5.7	0.0	13.3
Right on schedule	71.4	41.9	50.0
Running behind our planned time line	22.9	58.1	36.7

Teachers Leaders' Perceptions of Knowledge and Skills Gained

Technology skills. In surveys administered at the first and fifth training session, teacher leader participants were asked to indicate their level of agreement with questions about their specific technology skills. Table 10 shows that teacher leaders' comfort level with various technology skills greatly increased from the first session in October to the fifth session in May. Only responses from those participants' who rated their skill in both sessions are shown. Approximately one half agreed or strongly agreed that they were skilled with processing, editing, storing, and retrieving video clips in Movie Maker (46%–59%) at the beginning of the training sessions. By the end of the training sessions, each of these percentages increased to more than four fifths (82–88%). Additionally, although a high percentage of respondents agreed or strongly agreed that they were skilled in flip-style camera technology (80%) and Microsoft PowerPoint (84%) at the first training session, these percentages increased to 96% and 100% respectively at the last training session.

Table 10
Science, Technology, and Engineering Leadership Program:
Teachers' Perceptions of Technology Skills in Two Sessions

		% Responding Strongly Agree/Agree	
Survey items	N	October 2011	May 2012
I am skilled in Flip style camera technology for capturing student learning.	25	80.0	96.0
I am skilled at using Windows Movie Maker software for…			
processing.	23	52.2	87.0
editing.	24	45.8	87.5
storing.	22	54.5	81.8
retrieving video clips.	22	59.1	81.8
I am skilled at Microsoft PowerPoint.	25	84.0	100.0

Note. N represents those participants who responded in both October and May sessions.

An additional resource for gauging participants' growth in technology skill level was used. At the end of the school year, the STE program staff sent out a reflection survey to all year two STELP participants (see Appendix F) and they conducted the data summary results. They asked the teacher leader participants, "Prior to participating in STELP, what was your skill level of Movie Maker?" Three fourths of the 29 responding participants gave a rating of "basic,"

17% "proficient," and 7% "advanced." Then participants were asked, "As a result of participating in STELP, what is your skill level of Movie Maker?" Of the same responding participants, only 14% gave a rating of "basic," 55% "proficient," and 31% "advanced."

The same two questions were asked about PowerPoint. The first question asked was, "Prior to participating in STELP, what was your skill level of PowerPoint?" Just about one fourth (24%) responded "basic," over half (52%) gave a rating of "proficient," and 24% "advanced." When asked, "As a result of participating in STELP, what is your skill level of PowerPoint," no one gave themselves a "basic" rating; half indicated "proficient," and the other half "advanced."

Understanding of science standards and practices. Participants' rated their understanding of science standards and practices at the first training session in October, again at the third training session in February, and at the final training session in May. At the beginning of the year, 91% of the teacher leaders agreed or strongly agreed that they could: articulate look-fors in evaluating student proficiencies; nearly three fourths (74%) reported they could explain how K–8 technology standards are relevant to their STE teacher role; and 87% could explain how the practices of science and engineering and the framework for science education are relevant to their STE teacher role (Table 11). At the final session in May, the percentage of teacher leaders who agreed or strongly agreed with these statements was 100% or almost 100%.

Table 11
Science, Technology, and Engineering Leadership Program:
Teachers' Understanding of Science Standards and Practices

		% Responding Strongly Agree/Agree		
Survey items	*N*	October 2011	February 2012	May 2012
I can articulate look-fors in evaluating student proficiencies in the practices of science and engineering.	23	91.3	100.0	100.0
I can explain how K–8 technology standards are relevant to my role as a teacher and as a STE teacher leader.	23	73.9	97.5	100.0
I can explain how the practices of science and engineering and the Framework for K–12 Science Education are relevant to my role as a teacher and as a STE teacher leader.	23	87.0	100.0	95.7

Note: N represents those participants who responded in all three sessions: October, February, and May.

Reflections

Participant reflections. At the end of the school year, the STE program staff sent teacher leader participants a reflective questionnaire (see Appendix E.) It is important to note that this questionnaire was not collected anonymously, and narrative responses were submitted directly to the STE program staff supervisor. A summary of the information collected, relevant to the evaluation, follows.

When teacher leader participants were asked to describe how the STELP professional development has impacted their instruction, 7 of the 28 respondents mentioned they are using discourse in their classrooms, and 12 gave other specific examples of implementations in their classroom (i.e., using investigations more often, using models, analyzing data, reflecting in journals, etc.). Five said they are incorporating or trying to incorporate the practices more into

their teaching (without giving specific examples), and three said they are incorporating more science and engineering into their teaching. Five said they have a better understanding of the NGSS and where science education is headed. Three participants said they are working with other teachers at the school to better improve how science is implemented in their class.

Teacher leader participants also were asked to describe how the STELP professional development has impacted their work with colleagues or events at their school. Of the 29 participants who responded, 23 said they shared information they have acquired—17 shared it with other school staff members through various meetings; 4 shared it with either a colleague or the staff development teacher at their school; and 2 shared information with parents. Five participants gave examples of how they changed instruction, and five stated how they changed their schools' annual inquiry conference (for example, changed it to a STEM-focused conference). Three stated they are considered a science resource or "go to" person at their school; and three participants cited other activities they implemented at their school such as clubs, a summer family STEM activity calendar, student inquiry challenges, and instruction on well-designed investigations to be implemented before the annual school STEM conference.

The reflective questionnaire also asked participants if they would like to continue in the STELP program next year (i.e., if given the opportunity), and 23 of the 29 said they would like to continue. Three said they weren't sure and three said "no," citing work or personal conflicts.

When asked to provide any additional comments on how they have benefited as a result of their participation in the STELP professional learning community, the aspect mentioned most often (16 of 29) was the opportunity to network and work with other MCPS professionals. Many stated that they now have a group of colleagues they may go to and bounce ideas off of.

Instructional specialist reflections. The six STE instructional specialists were interviewed individually by OSA staff using a semi-structured questionnaire. All six specialists were involved in year one as well as year two; however, two of them had a more active role in year two. Each specialist was assigned one or two professional development design teams. The specialists described their role as being one of support and advisor to the team. The specialists met with their team during the scheduled participant trainings and were in touch with team members via e-mail. Some of the specialists met with their team separately, at the end of year. Although all specialists provided their assigned team with feedback and technical support, the depth of involvement by the specialist depended on the team and their needs. In some cases, involvement was minimal because, as one specialist described, the team was a "high functioning group." In other cases, involvement was greater with the specialists giving much more feedback which may have involved changes to the team plan or product or refocusing of direction. In some cases, the specialist needed to help some new members catch up on technical training or understanding the practice. Also, some specialists took on a few tasks such as making adjustments to the product presentation or finding examples to use. It was reported that most team members worked well together with minimal conflict; however, there were some cases where some team members didn't contribute or participate as much as others, or there was not someone who took a leadership role in the group.

All the specialists reported that the professional development and product development in year two was much better than year one. Reasons given for this positive turnaround were: much more built-in time for teams to work on their products; much clearer expectations for the end products; teams developed a training plan; teams built on last year's products and knowledge of the concepts and technology; and finally, more established framework and practices. However, technical issues were still reported as the biggest challenge, mostly relating to the software Articulate Studio '09 (i.e., use, availability, and obtaining support); as well as video problems, consistency with versions of software, such as Movie Maker, and other unforeseen technical issues that arose. Overall, most of the specialists were happy with the final product their team turned in (before being completely finalized); however there were two cases where the specialists felt the products were not at the appropriate professional level. Some of the items that individual specialists mentioned wanting to see implemented next year were: continue offering a lot of work time; incorporate cross-cutting concepts; bring in high school level examples and participants; more peer reviews; availability of Articulate Studio '09 at the technology lab; and continue to build this professional learning community. Three specialists also mentioned that the national standards and framework aren't final yet, so that would need to be considered as they move forward. Four of the six instructional specialists who were asked what they thought the most important thing teachers would get out of viewing the online professional development modules, and the responses were: learning about the new science standards; building leaders, learning about and working with other school levels besides their own, and understanding what it means to be proficient in engineering and science.

Final Online Professional Development Modules

The teacher leader teams turned in their final products at the end of the school year in June 2012. A subgroup of STELP participants was chosen to serve as editors for the final products. The editors worked on the product module in the summer and were charged with ensuring that all the projects met the expectations as outlined in the project rubric. They also were responsible for any additional movie editing, PowerPoint development, and script writing, before publishing the online product module to Articulate Studio '09. Seven of the eight product modules were launched and shown to science resource teachers at the beginning of September 2012.

OSA staff developed an evaluation protocol, based on a rubric created by STE staff, to use while viewing each of the online product modules to determine if they met the key expectations that were established. Seventeen aspects were given a rating of "highly proficient," "proficient," or "not proficient." Table 12 presents a summary of these findings (see Appendix B for the full evaluation protocol).

Table 12
Evaluation of STELP Online Professional Development Product Modules
(N = 7 reviewed products)

	Highly Proficient	Proficient	Not Proficient	Not Available	Total Products
	(*n*)	(*n*)	(*n*)	(*n*)	*N*
Organization					
Sequence	5	2			7
Description of practice	7				7
Use by scientists and engineering	3	3	1		7
Impact on student learning	7				7
Classroom exemplars	6			1	7
Instructional strategies	7				7
Design					
Multimedia	7				7
Navigation	1	6			7
Technical issues	2	4	1		7
Visual presentation	2	5			7
Audio presentation	2	4		1	7
Artifacts	6			1	7
Check for Understanding (CFU)					
Opportunities for CFU and reflection	6	1			7
Connection between CFU and presentation	6	1			7
Answer review for CFU	4	2		1	7
Preassessment connection with presentation	2	3		2	7
Goals/outcomes of presentation met	6			1	7
Cited Resources					
Resource for practice is cited	6 modules cited a reference for practice				7
Cited research (not including practices)	2 modules cited additional research				7

Among the areas which weren't found to be highly proficient, many of the shortcomings were related to presentation, navigation, or technical aspects. Examples were: it was not always clear how to continue to the next slide or how to navigate throughout the module; sometimes the user was navigated incorrectly; slides were set to advance at a very fast pace or very slow pace; some audio was hard to hear or not in alignment; font was fuzzy or too small; and links to websites or videos did not work.

Some examples which contributed to highly proficient ratings of some modules were: use of quotes, captions on video clips to further explain a strategy, various examples by grade or school level, clear directions on how to navigate throughout the module, examples used by scientists and engineers, many opportunities to check for understanding, and lots of resources available.

4. When and how were the online products made available to MCPS teachers?

The seven online product modules were combined into one product in a single location so that teachers are able to launch whichever product they wish to view using one main page. The product modules were initially shared with science resource teachers via a Webinar they participated in at the beginning of September 2012.

Discussion and Recommendations

This report addresses the second year of the Science, Technology, and Engineering Leadership Program. The focus of the year two evaluation was on implementation of the program in terms of continuing to train a group of teacher leaders to develop online professional development modules for other MCPS science, technology, and engineering educators to view.

The 47 teacher leaders who participated in the second year of STELP were consistently positive in their perceptions of the training and support provided by the program. In surveys and interviews, teachers and STE instructional specialists were highly positive in their feedback about being given time during trainings to work on their team projects, the improvement in clarity and organization compared to last year, receiving a time line, and developing a training plan. Participants also reported great improvement in their technology skills related to developing the online products. Although they appreciated the time allotted to team work, they identified time, followed by technology difficulties as the greatest challenges. Participants also reported great improvement regarding their understanding of science standards and practices; however, there is still room for improvement in mastering these concepts, and participants mentioned learning about practices and strands as an important piece of information covered in trainings. In response to several of the surveys, the teacher leaders were split about whether they felt their team was on schedule with their product development or running behind their time line.

Finally, at the completion of the second year of STELP, evaluation of the product modules by OSA researchers determined that most of the modules were proficient or highly proficient in meeting many of the expectations. However, the products also had room for improvement, primarily in the technical and logistical aspects of the presentations.

The following recommendations are suggested by year two findings:

- Resolve technical issues and logistical difficulties on existing product modules (e.g., the navigation and pace of slides, unclear font, inoperable website links, etc.).
- Encourage wide-spread use of the modules among MCPS STE teachers and staff.
- Collect data via the product modules, on who is viewing the modules.
- Promote viewer feedback on the product modules, and use the feedback to continue improving and expanding the product modules.
- Continue providing time for team work, clear expectations, a time line, a training plan, and continued education on science practices and standards for upcoming trainings as teacher leaders continue their work on developing and creating online product modules.
- Monitor ways in which teacher leaders are sharing their STELP information with their school staff and ways in which they are improving their own, or their schools', teaching of science, technology, and engineering.

References

Dahlberg, K.R., & Philippot, R.A. (2008). The power of collaboration: A case for teachers helping to determine professional development agendas. *Planning and Changing*, *39*(1&2), 21–41.

Dede, C., Ketelhut, D.J., Whitehouse, P., Breit, L., & McCloskey, E.M. (2009). A research agenda for online teacher professional development. *Journal of Teacher Education*, *60*(1), 8–19.

Garet, S.M., Porter, C.A., Desimone, L., Birman, F.B., & Yoon, S.K. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal*, *38*(4), 915–945.

Guskey, R.R. (2000). *Evaluating professional development*. Thousand Oaks, CA: Corwin Press.

Michaels, S., Shouse, A.W., & Schweingruber, H.A. (2007). *Ready, Set, Science! Putting Research to Work in K-8 Science Classrooms*. Washington, DC: The National Academies Press.

Montgomery County Public Schools. (2012). Science and engineering. Rockville, MD: Author. http://www.montgomeryschoolsmd.org/curriculum/science/.

National Research Council. (2007). *Enhancing professional development for teachers: Potential uses of information technology. Report of a Workshop.* Committee on Enhancing Professional Development for Teachers, National Academies Teacher Advisory Council. Center for Education, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

Sawchuk, S. (2009). An explosion of offerings and evolving methodologies have made web-based training a viable choice for many teachers. *Education Week Teacher Professional Development Sourcebook: The Online Option.* http://www.edweek.org /tsb/articles/2009/10/01/01online.h03.html.

Wei, R.C., Darling-Hammond, L., and Adamson, F. (2010). *Professional development in the United States: Trends and challenges*. Dallas, TX: National Staff Development Council.

Wolanin, N.L. & Wade, J.H. (2012). *Evaluation of the science, technology, and engineering leadership program, year one*. Rockville, MD: Montgomery County Public Schools.

Appendix A: Training Sessions' Feedback Surveys

Survey Part I
Science Technology Engineering Leadership Program (STELP)
Year 2, Oct. 27, 2011

As part of your involvement in the Science, Technology, and Engineering Leadership Program (STELP), we will be asking you to provide information and feedback about the program. Your input is very important to the evaluation of the program and it will help guide administrators in planning and implementation. This is the first in a series of surveys that will be given after each training session during year two of the program, thus our need to collect names; however, your answers are strictly confidential (i.e. answers will not be linked to individual names when reporting).

Name:_____

School:_____

Please indicate how much you agree or disagree with the following items by checking the appropriate box.

	Strongly Agree	Agree	Disagree	Strongly Disagree
1. I am skilled in using "Flip" style camera technology for capturing student learning.	☐	☐	☐	☐
2. I am skilled at using Windows Movie Maker software for…				
a. processing	☐	☐	☐	☐
b. editing	☐	☐	☐	☐
c. storing	☐	☐	☐	☐
d. retrieving video clips	☐	☐	☐	☐
3. I am skilled at using Microsoft Office Power Point capabilities for creating user-friendly, user-choice navigation for online professional development products.	☐	☐	☐	☐
4. *I can articulate look fors in evaluating student proficiency in the practices of science and engineering.	☐	☐	☐	☐

	Strongly Agree	Agree	Disagree	Strongly Disagree
5. I can explain how K-8 technology standards are relevant to my role as a teacher and as a STE teacher leader.	☐	☐	☐	☐
6. I can explain how the practices of science and engineering and the Framework for K-12 Science Education are relevant to my role as a teacher and as a STE teacher leader.	☐	☐	☐	☐

2. Is this your first or second year in STELP? First Second

Addendum to Survey – For New Teacher Leaders in Year 2
Science Technology Engineering Leadership Program (STELP)
Year 2, Oct. 27, 2011

As part of your involvement in the Science, Technology, and Engineering Leadership Program (STELP), we will be asking you to provide information and feedback about the program. Your input is very important to the evaluation of the program and it will help guide administrators in planning and implementation. This is part of a series of surveys that will be given after each training session, thus our need to collect names; however your answers are strictly confidential (i.e. answers will not be linked to individual names for reporting).

Name:_____

School:_____

1. How many years have you been in your current role (including the current year)? _____

2. How many years have you been a classroom teacher (including the current year)? _____

3. Do you have a degree or certification in science, technology, and/or engineering?

☐ Yes ☐ No

4a. How many years have you taught Science in the classroom (including the current year)? _____

4b. How many years have you taught Technology in the classroom (including the current year)? _____

4c. How many years have you taught Engineering in the classroom (including the current year)? _____

5. Have you ever participated in any kind of online training? ☐ Yes ☐ No

5a. If yes, please describe the extent of your experience with online training.

_____

_____

6. Do you have any experience leading or developing professional development?
☐ Yes ☐ No

6a. If yes, did any of your experiences include leading or developing online professional development?
☐ Yes ☐ No

7b. If yes, please describe the extent of your experience leading or developing trainings.

_____

_____

8. If you are an elementary teacher, to what extent is science integrated into the students' schedule at your school?

☐ A lot ☐ Somewhat ☐ A little ☐ Not at all

9a. If you are a middle school teacher, to what extent are math~~,~~ and science teachers collaborating with each other on lesson planning and looking at student work?

☐ A lot ☐ Somewhat ☐ A little ☐ Not at all

9b. If you are a middle school teacher, to what extent are technology education, math, and science teachers collaborating with each other on lesson planning and looking at student work?

☐ A lot ☐ Somewhat ☐ A little ☐ Not at all

10. List any science activities that students are given the opportunity to participate in outside of the curriculum.

_____

_____

Survey Part II
Science Technology Engineering Leadership Program (STELP)
Year 2, Oct. 27, 2011

As part of your involvement in the Science, Technology, and Engineering Leadership Program (STELP), we will be asking you to provide information and feedback about the program. Your input is very important to the evaluation of the program and it will help guide administrators in planning and implementation. This is the first in a series of surveys that will be given after each training session during year two of the program, thus our need to collect names; however, your answers are strictly confidential (i.e., answers will not be linked to individual names when reporting).

Name:_____

School:_____

1. Please check your current position(s) (enter all that apply)

☐ Kindergarten Teacher
☐ Grade 1 Teacher
☐ Grade 2 Teacher
☐ Grade 3 Teacher
☐ Grade 4 Teacher
☐ Grade 5 Teacher
☐ ES Science Teacher – lab or special (specify grades_____)
☐ Other (please specify_____)
☐ ES/MS Technology Education Teacher
☐ Staff Development Teacher
☐ Special Ed Teacher (specify grades _____)
☐ Focus Teacher (specify grades + subject_____)
☐ Science Resource Teacher
☐ MS Science Teacher (specify grades_____)

2. Please indicate any Leadership or Professional Development Roles you currently have:

_____

_____

Feedback on Today's Training

4. Please indicate how much you agree or disagree with the following items by checking the appropriate box.

	Strongly Agree	Agree	Disagree	Strongly Disagree
a. The goals of today's training were clear.	☐	☐	☐	☐
b. The objectives of today's training were met.	☐	☐	☐	☐
c. The trainers were knowledgeable and well-prepared.	☐	☐	☐	☐
d. An environment was created in which I felt comfortable taking risks (i.e., asking questions, expressing my ideas, working with unfamiliar content).	☐	☐	☐	☐
e. Opportunities were provided for me to process and reflect upon the application of the knowledge and skills learned.	☐	☐	☐	☐
f. My questions during the training today were answered adequately.	☐	☐	☐	☐
g. As a result of today's training, I have gained information and skills that will help me in this role.	☐	☐	☐	☐

5. Please elaborate on any of the statements above. (Indicate the corresponding letter item(s) with your comments or explanation/elaboration of your rating.

_____

_____

_____

6. What is the most important thing you gained from this training?

_____

_____

_____

7. Do you have any suggestions for improving the training?

_____

_____

_____

Overall Feedback on the STELP Project

8. Please indicate how much you agree or disagree with the following items by checking the appropriate box.

	Strongly Agree	Agree	Disagree	Strongly Disagree
a. The expectations for the professional development product are clear.	☐	☐	☐	☐
b. The expectations for next steps are clear.	☐	☐	☐	☐

9. Please elaborate on any of the statements above. (Indicate the corresponding letter item(s) with your comments or explanation/elaboration of your rating.)

_____

_____

_____

10. Are there any challenges you are facing in your teacher leader role as you develop your professional development topic and online product?

_____

_____

_____

11. Are there any additional suggestions you would like to give or resources that you think you will need to fulfill the teacher leader role as you develop your professional development product?

_____

_____

_____

Thank you for your help.

Post Training Survey
Science Technology Engineering Leadership Program (STELP)
Year 2, Dec. 6, 2011

As part of your involvement in the Science, Technology, and Engineering Leadership Program (STELP), we will be asking you to provide information and feedback about the program. Your input is very important to the evaluation of the program and it will help guide administrators in planning and implementation.

This is the second in a series of surveys that will be given after each training session during year two of the program, thus our need to collect names; however, your answers are strictly confidential. We may show verbatim answers to program staff, but no identifying information will be provided and answers will not be linked to individual names when reporting.

Name:_____

School:_____

Team: (science practice number)_____

Feedback on Today's Training

1. Please indicate how much you agree or disagree with the following items by checking the appropriate box.

	Strongly Agree	Agree	Disagree	Strongly Disagree
a. The goals of today's training were clear.	☐	☐	☐	☐
b. The objectives of today's training were met.	☐	☐	☐	☐
c. The trainers were knowledgeable and well-prepared.	☐	☐	☐	☐
d. An environment was created in which I felt comfortable taking risks (i.e., asking questions, expressing my ideas, working with unfamiliar content).	☐	☐	☐	☐
e. Opportunities were provided for me to process and reflect upon the application of the knowledge and skills learned.	☐	☐	☐	☐
f. My questions during the training today were answered adequately.	☐	☐	☐	☐
g. As a result of today's training, I have gained information and skills that will help me in this role.	☐	☐	☐	☐

2. Please elaborate on any of the statements above. (Indicate the corresponding letter item(s) with your comments or explanation/elaboration of your rating.)

_____

_____

_____

3. What is the most important thing you gained from this training?

_____

_____

_____

4. Do you have any suggestions for improving the training?

_____

_____

_____

Overall Feedback on the STELP Project

5. Please indicate how much you agree or disagree with the following items by checking the appropriate box.

	Strongly Agree	Agree	Disagree	Strongly Disagree
a. The expectations for the professional development product are clear.	☐	☐	☐	☐
b. The expectations for next steps are clear.	☐	☐	☐	☐

6. Please elaborate on any of the statements above. (Indicate the corresponding letter item(s) with your comments or explanation/elaboration of your rating.)

_____

_____

_____

7. Are there any challenges you are facing in your teacher leader role as you develop your professional development topic and online product?

_____

_____

_____

8. Are there any additional suggestions you would like to give or resources that you think you will need to fulfill the teacher leader role as you develop your professional development product?

_____

_____

_____

Thank you for your help.

Post Training Survey
Science Technology Engineering Leadership Program (STELP)
Year 2, Feb. 17, 2011

As part of your involvement in the Science, Technology, and Engineering Leadership Program (STELP), we will be asking you to provide information and feedback about the program. Your input is very important to the evaluation of the program and it will help guide administrators in planning and implementation.

This is the third in a series of surveys that will be given after each training session during year two of the program, thus our need to collect names; however, your answers are strictly confidential. We may show verbatim answers to program staff, but no identifying information will be provided and answers will not be linked to individual names when reporting.

Name:_____

School:_____

Team: (science practice number)_____

STE Concepts

1. Please indicate how much you agree or disagree with the following items by checking the appropriate box.

	Strongly Agree	Agree	Disagree	Strongly Disagree
a. I can articulate look fors in evaluating student proficiency in the practices of science and engineering.	☐	☐	☐	☐
b. I can explain how K-8 technology standards are relevant to my role as a teacher and as a STE teacher leader.	☐	☐	☐	☐
c. I can explain how the practices of science and engineering and the Framework for K-12 Science Education are relevant to my role as a teacher and as a STE teacher leader.	☐	☐	☐	☐

Professional Development Training

2. Please indicate how helpful you found the following items by checking the appropriate box.

	Very Helpful	Somewhat Helpful	Not Very Helpful	Not at all Helpful
a. How helpful was the feedback provided by the peer review in developing your online PD?	☐	☐	☐	☐
b. How helpful was the training plan in developing your on-line PD?	☐	☐	☐	☐
c. How helpful was today's article discussion on Science standards in further understanding the goals of STELP?	☐	☐	☐	☐

Please elaborate on any of the statements above. (Indicate the corresponding letter item(s) with your comments or explanation/elaboration of your rating.)

_____

_____

_____

3. What is the most important thing you gained from this training?

_____

_____

_____

4. Do you have any suggestions for improving the training?

_____

_____

_____

5. How useful would you find training for the following skills in one of the upcoming professional development sessions? Indicate usefulness by checking the appropriate box.

	Extremely Useful	Very Useful	A little Bit Useful	Not at all Useful
a. Using "Flip" style camera technology	☐	☐	☐	☐
b. Using Windows Movie Maker Software				
c. Processing using Movie Maker software	☐	☐	☐	☐
d. Editing using Movie Maker	☐	☐	☐	☐
e. Storing using Movie Maker	☐	☐	☐	☐
f. Retrieving video clips using Movie Maker	☐	☐	☐	☐
g. Using Microsoft Office PowerPoint for online professional development products	☐	☐	☐	☐

Development of Professional Development Products

6. Please indicate how much you agree or disagree with the following items by checking the appropriate box.

	Strongly Agree	Agree	Disagree	Strongly Disagree
a. I feel good about the progress my teacher team has made so far.	☐	☐	☐	☐
b. The expectations for what our teacher team is to accomplish for this project is clear.	☐	☐	☐	☐
c. The expectations for next steps were clearly communicated.	☐	☐	☐	☐
d. I feel good about the direction my team's final product is headed in.	☐	☐	☐	☐
e. I believe today's session has helped with our teacher team's progress as we develop our professional development topic and product.	☐	☐	☐	☐

Please elaborate on any of the statements above. (Indicate the corresponding letter item(s) with your comments or explanation/elaboration of your rating.)

_____

_____

_____

7. How would you describe your team's progress on your professional development product?

☐ Not as far along as we would like; running behind our planned time line
☐ Right on schedule
☐ Ahead of our planned time line

8. Are there any challenges you are currently facing in your teacher leader role as you develop your professional development topic and online product?

_____

_____

_____

9. Are there any additional suggestions you would like to give or resources that you think you will need to fulfill the teacher leader role as you develop your professional development product?

_____

_____

_____

Post Training Survey
Science Technology Engineering Leadership Program (STELP)
Year 2, April 26, 2012

As part of your involvement in the Science, Technology, and Engineering Leadership Program (STELP), we will be asking you to provide information and feedback about the program. Your input is very important to the evaluation of the program and it will help guide administrators in planning and implementation.

This is the fourth in a series of surveys that will be given after each training session during year two of the program, thus our need to collect names; however, your answers are strictly confidential. We may show verbatim answers to program staff, but no identifying information will be provided and answers will not be linked to individual names when reporting.

Name:_____

School:_____

Team: (science practice number)_____

Professional Development Training

1. Please indicate how helpful you found the following items today by checking the appropriate box.

	Very Helpful	Somewhat Helpful	Not Very Helpful	Not at all Helpful
a. How helpful was the feedback provided by the peer review in developing your online PD?	☐	☐	☐	☐
b. How helpful was the STE instructional specialist assigned to your group?	☐	☐	☐	☐

2. Please elaborate how helpful the peer review was to your product development (see Q2a), including the way in which the peer reviews were grouped this session.

_____

_____

_____

3. What is the most important thing you gained from this professional development session?

_____

_____

_____

4. Do you have any suggestions for improving the professional development sessions?

_____

_____

_____

Development of Professional Development Products

5. Please indicate how much you agree or disagree with the following items by checking the appropriate box.

	Strongly Agree	Agree	Disagree	Strongly Disagree
a. I feel good about the progress my teacher team has made so far.	☐	☐	☐	☐
b. The expectations for what our teacher team is to accomplish for this project is clear.	☐	☐	☐	☐
c. The expectations for next steps were clearly communicated.	☐	☐	☐	☐
d. I feel good about the direction my team's final product is headed in.	☐	☐	☐	☐
e. I believe today's session has helped with our teacher team's progress as we develop our professional development topic and product.	☐	☐	☐	☐

6. Please elaborate on any of the statements above. (Indicate the corresponding letter item(s) with your comments or explanation/elaboration of your rating.)

_____

_____

_____

7. How would you describe your team's progress on your professional development product?

☐ Not as far along as we would like; running behind our planned time line
☐ Right on schedule
☐ Ahead of our planned time line

8. Are there any challenges you are currently facing in your teacher leader role as you develop your professional development topic and online product?

_____

_____

_____

9. Are there any additional suggestions you would like to give or resources that you think you will need to fulfill the teacher leader role as you develop your professional development product?

_____

_____

_____

Thank you!

Survey
Science Technology Engineering Leadership Program (STELP)
Year 2, May 18, 2012

This is the last in a series of surveys this year that will be given after each training session during year two of the program, thus our need to collect names; however, your answers are strictly confidential (i.e., answers will not be linked to individual names when reporting).

Name:_____

School:_____

Please indicate how much you agree or disagree with the following items by checking the appropriate box.

	Strongly Agree	Agree	Disagree	Strongly Disagree
1. I am skilled in using "Flip" style camera technology for capturing student learning.	☐	☐	☐	☐
2. I am skilled at using Windows Movie Maker software for…				
a. processing	☐	☐	☐	☐
b. editing	☐	☐	☐	☐
c. storing	☐	☐	☐	☐
d. retrieving video clips	☐	☐	☐	☐
3. I am skilled at using Microsoft Office PowerPoint capabilities for creating user-friendly, user-choice navigation for online professional development products.	☐	☐	☐	☐
4. I can articulate look fors in evaluating student proficiency in the practices of science and engineering.	☐	☐	☐	☐

	Strongly Agree	Agree	Disagree	Strongly Disagree
5. I can explain how K-8 technology standards are relevant to my role as a teacher and as a STE teacher leader.	☐	☐	☐	☐
6. I can explain how the practices of science and engineering and the Framework for K-12 Science Education are relevant to my role as a teacher and as a STE teacher leader.	☐	☐	☐	☐

Development of Professional Development Products

7. Please indicate how much you agree or disagree with the following items by checking the appropriate box.

	Strongly Agree	Agree	Disagree	Strongly Disagree
a. I feel good about the progress my teacher team has made.	☐	☐	☐	☐
b. The expectations for next steps were clearly communicated.	☐	☐	☐	☐
c. I feel good about our team's final product/the direction my team's final product is headed in.	☐	☐	☐	☐

8. How would you describe your team's progress on your professional development product?

☐ Not as far along as we would like; running behind our planned time line
☐ Right on schedule
☐ Ahead of our planned time line

Please use this space any additional comments:

_____

_____

_____

Thank you for your assistance!

Appendix B: Program Evaluation Unit Project Rubric

STELP Online Professional Development Project RUBRIC
Summary of 7 modules

Research Claims				
Was there cited research, outside the practice, included in the module?				
Was the practice cited?				
Criteria	Exemplary (3)	Proficient (2)	Not Proficient (1)	Score
	Organization			
Sequence	The sequence of information is logical and intuitive *Does it build up?	The sequence of information is somewhat logical *Does it build up?	The sequence of information is not logical. *Does it build up?	
Description of Practice	Presentation includes a clear and comprehensive description of the practice as defined in the Framework (i.e. definition plus further description or explanation)	Presentation includes a nominal description of the practice as defined in the Framework, but not enough information is provided for clear understanding. (i.e., just given the definition)	Presentation does not include a description of the practice as defined in the Framework	
Use by scientists and engineering	Presentation includes how the practice is used by scientists and engineers (with examples of "how")	Presentation somewhat includes how the practice is used by scientists and engineers (no examples or partially explained)	Presentation does not include how the practice is used by scientists and engineers	
Impact on Student Learning	Presentation includes the impact of the practice on student learning (could be links to research; could show examples); connects with practice, shows impact on learning	Presentation somewhat includes the impact of the practice on student learning (could be links to research; could show examples); doesn't connect with practice or doesn't show impact on learning or only partially	Presentation does not address the impact of the practice on student learning	
Classroom exemplars	Presentation includes classroom exemplars of the practice (multi-grade level); enough examples that a teacher in any grade could learn something relevant?	Some Classroom exemplars of the practice but not enough that teachers in all grades would learn relevant information	Presentation does not include classroom exemplars of the practice	

Criteria	Exemplary (3)	Proficient (2)	Not Proficient (1)	Score
Instructional strategies	Presentation includes instructional strategies for supporting students in developing practice. Example: some videos of experiences; sample of student products; worksheet	Presentation includes Instructional strategies for supporting students in developing practice in only a limited way (e.g., shows classroom activity but doesn't explain strategy or make the link to developing practice).	Presentation does not include Instructional strategies for supporting students in developing practice.	
	Design			
Multimedia	Project is truly multimedia and interactive, and Is there a variety? (i.e., videos, pictures, slides)	Project contains one or two media choices for viewer. The design is primarily linear.	Project contains no choices. The design is one dimensional.	
Navigation	Presentation contains well-designed navigational choices for viewer. *Look at this 1x in sequence; 2nd time jumping around	Presentation contains somewhat well-designed navigational choices for viewer.	Presentation contains no well-designed navigational choices for viewer (i.e., linear with no choices or not well designed).	
Technical Issues	All technical functions seem to work correctly	Some technical functions do not work correctly (i.e., links, loading, etc.)	Many technical functions do not work correctly (i.e., links, loading, etc.)	
Visual Presentation	All Visual Presentations (i.e., text, graphics) are of good quality (can read, graphics clear)	Some Visual Presentations (i.e. text, graphics) are of poor quality (hard to read, graphics not clear)	Much of the Visual Presentation (i.e., text, graphics) is of poor quality (hard to read, graphics not clear)	
Audio Presenation	All Audio Presentations (i.e., narrator, video clips) are of good quality (i.e.,can hear, clear)	Some of the Audio Presentations (i.e., narrator, video clips) are of poor quality (i.e., cannot hear, not clear)	Much of the Audio Presentations (i.e., narrator, video clips) are of poor quality (i.e., cannot hear, not clear)	
Artifacts**	All the photographs, graphics, sound and/or video align appropriately and enhance the content as well as create interest. *Is there a conection to the content?	Some of the photographs, graphics, sound and/or video enhance the content and create interest.	The photographs, graphics, sound and/or video are inappropriate for the content and do not create interest.	

Criteria	Exemplary (3)	Proficient (2)	Not Proficient (1)	Score
	Check for Understanding			
Opportunities	Session consists of multiple opportunities for a viewer to process, reflect on, and apply new information as well as to evaluate learning. Could be quizmaker; choice link with explanation; reflection journals	Session consists of one opportunity for a viewer to process, reflect on, and apply new information or to evaluate learning.	There are no opportunities for a viewer to process, reflect on, and apply new information or to evaluate learning.	
Connection	All Check for Understandings had a clear connection to what was presented	Some Check for Understandings had a clear connection to what was presented or had a partial connection	No Check for Understandings had a clear connection to what was presented N/A – No Check for Understanding	
Answer Review	All Check for Understanding questions were reviewed/gave correct answers	Some Check for Understanding questions were reviewed/gave correct answers or had partial answers/review	No Check for Understanding questions were reviewed /gave correct answers – i.e., never find out results N/A – No Check for Understanding	
Preassessment Connection	All preassessment questions are revisited or addressed in the presentation	Some preassessment questions are revisited or addressed in the presentation	No preassessment questions are revisited N/A – There are no preassessments	
Goals/Outcomes	All goals or outcomes stated in the presentation are covered	Some goals or outcomes stated are covered/Goals or outcomes are partially covered	Goals or outcomes stated are not covered N/A – No Goals or outcomes were given	

Appendix C: STE Staff Interview

1. Were you involved in both year 1 and year 2 of the Howard Hughes STELP grant?

2. What has been your role(s) in this year's STELP project?
    a. Probe if needed: working with a team? Editing products? Training tasks? Etc.

3. How often have you met with your assigned group? Did you meet with other groups?

4. What depth of assistance did you provide your group? How much ownership do you have in the product?
    a. Probe if needed: did you assist only if needed/by request? Did you guide or actually take a task to do yourself? Etc.

5. How did you feel about the process of the trainings and product development this year?

    a. What were some good approaches or steps taken?

    b. What were some challenges or not good approaches taken?

6. Did you face any challenges yourself as you fulfilled your role?

7. How did you feel your team worked together?
    a. Probe if needed: did they have conflicts? Hard to get together?

8. What challenges did your team face when working on their professional development project?

9. So, how do you feel about the final professional development project they turned in?

10. What are the next steps for the on-line products?

11. How do you think you all will communicate to the wider audience of teachers to get them to take the online professional development?

12. What would you like to see implemented next year during the third year of this project?
    a. Probe if needed: What would you like to see again next year? What would you like to see differently? Any additional activities/steps you'd like to see happen next year?

Extra Question (if time allows)

What do you think is the most important thing that teachers who view the professional development projects online will gain from them?

Appendix D: STELP Training Plan Peer and STE Specialist Review
February 17, 2012

For each item, circle 0, 1, or 2. Do not leave any items unanswered. (0 = No; 1 = Some evidence; 2 = Yes)

Reviewer: _____ Practice Reviewed: _____

Training Plan Component	Score			Recommendations for Improvement
Outcome(s) The stated outcome identifies the scientific or engineering practice that a viewer of the PD will explore.	0	1	2	
Outcome(s) The stated outcome identifies what a viewer of the PD will know and be able to do as a result of completing the online PD.	0	1	2	
Identifying Mastery The training plan includes a detailed description of how mastery of the objective will be determined and any needed artifacts/resources. For example, "Participants will demonstrate an understanding of asking questions and defining problems through video and/or picture and/or case study scenario identifications."	0	1	2	
Engage The training plan clearly describes a learning task, and needed artifacts/resources, for viewers of the online PD which focuses viewer's attention, stimulates their thinking, and accesses their prior knowledge.	0	1	2	
Explain The training plan clearly describes at least two opportunities, and needed artifacts/resources, for viewers of the online PD to process, reflect on, and explain their thinking.	0	1	2	
Explore The training plan clearly describes several opportunities, and needed artifacts/resources, for viewers of the online PD to have experiences with the concepts and ideas of the scientific and engineering practice.	0	1	2	
Evaluate The training describes strategies and tools, and needed artifacts/resources, for pre-assessment, on-going checks-for-understanding, and an end-of-session assessment.	0	1	2	

Training Plan Component	Score	Recommendations for Improvement
Extend/Elaborate (Optional) The training plan describes learning tasks, and needed artifacts/resources, in which the viewers of the online PD are able to apply their new knowledge and skills to new, but similar situations.	0 1 2	
Overall The training plan content about the specific scientific and engineering practice is accurate and adequately addressed within the session.	0 1 2	
Overall All purposed artifacts (videos, pictures, student work samples, etc.) are aligned appropriately to the content.	0 1 2	
Overall The sequence of information is logical and intuitive.	0 1 2	

Additional comments and feedback:

Appendix E: Training Session Schedule, Attendance, and Outcomes

Science, Technology, and Engineering Leadership Program:
Training Sessions

Date of training session	Session Learning Outcomes and Tasks	Number attending
September 20, 2011 For participants new to the program	• Articulate the vision for science, technology, and engineering in MCPS • Identify student proficiencies in science and engineering • Facilitate use of video recording technology in classroom instruction • Use *Windows Movie Maker* and *Microsoft PowerPoint* to create instructional resources	37 of 47
October 27, 2011 PD Session #1	• Articulate the vision for science, technology, and engineering in MCPS • Explain how the MCPS science, technology, and engineering vision aligns to the Framework for K–12 Science Education and the Next Generation Science Standards (NGSS) • Describe how the strands for science and engineering proficiency align to the Framework for K–12 Science Education • Evaluate student proficiency in science and engineering through the lens of target proficiencies • Articulate next steps in STELP online professional development product work Additionally: • Reviewed and provided written feedback on year one products • Met assigned team and determined team roles and next steps	38 of 47
December 6, 2011 PD Session #2	• Use video cameras for capturing students engaged in scientific and engineering practices • Explain the 2011–2012 STELP tasks and time lines • Describe the connection between the strands for science learning and the scientific and engineering practices • Identify outcomes for professional development projects and develop a training plan • Explain the vision for the NGSS; included team work and guest speaker, Vice President of Achieve, who talked about the NGSS framework, practices and standards	40 of 47

Date of training session	Session Learning Outcomes and Tasks	Number attending
February 17, 2012 PD Session #3	• Presented training plan drafst for review • Reviewed training plan drafts of peers and provided recommendations for upgrades • Articulated next steps in STELP online professional development product work Additionally: • Discussion on NGSS • Team work on training plan and product (video clips, PowerPoint)	31 of 47
April 26, 2012 PD Session #4	• Presented PowerPoint drafts for review • Reviewed PowerPoint drafts of peers and provided recommendations for upgrades • Articulated next steps in STELP online professional development product work Included: • Received new video cameras • Team project work	31 of 47
May 18, 2012 PD Session #5	• Team project work session only	n/a
May 24, 2012	• Optional days for participants to work on products at computer lab facility	N/A
May 29, 2012		N/A
June 7, 2012		N/A
June 8, 2012		N/A
June, 2012	Additional work session offered as needed	N/A

Note: Precise attendance counts for each session are unknown. The attendance counts are based on the number of feedback surveys returned; therefore, attendance may be underestimated. N/A designates not available.

Appendix F: Participants' STELP Reflection

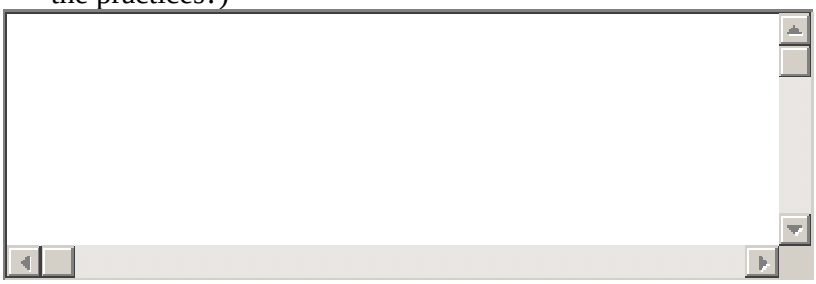
2011–2012 STELP REFLECTION

MCPS STEM Vision—All students achieve full science, technology, engineering, and math (STEM) literacy through seamlessly integrated instruction that is project/problem and standards-based. STEM literate students are critical thinkers who are able to solve non-routine problems in a globally competitive society. The primary goal of STELP is to build a cadre of STE teacher leaders to support the MCPS STEM vision by designing and delivering online PD about student proficiency in science and engineering. Teachers selected for this program must be committed to the MCPS vision and the STELP goal as evidenced in the work they do with students and teacher colleagues. Directions: Complete each item below. Be sure to provide specific evidence of how this program has supported your professional growth in understanding and implementation of STEM instruction.

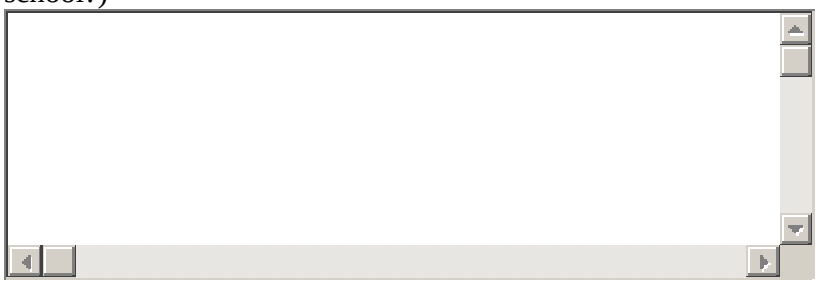
---

* Required
Top of Form

1. Describe how the STELP professional development on science and engineering proficiencies (Ready, Set, SCIENCE!) and scientific and engineering practices (Framework for K-12 Science Education) has impacted your instruction? (e.g., How have you changed your teaching to address the practices?) *



2. Describe how the STELP professional development on science and engineering proficiencies (Ready, Set, SCIENCE!) and scientific and engineering practices (Framework for K-12 Science Education) has impacted your work with colleagues or events at your school? (e.g., How have you shared what you have learned about the science and engineering practices with colleagues?, How have you used the science and engineering practices to upgrade science events at your school?) *



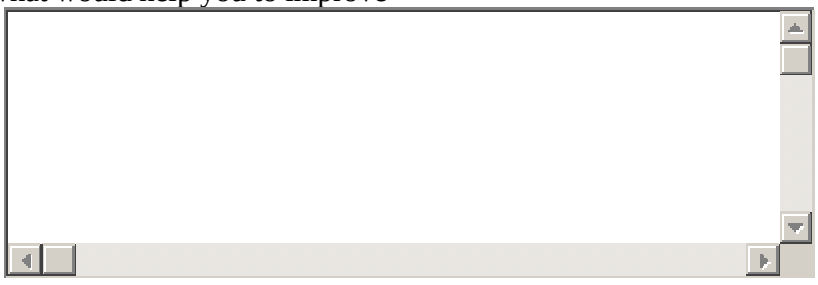
3. PRIOR to participating in STELP, what was your skill level? Please rate you level of proficiency with each of the following. * 1 = Basic - some knowledge but would need significant help; 2 = Proficient - knowledgeable but might need some assistance; 3 = Advanced - can do on my own.

	1	2	3
Movie Maker	☐	☐	☐
PowerPoint for online learning (multimedia and navigational options)	☐	☐	☐
Writing 5E professional development training plans	☐	☐	☐

4. As a result of participating in STELP, what is your skill level? Please rate you level of proficiency with each of the following. * 1 = Basic - some knowledge but would need significant help; 2 = Proficient - knowledgeable but might need some assistance; 3 = Advanced - can do on my own.

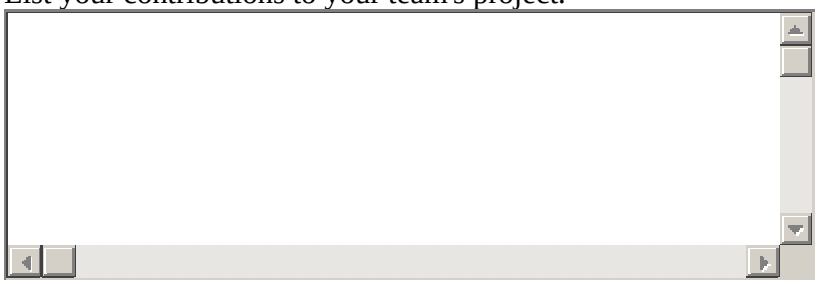
	1	2	3
Movie Maker	☐	☐	☐
PowerPoint for online learning (multimedia and navigational options)	☐	☐	☐
Writing 5E professional development training plans	☐	☐	☐

4a. If you rated yourself 1 (Basic), please explain what prevented you from obtaining more skill and what would help you to improve

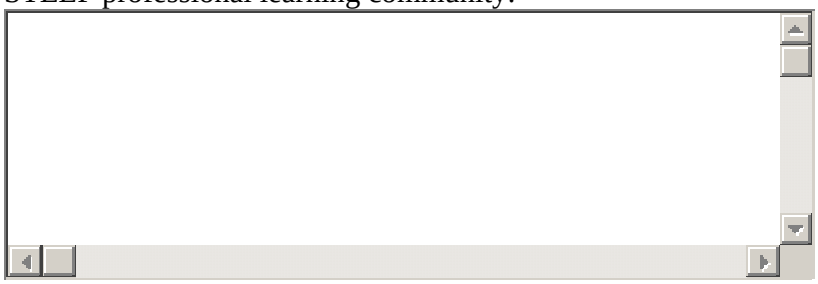


.

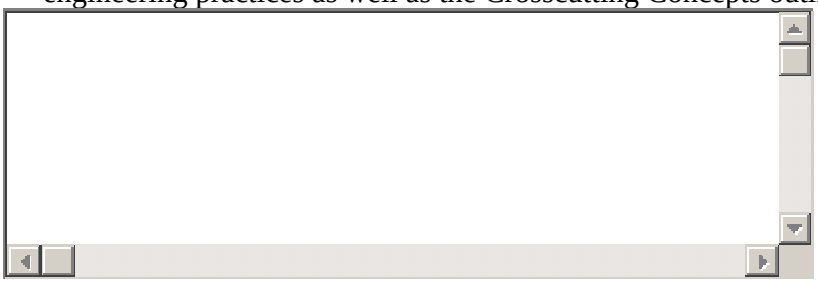
5. List your contributions to your team's project. *



6. Add any other comments about how you have benefited as a result of your participation in the STELP professional learning community. *



7. Would you like to continue in STELP? Explain how you think you would continue to grow professionally if you are to continue in this program. The work for next year will be a continuation of building online PD about classroom instruction that models the scientific and engineering practices as well as the Crosscutting Concepts outlined in the Framework.



8. Name * Your name is required in order for you to be paid for this year's work.

Submit

Bottom of Form