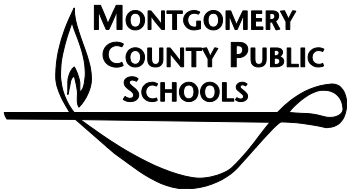

Evaluation of the Science, Technology, and Engineering Leadership Program, Year One

Office of Shared Accountability

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Executive Summary

The Office of Shared Accountability (OSA) conducted an evaluation of the implementation of the first year (2010–2011) 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 the three-year STELP is to improve instruction in science, technology, and engineering and, in turn, help students achieve full literacy in these areas. Students who are literate in science, technology, engineering, and math (STEM) are knowledgeable, informed citizens who are able to think critically about concepts and solve problems. To achieve this goal, in its first year, STELP provided training and support to a group of teacher leaders as they designed and created online professional development products.

The focus of the year one evaluation was on implementation of the program in terms of training a group of teacher leaders to develop online professional development resources for other MCPS science, technology, and engineering educators. Toward this end, the evaluation addressed the following questions:

1. **What was the context of the Science, Technology, and Engineering Leadership Program?**
    a. What are the characteristics of the teachers who participated in STELP, including degree and experience?
    b. How many participated in the Elementary Science Leadership Program?
    c. What are the characteristics of the schools with participating teachers?

2. **How was the Science, Technology, and Engineering Leadership Program implemented?**
    a. What was the organization and administration of the program, including development of a training plan and schedule?
    b. Was the training protocol and schedule followed as planned?

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

To examine the implementation of the first year of STELP, document review and program staff interviews were used to address the first two evaluation questions. To address the third evaluation question, Guskey's (2000) model for evaluating professional development was used.

Four of Guskey's sequential levels were addressed in the first year of the evaluation: participants' reactions, participants' learning, organization support and change, and participants' use of new knowledge and skills. Data collection methods for evaluation question 3 included surveys administered after each training session, and pre- and post-training content assessments, which provided a direct measure of knowledge gained. Data were summarized descriptively.

Summary of Key Findings

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

Characteristics of STELP teacher leaders. A total of 59 teachers were invited to participate in STELP. Selection of invitees was based on program staff's knowledge of individual teacher skills and participation in the Elementary Science Leadership Program (ESLP), an MCPS program supported by HHMI from 2005 through 2009, in which elementary teachers received professional development focused on science content and pedagogy, equitable instructional practices, and leadership. A total of 38 accepted the STELP teacher leader role. Of the 38 teachers who participated, 29 were elementary staff and 9 were middle school staff. The participants represented a variety of positions in both elementary and middle schools. The largest groups of teachers in STELP were 3rd through 5th grade teachers (n = 14, 37%) and middle school teachers (n = 7, 18%). The majority of teacher leaders had between 5 and 15 years total teaching experience as well as experience teaching science (n = *28*, 74%).

Ninety percent of the elementary teacher leaders previously had participated in the Howard Hughes Elementary Science Leadership Program. More than half (55%) of teacher leaders reported that they have a leadership role at their school such as team leader, resource teacher, or science coordinator.

Characteristics of schools with STELP teacher leaders. The 38 teachers who participated in STELP represented 24 elementary schools and 8 middle schools. On average, as a group, schools with teachers participating in STELP had percentages similar to MCPS averages in terms of students receiving Free and Reduced-price Meals System (FARMS) (33% for STELP elementary and 35% for MCPS; 22% for STELP middle schools and 30% for MCPS) and students participating in English for Speakers of Other Languages (ESOL) (20% of STELP elementary and 22% for MCPS; 4% for STELP middle schools and 5% for MCPS). However, STELP schools at both elementary and middle school levels had a wide range of FARMS and ESOL participation, similar to the range in elementary and middle schools systemwide.

2. How was the Science, Technology, and Engineering Leadership Program implemented?

Training and product development schedule. Three training sessions were held as scheduled to provide teacher leaders 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. Attendance at each of the three training sessions was very high, ranging from 33 to 35 of the 38 teacher leaders. Attendance was also high at a series of work sessions that was provided after the end of the school year so teacher leaders could work with their teams on the final stages of their products in technology labs.

Thirty-one teacher leaders attended a week-long work session and 15 teacher leaders participated in an additional work session. At the completion of the first year of STELP, however, none of the professional development products were determined to have fully met the criteria for effective online professional development in science, technology, and engineering. Therefore, plans for product development were revised to allow teacher leaders more time and training to create professional development products that would meet the STELP criteria.

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

Surveys of teacher leaders were administered at the end of each group training session. The three surveys included scaled questions as well as open-ended questions. A reflective activity on designing a professional development product also was conducted by the program staff in the third training session; findings from these sources are incorporated below.

Teachers' reactions to training. Surveys of teacher leaders were administered at the end of each group training session; the three surveys assessed teacher leaders' perceptions of the training received. All of the respondents (100%) agreed that the goals of the trainings were clear, the objectives of the trainings were met, trainers were knowledgeable and well-prepared, their questions were answered, they gained information and skills that will help in this role, as well as other statements about the training sessions (100% agreed). However, despite the high percentages of positive ratings, the need for a clear vision was mentioned by several teachers in response to open-ended questions across the three surveys and the reflective activity. Also, much positive feedback was given in each of the surveys stating that the project was useful and giving complements to the program staff. Half of the additional comments in the third survey were commending the guest speaker from Northrop Grumman.

Teachers' reactions to process of creating professional development products. Teacher leaders responded positively in both the first and third sessions about their attitudes towards technology. The one increase over the course of the training sessions was reflected in response to "I feel comfortable with my current technology skills"—71% of the respondents at the first administration agreed, and 85% of the respondents at the last survey administration agreed with this statement. In the third survey, one third of teacher leaders disagreed with the statement "I feel good about my skills with Movie Maker as it pertains to this project" and cited the need for more practice to feel comfortable. Technology issues also were mentioned in response to open-ended questions throughout the project as a support needed or lesson learned.

In survey questions addressing progress on their professional development products, high percentages of teacher leaders responded with positive perceptions about their team's progress on their products. However, time was a dominant area of concern throughout all the surveys. Teacher leaders found it challenging to coordinate schedules among the team members, work on the product, collect video clips, and practice the technology.

Knowledge and skills gained. To measure the understanding of STELP concepts, OCIP staff administered pre- and post-training content assessments at each of the three training sessions. The content assessments measured teachers' knowledge of the National Research Council's (NRC) four learning strands in science, as well as standards in technology education

and components of online professional development. Teacher leaders' understanding of the learning strands showed large variation among the different strands. Across the three administrations of the content assessment, the largest percentage of teachers demonstrated an understanding of Strand 2—generating and evaluating scientific evidence or technological solutions (100%, 100%, 89%). Strand 1—know, use, and interpret scientific explanations of the natural and design world—was correctly answered by about half to three quarters of the teachers. Lower percentages of teacher leaders demonstrated an understanding of the other two strands: Strand 3—understanding the nature and development of scientific and technological knowledge and capabilities, and Strand 4—participating productively in practices and discourse of science and engineering. Most teachers were unable to list three standards for technology literacy on any of the three assessments (18% at the last session). Additionally, some teachers commented in the last survey that they learned about engineering or the STELP strands from the trainings.

Teachers also reported that they learned how to make the products better and more interesting or how to use specific techniques. Some also mentioned they learned that it takes a lot of time and/or flexibility to create a quality product.

Using the information gained. When asked at the start of the year "What outcomes do you hope result from this initiative?" one half of the teachers responded that they would like to see STEM implemented into classrooms and one third mentioned they'd hoped to create an online professional development tool for teachers to be more proficient in science. In the reflective activity, many of the teacher leaders indicated that they would introduce the professional development products at staff, preservice and/or team meetings at their school. Teachers also talked about how the products would interest participants by being convenient in terms of accessibility and flexibility. Barriers mentioned that might limit participants to use the professional products were: time, lack of interest in science, lack of human interaction, and the view that it's one more thing for teachers to do.

Recommendations

The following recommendations are suggested by the year one study findings:

- Clarify expectations and provide a clear vision for the final professional development products. Develop a model or concrete examples of what a finished product should look like.
- Have the teacher leader teams provide regular detailed updates and show their work to the program staff. This will help detect problems early on and ensure that the teacher leader teams are making progress and are on track to create a high-quality product.
- Provide more opportunities for teachers to get together to work on their products by offering more trainings and work sessions. Additionally, consider offering strategies to teacher leaders on how they can work together and on their products more efficiently and effectively.
- Strengthen the understanding of STELP strands among teacher leaders; pre- and post-survey results indicated gaps in understanding some of the learning strands.

- Provide more guest speakers, such as the Northrop Grumman speaker that was so well received, to encourage STELP participation and strengthen teachers' understanding of the STELP core objectives.
- Continue providing the needed training to ensure teacher leaders have opportunities to clarify their understanding of STELP as well as the goals and expectations of their professional development product.
- Continue collecting feedback from participants in order to address teachers' needs and challenges. More direct and specific questions may be needed to generate more informative feedback from participants throughout the course of training sessions.
- Continue assessing teacher leaders' understanding of the program.
- Continue providing support to teacher leaders throughout the entire process, especially technical support which was the challenge cited the most.

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

Natalie Wolanin and Julie 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 math (STEM) are knowledgeable, informed citizens who are able to think critically about concepts and solve problems. MCPS supports this vision by engaging all students in inquiry-based STE programming, and by building the capacity of STE leaders in every school for the purpose of improving teaching and learning (MCPS, 2010).

The goal of the three-year Science, Technology, and Engineering Leadership Program (STELP) is to improve instruction in these areas and, in turn, help students achieve STEM literacy. To achieve this goal, in its first year, STELP provided training and support to a group of teacher leaders as they designed and created online professional development resources. STELP, including its evaluation, is supported by a grant from the Howard Hughes Medical Institute (HHMI) to MCPS.

STELP builds on the work of the Elementary Science Leadership Program (ESLP), an MCPS program supported by HHMI from 2005 through 2009 in which 115 teachers at 96 elementary schools received professional development focused on science content and pedagogy, equitable instructional practices, and leadership. Collaboration with local and national associations supported the professional development allowing participants to have access to current research on effective, content-rich science instruction. The role of the ESLP teachers in their schools was to apply their learning not only in their own classrooms, but in their work with colleagues so that high-quality, inquiry-based instruction in science, technology, and engineering would be accessible for all students.

To continue supporting improvement in STEM instruction, particularly teachers' understanding and capacity to use inquiry in their science classrooms, STELP identified a cadre of teacher leaders to create and deliver online professional development. Building on the skills and knowledge developed through ESLP, as well as tapping the expertise of content specialists in the middle schools, STELP prepared a group of teacher-leaders to develop online materials to support inquiry-based instruction within effective, research-based teaching practices in science, technology, and engineering. Through the creation of these resources, STELP aims to build a professional development network for wide use across MCPS.

The goal of STELP—to improve instruction and help students achieve STEM literacy—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."

Toward this end, the objectives for the first year of STELP were—

- produce a group of trained teacher leaders who have the skills and knowledge to produce online professional development products for other MCPS educators in science, technology, and engineering; and
- support this group of teacher leaders as they create professional development products that are based on a rubric of elements that are characteristic of effective online professional development in science, technology, and engineering.

This report addressed the evaluation of the first year of STELP, focusing on the training of teacher leaders to design and deliver online professional development products. Plans for the second and third years of the program are contingent upon the completion and delivery of the online professional development resources, and the evaluation of subsequent stages of the program will be reported in future documents. The evaluation was requested by the Office of Curriculum and Instructional Programs (OCIP) and conducted by the Office of Shared Accountability (OSA).

Literature Review

In a recent nationwide study, Wei and colleagues (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." (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; however, 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." 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 can be better understood.

Scope of the Study

The evaluation addressed the first year of the Science, Technology, and Engineering Leadership Program. The focus of the year one evaluation was on implementation of the program in terms of training a group of teacher leaders to develop online training and resources for other MCPS science, technology, and engineering educators. Toward this end, the evaluation addressed the following questions:

1. **What was the context of the Science, Technology, and Engineering Leadership Program?**
    a. What are the characteristics of the teachers who participate in STELP, including degree and experience?
    b. How many participated in the Elementary Science Leadership Program?
    c. What are the characteristics of the schools with participating teachers?

2. **How was the Science, Technology, and Engineering Leadership Program implemented?**
    a. What was the organization and administration of the program, including development of training plan and schedule?
    b. Was the training protocol and schedule followed as planned?

3. **What was the impact of the training on the teacher leaders?**
    a. What were teacher leaders' reactions to training, including the process for creating professional development products?
    b. What knowledge and skills did teacher leaders gain?

c. Did teacher leaders have the resources and support needed to apply what they learned?
d. How did teacher leaders use the new information?

Methodology

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

- Reviews of program documents, training records and materials, including professional development plan, session agendas, session handouts, session attendance records
- Interviews with project manager
- Surveys of teacher leaders after each training session
- Pre- and post-training content assessments for teacher leaders

Study Sample

In the first year of the evaluation, all teacher leaders enrolled in STELP comprised the study sample. A total of 38 teachers participated during year one, representing 24 elementary schools and 8 middle schools in MCPS.

Data Collection Activities

To address the first evaluation question, "What was the context of STELP?," data were drawn from program records and MCPS archival records to describe the participants and their schools.

Assessment of the second evaluation question, "How was STELP implemented?," 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 training on the teacher leaders?," Guskey's (2000) model for evaluating professional development was used. Four of Guskey's sequential levels were addressed in the first 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	Content assessments 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)	Participants' reported use of new knowledge as they created professional development products
5. Student learning outcomes (objective for year three of project)	Surveys of teachers; student records	Measures of student performance and engagement

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 first year of the evaluation:

- Surveys of the teacher leaders administered at the end of each group training session; the surveys assessed teacher leaders' perceptions of the training received in the program (Appendix A).
- Content assessments providing pre- and post-training measures of content knowledge; OCIP staff developed the content assessments and scoring rubric (Appendix B).

Summary of Data Analysis

Procedures included the following:

- Descriptive summary of characteristics of participants
- Descriptive summaries of attendance at professional development sessions
- Descriptive statistical analysis of teacher leaders' survey and content assessment data

Description of the STELP Program

Invitation and Enrollment of Participants

A total of 59 staff were invited to participate in STELP. Selection of invitees was based on program staff's knowledge of individual teacher skills and participation in the ESLP, or a recommendation from other STE teammates. Each invited teacher was sent an e-mail describing the program and explaining the commitment. See Appendix C for the recruitment attachment that was used. The teachers were invited to attend an information meeting to learn more about the project. A total of 38 teachers signed on to participate in STELP.

Training Sessions for Teacher Leaders

Three professional development sessions were held in the first year: October 2010, February 2011, and May 2011. Attendance was very high for these sessions with 33, 35, and 33 of the total 38 participants attending, respectively.

In the first session, held in October 2010, teacher leaders participated in the following activities:

- Met their teams
- Practiced using flip camcorders
- Discussed the vision for STE in MCPS
- Discussed STEM and the strands of STEM
- Identified key traits of effective leaders for the goals of this program
- Selected topic choices for developing the online professional development product (STE PD)

By the next session in February, teacher leaders were expected to have their topics and outcomes developed, team members' roles identified, and possibly the collection of video clips of classroom activities begun.

In the second session, held in February 2011, participants—

- listened to an MCPS guest speaker advocating for effective science, technology, and engineering instruction;
- discussed goals, topics, progress, and ideas as it pertained to the development of the online professional development product; and
- received tips on how to actively engage adult learners in professional development using PowerPoint and received an overview of Movie Maker.

Participants were left with the charge (to complete by the final session) to collect artifacts (i.e., evidence of students meeting various target proficiencies) and develop a PowerPoint presentation of their professional development topic, which would later be put into the software program Articulate.

In the third and final session, held in May 2011, teacher leaders participated in the following activities:

- Listened to a guest from Northrop/Grumman talk about STEM education

- Reflected on creating their online professional development product
- Heard tips for using "talking head" videos
- Heard tips for organizing PowerPoint presentations for effective online use
- Worked on products with their teams

This session also revealed the online template which would be used to organize all the teams' professional development products. The expectation after this session was that teams were to finish creating their professional development products emphasizing content, organization, and processes. Teams were directed to structure their products with the template and the science department staff would complete the teams' PD in the software program, Articulate, and organize them in one core location.

Formation of Teams and Selection of Topics

Nine teams, made up of three to five teachers, were formed at the beginning of year one and each team was expected to develop an online STE PD product. Teams were chosen based on location of participants. Additionally, a middle school staff member was included on each team to assure vertical collaboration. The teams were assigned one of the PD topics listed below in Table 2. At the end of the first training session, participants were asked to give their first and last choices for topics. Most teams received their first choice. Reasons most frequently given when asked why they chose their topic of choice were: interest (including some specifying engineering or analytical skills), experience, ease of incorporating a specific grade-level curriculum into the product, and ease of collecting artifacts.

Table 2
STELP Online PD Design Teams and their Assigned Topics

Strand 1 (two teams):	Know, use, and interpret scientific explanations of the natural and design world
Strand 2 (two teams):	Generating and evaluating scientific evidence or technological solutions
Strand 3 (one team):	Understanding the nature and development of scientific and technological knowledge and capabilities
Strand 4 (two teams):	Participating productively in practices and discourse of science and engineering
Non-strand Topic (one team):	Supporting students in developing experimental questions and/or identifying problems that can be addressed through engineering innovations
Non-strand Topic (one team):	Well-designed investigation and engineering design process in grades K–8

Product Development

The nine teams were to produce online professional development products based on a rubric of elements that are characteristic of effective online professional development in science, technology, and engineering. At the first teacher leader training held in October, teams were given a training plan template to be used for planning their professional development product (Appendix D). The template included the following criteria:

- Clearly stated, measurable outcomes
- An activator to engage the audience
- Learning tasks that align directly to session outcomes
- Effective pacing
- Adequate opportunities for participants to explore and/or practice with new knowledge of skills learned
- Adequate opportunities for participants to process and reflect on knowledge and skills learned
- Effective processes for participants to summarize learning
- Equitable practices
- Effective instructional practices for content STE classrooms

At the May teacher leader training session, a Self–Evaluation worksheet was given to help guide and assess the professional development products (Appendix E).

Findings

Who participated in the first year of STELP?

Characteristics of the Participating Teachers. A total of 59 teachers–40 elementary and 19 middle school—were invited to participate in STELP. Among the elementary staff invited, 5 were staff development teachers, 29 were classroom teachers and the remaining 6 were various specialized teachers (i.e., focus, special education, science teachers). Among the middle school staff invited, 8 were science teachers, 7 were science resource teachers, 1 was a staff development teacher, and 3 were technology resource teachers or technology teachers.

Of the 59 teachers invited, 38 (64%) accepted the STELP teacher leader role. The remaining declined, didn't respond, or in the case of two invitees, agreed but did not participate in the professional development sessions. Of the 38 who participated, 29 were elementary staff and 9 were middle school staff. 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 Elementary and Middle School Staff

	Total Teacher Leaders (*N* = 38)		Elementary Teacher Leaders (*N* = 29)		Middle School Teacher Leaders (*N* = 9)	
Current position	*N*	%	*N*	%	*N*	%
K–2	5	13.2	5	17.2	0	0.0
3–5	14	36.8	14	48.3	0	0.0
Multiple grades, science teacher	2	5.3	2	6.9	0	0.0
Intervention & science teacher	1	2.6	1	3.4	0	0.0
Focus teacher	1	2.6	1	3.4	0	0.0
Special education teacher	1	2.6	1	3.4	0	0.0
Staff development teacher	6	15.8	5	17.2	1	11.1
MS science teacher*	7	18.4	0	0.0	7	77.8
Tech and engineering teacher	1	2.6	0	0.0	1	11.1
Total years teaching						
1–4 years	4	10.5	2	6.9	2	22.2
5–15 years	28	73.7	21	72.4	7	22.8
16+ years	6	15.8	6	20.7	0	0.0
Years teaching science						
1–4 years	4	10.5	2	6.9	2	22.2
5–15 years	28	73.7	21	72.4	7	22.8
16+ years	6	15.8	6	20.7	0	0.0
Years teaching technology						
None	23	60.5	19	65.5	4	44.4
1–4 years	8	21.1	5	17.2	3	33.3
5–15 years	5	13.2	3	10.3	2	22.2
16+ years	2	5.3	2	6.9	0	0.0
Years teaching engineering						
None	26	68.4	21	72.4	5	55.6
1–4 years	9	23.7	5	17.2	4	44.4
5–15 years	2	5.3	2	6.9	0	0.0
16+ years	1	2.6	1	3.4	0	0.0
Degree or certification in science, technology, or engineering						
	11	28.9	5	17.2	6	66.7

*Two middle school science teachers were also middle school science resource teachers.

As shown in Table 3a, the participants represented a variety of positions in both elementary and middle schools. The largest groups of teachers in STELP were third through fifth grade teachers (*n* = 14, 37% of the total) followed by middle school science teachers (*n* = 7, 18% of the total). The majority of teacher leaders had between 5 and 15 years total teaching experience as well as experience teaching science (*n* = 28, 74%). However, according to teachers' survey responses, nearly two thirds did not have any experience teaching technology or engineering (*n* = 23, 61% and *n* = 26, 68% respectively) with more elementary school teachers having no experience in

these areas than middle school teachers (*n* = 19, 66% vs. *n* = 4, 44% in technology and *n* = 21, 72% vs. *n* = 5, 56% in engineering). Sixty-seven percent (*n* = 6) of middle school teacher leaders said they have degrees or a certification in science, technology, or engineering; compared with 17 percent of elementary teacher leaders.

Shown in Table 3b, almost all of the elementary school participants (90%) participated in the Howard Hughes ESLP prior to this project with more than half (55%) having three or more years of experience in ESLP. More than half (55%) of teacher leaders reported that they have a leadership role at their school such as team leader, resource teacher, leadership team, science coordinator, etc. A similar percentage (55%) reported having some other leadership or professional development role such as a specified school program coordinator, a liaison for the school, or a role outside MCPS. A higher proportion of elementary school teachers reported team or subject leadership roles compared to middle school teachers (66% vs. 22%) and a slightly higher percentage of middle school teachers cited other types of leadership role such as: Positive Behavioral Interventions and Support (PBIS) team, GT Liaison, roles outside MCPS, etc. (67% vs. 52%).

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

	Total Teacher Leaders (*N* = 38)		Elementary Teacher Leaders (*N* = 29)		Middle School Teacher Leaders (*N* = 9)	
Participation in ESLP**	*n*	%	*n*	%	*n*	%
None	12	31.6	3	10.3	n/a	n/a
½–2 years	10	26.3	10	34.5	n/a	n/a
3 or more	16	42.1	16	55.2	n/a	n/a
Leadership/PD Role						
Team or Subject Leader Roles (i.e. Team Leader, RT, Leadership Team, etc.)	21	55.3	19	65.5	2	22.2
Other (i.e. PBIS/Green School/Extend Day Coordinator, GT Liason, Outside MCPS roles, etc.)	21	55.3	15	51.7	6	66.7

**ESLP prior to current STELP.

A large majority (84%) of participants said that they have participated in some type of online training. Almost one third (31%) of teacher leaders have participated in webinars and 20% have participated in online courses and trainings (Table 3c).

Table 3c
Science, Technology, and Engineering Leadership Program:
Participation in Online Training

		Total Teacher Leaders (N = 38)	
		n	%
Yes, participated in any kind of online training		32	84
Online training experience	Participated in webinars	12	31
	Created webinars	4	10
	Online courses/trainings	11	20
	Other technologies (i.e., Blackboard, Articulate, Modules)	5	13
	Other	2	5

Note. Respondents may have participated in more than one training.

Characteristics of Schools with STELP Teachers. Teachers who participated in STELP were from 24 elementary schools and 8 middle schools. Characteristics of the schools are shown in Table 4.

Table 4
Science, Technology, and Engineering Leadership Program:
Characteristics of Elementary and Middle Schools with Participating Teachers

School-level characteristics		STELP (24 schools)	MCPS	STELP (8 schools)	MCPS
Number of students	Mean	543	519	884	805
	Range	289–1025	169–1025	635–1122	355–1291
% of students eligible for FARMS	Mean	32.8	35.3	21.9	29.9
	Range	4.0–74.5	0.6–90.9	5.1–43.4	0.9–60.6
% of students enrolled in ESOL classes	Mean	19.8	22.2	3.6	4.7
	Range	3.0–58.0	1.7–74.0	1.3–8.3	0–11.6

On average, as a group, schools with teachers participating in STELP had percentages similar to MCPS averages in terms of students receiving Free and Reduced-price Meals System (FARMS) (33% for STELP elementary and 35% for MCPS; 22% for STELP middle schools and 30% for MCPS) and students participating in English for Speakers of Other Languages (ESOL) (20% of STELP elementary and 22% for MCPS; 4% for STELP middle schools and 5% for MCPS). However, STELP schools at both elementary and middle school levels had a wide range of FARMS (4–75% for elementary; 5–43% for middle school) and ESOL (3–58% for elementary; 1–8% for middle school) participation, similar to the range in elementary and middle schools systemwide.

Was STELP implemented as designed?

Training schedule. The program plan specified that whole-group training sessions would be held in October, February, and May, and that a supported work session for completion of the professional development products would be scheduled for June or July. Additionally, the program staff offered some days prior to the end of the school year for substitute release time for teacher leaders to work on their own or in groups at the computer lab. Table 5 outlines the program training plan.

Table 5
Science, Technology, and Engineering Leadership Program:
Training Plan

Date of training session	Learning outcomes	Number attending
October 22, 2010	Articulate the vision for science technology and engineering in MCPS; Facilitate use of video recording technology in classroom instruction; Explain what research says about proficiency in science, technology, engineering; Relate key traits of effective leaders to the goals of STELP; Select topics for online STELP design	33
February 2, 2011	Use Windows Movie Maker to create instructional resources; Actively and meaningfully engage adult learners in online professional development; Design a draft power point of PD session that address stated criteria	35
May 11, 2011	Use criteria for effective online PD to provide constructive feedback to team peers; Include "talking head" video segments into their online PD sessions; Use peer feedback to make revisions and finalize their PowerPoint PD training plans; Articulate the knowledge and skills necessary for STEM careers as demonstrated by industry engineers. Also, will have reflected on their online PD design work to make recommendations for next steps; considered how to organize the flow of their online PD to engage all learners	33
June 20–24, 2011*	Participants chose one of these team work sessions to attend at the computer lab facility	16
June 27–July 1, 2011*		13
July 28–22, 2011*		2
June 7 or June 10, 2011	Additional work session offered as needed	15

*Participants attended 3–5 days. One team consisting of five teacher leaders did not attend.

Attendance at each of the three training sessions was very high, ranging from 33 to 35 teacher leaders. Attendance at the work sessions was also high with 31 attending one of the weekly summer sessions and approximately 15 attending the optional additional work session at the beginning of June.

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. Feedback was summarized by the evaluators and provided to program administrators after each training session.

Product development. The original STELP plan projected that the online products would be completed and launched during the summer of 2011 (end of year one), following the training sessions held during 2010–2011. At the completion of the first year of STELP, however, none of the professional development products were determined to have fully met the critera for the program (see Appendices D and E).

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 timeframe for the program was adjusted. The revised program plan specifies that the professional development products will be completed during year two of STELP, after teacher leaders have received further training and additional time for the completion of their work.

What was the impact of STELP training of teacher leaders?

Teachers leaders' perceptions about technology. In surveys administered at the first and third training session, teachers were asked to indicate their level of agreement with questions about technology. Table 6 shows teachers leaders' responses after each of these training sessions.

Table 6
Science, Technology, and Engineering Leadership Program:
Teachers' Perceptions of Technology Provided in Two Sessions

	% Responding Agree or Strongly Agree	
	October 2010 *(N = 35*)*	May 2011 *(N = 33)*
I believe technology is an effective tool for helping teachers master effective teaching skills and strategies.	100.0	97.0
I believe technology makes the process of learning more accessible.	97.1	97.0
I feel comfortable with my current technology skills.	71.4	84.8
I feel comfortable with experimenting and learning how to use new technology.	97.1	97.0

*Includes two staff members who did not attend the October session but answered at the February session.

Across the two sessions, large percentages of teachers responded with positive perceptions about the technology. The biggest change was an increase in the percentage of teachers saying they

"feel comfortable with their current technology skills." Although 85% of teachers in the May session said they felt comfortable with their technology skills, those who did not feel comfortable reported that although they were making progress and willing to learn, it was a lot to process and master in the limited amount of time they had. One of the participants mentioned that having limited technology in their school was also an obstacle.

Teachers' understanding of STELP concepts. OCIP staff administered the same content assessment to teacher leaders at the beginning of each of the three training sessions. The intent was to measure teachers' understandings of STELP concepts and good professional development practices and whether their understanding increased later in the year after attending the training sessions. The findings are based on the OCIP staff's grading of the questions. Teachers were given a score of "correct" if they demonstrated an understanding of the concept in their answer.

The first question asked teachers to select one of the four learning strands put out by the National Research Council's (NRC) Committee of Science Learning and then define the strand. These strands also are used when designing the professional development products. Teachers could pick a different strand to define on each of the training session questionnaires; therefore, the same teachers may or may not be represented with each training strand definitions. It also should be pointed out that the sample size for all of these questions is small and should be viewed with caution.

An understanding of strand 1—know, use, and interpret scientific explanations of the natural and design world—varied among participants, ranging from 50% to 71% obtaining a correct score. No evidence of an increasing understanding over time was observed (Table 7). However, only four teacher leaders selected strand 1 in the May administration.

Strand 2—generating and evaluating scientific evidence or technological solutions—had the highest level of understanding of all the strands, with 100% of the teacher leaders getting a correct answer in the first two sessions and eight out of nine getting a correct answer in the last session.

No one selected strand 3—understanding the nature and development of scientific and technological knowledge and capabilities—in the first two sessions, and of the two teacher leaders who selected it in the last session, one provided a correct answer.

Finally, strand 4—participating productively in practices and discourse of science and engineering—was the strand chosen most by teacher leaders in each of the sessions, with an increasing percentage of correct answers over the three sessions (23%, 44%, and 75% respectively).

Teacher leaders' understanding of the learning strands showed large variation among the different strands. Across the three administrations of the content assessment, the largest percentage of teacher leaders demonstrated an understanding of Strand 2—generating and evaluating scientific evidence or technological solutions (100%, 100%, 89%). Strand 1—know, use, and interpret scientific explanations of the natural and design world—was correctly

answered by about half to three quarters of the teachers leaders, but lower percentages of teacher leaders demonstrated an understanding of the other two strands.

The second question asked teacher leaders to list three standards for technology literacy (Table 6). Most teacher leaders across all three sessions did not successfully answer this question, with 18% getting a correct answer in the last session.

The third question asked teacher leaders to describe three components of online professional development (Table 7). Most teacher leaders answered this question correctly in the first two sessions, and all of the teacher leaders answered correctly in the last session.

Table 7
Science, Technology, and Engineering Leadership Program:
Pre- Post-Questionnaire

	% Correct		
	October 2010*	February 2011	May 2011
Q1 Select one science and engineering strand for student proficiency. Define and give examples of student behavior.			
Strand 1. Know, use, and interpret scientific explanations in the designed world	(*N* = 7) 71.4	(*N* = 9) 66.7	(*N* = 4) 50.0
Strand 2. Generating and evaluating scientific evidence	(*N* = 7) 100.0	(*N* = 10) 100.0	(*N* = 9) 88.9
Strand 3. Understanding the nature and development of technological knowledge and capabilities	n/a	n/a	(*N* = 2) 50.0
Strand 4. Participating productively in practices and discourse of Science or Engineering	(*N* = 17) 23.5	(*N* = 9) 44.4	(*N* = 12) 75.0
Q2 List three standards for technology literacy	(*N* = 33) 3.0	(*N* = 31) 9.7	(*N* = 28) 17.9
Q3 Describe three components of online professional development	(*N* = 33) 72.7	(*N* = 31) 71.0	(*N* = 28) 100.0

*Staff who attended the October session, but later dropped out of the program, was included in this reporting.

Teacher leaders' perceptions of training sessions. In surveys administered after each 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 8.

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

	% Responding Agree or Strongly Agree		
	October 2010 (*N* = 33)*	February 2011 (*N* = 35)	May 2011 (*N* = 33)
The goals of today's training were clear.	100.0	100.0	100.0
The objectives of today's training were met.	100.0	100.0	100.0
The trainers were knowledgeable and well prepared.	100.0	100.0	100.0
An environment was created in which I felt comfortable taking risks (i.e., asking questions, expressing my ideas, working with unfamiliar content).	100.0	100.0	100.0
Opportunities were provided for me to process and reflect upon the application of the knowledge and skills learned.	100.0	100.0	90.9
My questions during the training today were answered adequately.	100.0	100.0	100.0
As a result of today's training, I have gained information and skills that will help me in this role.	100.0	100.0	100.0
Overall, today's training has been helpful to me.	100.0	100.0	100.0
The Movie Maker workshop did a good job presenting the information and skills needed to use this software.	n/a	97.1*	n/a
I feel able to use Movie Maker in the creation of our online professional development.	n/a	97.1	n/a
The Effective PD workshop did a good job presenting the information, skills, and tools needed to actively engage teachers in our online development.	n/a	94.3	n/a
I feel able to use technology (e.g., PowerPoint) to actively engage teachers in online professional development.	n/a	100.0	n/a
The guest from Northrop/Grumman provided helpful information as a science, technology, engineering teacher leader.	n/a	n/a	100.0
The feedback provided by the peer review was very helpful in developing our online PD.	n/a	n/a	97.0
The "Talking Head" segment was effective in providing information and the skills needed to incorporate this option to the online PD.	n/a	n/a	94.0
The PowerPoint presentation did a good job presenting the information and skills needed to set up options for the user to navigate through the online PD at their own pace.	n/a	n/a	97.0

*Includes staff who attended the October session, but later dropped out of the program.

Across the three sessions, large percentages of teacher leaders responded with positive perceptions about the training, with 100% agreeing with most of the statements. There were a few statements where one or two participants disagreed and these mostly related to the presentation of a technical portion of the training. In the third training, three participants did not agree with the statement "Opportunities were provided for me to process and reflect upon the application of the knowledge and skills learned."

In open-ended questions, teacher leaders were asked to identify the most important thing gained from the training. After the first training, thirty participants responded. *Learning about the four strands* (67%) and *gaining an understanding of STELP* (27%) were cited as most important. When asked the same question in the second training, of the 35 responses given, *gaining a clearer vision of the final product and directions* (37%), *learning Movie Maker* (37%), *learning about Articulate* (24%) and *working with their team* (14%) were most important. After the third and final training, 33 responses were identified *gaining a clearer vision of the final product* (30%), *understanding engineering and STEM* (21%), *working with their team* (21%), learning about *PowerPoint* (15%), and *Talking Heads* (12%).

Development of the Professional Development Products

Progress reported during training. After the second and third training sessions, teacher leaders were asked about their team's progress and about the ways the team had been communicating and working. At both sessions, over three quarters of the teacher leaders reported at least one-in-person meeting with their teams. The number of times participants met in person ranged from one to seven times; the largest percentage (54%) reporting meeting one time followed by 21% saying they met four times. Teacher leaders rated their perception of their team's progress, which can be found in Table 9.

Table 9
Science, Technology, and Engineering Leadership Program:
Teacher Leaders' Perceptions of Team Progress and Product Development Provided in Two Sessions

	% Responding Agree or Strongly Agree	
	February 2011 *(N = 35)*	May 2011 *(N = 33)*
I feel good about the progress my teacher team has made so far.	100.0	91.0
I feel good about the direction my team's final product is headed in.	n/a	100.0
The expectations for what our teacher team is to accomplish for this project is clear.	97.1	n/a
The expectations for next steps were clearly communicated.	100.0	n/a
I am confident that my teacher team will be able to accomplish the next steps.	100.0	100.0
I feel good about my skills with movie maker as it pertains to this project.	n/a	67.0
I believe today's session will help/has helped with our teacher teams' progress as we develop our professional development topic and product.	100.0	n/a

Summary of Teacher Leaders' Responses to Open-ended Questions

In each of the three training session surveys, teacher leaders were asked varying open-ended questions about STELP. Additionally, as part of the professional development agenda in the third training session, participants were asked by staff to answer a few reflective open-ended questions and then discuss their answers with the larger group. Teacher leaders' responses to the open-ended survey questions and training session reflective questions are summarized below.

Expected outcomes of STELP initiative. In the first session survey, teacher leaders were asked "What outcomes do you hope result from this initiative?" Fifteen of the 31 teacher leaders who responded said that they would like to see STEM implemented into classrooms. Examples of teacher leaders' comments were: "I hope to increase my STELP use in my room and in the other science classes at my school;" "A more wide-spread application of STEM topics in the elementary/middle school classroom to high school;" and "Strengthen the teaching and learning of STEM literacy at my school." A third of teacher leaders mentioned the creation of the STE professional development product: "to gain skills to design and deliver PD online;" "an online tool that teachers would be able to utilize in order to become more proficient in the teaching of STE." Several teacher leaders also mentioned that they would like to inspire and motivate teachers through the use of this initiative.

Additional supports teacher leaders need. Participants were asked in each of the three session surveys, "What additional resources or supports will you need?" Responses over the three survey administrations reflected the specific needs at different stages of project involvement. Participants in the first training who had a suggestion (N = 26) stated *technical related support such as with flipcams, platforms, and software*, (43%) and a few more (10%) stated *collaboration/sharing/feedback* as a support they felt they would need. When asked the same question in the second training, only about one fourth (26%) of the survey participants (N = 9) had a suggestion. Although the responses varied, a few of those that responded stated they would "like to have someone videotape or substitute while they videotaped" (33%). When asked the same question in the third and final training, 42% of the (N = 12) participants who had a suggestion stated they could use "some technical support such as PowerPoint, editing, and loading videos."

Challenges. In both the second and third training session surveys, teacher leaders 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 30 teacher leaders providing a challenge in the second survey, 53% reported that "scheduling time to work on the products" and "coordinating schedules among the team for work on products" was especially challenging. These concerns about scheduling were reported by 69% of the 26 teachers who stated challenges in the third survey. Some examples that participants cited were: "time to videotape and collaborate;" "Everyone's schedules are so crazy that it has made it very difficult to meet and organize materials;" and "just time to gather files and materials."

Some other examples of challenges mentioned were: "developing a clear vision," "limited access to additional grade levels," "some changes to make projects more unified came after work was already done."

It also is relevant to point out that in the third survey, one third of teacher leaders disagreed (67% agreed) with the statement "I feel good about my skills with Movie Maker as it pertains to this project" (see Table 9). In a follow-up open-ended question asking them to further explain their response, they reported problems with "downloading, formatting, and converting" (4 of 11 teachers) or "needing more practice time to feel confident with the Movie Maker technology" (3 of 11 teachers).

Overview of lessons learned. In the last training session survey, teachers were asked to identify lessons learned about developing online professional development or about student proficiencies in science and engineering. Over half (59%) of those responding (N = 29) cited lessons on *how to make the product better, more interesting, or using specific techniques*. Some examples were: "Chunking information into meaningful segments;" "presenting to a variety of learners with differing styles;" and "how to make it interesting and interactive and how I can show learning happening online." Just under one fourth (21%) learned that it *takes a lot of time, thought and/or flexibility to create a quality product*. Similarly, 17% learned more *about engineering or the STELP strands* and finally, 10% learned that *a clear focus is needed.*

Teacher leaders were also asked "What lessons have you learned so far about developing online professional development?" as part of the reflective activity in the third training session. Similar responses to the survey were found with comments such as: *taking a lot of time*, *specific ways to make the product more interesting and useful,* and *a clear focus is need*ed. In addition, some participants mentioned that *technology doesn't always go as planned* and *it is better to know the software.*

Reflections about online PD sessions. In the third training session, as part of the training agenda, participants were asked to reflect and write the answer to "Are the online PD sessions something that would interest participants?" On the positive side, teachers stated *yes because it's convenient in terms of accessibility and flexibility* (N = 18, 39%). However, some barriers mentioned by one third of teacher leaders were: *time, lack of interest in science, lack of human interaction*, and *"one more thing (to do)." To* combat the barriers, teacher leaders suggested giving teachers *some type of credit* or *aligning the professional development with the curriculum.*

Teachers were also asked, "How do you envision using the online PDs at your school?" Many (42%) of the 26 responses indicated that they *would introduce the professional development products at staff, preservice and/or team meetings at their school*. A few suggested it be used at *back-to-school or PTA nights or at new teacher trainings*. Some teachers suggested some specific uses of the product by *using it for special interest groups, for teachers uncomfortable in science, or presenting as a resource for good instructional strategies*.

Additional comments. Finally, teacher leaders were given an opportunity to provide additional comments about the STELP project after each training session. In all three surveys,

(*N* = 18, 7, 22 in first, second and third training sessions respectively), most of the comments were positive (61%, 86%, 91% respectively) including comments such as: "great job", "very well organized", "this has been a very useful, very effective PD experience." Half of the positive comments about the third session were commending the guest speaker from Northrop Grumman. Participants (*N* = 18, 28%) also made comments in the first training survey stating that they wanted more clarity or examples, such as "still not totally clear on what's expected" and "I look forward to seeing more examples."

Discussion and Recommendations

This report addressed the evaluation of the first year of STELP. The focus of the year one evaluation was on implementation of the program in terms of training a group of teacher leaders to develop online professional development products for other MCPS science, technology, and engineering educators.

The 38 teacher leaders who participated in the first year of STELP were consistently positive in their perceptions of the training and support provided by the program, but knowledge and understanding demonstrated by the participants in content assessments revealed gaps in their understanding of the National Research Council's four learning strands in science, as well as standards in technology education. In addition, although teacher leaders had positive perceptions of their progress on their professional development products, at the completion of the first year of STELP, it was determined that none of the professional development products had met the expectations of the program. Therefore, plans for product development were revised at the end of year one to allow teacher leaders more time and training to create professional development products that would meet the criteria established for the project.

The following recommendations are suggested by the year one study findings:

- Clarify expectations and provide a clear vision for the final professional development products. Develop a model or concrete examples of what a finished product should look like.
- Have the teacher leader teams provide regular detailed updates and show their work to the program staff. This will help detect problems early on and ensure that the teacher leader teams are making progress and are on track to create a high-quality product.
- Provide more opportunities for teachers to get together to work on their products by offering more trainings and work sessions. Additionally, consider offering strategies to teacher leaders on how they can work together and on their products more efficiently and effectively.
- Strengthen the understanding of STELP strands among teacher leaders; pre- and post-survey results indicated gaps in understanding some of the learning strands.
- Provide more guest speakers, such as the Northrop Grumman speaker that was so well received, to encourage STELP participation and strengthen teachers' understanding of the STELP core objectives.
- Continue providing the needed training to ensure teacher leaders have opportunities to clarify their understanding of STELP as well as the goals and expectations of their professional development product.

- Continue collecting feedback from participants in order to address teachers' needs and challenges. More direct and specific questions may be needed to generate more informative feedback from participants throughout the course of training sessions.
- Continue assessing teacher leaders' understanding of the program.
- Continue providing support to teacher leaders throughout the entire process, especially technical support which was the challenge cited the most.

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Appendix A: Surveys Administered to Teacher Leaders

Science, Technology, and Engineering Leadership Program (STELP)
Teacher Leaders' Survey – Oct 2010

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 survey in a series of surveys after each training session, thus our need to collect names; however, your answers are strictly confidential.

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

_____

_____

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

_____

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

_____

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

☐ Yes ☐ No

6a. How many years have you taught Science in the classroom (including the current year)? _____

6b. How many years have you taught Technology in the classroom (including the current year)? _____

6c. How many years have you taught Engineering in the classroom (including the current year)? _____

7. Have you participated in any Elementary Science Leadership Program (ESLP) professional development? ☐ Yes ☐ No

7a. If yes, please describe the extent of your experience with ESLP professional development (i.e. number of sessions).

_____

_____

8. Have you ever participated in any kind of on-line training? ☐ Yes ☐ No

8a. If yes, please describe the extent of your experience with on-line training.

_____

_____

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

9a. If yes, did any of your experiences include leading or developing online professional development?
☐ Yes ☐ No

9b. If yes, please describe the extent of your experience leading or developing trainings.

_____

_____

10. 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 believe technology is an effective tool for helping teachers' master effective teaching skills and strategies.	☐	☐	☐	☐
b. I believe technology makes the process of learning more accessible.	☐	☐	☐	☐
c. I feel comfortable with my current technology skills.	☐	☐	☐	☐
d. I feel comfortable with experimenting and learning how to use new technology.	☐	☐	☐	☐

11. 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

11a. 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

11b. 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

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

_____

_____

13. 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 trainer was 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.	☐	☐	☐	☐
h. Overall, today's training has been helpful to me.	☐	☐	☐	☐

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

15. Are there additional resources or supports that you think you will need to fulfill the teacher leader role as you develop your professional development topic?

16. What outcomes do you hope result from this initiative?

17. Other comments about this training:

Thank you for your help.

Science, Technology, and Engineering Leadership Program (STELP)
Teacher Leaders' Survey – Feb 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 survey in a series of surveys after each training session, thus our need to collect names; however, your answers are strictly confidential.

Name:_____

School:_____

Online PD Design Team: _____

1. Which topic are you assigned for your online professional development?

☐ Know, use, and interpret scientific explanations of the natural world or the design world (S1)
☐ Generating and Evaluating Scientific or Technological Solutions (S2)
☐ Understanding the nature and development of Scientific Knowledge and Capabilities or Technological Knowledge and Capabilities (S3)
☐ Participating Productively in practices and discourse of Science or Engineering (S4)
☐ The Well Designed Investigation and the Engineering Design Process
☐ Curriculum-related, Student-relevant Questions and Problems

2. Why did you choose this as one of your top three choices for a topic? (i.e. interest, experience)

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1. Have you been in contact with your teacher team since the last professional development session in October? (check all that apply)

☐ Yes, by email
☐ Yes, by phone
☐ Yes, in person/meeting _____Number of times you've gotten together
☐ No, I haven't

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. 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 am confident that my teacher team will be able to accomplish the next steps.	☐	☐	☐	☐
e. I believe today's session will help/has helped with our teacher team's progress as we develop our professional development topic and product.	☐	☐	☐	☐

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 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.	☐	☐	☐	☐
h. Overall, today's training has been helpful to me.	☐	☐	☐	☐
i. The Movie Maker workshop did a good job presenting the information and skills needed to use this software in the creation on our online professional development.	☐	☐	☐	☐
j. I feel able to use Movie Maker in the creation of our online professional development.	☐	☐	☐	☐
k. The Effective PD workshop did a good job presenting the information, skills, and tools needed to actively engage teachers in our online professional development.	☐	☐	☐	☐
l. I feel able to use technology tools (e.g., PowerPoint) to actively engage teachers in online professional development.	☐	☐	☐	☐

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

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

8. Are there additional resources or supports that you think you will need to fulfill the teacher leader role as you develop your professional development topic and product?

9. What is the next step for you and your teacher team?

10. Other comments about this training:

Thank you for your help.

Science, Technology, and Engineering Leadership Program (STELP)
Teacher Leaders' Survey – May 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 survey in a series of surveys after each training session, thus our need to collect names; however, your answers are strictly confidential.

Name:_____

School:_____

Online PD Design Team: _____

1. Have you been in contact with your teacher team since the last professional development session in February? (check all that apply)

☐ Yes, by email
☐ Yes, by phone
☐ Yes, in person/meeting _____Number of times you've gotten together
☐ No, I haven't

2. Please indicate how much you agree or disagree with the following items by checking the appropriate box. Please explain any disagree ratings you give in 2a.

	Strongly Agree	Agree	Disagree	Strongly Disagree
a. I feel good about the progress my teacher team has made so far.	☐	☐	☐	☐
b. I feel good about the direction my team's final product is headed in.	☐	☐	☐	☐
c. I am confident that my teacher team will be able to accomplish the next steps.	☐	☐	☐	☐
d. I feel good about my skills with movie maker as it pertains to this project.	☐	☐	☐	☐
e. I feel good about my skills with webinars as it pertains to this project.	☐	☐	☐	☐

3. **Why do you disagree or strongly disagree with any of the statements above?** (Indicate the corresponding letter item(s) before your explanation of any statement given a rating of "disagree" or "strongly disagree")

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4. What actions have you taken in developing your professional development product (check all that apply)?

☐ a. Choosing lessons to feature in our product
☐ b. Research science best practices, curriculum connections or other research needed (please specify) _____
☐ c. Create/collect video taped lessons
☐ d. Collect other artifacts
(please specify) _____
☐ e. Create power point presentation for product
☐ f. Create movies using movie maker
☐ g. Other (please specify)_____

_____

5. **Please describe any difficulties you may have had with the above actions you've taken**. (please list the above corresponding letter first before your explanation)

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6. Are there any other challenges you are facing in your teacher leader role as you work with your team and develop your online product?

7. What lessons have you learned so far about developing online PD or about student proficiencies in science and engineering?

8. Are there additional resources or supports that you think you will need to fulfill the teacher leader role as you develop your professional development topic and product?

9. 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.	☐	☐	☐	☐
h. Overall, today's training has been helpful to me.	☐	☐	☐	☐
i. The guest from Northrop/Grumman provided helpful information as a science, technology, engineering and teacher leader.	☐	☐	☐	☐
j. The feedback provided by the peer review was very helpful in developing our on-line PD.	☐	☐	☐	☐
k. The "Talking Head" segment was effective in providing information and the skills needed to incorporate this option to the online PD.	☐	☐	☐	☐
l. The Power Point presentation did a good job presenting the information and skills needed to set up options for the user to navigate through the online PD at their own pace.	☐	☐	☐	☐

10. Why do you disagree or strongly disagree with any of the statements above? (Indicate the corresponding letter item(s) before your explanation of any statement given a rating of "disagree" or "strongly disagree")

11. 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 believe technology is an effective tool for helping teachers' master effective teaching skills and strategies.	☐	☐	☐	☐
b. I believe technology makes the process of learning more accessible.	☐	☐	☐	☐
c. I feel comfortable with my current technology skills.	☐	☐	☐	☐
d. I feel comfortable with experimenting and learning how to use new technology.	☐	☐	☐	☐

12. Why do you disagree or strongly disagree with any of the statements above? (Indicate the corresponding letter item(s) before your explanation of any statement given a rating of "disagree" or "strongly disagree")

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

14. Other comments about this training:

15. What is the next step for you and your teacher team?

Appendix B: Content Assessments Administered to Teacher Leaders

Science Technology Engineering Leadership Program
Content Assessment (May 11, 2011)

1. Select one of the strands of science and engineering proficiencies from the table below. In the space below the table, define student proficiency for the strand you selected and list at least three student behaviors that would be observed as evidence of proficiency of the strand.

Science and Engineering Strands for Student Proficiency

Strand 1: Know, use, and interpret scientific explanations of the natural and design world
Strand 2: Generating and evaluating scientific evidence and technological solutions
Strand 3: Understanding the nature and development of scientific/technological knowledge and capabilities
Strand 4: Participating productively in practices and discourse of Science and Engineering

2. List at least three standards for technology literacy as defined by the International Technology and Engineering Educators Association (ITEEA).

3. Describe at least three components of effective online professional development.

Appendix C: Recruitment Document for STELP

Science, Technology, and Engineering Professional Development Opportunity

- Are you passionate about enhancing effective science, technology, and engineering instructional practice?
- Do you have an interest in exploring various online learning platforms to deliver professional development?
- Are you interested in expanding your leadership to the broader MCPS community?
- Do you want time to collaborate with like-minded science, technology, and engineering leaders throughout MCPS?
- Are you interested in learning how to create instructional products using portable video cameras, movie editing software, and online presentation software?

Then this opportunity is for you!

Sign up now for the Science, Technology, Engineering Leadership Program!

Become part of a corps of science, technology, and engineering teacher professional developers to select training topics and learn to use innovative online tools to produce professional development programs for teachers throughout MCPS.

Through a Howard Hughes Medical Institute grant, MCPS is expanding the science leadership program to include technology and engineering and to go beyond elementary. The science, technology, engineering leadership program (STELP) will strive to:

- expand teacher leadership knowledge and skills for the purpose of building the capacity of science, technology, and engineering teachers on effective instruction; and,
- increase effective, research-based instructional implementation of inquiry-based science, technology, and engineering practices.

For the 2010-2011 school year, you will participate in three full-day, grant-funded professional development sessions and one week of stipend-supported professional development next summer. In addition, you will be given a stipend for training plan development conducted beyond the scheduled professional development sessions.

To join the program or for more information, please contact Mary Doran Brown, Project Manager, at Mary_E_DoranBrown@mcpsmd.org

Develop Online PD

Create video-clips of effect instruction

Develop and deliver webinars

Science, Technology, and Engineering 2010-2011 PD Schedule

Event / Task	When	Where
STELP Information meeting	Thursday, September 30, 4-5 PM	CESC Cafeteria
STELP Professional Development Full-day Session 1	Friday, October 22, 2010, 8:30-3:30	CTI
STELP Professional Development Full-day Session 2	Wednesday, February 2, 2011, 8:30-3:30	CTI
STELP Professional Development Full-day Session 3	Wednesday, May 11, 2011, 8:30-3:30	CTI
STELP Collaboration Sessions	In between scheduled STELP PD sessions, TBD by teams	TBD
STELP Summer Professional Development	June 20-21 and June 27-29 ***OR*** July18-22	TBD

Appendix D: Online Professional Development Product Template

Science Technology Engineering Leadership Program (STELP)

Training Plan Template

(We will go over this at the February STELP PD)

Science Technology Engineering Leadership Program *STEM Vision* All students achieve full science, technology, engineering, and math literacy and are capable of thinking critically, solving problems, and communicating effectively in order to be informed citizens and competitive in a global workforce.			
Session Title			
Session Outcomes			
Supplies / Trainer Resources			
Time	**Format**	**Content**	**Resources**
Specify the time for each portion of the PD.	Specify the process participants will use for this portion of the PD. Will this be whole group, chat discussions, breakout rooms, every pupil response, etc.)	Specify the content, directions for participants, learning tasks, key talking points, etc.	Specify materials to be used for this portion of the PD.

All PD training plans should model:

- Clearly stated, measurable outcomes
- An activator to engage the audience
- Learning tasks that align directly to session outcomes
- Effective pacing
- Adequate opportunities for participants to explore and/or practice with new knowledge of skills learned
- Adequate opportunities for participants to process and reflect on knowledge and skills learned
- Effective processes for participants to summarize learning
- Equitable practices
- Effective instructional practices for content science technology engineering classrooms

Appendix E: Self-Evaluation of Online Professional Development Product

STELP PowerPoints

Team _____
Strand _____

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

Does the session clearly provide the purpose, outcomes, and itinerary?	0	1	2
Does the session honor diverse learners and demographics?	0	1	2
Are there multiple opportunities for the viewers to…			
…interact?	0	1	2
…connect to the content?	0	1	2
…process and reflect on new information?	0	1	2
… apply content to instruction?	0	1	2
…evaluate learning?	0	1	2
Do the artifacts (videos, pictures, samples of student work) align to the content?	0	1	2
Are videos effectively edited to explain the content in a concise manner?	0	1	2
Do the PowerPoint (PPT) text and graphic animations avoid delay, distractions, or in any way take away from the flow of the presentation?	0	1	2
Do the PowerPoint PPT note pages include script (content, processes) and, if used, handouts?	0	1	2
Is the script limited to avoid extended time on any one slide?	0	1	2
Is the session divided into logical segments that can be used independently? (For example, the way DE steaming videos are segmented into short clips.)	0	1	2
Does the session exceed the maximum of 60 minute time limit?	0	1	2
Is the text per slide limited to 6-8 words per line and 6 lines per slide?	0	1	2
Does the total number of slides not exceed 40 (not counting transition slides) for a sixty minute session?	0	1	2

Overall, what works well in the teams' plan and what recommendations do you suggest?

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